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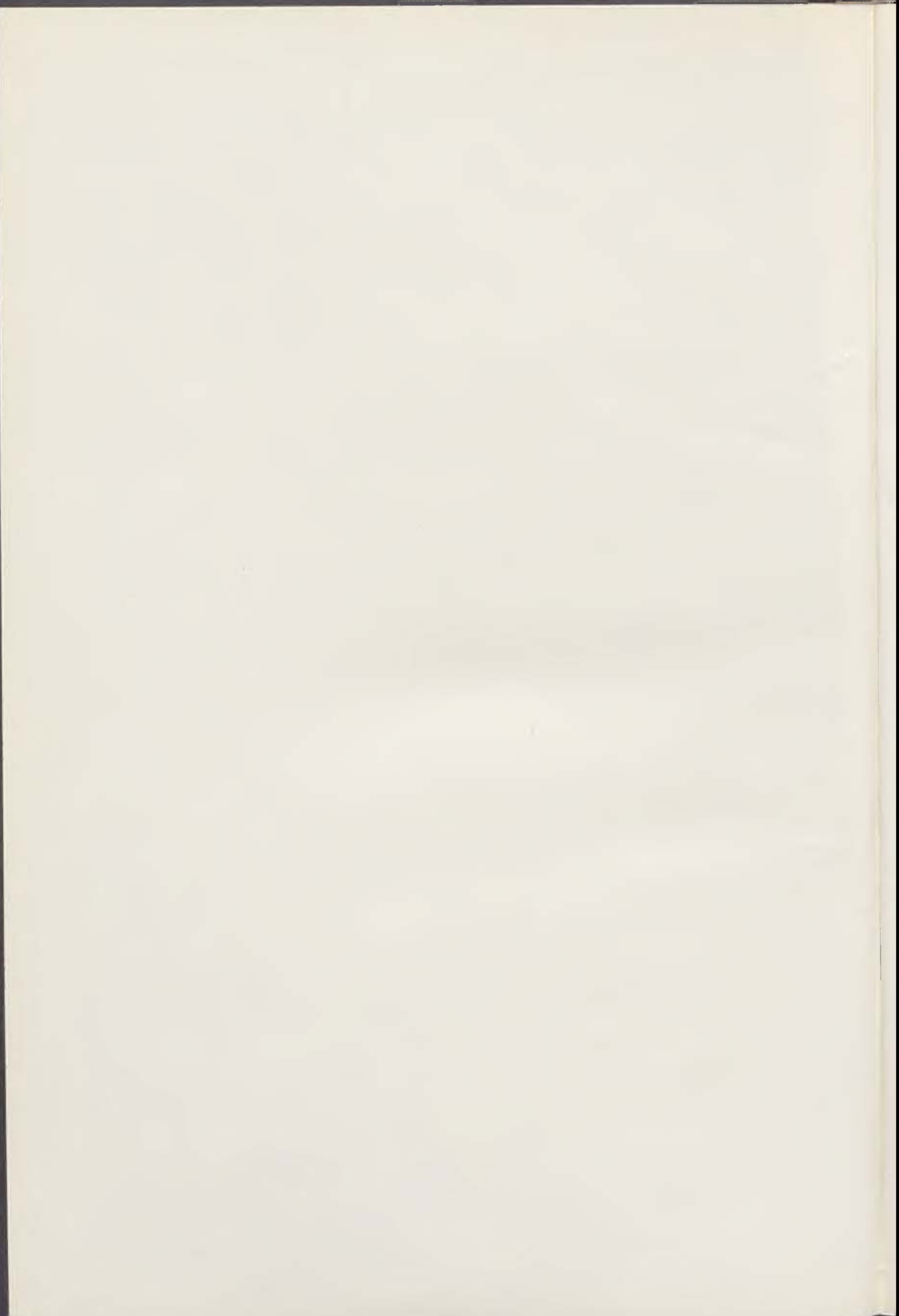
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60th Anniversary of the Great October Socialist Revolution

This year, the Soviet Union together with the rest of the socialist countries and progressive people all over the world commemorate the 60th anniversary of that significant event — the Great October Socialist Revolution.

One of the extremely important achievements of the victorious October Revolution was that it gave birth to the system of socialist health care with its highly humane assignment as characterized by B. V. Petrovski: "Meeting in full and free of charge the requirements of the Soviet people in all spheres of highly qualified medical care regardless of their social position, material well-being, domicile, race or nationality."

The constantly improved, well-planned, scientifically based development of the system of socialist health care in the Soviet Union has resulted in a lively expansion of scientific, research, preventive, organizational and clinical work in all branches of medicine and also in plastic and reconstructive surgery, in which the Russians can boast of a long tradition. There is the familiar, 19th-century name of J. Szymanowski, the author of an extensive book on plastic operations with numerous drawings of surgical procedures. The book carries the descriptions of a large number of techniques, many of which continue to be rediscovered till today. Another well-known name is that of the ophthalmologist V. P. Filatov, who — coinciding with H. Gillies — was the first to work out and to publish in 1915 the technique of the rope flap, a significant contribution to plastic and reconstructive surgery.

Other names to have earned prominence before the 2nd world war were those of B. E. Bauer and N. M. Mikhelson, who worked wonders during the

war, like S. Yudin and A. A. Limberg, whose methods of measurement and mathematical solution to a number of plastic surgery techniques are only too well known among specialists all over the world. Positions of prominence in plastic surgery also belong to a number of surgeons, such as N. N. Petrov, N. N. Blochin, B. V. Parin, F. M. Khitrov, A. Vishnevski and others. Corrective surgery, so excellently organized, was able to achieve unusually good results during the 2nd world war in that it helped to save the lives of the wounded.

Ever since the end of the 2nd world war there has been a rapid expansion of the number of clinical units of plastic and reconstructive surgery and the treatment of the burned which in the Soviet Union are attached to institutes and departments of dental surgery, traumatology and orthopaedics. Independent specialized departments have become not only centres of scientific work and expert training of new specialists, but also centres of uninterrupted post-graduate training and initiative in introducing well-elaborated and successful methods and techniques into all branches of surgery on a national scale.

Readers of our journal, seeing the reports published in it, can get acquainted with names of the young generation and judge for themselves the significant contribution the branch has been making within the health care system. They can see for themselves that plastic surgery in the Soviet Union enjoys a position it fully deserves while successfully fulfilling its mission in research, scientific and clinical work.

Wishing all Soviet colleagues much success in the years to come we hope firmly for the continued extension of co-operation and exchange of experience with specialists all over the world under conditions of mutual respect, friendship and lasting peace, which is the prerequisite for a happy and fruitful life of all mankind.

Editors

K. I. Kharitonova, A. M. Zaidman, Yu. V. Ettein, G. S. Pakhomenko, V. G. Botchkareva,
V. P. Slavitch

COVERING OF DURA MATER DEFECTS BY A HOMOLOGOUS
CHEMICALLY STERILIZED TISSUE

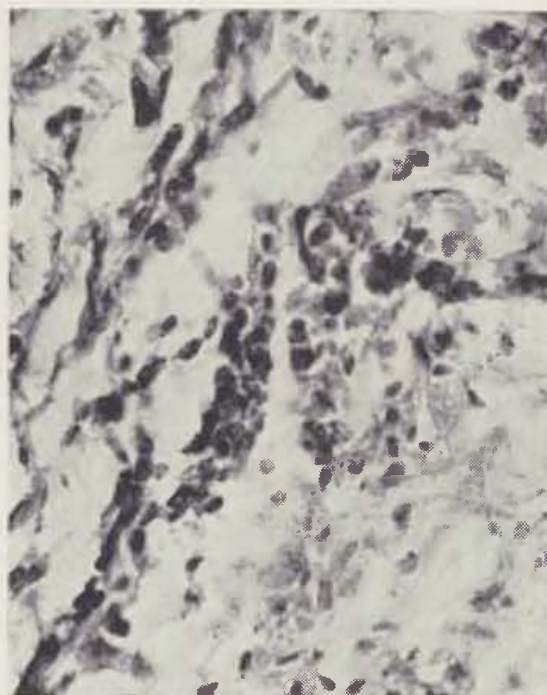


Fig. 1. The lowered intensity of the Heil's reaction in ground substance of the graft

Fig. 2. Enhanced fibroblastic reaction in the place of contact of recipient's dura mater and graft

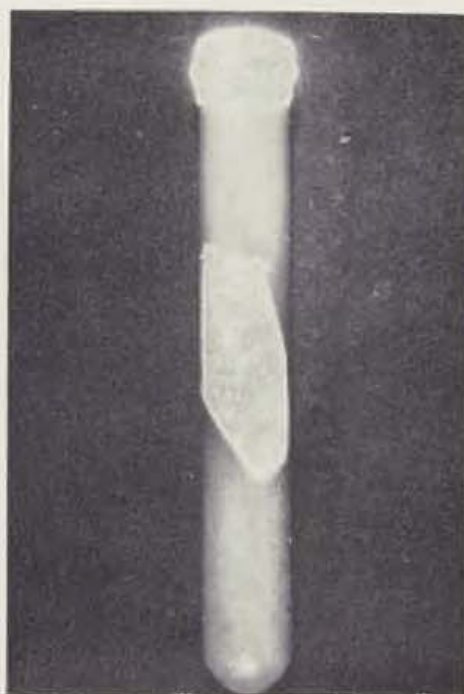
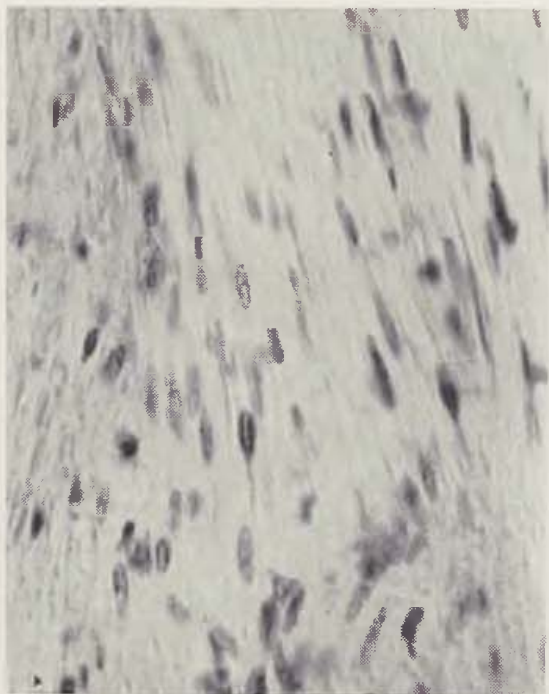


Fig. 3. One year after the plasty. Full reconstruction of the graft

Fig. 4. The dura mater graft in the gel-containing medium

A. Kipikaša, E. Potocká

PIERRE ROBIN SYNDROME

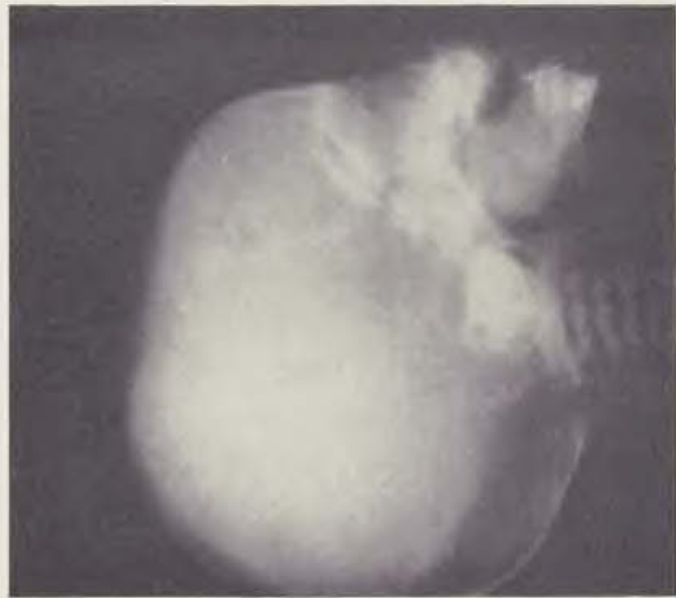
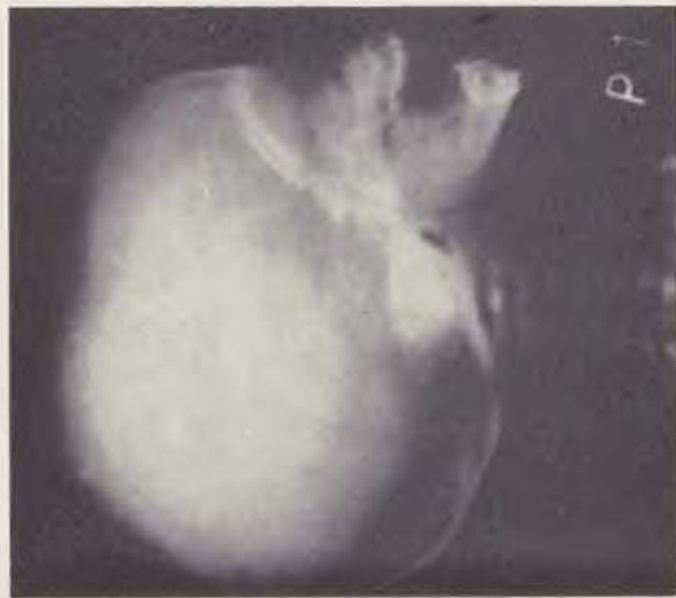


Fig. 4. X-ray picture of neonate's skull in the phase of acute asphyxia due to the tongue slipping through the cleft palate and becoming impressed to the posterior wall of the oropharynx. The mandible shows wires inserted to ensure mandibular traction.

— Fig. 5. The same patient with mandibular traction established. The airways are free. — Fig. 6. Normal, proportional growth of the mandible and the tongue in the same patient in two and half years' time, prior to operation for cleft palate

Central Scientific Institute of Stomatology, Moscow (USSR)

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Scientific and clinical department

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THE MAIN ACHIEVEMENTS OF THE SOVIET RECONSTRUCTIVE SURGERY OF FACE AND JAWS

[To the 60th anniversary of The Great October Socialist
Revolution.]

F. M. KHITROV

The great advances of medical science and practice were made possible by the Communist Party and Soviet Government taking constant care of the problems of the health care.

The reconstructive surgery of face and jaws became an autonomous branch of medicine not sooner than after victory of The Great October Socialist Revolution.

In Russia, only some surgeons performed facial operations during the end of the 19th century and during the beginning of the 20th century. Nevertheless, the studies of Yu. K. Shimanovskii, N. I. Pirogov, V. N. Pavlov-Silvanskii, S. I. Spasokukotskii and others were the basis of many surgical techniques deepening and broadening possibilities of the maxillo-facial surgery.

Under the Soviet Government, the reconstructive (plastic) surgery of face and jaws started to develop successfully. A. E. Rauer, N. M. Mikhelson, A. A. Limberg, A. I. Yevdokimov, N. A. Bogoraz and B. E. Frankenberg are founders of this medical branch.

The plastic surgery developed in four main directions: plasty by local tissues, i.e. by undamaged tissues surrounding the defect; plasty by tissues taken from distant parts of the body, mostly using the tubular Filatov's flap; free transfer of split or fullwidth skin grafts; bone plasty and plasty by artificial materials.

The aim of the local plasties is redistribution of the tissues without need of any supplements. The teaching of A. A. Limberg on redistribution and transformation of surfaces is in fact teaching on local tissues plastics.

A. A. Limberg devised series of all possible variations in redistribution of triangular flaps, which could be used for treatment of various deformities caused mainly by scar shrinkage. By this means, reconstruction of form and function of different parts of the body (eye-lids, lips, cheeks, chin, ala nasi, ears, neck, fingers etc.) was greatly simplified. It considerably enlarged possibilities of the reconstructive surgery.

A. E. Rauer suggested use of flaps on nutritive pedicles (consisting of connective tissue) for construction of inner surfaces of double-walled organs (lip, cheek). The use of such flaps, representing another application form of local tissues for plastic operations, led to shortening of treatment periods and good functional and cosmetic results were achieved.

The technique of eye-brow formation using narrow band of haired skin from scalp on two nutritive pedicles, redistribution of skin flaps on head by bald-headed patients and construction of the lower lip red by redistribution of mucosal flaps were also devised by A. E. Rauer.

Skin bands with subcutaneous connective tissue on two nutritive pedicles were quite successfully applied by A. G. Laptchinskii to treatment of patients with severe ectropium of lip and chin caused by scar. The flap was taken from the submandibular region.

N. N. Blokhin used with great success forehead skin flaps on two nutritive pedicles situated in temporal regions for reconstruction of nasal outer skin surfaces and for replacement of large scars in maxillar-facial region. Wound surface on forehead is covered by a free skin graft. The nutritive pedicles of the healed up transferred flap are cut and partially moved back to the original place. The newly attained natural form of the reconstructed nose and maxillar zone is steadily maintained. The free skin grafts healed up in the limits of scalp and eye-brow regions are hardly noticeable.

The limits of plastic surgery became much broader, when a tubular Filatov's flap was introduced into general practice in 1916. The suggested tubular flap prepared far from the defect marked a new era of plastic surgery. The treatment of defects even extremely differing in size and severity was made possible by using such a flap. The flaps of various forms and sizes were utilized (A. A. Limberg, M. S. Rabinovitch, E. Yu. Kramarenko, S. A. Proskuryakov, V. A. Gusynin, M. P. Sheftel, Z. I. Kartashov, F. M. Khitrov).

The method of rhinoplasty using the Filatov's flap was devised by F. M. Khitrov. It was worked out and widely practically used as a method of choice.

The method of total rhinoplasty served as a basis for a series of standard techniques enabling treatment of all possible nasal defects and deformities separately or together with other facial defects.

Correspondingly, the following classification was suggested: The first group — defects in the limits of the external nose: 1. total abruption of the nose, 2. abruption of one half of the nose, 3. abruption of great part of cartilaginous and bony nasal portions (subtotal abruptions of the nose), 4. abruption of the whole cartilaginous portion of the nose, 5. partial abruptions

of elementary parts of the cartilaginous nasal portion, 6. abruptions and deformities of the bony portion of the nose, 7. possible combinations of the enumerated defects.

The second group — destruction of margins of the nasal basis: 1. destruction of lower margins of bony nasal basis, 2. destruction of middle-part margins of nasal basis, 3. destruction of upper margins of bony nasal basis.

The third group — defects of nose combined with defects of the surrounding tissues: 1. total abruption of nose combined with bilateral rupture of frontal maxillar walls and superficial soft tissues, of upper lip and hard palate; 2. total abruption of nose combined with unilateral rupture of a frontal maxillar wall, upper lip and hard palate; 3. total abruption of nose combined with bilateral rupture of frontal maxillar walls, while the upper lip and hard palate remain uninjured; 4. total abruption of nose combined with unilateral rupture of a frontal maxillar wall, while the upper lip and hard palate remain undamaged; 5. abruptions of nose combined with orbital injuries; 6. other possible combinations of nasal defects with partial or total destruction of surroundings parts of the face.

F. M. Khitrov was the first who suggested a method leading to recovery of oral and nasal breathing and swallowing of food through natural pathways by patients having lost larynx, pharyngeal walls and neck portion of oesophagus due to bullet injury. It represents an important achievement significantly broadening the possibilities of plastic surgery. His method consists in utilization of the local tissues and of a figural T-like Filatov's flap. F. M. Khitrov also introduced a technique utilizing Filatov's flap for reconstruction of pharynx and neck oesophageal portion by their defects due to radical laryngectomy in patients with malignant tumors. The two Filatov's flaps were used simultaneously for reconstruction of chin and floor of the oral cavity and for removal of severe and large scar contractures on the neck.

Recently, the tubular Filatov's flap is widely used with great success in urology, gynecology, orthopaedics, traumatology and in general surgery (B. N. Parin, N. N. Blokhin, N. A. Bogoraz, M. P. Frumkin, B. V. Ognev, V. N. Blokhin, B. A. Petrov, S. S. Yudin, A. K. Tytchinkina).

According to A. A. Limberg, subcutaneous connective and fat tissue of the flap can be interposed into ankylotic temporo-mandibular joint after the osteotomy. When its healing is completed, the superfluous subcutaneous tissue of the flap can be used for remodelling of facial asymmetry, which is inherent to this disease.

A free skin plasty is an important tool of reconstructive surgery. Owing to its excellent plastic properties, the free skin graft was widely used for covering epithelial defects on any part of the human body.

The wide possibilities of the method were opened by discovery of dermatomes of different design (M. V. Kolokoltsev, P. M. Medvedev). Split and full-width skin grafts cut by dermatome are recently applied in the most wide field of indications (B. A. Petrov, N. N. Blokhin, T. Ya. Apyev, B. V. Parin, F. M. Khitrov, A. A. Limberg, P. V. Naumov, N. I. Yartchuk).

During the last years, the method of plasty by a submerged skin graft has been increasingly used for treatment of large superficial alterations of facial skin [V. G. Tchantladze, O. P. Tchudakov].

The method is a new variation of a double-skin flap technique suggested by A. K. Tytchinkina. The originality of the method lies in the fact that the separated altered skin is left on the wide nutritive pedicle. The resulting wound surface is covered by a full-width skin graft. The separated flap is put over the graft and sutured along the wound limits. Thus, the optimal conditions for healing of the graft are created. The flap is cut off 16—18 days later and the healed graft is fully exposed.

This technique is used in plasty of eye-brows and eye-lashes. It is used especially in the cases, when a free graft on a vascular pedicle cannot be used [F. M. Khitrov, V. G. Tchantladze, N. I. Yarchuk].

The alloplasty of cartilage was quite widely used in surgery of jaws and face.

The method of cartilage preservation in a liquid was firstly worked out by N. M. Mikhelson. Recently, the alloplasty of frozen or lyophilized cartilage has been used for reconstruction of shape of nose and of missing parts of facial skeleton, of tracheal walls and trachea, by atrophies of alveolar process, for reconstruction of fingers and by defects of skull bones (Ya. S. Bokshteyn, F. M. Khitrov; V. N. Blokhin, A. I. Yunina). Minced cartilage was used by A. A. Limberg in clinical stomatology.

The outline and symmetry of the face are often reconstructed by means of macromolecular polymers — polymethylmethacrylate, polyethylene, EG MASS-12 [N. M. Mikhelson, V. B. Dobrin, E. V. Grudzkova]. During the last decade, silicone has been rather widely used in surgery of jaws and face. The great advantage of silicone in comparison with other polymers is in possibility of its use not only for treatment of defects and deformities of facial skeleton, but also of soft facial tissues. The deformities of nasal-frontal-orbital complex of the skull-orbital region and hypoplasias of mandible, auricle, nose and cheeks can be thus successfully treated [E. V. Grudzkova, L. A. Brusova].

The treatment of patients suffering from inborn developmental anomalies of mandibular-facial region constitute one of the main branches of the reconstructive surgery. The inborn cleft lip and palate occupy one of the first places.

For many decades, the surgeons concentrated on design and improvement of techniques intended to surgical covering of lip and palatal clefts. The cleft was considered as the local isolated defects of the tissues.

A. A. Limberg suggested in 1926 a so called radical uranoplasty. It consisted of the most rational features of the operation, interlaminar osteotomy aimed to narrowing of middle-part pharyngeal aperture and getting the mucosal-periosteal flaps close together. Even now, this operation is used in adult patients in our clinics. The A. A. Limberg's suggestion was preceded by anatomical studies of P. P. Lvov and V. M. Uvarov. Later on, many Soviet surgeons suggested further improvements of this method [A. E. Rauer, F. M.

Khitrov, R. L. Lando, M. D. Dubov, Yu. I. Bernadskii, N. I. Yartchuk, V. I. Titarev, G. I. Sementchenko, E. Ya. Klyatchko and others).

Observations of the patients and analysis of the long-term results revealed the fact, that cleft lip and palate is not a local isolated defect of the tissues, but many organs and systems in the jaw-facial region are disturbed. Based on these observations, the opinions regarding the time periods and techniques of operations were revised and a necessity of a complex treatment of children was realized.

The progress of anaesthesiology, safe use of endotracheal anesthesia with intubation through nose (O. P. Rukavishnikov, I. N. Mukovozov, A. F. Biznev) and the fact that obligatory pre- and postoperational orthodontic care (V. Ilyina-Markosyan, Z. I. Tchasovskaya, B. D. Kozliner, D. N. Popova), otolaryngologic examination (O. E. Manuylov, I. L. Kuznetsova) and logopaedic exercise were included into the general plan of treatment, enabled to perform the palatal surgery in an earlier age. In addition to it, a so called sparing method of uranoplasty excluding bone surgery and mesopharyngeal constriction could be worked out and widely used (A. S. Silayeva, V. M. Messina).

The technique of an upper lip plasty was designed by L. M. Obukhova and L. E. Frolova and has been successfully used in clinics of our country.

During the last years, the genetic factors leading to inborn facial defects have been studied. The family data of probands were gathered. It was concluded, that a polygenic mode of inheritance was operating by the isolated cleft lip and nose and the principles of genetic counseling could be established (V. M. Messina, N. S. Stonova, E. N. Samar).

Nowadays, the children suffering from inborn clefts are hospitalized in clinics of stomatologic surgery. The children attend a school there, while being treated according to the complex obligatory therapeutic plan (Sverdlovsk, Donetsk, Leningrad, Riga).

Many communications dealt with repairment of upper lip and nasal secondary deformities developed after plasties of oblique clefts (A. A. Limberg, G. V. Krutchinskii, I. A. Kozin, M. P. Oskolkova, V. N. Titarev). Shortening and deformity of the lip is repaired in different ways. The transitional fold is reconstructed by means of the cartilaginous portion of the nose being shifted forwards, thus establishing its symmetry.

An otoplasty of inborn and acquired defects and deformities of the external ear is a complicated task of the reconstructive surgery. There were suggested various techniques of plasty utilizing surrounding tissues or transfer of free figural full-width graft taken from the normal auricle. The Filatov's flap is used by total traumatic defect of the auricle. A reinforced cartilage, silicone, rib cartilage, polyamide thread and minced homologous cartilage may be used for formation of the supporting framework of the auricle (G. V. Krutchinskii, Yu. P. Rostokin, A. S. Kokotkina, V. S. Tchmyrev, S. N. Laptchenko, N. I. Yartchuk).

Significant successes were achieved in treatment of haemangiomas of the jaw-facial region. The methods of surgical extirpation of the tumor,

sclerotization of the supplying blood vessels, sclerosing treatment and cryo-destruction were designed (S. A. Kholdin, G. I. Kovrunevitch, V. S. Agapov, Yu. D. Moskalenko).

The method of intravascular sclerosing treatment was worked out in the Central scientific institute of stomatology and introduced into practice. A draining blood vessel determined by angiography is catheterized. The catheter is led through the cavities to the outer limits of the tumor. For 10 to 14 days, the 70 % ethanol is periodically introduced. A quantity of the applied ethanol depends on reaction of the tissues, but should not exceed 80—100 ml. Catheterization of the vessels slows down an out-flow of blood from the tumor, thus favoring to more complete filling and prolonged effect of the sclerosing solution on stroma of the tumor, while the surrounding tissues are protected from the alterations (K. A. Mardaleyshvili).

A surgical treatment of tongue paralysis of central and peripheral origin was worked (F. M. Khitrov). In the case of the central paralysis, a mobilization of the muscles is achieved by transfer of a sternal portion of sternocleidomastoid muscle to tongue muscles fixed to bones and by transfer of tendons of biventer cervicis muscle to the tongue's root. When the peripheral paralysis takes place, then a central stump of hypoglossal nerve is transferred inside lingual artery on the side and inside perineurium of lingual nerve on the other side. These interventions are made, if the interrupted hypoglossal nerve cannot be reunited. A hypersalivation is prevented by transfer of the whole Stenon's duct with its orifice into the supratonsillar cavity.

There were worked out also techniques designed for reconstruction of a pharyngeal aperture, which are indicated by its stenoses due to chemical injuries, cut wounds and neck compressions, as well as techniques of aperture reconstruction of the oesophageal neck portion, which can be used by stenoses of varied etiology.

The method of intestinal-pharyngeal anastomosis was suggested, which can be applied by reconstructive operation on oesophagus, if severe scar obliterations of pharynx and oesophagus, caused by burn injuries, are present (F. M. Khitrov).

It is a regular task of plastic surgeons to repair mimic functions of reconstructed organs (lips, eye-lids, cheeks) and also, if paralysis of facial nerve occurs. In this respect, the significant results were achieved, as well. N. M. Mikhelson designed and successfully applied a method consisting in equal splitting of oral and ocular orbicular muscle, which is transferred on two nutritive pedicles into the reconstructed lip or eye-lid and enables mimic function of these organs. The similar effect is achieved, if the ends of preserved muscles (quadrate muscle of the upper lip) are bound together by a band of femoral fascia lata or by silk thread, which are passed through a tunnel in depth of the reconstructed upper or lower lip (F. M. Khitrov).

The surgical transfer of the masticatory muscle to the mouth angle in the case of paralyzed facial nerve (P. V. Naumov) was also widely used in clinics of our country.

The Soviet surgeons-stomatologists significantly contributed to surgical treatment of tumors of soft and bone tissues in the jaw-facial region. It is especially true in respect to repairment of postoperational defects by oncological patients (A. I. Evdokimov, I. I. Ermolayev, P. V. Naumov, V. A. Dunayevskii, L. P. Balon, N. P. Butikova).

One of the important parts of the reconstructive surgery is repairment of acute injuries of facial soft tissues, which are combined with tissue defects.

Utilization of early and primary plastic operations led to shortening of treatment periods and to improvement of functional and cosmetic results. V. G. Vainshtein wrote already in 1937 on necessity of such an approach.

The early plastic covering of facial wounds, i.e. in the period of granulations and of early scars, was successfully utilized by many surgeons during The Great Patriotic War (L. P. Balon, G. A. Vasilyev, N. M. Mikhelson, M. V. Mukhin, A. A. Limberg).

The primary plasty was also developing during the war (I. G. Lukomskii, Ya. Z. Bronshtein). The details of it were worked out after the war in respect to repairment of traumatic defects of facial soft tissues having different sizes and localizations, and all kinds of plasty were utilized (N. M. Mikhelson, E. A. Domratheva, V. M. Messina, N. I. Agapov, N. I. Berdygan, N. A. Shinbirev, M. M. Slutskaya).

The plastic and reconstructive operations on bones by deformities of the facial skelet represent a great part of plastic surgery. The Soviet surgeons-stomatologists worked out a series of plastic operations on bones, which were widely practically utilized. The successful results were achieved, due to close collaboration with orthodontists.

If the maxilla remains underdeveloped, it is transferred forwards and its transversal size is increased either totally (G. I. Sementchenko, F. M. Khitrov, G. V. Krutchinskii, V. M. Bezrukov), or of its separate fragments with the aim to achieve contact of the tooth lines (P. F. Mazanov, G. I. Sementchenko, V. I. Artsybushev, V. A. Sukatchev, V. M. Bezrukov).

The maxillar prognathia is treated by various types of partial resections combined with extraction of individual teeth, by section of nasal septum followed by dorsal shift of the frontal maxillar part resulting in normoocclusion, or by compact-bone osteotomy of the alveolar process in combination with extraction of individual teeth followed by prolonged orthodontic treatment (G. I. Sementchenko, N. M. Mikhelson, A. T. Titova, A. S. Avtsyna-Tchernomordik, P. V. Khodorovitch).

By the mandibular retrognathia, the aims of surgical treating methods are: a) prolongation of mandibular body or branch by plastic osteotomy or by means of free bone plasty (A. A. Limberg, O. E. Babitskaya, G. I. Lukomskii, M. D. Dubov, P. M. Naumov, V. A. Dynayevskii, M. V. Kukhin, V. F. Rudko); b) prolongation of the mandibular branch by means of free bone plasty and formation of a new joint (A. T. Titova, V. S. Yovtchev); c) frontal shift of mandible as a whole combined with chondro- or osteoplasty of dorsal margin

of the mandibular branch (V. I. Znamenskii); d) operations on maxilla correcting tooth occlusion (A. T. Titova); e) local plastic operations or contour plasty of tissues surrounding the mandible (E. V. Gruzdkova, N. M. Mikhelson, L. A. Brusova, V. F. Rudko).

The surgical treatment of closed occlusion is the least studied part of stomatology. This form of malocclusion is most frequently repaired by orthodontic methods, however, surgical techniques were suggested as well (V. A. Bogatskii, V. A. Sykatchev).

During the last years, a so called flat-bone osteotomy of mandible was increasingly utilized in treatment of prognathia (P. Z. Apzhantsev, V. A. Sykatchev, V. V. Rudko). It consists in longitudinal splitting of mandible in the limits of its angle and branch, thus supplying a relatively large area for contact of spongy matter.

V. M. Bezrukovyi's design of surgical techniques for treatment of accumulated mandibular deformities represents a further progress in relation to this problem. The osteotomy of Le Fort-I-type combined with partial inclusion of the zygomatic bone and frontal shifting of the whole fragment is performed by the maxillary prognathia. Correspondingly, the flat-bone osteotomy is performed on mandible simultaneously, or in several stages.

The time periods required for bone grafting used as substitution of jaw traumatic defects were significantly shortened (A. A. Limberg, M. P. Zhakov, N. M. Mikhelson, P. S. Sysolyatin). Great experience was accumulated in respect to free bone plasty of mandible into an infected bed (A. Z. Bronshtein, B. D. Kabakov).

Many surgeons made themselves familiar with methods of bone plasty utilizing different materials. Thus, fresh rib allografts (E. B. Simelson), frozen bone tissue (N. M. Mikhelson, P. M. Medvedev, A. A. Kyandskii, M. V. Mukhin, B. D. Kabakov, P. P. Kovalenko) and frozen cartilage (F. M. Khitrov, A. A. Limberg, E. V. Gruzdkova, L. M. Obukhova, E. A. Alexandrova and others) were applied.

N. A. Plotnikov showed in his experimental and clinical studies, that lyophilized bone allograft possesses good osteogenic properties and is a valuable material for substitution of large defects of mandible and for contour plasty of facial skeleton.

The so called "lightened seedlings", i. e. small parts of a split autologous rib, which were suggested by A. A. Limberg, were widely utilized for repairment of the jaw defects. A firm fixation of bone fragments by the bone plasty is secured by extraoral fixative device suggested by V. F. Rudko.

Building up of a socialist system of health care in our country providing free-of-charge treatment and unlimited duration of stay in specialized hospitals for all working people and generous financial support of medical care secured favourable conditions for development of all branches of medicine, and of plastic jaw-facial surgery in particular. It was promoted by specialization of surgical clinics, where narrowly specialized surgeons were brought to a common work.

Simultaneously with scientific work in this field, a preparation of new scientific workers and practical physicians was successfully carried out.

Recently, two scientific institutes of stomatology in Moscow and Odessa, two medical stomatologic institutes and 33 stomatologic faculties in the medical institutes have been working in the Soviet Union.

The courses of stomatology take place in each medical institute. The postgradual and advanced specialized study of physicians is possible in stomatologic departments of 12 institutes.

The total of 2465 doctor's and candidate's dissertation theses has been defended during all the years of the Soviet Government in the field of reconstructive jaw-facial surgery. The conferences organized in the scientific institutes every year help to solve the problems of development and education in this field.

M. T.

SUMMARY

The reconstructive surgery of face and jaws became a separate branch of medicine in Soviet Union not sooner than after victory of The Great October Socialist Revolution. Since that time, 33 stomatologic faculties in the medical institutes, 2 scientific institutes and institutes of postgradual study of physicians in each Soviet republic have been created.

The scientific work has concentrated to the following basic problems: inborn developmental anomalies of jaw-facial region, traumatology, inflammatory diseases and their consequences, tumors. The techniques used for repairment of the defects and deformities of individual organs in the jaw-facial region and for treatment of complex diseases were worked out in details. All kinds of skin plasty have been widely used, especially local plasties and Filatov's flap plasty. Great attention is applied now to treatment of patients having suffered fractures of facial bone skelet as a result of car accidents. The techniques designed for repairment of defects and scar obliterations of pharynx, neck part of oesophagus, larynx and trachea and the techniques leading to recovery of paralyzed tongue and mimic muscles were also worked out.

The scientific reports are published in journals "Stomatologiya", "Vestnik khirurgii", "Acta chirurgiae plasticae" and others.

RÉSUMÉ

Succès principaux de la chirurgie reconstructive soviétique des maxillaires et de la face

Khistrov F. M.

La chirurgie reconstructive des maxillaires et de la face ne s'est formé comme une spécialité indépendante de la médecine en Union Soviétique qu'après la victoire de la Grande Révolution Socialiste d'Octobre. De ce temps là on a créé 33 facultés stomatologiques dans les instituts médicaux ultérieur des médecins dans chaque république soviétique.

Les travaux scientifiques s'orientent vers les problèmes principaux suivants: défauts congénitaux d'évolution des maxillaires et de la face, traumatisme, maladies inflammatoires et leurs conséquences, tumeurs. En détail, on a élaboré la méthode de correction des défauts et des déformités de la région maxillaire et faciale même que celle des affections combinées. Largement, on utilise toutes sortes de plasties cutanées, surtout les opérations plastiques locales et la plastie à lambeau de Filatov.

Actuellement, on se concentre surtout à la question du traitement des malades qui souffrent des fractures des os du squelette facial éprouvées dans un accident d'automobile. On a élaboré des méthodes de la correction des défauts et des oblitérations cicatrisées du pharynx, de la partie cervicale de l'oesophage, du larynx et de la trachée et même la méthode de la suppression de la paralysie des muscles de la langue et des muscles mimiques.

Les travaux scientifiques sont publiés dans les revues «Stomatologija» (Stomatologie), «Vestnik Chirurgii» (Bulletin de chirurgie), «Acta chirurgiae plasticae» et d'autres.

ZUSAMMENFASSUNG

Haupterfolge der sowjetischen Kiefer- und Gesichtswiederherstellungschirurgie

Chitrow F. M.

Die Kiefer- und Gesichtswiederherstellungschirurgie entstand als selbständiger Medizinenzweig in der Sowjetunion erst nach dem Sieg der Grossen Sozialistischen Oktoberrevolution. Seit dieser Zeit wurden 33 stomatologische Fakultäten in medizinischen Instituten, 2 wissenschaftliche Institute und Anstalten für ärztliche Fortbildung in jeder Unionrepublik geschaffen.

Die wissenschaftliche Arbeit orientiert sich auf folgende Grundprobleme: angeborene Entwicklungsfehler der Kiefer und des Gesichtes, Trauma, entzündliche Erkrankungen und ihre Folgen, Tumoren. Eingehend wurde die Methodik der Defekt- und Deformitätenkorrektur sowohl einzelner Organe des Kiefer- und Gesichtsbereichs als auch kombinierter Affektionen durchgearbeitet. Im breiten Ausmass werden alle Arten der Hautplastik verwendet, besonders die lokale plastische Operation und die Plastik mit dem Filatowschen Lappen. Ein hoher Aufmerksamkeitsgrad konzentriert sich derzeit auf die Frage der Behandlung von Kranken, die bei Autounfällen Frakturen der Gesichtsskelettknochen erlitten haben. Es wurden Verfahren für die Korrektur von Defekten und Narbenobliterationen im Bereich des Schlundes, des Halssegmentes der Speiseröhre, des Kehlkopfes und der Trachea sowie ein Verfahren zur Behebung der Paralyse der Zungen- und mimischen Muskeln ausgearbeitet.

Die wissenschaftlichen Arbeiten werden in den Zeitschriften „Stomatologija“, „Vestnik chirurgii“, „Acta chirurgiae plasticae“ und in anderen mehr veröffentlicht.

RESUMEN

Los principales éxitos de la cirugía reconstructiva soviética de los maxilares y de la cara

Jitrov, F. M.

Cirugía reconstructiva de los maxilares y de la cara se formó como un ramo de medicina en la Unión soviética hasta realizada la victoria de la Gran Revolución Socialista de Octubre. Desde aquel tiempo fueron establecidas 33 facultades estomato-

lógicas en Institutos de medicina, 2 institutos científicos e institutos para instrucción continua de médicos en cada república de la Unión.

La obra científica está orientada hacia los siguientes problemas principales: defectos evolucionales congénitos de los maxilares y de la cara, el trauma, enfermedades inflamatorias y sus consecuencias, tumores. Fueron desarrollados detalladamente los métodos de corrección de los defectos y deformidades tanto de los singulares órganos en el área de los maxilares y de la cara como de las afecciones combinadas. Se usan ampliamente todos los métodos de la plástica cutánea, especialmente intervenciones plásticas locales y la plástica por el lóbulo de Filatov. Gran atención se concentra actualmente a la cuestión de cómo tratar los pacientes que sufrieron fracturas de los huesos del esqueleto facial en un accidente automovilístico. Fueron desarrollados los métodos de la corrección de los defectos y de las obliteraciones de la faringe por cicatrices, de la parte yugular del esófago, de la laringe y tráquea, así mismo el método de suprimir la parálisis de los músculos de la lengua y de la musculatura mímica.

Las obras científicas están publicadas en las revistas "Stomatologija" [Estomatología], "Vestnik chirurgii" [Boletín de Cirugía], "Acta chirurgiae plasticae" [Actos de cirugía plástica] y tros.

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Dedicated to Prof. V. Kubáček, M.D., DrSc, on his 60th birthday

ULTRASONIC EFFECT ON COLLACEN SYNTHESIS AND DEPOSITION IN DIFFERENTLY LOCALIZED EXPERIMENTAL GRANULOMAS

J. POSPÍŠILOVÁ, A. ROTTOVÁ

INTRODUCTION

Ultrasonic energy applied in vivo to regenerating connective tissue can have a positive or negative effect on tissue healing processes (Pospíšilová 1973, Pospíšilová et al. 1974, Pospíšilová in press). The result of such exposure will depend on the methodological and biological conditions of the experiment. In verifying the local action of ultrasound it will prove necessary to determine the extent of the frequency, intensity, and time of exposure to the energy. In view of the resistance ultrasonic radiation meets in penetrating living matter, the frequency range of 0.7—1.0 MHz appears to be the most suitable. Given the above frequency, ultrasound penetrates living tissue evenly to a depth of 2 cm. Lower frequencies increase excessively the extent of ultrasonic action, while higher frequencies tend to become absorbed in the superficial layer of the tissue. The scope of utilization of different degrees of ultrasound intensity is limited by the perception of pain, the organism's individual response to stimulation. Pain triggers off a general stress reaction, which is undesirable as regards the assessment of the immediate local effect of ultrasonic radiation.

In experiments aimed at the non-destructive action of ultrasound in animals the appropriate range of intensity is 0.5—1.5 W/cm² and the time of sonication 5 to 10 minutes. Values in excess of those mentioned may lead to permanent paralytical hyperaemia with subsequent oedema and tissue damage (Paaske et al. 1973). Another factor to be borne in mind in any exposure to ultrasound concerns the dynamics of the tissue healing process itself (Peacock 1973). Also extremely sensitive is the acute phase of healing which can be slowed down by exposure to ultrasound. However, cases have been described of connective tissue growth and synthetic processes being stimulated by ultrasonic radiation. The supply of nutrients to the regenerating tissue is an important factor affecting the process of healing. Healing in all its phases is

more intensive in areas of ample nutrient supply [Silver 1973, Winkle 1973]. In that respect, particular attention was devoted to the supply of oxygen [Niinikoski 1973].

The aim of the present study was to examine the possibilities of different ultrasonic action on proliferating connective tissue, given a better and a worse supply of nutrients following the development of experimental granuloma in animals. An earlier experiment involving the symmetrical implantation of four

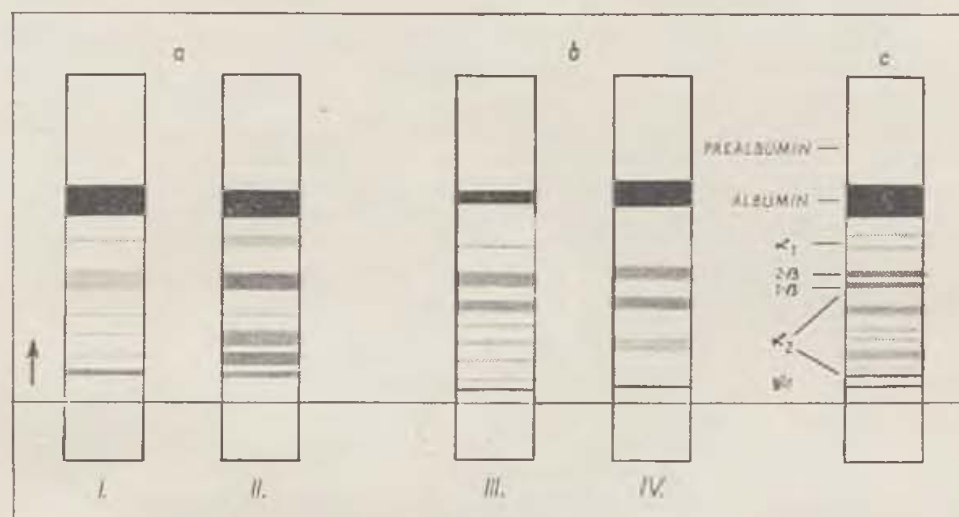


Fig. 1. Polyacrylamide electrophoresis of non-collagenous proteins extracted from 21-day-old granulomas. A comparison is made between equally located control and experimental granulomas and serum diluted 1:10. Conditions of separation: 14 % polyacrylamide, buffer Tris-glycine pH 8.3 (1:10) $I = 5$ mA per sample, time 50 mins, at room temperature. Granuloma age in days — 21: a) Front position I. Control, II. Treated — b) Hind position III. Control, IV. Treated — c) Serum

viscose prisms into the subcutis of a rat's back revealed that granulomas placed nearer the tail had a lower proportion of fibroblasts and collagen than those placed nearer the animal's head. The drop in the proportion of cells together with the resultant impaired synthesis of specific tissue substances was seen as evidence of impaired nutrient supply to the hind granulomas [Silver 1973]. Intensification of ultrasonic action was ensured by repeated exposures. Tissue designed for analysis was taken in such a manner as to enable a check up on ultrasonic action in the peak phase of fibroblast proliferation and glycosaminoglycan synthesis, in the peak phase of the synthesis of collagen and in the resting period of its reconstitution and deposition.

MATERIAL AND METHODS

The granulomas were induced using a method described in more detail by Pospíšilová (in press). To conduct the experiments, male rats of the Wistar strain, average body weight 230 ± 15.5 g, were used. Larsen's diet and water were supplied ad libitum. Under aether anaesthesia, each of the animals had

Tab. 1. Average values of DNA, RNA, GAG, and GP contents in μg in 7-day-old granulomas (front and hind). A comparison is presented between control and experimental granulomas

	Granuloma										
	position front					P-value	position hind				P-value
	control		experimental		control		experimental				
	n	$\mu\text{g} \pm \text{S. E.}$	n	$\mu\text{g} \pm \text{S. E.}$	n		$\mu\text{g} \pm \text{S. E.}$	n	$\mu\text{g} \pm \text{S. E.}$		
Dna	15	2910 ± 125	15	2340 ± 52	<0.02	14	2520 ± 184	14	2580 ± 52	N. S.	
RNA	15	815 ± 78	15	630 ± 52	<0.02	14	555 ± 55	13	582 ± 57	N. S.	
Hexos-amine	15	263 ± 13	15	228 ± 12	<0.02	15	237 ± 54	14	175 ± 37	N. S.	
Uronic acid	15	138 ± 10	15	108 ± 4	<0.02	15	127 ± 15	15	103 ± 14	N. S.	
Sialic acid	15	342 ± 31	14	288 ± 13	<0.05	15	260 ± 50	15	258 ± 37	N. S.	

4 prisms of viscose-cellulose sponge (Vissella, Säteri Oy, Finland), sized $10 \times 10 \times 20$ mm and weighing 80 mg dry, aseptically implanted into the subcutis of the back. Two of the prisms were deposited symmetrically on either side of the spinal column nearer to the head, the other two nearer to the tail. A total of 10 doses of ultrasound (frequency = 0.8 MHz, intensity = 1 W/cm^2 , sonication time = 5 mins) were applied to the granulomas located to the right of the spinal column each morning and evening for five days prior to the destruction of the animal. The granulomas located to the left served as control ones. The animals were destroyed and the granulomas taken out in three phases:

1. 30 animals were destroyed on day 7 of the granuloma development in order to establish:

- the amount of fibroblast (15 animals)
- the proportion of acid glycosaminoglycans and glycoproteins (15 animals).

2. 15 animals were destroyed on day 21 of the granuloma development in order to establish:

- the proportion of collagen
- the proportion of non-collagenous proteins.

3. 15 animals were destroyed on day 35 of the granuloma development in order to determine:

- a) the proportion of collagen
- b) the proportion of non-collagenous proteins.

Each granuloma was homogenized independently and further treated cool. All of the quantitative data stand for the proportion in the granuloma of the substances under observation, measured by means of regular analytical methods.

1a) The amount of cells was determined on the basis of desoxyribonucleic acid (DNA) content. The extraction was made using a modification of the Schmidt-Thannhauser method, and estimation performed using the diphenylamine reaction. At the same time, the proportion of ribonucleic acid (RNA) was also determined.

1b) The proportion of acid glycosaminoglycans (GAG) was established by the determination of hexosamine and uronic acid following isolation from the tissue, using a modification of the Callatoni method. At the same time, prior to papain digestion, glycoproteins (GP) were estimated by determining the proportion of sialic acid.

2a) and 3a) Collagen fractionation was performed using a modification of a method described by Pikkarainen [1968]. Collagen in all its fractions [neutrally soluble — NSC, gelatinized at temperatures of 40° and 60 °C — 40° and 60 °C Gel, as well as insoluble — ISC] was estimated on the basis of hydroxyproline content.

2b) and 3b). Non-collagenous proteins were obtained after the separation of collagenous proteins which had been precipitated using 20 % NaCl solution. Following the dialysis and hydrolysis of the supernatant, nitrogen was estimated using modified kjeldahlization. Prior to hydrolysis, discontinual polyacrylamide electrophoresis was performed.

A comparison of the results involved front and hind granulomas, control and experimental. The statistical significance of the differences between the groups of values thus obtained was determined by means of the Wilcoxon sequence test.

RESULTS

1—7-day-old granuloma:

a) Differences in DNA contents in 7-day-old granulomas are listed in Tab. 1. Ultrasound was found to have significantly decreased ($P < 0.02$) DNA contents in front granulomas in comparison with the control ones. No such effect was observed in the hind granulomas. The same results were obtained in determining RNA.

b) The same table contains a representation of ultrasound-induced changes in the contents of sialic and uronic acids and hexosamine. In the front granulomas ultrasound proved to have significantly reduced the proportions of the saccharides under observation ($P_1 < 0.05$, $P_2 < 0.02$, $P_3 < 0.02$). In the

Tab. 2. Average values of total hydroxyproline contents in mg and its fractions (in % of total amount) in 21- and 35-day-old granulomas. Equally located control and experimental granulomas are compared

Granuloma		Hydroxyproline																			
		Position		age/days		n.		total/mg \pm S. E.		soluble collagen-SC						insoluble-ISC		SC/ISC			
										40° gel/% \pm S. E.						60° gel/% \pm S. E.				ISC/% \pm S. E.	
										NSC/% \pm S. E.		40° gel/% \pm S. E.		60° gel/% \pm S. E.		ISC/% \pm S. E.					
contr.		exp.		contr.		exp.		contr.		exp.		contr.		exp.		contr.		exp.			
Front	21	15	5.5 \pm 0.5	7.3 \pm 0.8	5.5 \pm 0.2	4.3 \pm 0.2	7.3 \pm 0.7	5.8 \pm 0.3	22.7 \pm 1.3	19.4 \pm 1.1	64.5 \pm 1.9	70.5 \pm 2.0	0.55	0.41							
	p-value		0.02		0.02		0.05		N. S.		0.02										
	21	11	3.8 \pm 0.8	7.0 \pm 0.7	3.1 \pm 0.8	4.7 \pm 0.2	5.2 \pm 0.6	6.4 \pm 0.5	18.5 \pm 1.7	18.0 \pm 1.2	73.2 \pm 1.5	70.9 \pm 1.2	0.36	0.41							
Hind	p-value		0.05		0.02		0.05		N. S.		0.05										
	35	13	7.3 \pm 1.1	6.6 \pm 1.0	4.4 \pm 0.2	4.4 \pm 0.3	5.0 \pm 0.4	11.8 \pm 0.3	13.3 \pm 1.8	13.5 \pm 1.2	77.3 \pm 2.5	70.3 \pm 2.3	0.29	0.42							
	p-value		N. S.		N. S.		0.02		N. S.		0.02										
Front	35	12	5.8 \pm 1.2	7.6 \pm 1.1	3.0 \pm 0.2	3.8 \pm 0.2	6.9 \pm 1.0	5.8 \pm 0.9	14.5 \pm 1.0	12.2 \pm 2.3	75.6 \pm 1.8	78.2 \pm 2.3	0.32	0.27							
	p-value		N. S.		N. S.		N. S.		N. S.		N. S.										

Tab. 3. Average values of non-collagenous protein contents in 21-and 35-day-old granulomas depending on exposure and site of process

Granuloma			Nitrogen		
			control	experimental	P-value
Position	Age/days	n	mg \pm S. E.	mg \pm S. E.	
Front	21	14	22.6 \pm 4.2	32.8 \pm 5.6	0.02
Hind	21	10	14.6 \pm 6.9	27.6 \pm 8.5	0.05
Front	35	12	30.7 \pm 8.7	27.0 \pm 8.2	NS
Hind	35	10	27.9 \pm 8.7	29.0 \pm 9.1	NS

hind granulomas the proportion of saccharides after sonication was either the same (sialic acid), or slightly reduced (uronic acid, hexosamine).

2—21-day-old granuloma:

a) The results of hydroxyproline content estimation are listed in Tab. 2. In the front granulomas, total collagen on exposure to ultrasound was significantly higher with the simultaneous effect on the distribution of fractions at the expense of the more soluble ones. After sonication the insoluble fraction was significantly higher. In the hind granulomas, total collagen contents was also significantly higher after exposure to ultrasound than in controls, though in that case there was a pronounced increase in the more soluble fractions, particularly in neutrally soluble collagen.

b) Non-collagenous proteins were seen rising prominently after exposure to ultrasound in both the front and the hind granulomas (Tab. 3). Discontinual electrophoresis was used in those granulomas. In the front granulomas exposed to ultrasonic radiation there was an increase in the globulin fractions, in the hind sonicated granulomas the increase was in the fractions in the albumin region (Fig. 1).

3—35-day-old granuloma:

a) Collagenous proteins of the front sonicated granulomas were significantly increased merely in the 40 °C gelatine fraction. At the same time, the proportion of insoluble collagen was reduced. In the experimental hind granulomas there were just signs of a drop in the more readily soluble fractions of collagen. The changes were not significant (Tab. 2).

b) Non-collagenous proteins were slightly reduced in the front granulomas following exposure to ultrasonic radiation, but increased in the hind ones.

Tab. 4. Ultrasound action at different healing time intervals depending on the site of the process. Controls are compared for process interrelationship in front (better) and hind (worse) granulomas. In terms of tissue processes, experimental granulomas are subject to comparison each time between front experimental and front control, and hind experimental with hind control ones

	Supply of nutriens	Fibroblast - active phase		- inactive phase
		cell proliferation	collagen synthesis	collagen deposition
Control	better	+	+	+
	worse	-	-	-
Treated according to control	better	-	-	-
	worse	no diff.	+	+

+ higher
- lower

It follows from the above facts that ultrasound acts differently on the deposition of proteins in the tissues depending on the phase of healing. In the acute phase of the synthesis ultrasound rather tends to stimulate protein deposition, particularly in the front granulomas, while in the chronic phase the process is rather prominently impaired in the front granulomas.

DISCUSSION

An experimental granuloma contains clearly outlined fibrous tissue of exactly definable age. The employment of viscoscellulose as the implantation material prevents the adjacent tissue from excessive stimulation, there is no macrophage reaction and no premature destruction or resorption of the granuloma. The process of the granuloma being healed in takes a course similar to that of collagen metabolism in wound healing. The amount of collagen in the granuloma depends on the dynamic balance between protein synthesis and breakdown. Synthesis is the predominant feature in the first post-implantation period up to the end of the 3rd week, while in the subsequent period the breakdown and reconstitution or deposition of collagen become the more significant factors. The initial period is marked by proliferative and synthetic fibroblast activity. During the subsequent period, fibroblast gradually become inactive. This particular period depends to a greater degree on the quality of the intercellular matrix, particularly on the amount and condition of cell-produced substances and also on the presence of proteolytic enzymes (Madden, Peacock 1971).

Of all the phases of healing, the one involving cell proliferation activity depends the most on the supply of nutrients, particularly oxygen (Silver 1973). The higher cell activity in the front granulomas in comparison with the hind ones in the acute phase of healing can be put down to better nutritional and functional conditions. Another point to be assumed is that ultrasound may have an effect particularly on blood supply processes. Any more intensively proliferating tissue, where, the blood supply represents a critical function, is then likely to be more sensitive to the action of ultrasound. The result is likely to involve proliferative activity inhibition as well as a drop in the number of cells in the tissue. As a result of tissue cellularity being so affected, there are discernible differences in the proportion of saccharide constituents, whose synthesis is known to take place immediately after division of cells and prior to the culmination of specific protein synthesis.

The proteosynthetic activity of fibroblasts depends primarily on the amount of cells in the tissue and also on the supply of nutrients. During the period of maximum collagen synthesis, the supply of oxygen is no longer quite so critical (Silver 1973). What is important, however, is the pool of basic construction substances which are vital for the function of ribosomes (Chvapil, Ryan 1973). Even during this phase, exposure to ultrasound is responsible for differences in the course of healing in the front and hind granulomas. As a result of ultrasonic action, collagen synthesis in the front granuloma is lower (less NSC), the number of insoluble fractions is increased, and the total amount of collagen is higher. The result suggests that ultrasound stimulates collagen deposition in tissues. Vice versa, in granulomas with a worse supply of nutrients ultrasound stimulates collagen synthesis (higher NSC) while reducing the proportion of insoluble fractions at a higher total amount of collagen. The course thus confirms the possibility of double intervention into the dynamics of the biological process with the proportion of the substance in the tissue being increased in both cases but with the quality of the substance being different due to different processes going on there under different conditions. The mechanism of ultrasound action in this particular phase of the healing process is not clear. However, the results again point to an inhibition of the healing processes in the front granulomas. In this phase, however, there is a pronounced activation of the healing processes in the hind granulomas.

The non-collagenous proteins examined in this phase of granuloma development are not merely a local product. Part of them penetrate the tissue from the supply vessels. However, even in this case the composition of the proteins is indicative of an intensification of the chronicity of the process due to exposure to ultrasound as far as the better supplied front granulomas are concerned in contrast to inflammatory reactions being stimulated in granulomas with inferior nutrient supply.

A follow-up of ultrasound action on collagen deposition in the final phase of the inflammation in the better supplied granulomas exposed to ultrasonic radiation revealed an increase in the ratio of soluble collagen fractions to the insoluble ones. There was a particularly pronounced increase in the 40 °C

gelatine fraction. In the worse supplied granulomas the effect of ultrasound was quite the reverse. Given a higher proportion of total collagen, the insoluble fractions predominated. It appeared that in the phase of deposition ultrasound stimulated tissue reconstitution in the better supplied granulomas by an intensification of collagenolysis, while under worse nutritional conditions it rather tended to stimulate the deposition of ageing of collagen. In the non-collagenous proteins there was only a suggestion of such an effect.

The results of the experiment are summed up in Tab. 4 which suggests that ultrasound acts differently depending on the phase of healing and on the state of tissue nutrition. In essence, ultrasound acts in terms of homeostasis, toning down intensive processes and intensifying the less intensive ones. At the present time, the true nature of the action of ultrasound can only be a matter of speculation. It may involve a strictly local effect on microcirculation and on tissue chemistry, or, again, complex reflex processes under neurohumoral control.

Irrespective of this lack of clarity, the results obtained do underline the opportunities for taking advantage of ultrasound action in the control and channeling the processes of healing. J. H.

SUMMARY

With a view to different clinical results in its therapeutical uses, ultrasound was examined for its effects on experimental inflammatory tissue in 3 phases of ongoing healing. The inflammation was induced under different conditions of local nutrition which is known to condition the intensity of the process. Ultrasound appeared to have a different effect on the process of healing, depending on the functional state of the tissue, its action being essentially one of homeostasis. Intensive processes were being slowed down, while the less intensive ones were being intensified.

RÉSUMÉ

Influence de l'ultrason sur la synthèse et la déposition du collagène dans les granulomes expérimentaux différemment localisés

J. Pospíšilová, A. Rottová

En respectant les résultats cliniques divers dans l'utilisation curative de l'ultrason on a suivi son influence sur le tissu inflammatoire expérimental pendant 3 stades de la guérison. L'inflammation a été provoquée dans différentes conditions de la nutrition locale dont on sait qu'elle conditionne l'intensité du processus. L'expérience a démontré que l'ultrason intervenait dans le processus de la guérison différemment ce qui dépend de l'état fonctionnel du tissu. Au fond, son effet est homéostatique. Il calme les processus se développant intensivement, mais au contraire, il favorise ceux qui se développent faiblement.

ZUSAMMENFASSUNG

Der Einfluss von Ultraschall auf die Synthese und Ablagerung von Kollagen in unterschiedlich lokalisierten Versuchsgranulomen

J. Pospíšilová, A. Rottová

Unter Rücksichtnahme auf die unterschiedlichen klinischen Ergebnisse bei der therapeutischen Anwendung von Ultraschall untersuchte man seinen Einfluss auf das experimentelle Entzündungsgewebe in drei Stadien des Heilprozesses. Die Entzündung wurde unter unterschiedlichen Bedingungen der lokalen Ernährung hervorgerufen, von denen bekannt ist, dass sie die Intensität des Prozesses bedingen. Es stellte sich heraus, dass der Ultraschall in den Heilprozess auf unterschiedliche Weise eingreift, und zwar in Abhängigkeit von dem Funktionszustand des Gewebes. Im Prinzip wirkt er homeostatisch. Auf den intensiv verlaufenden Prozess hat er eine mildernde, auf den schwachen Prozessverlauf dagegen eine stimulierende Wirkung.

RESUMEN

Influencia del ultrasonido a la síntesis y depósito del colágeno en granulomas experimentales diferentemente localizados

J. Pospíšilová, A. Rottová

Teniendo en cuenta las diferencias entre los resultados clínicos en el uso terapéutico del ultrasonido fue estudiada su influencia al tejido inflamatorio experimental en 3 estadios del transcurso de la sanación. La inflamación fue provocada en condiciones diferentes de la nutrición local, de la cual se sabe que condiciona la intensidad del proceso. Se mostró que el ultrasonido interviene en el proceso de la sanación diferentemente en dependencia del estado funcional del tejido. Su efecto es homeostático en lo fundamental. Tranquiliza los procesos que transcurren con mucha intensidad y al revés refuerza los procesos que transcurren con poca intensidad.

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COVERING OF DURA MATER DEFECTS BY A HOMOLOGOUS CHEMICALLY STERILIZED TISSUE

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The defects of cerebral dura mater often remain after operations of brain tumours, cranio-cerebral injuries and cerebral herniae. They must be covered as a prevention of such threatening complications like liquorrhoe, meningitis, prolapsus cerebri and gross meningeal-cerebral scars. Such scars may be a cause of such a serious disease as epilepsy.

Since the end of the last century, about 70 allo-, hetero-, homo- and autoplasmic materials were tested as substitutes of dura mater defects, each of them possessing some advantages and disadvantages. Most of them were discarded as not corresponding to basic requirements of the clinical practice. Recently, the most suitable plastic material is a preserved homologous tissue, as it is functionally and morphologically closest to the recipient's meninges [Klement 1967, Meskhia 1974, Arulyunov and Meskhia 1972, Kargopol'tseva 1975]. The preserved dura mater is resistant to infection, biologically active and defects of any size can be covered.

Up to now, majority of authors have used biological tissues in the clinical practice, including dura mater, prepared in steril conditions. However, despite strict adherence to the aseptic conditions of tissue preparation, its sterility is not always guaranteed. A rejection of the surgical, i.e. strictly aseptic, way of collecting the plastic biomaterials opens a possibility of mass preparation of tissue transplants in any conditions. The organizational difficulties connected with equipment of a surgical unit are needless, the technique of taking the transplants is simpler and accessible for middle and junior medical staff.

In the laboratory for preservation of the tissues of Novosibirsk scientific institute of traumatology and orthopaedics, the homologous tissues are prepared in unsteril conditions of a forensic medicinal mortuary. Dura mater should be removed 6-12 hours after death, having been in a room temperature, or 24 hours after death, if stored in cold.

For sterilization of tissue transplants, including dura mater, an antiseptic complex, β -propiolactone and ethylene oxide in the form of solution or gas were proposed [Savelyev 1971]. In addition to it, low concentrations of formalin are used.

The chemical substances, usually dissolved, are mostly used for sterilization. The homologous dura mater is sterilized in solutions containing different sterilizing agents: 1. antiseptic complex consisting of Neomycine, Polymyxine, Furazolidone and sorbic acid; 2. 1 % β -propiolactone; 3. 1 % ethylene oxide; 4. 0.5 % solution of neutral formalin.

Besides simplicity and availability of sterilization in solutions, it possesses a disadvantage, i.e. the sterilized tissues have to be transferred into bottles under strictly aseptic conditions. The procedure is then more complicated and secondary contamination from the air or by contact is possible. Therefore, the methods of sterilization fully avoiding requirements for asepsis during preparation of the tissues were worked out and utilized in our laboratory during the last years: 1. sterilization by gas ethylene oxide in a chamber and 2. sterilizing in media containing gel, consisting of preserving solution (No. 9 "COLIPK" or 11 % saccharose solution with "COLIPK"), gel (gelatine with agar-agar) and sterilizing agent like: a) antiseptic complex, or b) 1.5 % β -propiolactone, or c) 0.25 % formalin.

Bacteriological examination showed 100 % sterility of the biomaterials sterilized by methods described above.

Morphological examination of dura mater (150 slides stained by haematoxylin-eosin and according to van Gieson) showed no observable structural changes after sterilization by an antiseptic complex, β -propiolactone or formalin. Sterilization by ethylene oxide causes some changes of the collagen stroma of the graft: foci of released collagen fibrils and of dehydrated fibrous structures are observed.

Dura mater was preserved frozen to -25°C (after sterilization in solutions or by gas), or in sterilizing media containing gel (Savelyev and Etitein 1971). The time of storage was 1—6 months for the frozen dura mater. During this time, no observable structural changes of dura mater were seen on 112 slides (stained by haematoxylin-eosin and by van Gieson's stain).

The gel-containing media maintain structural integrity of dura mater for 30—45 days in the room temperature, and as long as 60 days with 0.25 % formalin. The time period of storage can be prolonged to 6—8 months, if dura mater is preserved in media containing gel and maintained in $+4^{\circ}\text{C}$. These time periods were ascertained from 63 histological preparations (stained by haematoxylin-eosin and according to van Gieson).

An experimental study on transplantation of dura mater sterilized and preserved by the described methods was performed on 28 normal dogs (Kharitonova et al. 1973). The tissue for morphological examination was taken after 7, 14, 30, 90, 180, 360 days. Histological sections were stained by haematoxylin-eosin and by van Gieson's stain. In addition to it, acid mucopolysaccharides (according to Fuks and Vinogradov) and protein groups of molecules (according to Danielli) were traced.

During the first week, the transferred homograft sterilized by β -propiolactone, antiseptic complex, formalin and ethylene oxide is encircled by infiltrations of lymphoid and round cells with fibrin. The bundles of collagen

Table 1. Number of operations in dependence on methods of sterilization of the dura mater homografts (total of 189 operations)

Method of sterilization	Method of preservation	Temperature of preservation (°C)	Number of operations
In solutions	Freezing	-25	39
Gaseous ethylene oxide (chamber sterilization)	Freezing	-25	69
In gel-containing media	Gel-containing sterilizing media	4 20 ± 3	81

fibres in the graft seem to be normal, but after 1—2 weeks a loosening of the fibrous structures, their thinning out damaged architectonics are observed.

As shown by histochemical studies, the destructive process starts by depolymerization of the ground substance stabilizing the fibrous structures. It is confirmed by lowered intensity of the Heil's reaction and increased reactions for proteins (Fig. 1).

Disturbance of tissue homeostasis leads to further changes of the structural components of the grafted dura mater. It is morphologically expressed by changes in staining properties of the fibrous structures with subsequent parvicellular breakdown.

The changes of the fibrous structures were associated with enhancement of the protein reactions in cytoplasm of fibroblasts. Similarly are stained also the cellular components in the control series. It could be suggested, that changes related to reversible denaturation of native proteins, as described by Nasonov (1963), proceed in cytoplasm of fibroblasts during the sterilization process.

One month after grafting, the process of graft's resorption is accompanied by a productive reaction. In the places, where the grafted and recipient's meninges join together, an enhanced fibroblastic reaction takes place (Fig. 2). The cells are rounded, volume of their cytoplasm increases. A high functional activity of fibroblasts is shown by intensive acid mucopolysaccharide reactions in their cytoplasm. In these regions, thin collagen fibres could be seen, that are strongly stained by fuchsin.

Five to six months later, the fibrous structures of the regenerate combine into groups, their architectonics being characteristic for dura mater. The cells are oriented parallelly with fibrous structures. It is undoubtedly connected with an adequate functional load applied on the graft.

Continuous rebuilding of the graft depends on relatively rapid renewal of blood circulation from recipient's dura mater to the graft. As early as 2—3 weeks after grafting, the blood vessels from the surrounding tissues penetrate gradually into the graft (28 preparations with injected blood vessels), contributing to the reparative process.

The processes of the graft's resorption and reconstruction result in full substitution of the graft. One year later, it is impossible to find the original borders of the plasty (Fig. 3).

Thus, the structural characteristics of collagen fibres (i.e. of the main component of dura mater) allow us to recommend such a method of sterilization, which preserved structural integrity of the grafts. No significant metabolic disturbances occur during their grafting. These requirements are met by the sterilization methods described above. It should be mentioned that dura mater grafts treated by formalin triggered stronger reaction of the surrounding tissues in the early period after grafting (7 days), than it was observed by other methods of sterilization. The subsequent reconstruction of the homografts sterilized by any agent mentioned in this article proceeded equally and was completed one year after grafting.

Based on our experimental data, it was possible to recommend with full responsibility the dura mater grafts preserved by the described methods for the use in the clinical practice. It should be noted, that all methods of sterilization had 100 % bactericidal effectivity and preserved bioplasticity of dura mater grafts. Therefore, a selection of a method to be used in clinical practice is determined by local conditions and possibilities. The most simple and available method is sterilization in solutions, which can be done in any medical institution. The gas sterilization of tissues by ethylene oxide in chambers seems to be the most prospective method for mass preservation of tissue grafts in the laboratory conditions. The alterations of dura mater caused by ethylene oxide sterilization, which were described previously, do not prevent their use for grafting, as the process of the graft's reconstruction and result of the plasty are not affected. The sterilizing media containing gel are suitable for both sterilization and preservation of the bioplastic materials for prolonged time periods in the room temperature. In this way, the expansive low-temperature freezing devices are not required for storage of the tissues and they could be simply sent by post to any distances.

In the neurosurgical clinic of the Novosibirsk scientific institute of traumatology and orthopaedics, during ordinary and urgent operations of the total of 256 cases, the dura mater defects were covered by a homologous tissue sterilized and preserved by methods described previously. In this article we are going to analyze 189 dura mater plasties applied to 101 patients after removal of cerebral tumours (including 15 patients with incision of the lateral ventriculus), to 71 patients with acute cranio-cerebral injuries and their consequences, to 10 patients with cerebral herniae and to 7 patients after spinal cord operations. The graft is taken out from the bottle and immersed in warm physiologic saline for 15 minutes during the operation (Fig. 4). The flap corresponding to the size of the defect is cut out from the graft. If the decompression is necessary, the flap of greater size is sewn to borders of the dura mater defect by continuous suture from unresolvable suture material (silk, caprone, lavsan).

For plasties of 108 patients the homografts sterilized in solution (39 patients) and in gas mixtures (69 patients) and preserved by freezing to -25°C , were used. The homografts sterilized and preserved in media containing gel were applied to 81 patients, while in 58 cases the 0.25 % formalin was included (see a Table).

The operated patients were followed from 3 months to 10 years. The postoperative complications did not occur after the plasties. The secondary operation was performed in 52 patients for the different reasons: cranioplasty after cranio-cerebral injury (if the primary substitution of the skull defect was not made), removal of cerebral tumour, relapse of the tumour. On these occasions, it was possible to examine the grafted dura mater. In all cases, the homograft successfully obstructed the subdural space and separated brain from the soft tissues of the skull.

The transferred grafts were substituted by the newly formed connective tissue, the characteristics and macroscopic structure of which were identical with the recipient's dura mater.

CONCLUSIONS

1. Sterilization of the dura mater by means of chemical agents (β -propiolactone, ethylene oxide, formalin, antiseptic complex) secures 100 % sterility of the grafts, does not cause serious morphologic alterations and enables preparation of the bioplastic materials in unsteril conditions. Choice of the method depends on the local conditions and possibilities.

2. The method of sterilization and preservation of tissues in media containing gel permits exclusion of aseptic principles from preparation of the dura mater, stores of bioplastic materials could be formed and postal transportation is simply accomplished.

3. The homologous tissue sterilized by chemical agents and grafted experimentally or clinically into a defect of dura mater is rebuilt and substituted by newly formed connective tissue, which is not different from the recipient's dura mater in its architecture.

4. The clinical application of homografts sterilized by chemical agents for substitution of dura mater defects (189 operations) gave good results, the wounds always healed without complications.

M. T.

SUMMARY

In this study were described the methods of chemical sterilization of homologous dura mater: 1. in solution containing antiseptic complex, 1 % β -propiolactone, 1 % ethylene oxide and 0.5 % formalin, as sterilising agents; 2. in gas mixtures with ethylene oxide as a sterilising agent; 3. in gel-containing media consisting of preserving solution, gel and sterilising agent (1.5 % β -propiolactone, antiseptic complex, 0.25 % formalin).

The preservation of dura mater was made by freezing to -25°C (after sterilization in liquid or gaseous media) or in gel-containing sterilizing media enabling preservation and transportation of grafts in room temperature.

The experimental study on grafted dura mater sterilized previously by chemical agents was performed on 28 normal dogs. The histochemical examination of grafts' development within a year revealed their active rebuilding and substitution by a newly formed connective tissue, the architectonics of which was not different from the recipient's dura mater.

The clinical application of homografts sterilized by chemical agents for covering of dura mater defects (189 operations) was not accompanied by any complications and the wounds healed primarily.

RÉSUMÉ

Compensation des défauts de la dure-mère par une homogreffe stérilisée par des matières chimiques

K. I. Kharitonova, A. M. Zaidman, Yu. V. Etiteyn,
G. S. Pakhomenko, V. G. Botchkareva, V. P. Slavitch

Dans ce travail-ci on a décrit plusieurs méthodes de la stérilisation chimique de la dure-mère homologue: 1^o dans des solutions antiseptiques qui contiennent un complexe des matières stérilisantes (1 % beta- propiolactone, 1 % ethylenoxyde et 0,5 % formol), 2^o dans des milieux gazeux contenant l'éthylenoxyde, 3^o dans des milieux qui contiennent le gel, la solution de conservation et des matières stérilisantes (1,5 % beta-propiolactone, le complexe antiseptique, 0,25 % formol).

La dure-mère a été conservée tantôt par la congélation à -25°C [après la stérilisation dans des milieux liquides et gazeux], tantôt dans un milieu stérilisant qui contient le gel et qui a permis de conserver et transporter les biogreffes dans la température de chambre.

Sur 28 chiens sains nous avons fait une étude expérimentale concernant la transplantation de la dure-mère stérilisée par des matières chimiques. L'examen histochimique du développement des greffes a démontré qu'elles se reconstruisaient d'une façon active pendant une année à l'aide d'un tissu fibreux nouveau créé qui ne diffère pas par son architecture de la dure-mère du receveur.

En utilisant les homogreffes de la dure-mère stérilisée par des matières chimiques dans la pratique clinique, dans le but de compenser les défauts de la dure-mère (189 opérations) nous n'avons observé aucune complication, la plaie a toujours guéri per primam.

ZUSAMMENFASSUNG

Ersatz der Defekte der harten Hirnhaut durch ein mit chemischen Stoffen sterilisiertes Homotransplantat

K. I. Charitonowa, A. M. Zajdman, Ju. V. Etitein,
G. S. Pachomenko, V. G. Botchkarewa, V. P. Slavitsch

Die Arbeit beschreibt Methoden der chemischen Sterilisierung der homologen harten Hirnhaut: 1. in antiseptischen Lösungen, die einen Komplex sterilisierender Stoffe enthalten (1 % Beta-Propiolakton, 1 % Äthylenoxyd und 0,5 % Formol), 2. in gashaltigen Medien, die Äthylenoxyd enthalten, 3. in Medien, die ein Gel, konservierende Lösung und sterilisierende Stoffe enthalten (1,5 % Beta-Propiolakton, antiseptischer Komplex, 0,25 % Formol).

Die harte Hirnhaut wurde konserviert entweder durch Tiefkühlung auf -25°C (nach Sterilisierung in flüssigen und gashaltigen Medien), oder im sterilisierenden, Gel enthaltenden Medium, welches die Lagerung sowie den Transport der Biotransplantate bei Raumtemperatur ermöglichte.

An 28 gesunden Hunden unternahmen wir eine experimentelle Studie bezüglich der Transplantation der harten Hirnhaut nach Sterilisierung mit chemischen Stoffen. Histochemische Untersuchung der Entwicklung der Transplantate zeigte, dass innerhalb eines Jahres ein Umbau durch ein neu gebildetes Bindegewebe erfolgt, welches sich in seiner Architektur nicht von der harten Hirnhaut des Empfängers unterscheidet.

Bei Anwendung der Homotransplantate der durch chemische Stoffe sterilisierten harten Hirnhaut für den Ersatz der Defekte der harten Hirnhaut in klinischer Praxis (189 Operationen) haben wir keine Komplikationen beobachtet, die Wunde heilte immer per primam.

RESUMEN

Compensación de los defectos de la duramadre por un trasplante homoplástico esterilizado por sustancias químicas

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G. S. Pajomenco, V. G. Botchkareva, V. P. Slavitch

En esta obra fueron descritos los métodos de esterilización química de la duramadre homóloga: 1. en soluciones antisépticas contenientes un complejo de sustancias esterilizantes (1 % de beta-propiolactona, 1 % de etilénóxido y 0,5 % de formol), 2. en medios gaseosos contenientes el gel, la solución conservadora y unas sustancias esterilizantes (1,5 % de beta-propiolactona, el complejo antiséptico, 0,25 % de formol).

La duramadre fue conservada tanto por congelación a -25°C (después de ser esterilizada en medios líquidos y gaseosos) como en medio esterilizante conteniente el gel que posibilitada conservar y transportar los biotrasplantes a temperatura de interior.

El estudio experimental concerniente los trasplantes de la duramadre esterilizada por sustancias químicas fue hecho en 28 perros. El examen histoquímico del desenvolvimiento de los trasplantes mostró que estos activamente se reconstruían en un tejido conjuntivo nuevamente hecho durante el año que por su forma arquitectónica no se difiere de la duramadre del receptor.

Al utilizar los trasplantes homoplásticos de la duramadre esterilizada por sustancias químicas en la práctica clínica para recompensar los defectos de la duramadre (189 operaciones) no hemos observado ningunas complicaciones, la llaga siempre se cicatrizaba per primam.

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EXPERIMENTAL REIMPLANTATION OF EXTREMITIES

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V. SEKAN, J. DREXLER

The term microsurgery pertains to those surgical techniques which can be applied to minute structures under the microscope, usually with a magnification of 8 to 20 diameters. Given such an enlargement, an entirely new world appears such as the surgeon has never seen before. This immediately opens up new possibilities for reconstructive surgery. Modern dissection microscopes, though still being developed, are the keys to this new surgical specialization. The development of microsurgical instruments as well that of microsurgical technique are of equal importance.

Interest in the restoration, reimplantation and transplantation of different parts of the human body is as old as mankind itself. There are many drawings, paintings, fables and stories of old to serve as evidence of the interest and of people's aspirations in the past. However, it was not until 1887 that Halsted made the first ever experimental dissection of all the structures in the hind leg of a dog except the femoral artery and vein to resorte the continuity by suture. This was followed by femoral artery and vein ligation for different periods of time, which resulted in the development of oedema and collateral circulation. The results were published in 1922. Hopfner described experiments, whereby he amputated canine extremities to reimplant them without the development of vascular anastomoses with a maximum survival of the extremity of 11 days. Soon afterwards, CARREL and GURTHIE, too, described dog extremity reimplantation with short-term survival. The period between 1908 and the Lapczinski report of 1960 is marked by a vacuum in reporting on the subject in literature. True, there were reports on experimental reimplantation, in which emphasis was laid on information on the technique and the physiological effects involved in reimplantation, but lacking in success as far as survival was concerned. It was not until 1944 that clinical notes on the reimplantation of amputated human extremities were formulated and published (Hall 1944). The first successful reimplantation of the upper extremity in the region of the shoulder in a 12-year-old boy was performed in 1962. It was the effort of several laboratory workers and, in particular, the objective reports on re-



Fig. 1. Soft tissue separation down to the bone — Fig. 2. Hind extremity necrosis following neurovascular bundle interruption



Fig. 3. Soft tissue incised so as to leave only the neurovascular bundle and bone intact — Fig. 4. Neurovascular bundle exposed, with millimetre scale and a clamped femoral artery in rabbit



Fig. 5. Sutured femoral artery in rabbit with satisfactory post-suture patency — Fig. 6. Sutured femoral artery in rabbit and cut and clamped femoral vein



Fig. 7. Sutured femoral artery and vein in rabbit — Fig. 8. Vascular bundle visibly patent under X-ray control



Fig. 8

implantation in two patients as presented by Malt and McKhann that stimulated the world to show more interest in reimplantation. Since then, the surgical world's growing experience with clinical reimplantation has made a clear definition possible and helped to include limb reimplantation into the sphere of surgery. By the end of 1970, some 50 major cases of reimplantation surgery had been described in world literature (Sabiston 1972).

MATERIAL AND METHODS

Ten white rabbits weighing 2 to 3.3 kg each, and 10 grey rabbits of the same body weight were used. Anaesthetics were given as follows: pentobarbital intravenously, 40 to 60 mg per 1 kg b. w., and heparin in a single intravenous dose of 5,000 units - SPOFA. To serve as a model, a hind extremity was chosen

in the region of the artery and vein above the knee joint. The experiment involved the complete dissection of all soft tissues and arterial and venous ligation in 5 of the rabbits.

Complete necrosis of the extremity occurred in three days and the animals died.

To make inspection possible, we severed all the soft tissues leaving only a neurovascular bundle in the area in 5 rabbits.

Following soft tissue reconstruction, all reimplanted extremities were able to survive. For that reason, attention was focussed on circulatory restoration in the region of the above mentioned arteries and veins.

After the dissection and subsequent anastomosis of vessels in 16 rabbits, circulation was restored in the reimplanted extremities.

Two rabbits were lost due to a technical fault during anaesthesia, though patency at the site of the suture was satisfactory there, too. Following the suture of the vessels, we proceeded in a mechanical way to check on arterial and venous patency at the site of anastomosis.

A clinical follow-up of extremity survival, however, was seen as the decisive factor. At the same time, the authors developed a technique of in vivo vascular patency contrast demonstration. After a period of six weeks, the arteries and veins were laid open and their patency rates checked up on mechanically, following an X-ray examination.

The present study sums up experience so far in experimental reimplantation surgery and will be followed by more work along the lines.

CONCLUSION

The study is meant as a report on the experimental results of vascular reimplantation in the hind extremities of rabbits with evidence of satisfactory patency rates established by clinical, mechanical, and contrast investigations.

J. H.

SUMMARY

Experimental work performed in 30 hind legs of rabbits with a view to exploring the possibilities of reimplantation using microsurgical technique. The authors use a model to show the opportunities for clinical utilization as well as a microsurgical technique in extremity reimplantation.

RÉSUMÉ

Reimplantation des extrémités dans une expérience

Š. Zboja, J. Fedeleš, M. Brozman, J. Janovič, V. Sekan, J. Drexler

C'est un travail expérimental exécuté sur 30 extrémités inférieures des lièvres avec le but de vérifier la possibilité d'une reimplantation à l'aide de la technique microchirurgicale. Les auteurs montrent sur un modèle la possibilité d'une utilisation clinique et même la technique de microchirurgie dans le domaine de la chirurgie de reimplantation des extrémités.

Reimplantation von Extremitäten im Experiment

Š. Zboja, J. Fedeleš, M. Brozman, J. Janovič, V. Sekan, J. Drexler

Experimentelle Arbeit, durchgeführt an 30 unteren Extremitäten von Hasen zwecks Überprüfung der Möglichkeit der Reimplantation mittels mikrochirurgischer Technik. Die Autoren zeigen am Modell die Möglichkeit der klinischen Anwendung sowie die Technik der Mikrochirurgie in der Reimplantationschirurgie von Extremitäten.

RESUMEN

Reimplantación de las extremidades en un experimento

Š. Zboja, J. Fedeleš, M. Brozman, J. Janovič, V. Sekan, J. Drexler

Es un trabajo experimental hecho en 30 extremidades inferiores de liebres con el fin de averiguar las posibilidades de una reimplantación por medio de la técnica microquirúrgica. Los autores muestran en un model la posibilidad del aprovechamiento clínico y la técnica de la microcirujanía en la cirujanía de la reimplantación de las extremidades.

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TRACHEAL AND BRONCHIAL PLASTIES DURING THE GROWTH OF AN ORGANISM (AN EXPERIMENTAL STUDY)

V. V. ANITCHKIN, V. M. VELITCHENKO, M. G. SATCHEK

The least damaging modes of lung operations were enabled by achievements of chest surgery, anaesthesiology, bronchological diagnostics and surgical technique.

A similar tendency in a paediatric surgical practice is fully justified, as partial or total removal of lungs leads to changes caused by shifting of the residual lung tissue, bending of bronchi, hypoventilation, atelectasis and disturbances of ventilation-perfusion relationships. For instance, reduction of a vascular bed of lungs causes increase of total peripheral resistance and formation of a "cor pulmonale". It lays a basic obstacle to enlargement of lung resections (Voroncov et al. 1975). The principle of maximally sparing operations was most successfully utilized in tracheo-bronchial plasties. The known radicalism is combined with maximal sparing of normal lung tissue, thus "not only treating a disease of a child, but also securing its further normal development" (Isakov et al. 1973).

Despite significant successes of reconstructive surgery of trachea and bronchi, the problem of tracheo-bronchial resections applied by children remains unsolved (Maeda and Grillo 1972, Eteria 1974). Experimental and clinical studies on this subject are rather incidental and their results are contradictory.

Borrie (1960) and de Lima (1969) considered such operations unapplicable by children, as circular resection of trachea and bronchi was complicated by a relative stenosis of the anastomotic region, due to permanent increase of linear dimensions of respiratory pathways during the period of growth. Another group of scientists obtained satisfactory results (Maeda and Grillo 1972, Eteria 1974) and suppose that technically formed anastomoses are able to enlarge in correspondence with growth and their use by children is justified (Avilova 1975). Finally, based on analysis of clinical data, a conclusion of the third group (Carcassone et al. 1973) was drawn, i.e. there were recently no reasons for wide use of tracheal resections by children, but if absolutely indicated, its real possibility should be kept on mind. According to

opinion of Perelman (1972) and Maeda (1974), the problem of enlargement of the anastomotic cross sectional area in children was not studied adequately and requires further exploration.

The aim of this study was to ascertain, if the linear parameters of the respiratory pathways in the anastomotic region are able to enlarge consistently with growth of the animal.

Four series of experiments were performed on the total of 53 puppies (weight 1.5—6.0 kg, age 6—24 weeks): resection of the left main bronchus (14 experiments), upper lobectomy with wedge-shaped resection of the right



Fig. 1. Bronchial circles of a puppy and of an adult animal in the anastomotic region and above it (observed after 205 days)

main bronchus (11 experiments), resection of thoracal part of trachea (17 experiments), implantation of the left main bronchus to the lateral wall of trachea (11 experiments). The vascular supply and innervation of the sutured ends of trachea (bronchus) were spared as much as possible in all the experiments. The respiratory pathways were cut in the intercartilaginous spaces along the plane perpendicular to the segmental axis. The anastomosis was sewn by means of separately knotted stitches. The threads were led through the cartilaginous circle in its middle part, the mucosa was sewn through and the knots were made on the outer side (Perelman 1972). The unresolvable synthetic threads with atraumatic needles were used.

By means of sliding callipers, the linear parameters of bronchial and tracheal segments were measured on the resected preparation (outer and inner diameters in two perpendicular directions, thickness of the wall, width of the membranous part, diameter and circumference of the cross-sectional area). The diameters of the circular tracheal defect (in experiments with bronchial implantation) were measured in two perpendicular directions. The total area of bronchial (tracheal) cross-sections, cross-sectional areas of circles and inner apertures were measured planimetrically.

The animals were killed after period of observation ranging from 25 to 550 days. Similar measurements were made in the anastomotic region and

above it, thus enabling objective evaluation of the growth changes. The coefficient of stenosis R₂ and the coefficient of relative enlargement R₃ were calculated according to Maeda and Grillo (1972), characterizing the degree of narrowing or enlargement of the bronchial (tracheal) anastomotic region by adult animals. The numerical data were analyzed statistically.

In the group of puppies with the circular resection of the left main bronchus, the values of all dimensions of the left main bronchus increased in

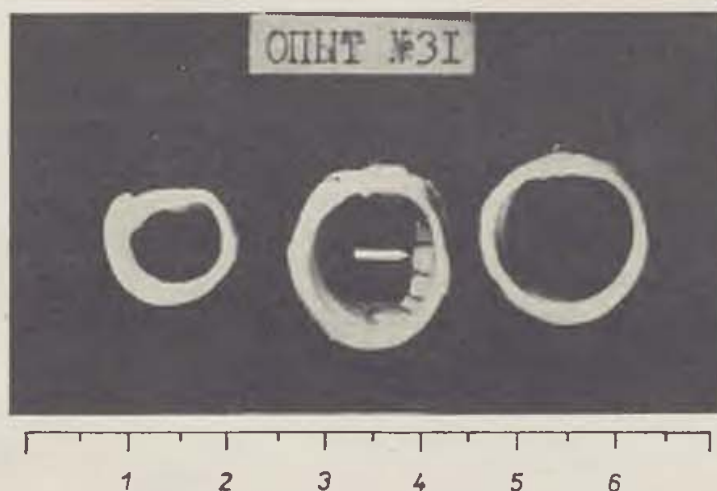


Fig. 2. Tracheal circles of a puppy and of an adult animal in the anastomotic region and above it (observed after 310 days). Note an inaccurate adaptation of adjacent cartilaginous segments in the site of the formed anastomosis (indicated by an arrow)

comparison with corresponding data of adult animals. Simultaneously, with prolongation of the linear parameters, the size of cross-sectional areas of bronchi increased from 0.27 ± 0.03 to 0.58 ± 0.05 cm² ($P < 0.1$ %), of bronchial circle from 0.15 ± 0.2 to 0.21 ± 0.02 cm² ($P < 5$ %) and of the total surface from 0.42 ± 0.05 to 0.79 ± 0.06 cm² ($P < 0.1$ %). The coefficients of stenosis R₂ were equal in both directions (0.96 ± 0.01). It corresponds to the 4 % shortening of diameters in the anastomotic region, when compared with the normal bronchial circle. The enlargement of the bronchial aperture in the anastomotic region was equal to 83 % and 86 % of the normal values in cranio-caudal and ventro-dorsal directions, respectively (Fig. 1).

By adult animals with wedge-shaped resection of right bronchus, the linear parameters of the intact bronchial circle and in the region of suture did not differ significantly. The size of cross-sectional area of the right main bronchus in the region of suture was equal to the normal regions and was of a circular form with prevailing outer and inner cranio-caudal diameters. The values of the coefficients of stenosis R₂, calculated for cranio-caudal and ventro-dorsal diameters (1.00 ± 0.02 and 1.00 ± 0.01 , respectively) indicated a total absence of any stenosis in the region of suture of the defect.

In correspondence with the animal's growth, an increase of mean tracheal diameters was observed either in the intact places, or in the anastomotic

region after the circular resection of trachea. The cross-sectional area of tracheal circle, tracheal aperture and total cross-sectional area of the anastomotic region increased 2.7 times, 2.3 times and 2.4 times, respectively ($P < 0.1\%$). A comparative analysis of the linear dimensions of the intact tracheal segment and of the anastomotic site by adult animals revealed the significant thickening of the tracheal walls in the anastomotic region in comparison with the more proximal cartilaginous circle. Therefore, the cross-sectional area of the anastomotic tracheal circle is increased by 12% (from 0.41 ± 0.03 to 0.53 ± 0.03 cm², $P < 0.9\%$), in comparison with the normal segment. The thickened tracheal walls of the anastomotic region cause a circular appearance of the tracheal cross section; a characteristic cricoid form disappears. The relatively increased inner (lateral and ventro-dorsal) diameters of the anastomotic region were equal to 85% and 93% of the normal values, respectively. The delayed growth mostly of the lateral diameters is usually explained by extensive thickening of the lateral walls of the anastomotic segment, which is due to inaccurate adaption (displacement) of the adjacent cartilaginous segments (Fig. 2).

An experimental implantation of the left main bronchus into the trachea was followed by a statistically significant increase of diameters and area of the circular defect on the tracheal wall, consistently with growth of the animal. The increase of diameters was equal to 0.2 cm (from 0.7 to 0.9 ± 0.06 ; $P < 0.5\%$) in the craniocaudal direction, 0.36 cm (from 0.7 to 1.06 ± 0.05 ; $P < 0.1\%$) in the ventro-dorsal direction and was reflected in the 1.9 times increased cross-sectional area (from 0.38 to 0.70 ± 0.08 cm²; $P < 0.1\%$). By adult animals, the circular defect in the tracheal wall acquired an ellipsoid form, the long axis being oriented dorso-ventrally. The total cross-sectional area of the defect was slightly greater than the mean cross-sectional area of the left main bronchus by the intact adult animals.

Thus, the observed changes of the linear parameters of different tracheal and bronchial anastomoses and absence of any functional disturbances of operated or intact lungs, as shown in our previous study (Velitchenko et al. 1976), prove an enlargement of the respiratory pathways in the anastomotic region, which is proportional to the animal's growth.

CONCLUSIONS

1. The resection of trachea and bronchi by puppies is followed by the increase of the linear parameters of the respiratory segment and by enlargement of the cross-sectional area in the anastomotic region, in correspondence with the growth changes of the animals.

2. The adequate growth of the anastomotic region of the intrathoracal respiratory pathways is achieved by a strict adherence to the details of the operation technique: sparing of innervation and of blood supply of the connected ends, accurate adaptation of the sutured walls, use of separately knotted stitches from synthetic threads and taking one half of the cartilaginous segment's thickness for sewing.

M. T.

SUMMARY

A possible increase of linear parameters in the anastomotic region of the respiratory pathways, proportional to the animal's growth, was studied experimentally on 53 puppies after a circular resection of the left main bronchus, thoracic part of trachea and upper lobectomy with wedge-shaped excision of the main bronchus on the right side.

The results of our investigation showed increased dimensions of the respiratory segment and enlarged area of the aperture in the anastomotic region, which corresponded to the animal's growth. The required conditions were a careful technique of an operation and adherence to general principles of the tracheal and bronchial surgery.

RÉSUMÉ

Opérations plastiques de la trachée et des bronches pendant la croissance de l'organisme (étude expérimentale)

V. V. Anitchkin, V. M. Velitchenko, M. G. Satchek

Sur 53 petits chiens auxquels on a fait une résection circulaire de la bronche souche gauche, de la partie thoracale de la trachée et une lobectomie supérieure droite avec une excision cunéiforme de la bronche souche, nous avons suivi les possibilités d'un accroissement des paramètres longitudinaux des voies aériennes dans la région de l'anastomose sous la dépendance de la croissance de l'animal.

Nous avons constaté que l'accroissement des dimensions du segment aérien et de la surface du diamètre intérieur de l'anastomose correspondait à la croissance de l'animal, si la technique opératoire était soigneuse et si l'on a tenu les principes généraux concernant l'opération de la trachée et des bronches.

ZUSAMMENFASSUNG

Plastische Operationen der Trachea und der Bronchien in der Zeit des Wachstums des Organismus (experimentelle Studie)

V. V. Anitschkin, V. M. Velitschenko, M. G. Satschek

An 53 jungen Hunden, bei denen eine Zirkularsektion des linken Hauptbronchus, des Brustteiles der Trachea sowie eine rechtseitige obere Lobektomie mit keilförmiger Exzision des Hauptbronchus durchgeführt wurden, untersuchten wir die Möglichkeit der Vergrößerung der Längenparameter von Atmungswegen im Bereich der Anastomose in Abhängigkeit vom Wachstum des Tieres.

Wir stellten fest, dass die Vergrößerung der Dimensionen der luftführenden Segmente und der Fläche des inneren Diameters der Anastomose dem Wachstum des Tieres entspricht, wenn die Operationstechnik sorgfältig war und die Allgemeinprinzipien bei Operation der Trachea und Bronchien beachtet wurden.

RESUMEN

Operaciones plásticas de la tráquea y de los bronquios durante el crecimiento del organismo (estudio experimental)

V. V. Anitchkin, V. M. Velichenco, M. G. Satchek

En 53 perillos a los cuales fue hecha una resección del bronquio izquierdo principal, de la parte toracal de la tráquea y lobotomía superior derecha con una excisión cuneiforme del bronquio principal observabamos la posibilidad de agrandar los parámetros de las vías respiratorias en la región de la anastomosis en dependencia al crecimiento del animal.

Hemos constatado que la ampliación de las dimensiones del segmento aéreo y de la superficie y del diámetro de la anastomosis corresponde al crecimiento del animal, si la técnica operatoria fue cuidadosa y si los principios generales de la operación de la tráquea y de los bronquios fueron observados.

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SURGICAL TREATMENT OF SECONDARY AXIAL DEFORMITIES AFTER OPERATION FOR BIFURCATED THUMB

J. JAKUBÍK

A plastic surgeon is often called to treat congenital malformations of the hand. These are mostly cases of syndactyly, or, less often, ectrodactyly, macrodactyly, amnionic disease, claw hand, cleft hand etc. Polydactyly is the kind of congenital malformation which the plastic surgeon is likely to meet fairly often; only syndactyly is some across more often. According to Tapie (1885), out of 2,200 children born in the Paris Maternity Hospital in 1884 five had polydactyly. Shapiro (1958) et al. followed up 30,398 children born between January 1, 1952 and December 31, 1955 and found 2 white and 78 black children with polydactyly. Simpkins and Lowe (1961) reported 1.4 % children born in Kampala (Mulaga Hospital), Uganda, to have had polydactyly. Hand-

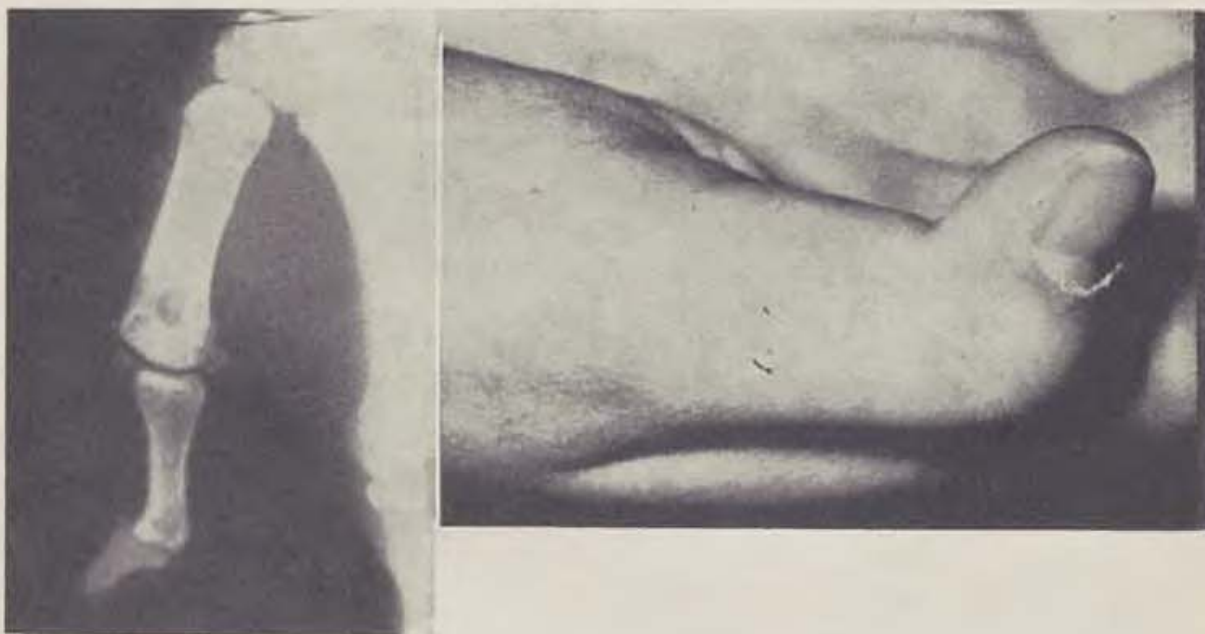


Fig. 1. Axial deformity of the right hand thumb after removal of duplicated distal phalanx in a 17 year old girl, patient R. M., born 1958, No. clin. notes 37 317. — Fig. 2. X-ray picture of the thumb in the same patient

forth (1950) described 14 cases of polydactyly among 5,852 Chinese prisoners in Hong Kong. Frazier (1960) found among all those born in Baltimore in the years 1954—1958 a total of 200 children with polydactyly; 179 of them black, 21 white. Also familiar are cases of endemic polydactyly. Sysak (1928) described the families of Jetniks and Siomaks in the Poltava region, whose children has six fingers each. DeLinares (1930) found and described a similar situation in the village of Cervera de Buitrago near Madrid while more cases of endemic polydactyly have been reported from France.

Manoiloff (1931) described the case of a man living in Batumi who bore the same name as the Roman general Scipio Africanus (185—129 B. C.). Manoiloff's patient had six digits on both hands and feet. According to the patient, the trait was hereditary in his family. His ancestors had moved to Russia via Poland from Italy. Manoiloff claimed the origin of the family might be traced back to Scipio Africanus, who, according to historical records, also had six digits on both hands and feet. Gates (1946) says that if it were possible to verify the data it would mean that hexodactyly had been transmitted in



Fig. 3. The same patient. Cross-finger-flap sutured into the defect in the region of the volar flexion crease of the thumb which is extended and whose straight axis is maintained by K-wire inserted intramedullary. — Fig. 4. The same patient. Defect due to cross-finger-flap clearly visible on the dorsal side of the basal phalanx of the index. Note the direction and extent of the flap. Defect is covered by free skin graft

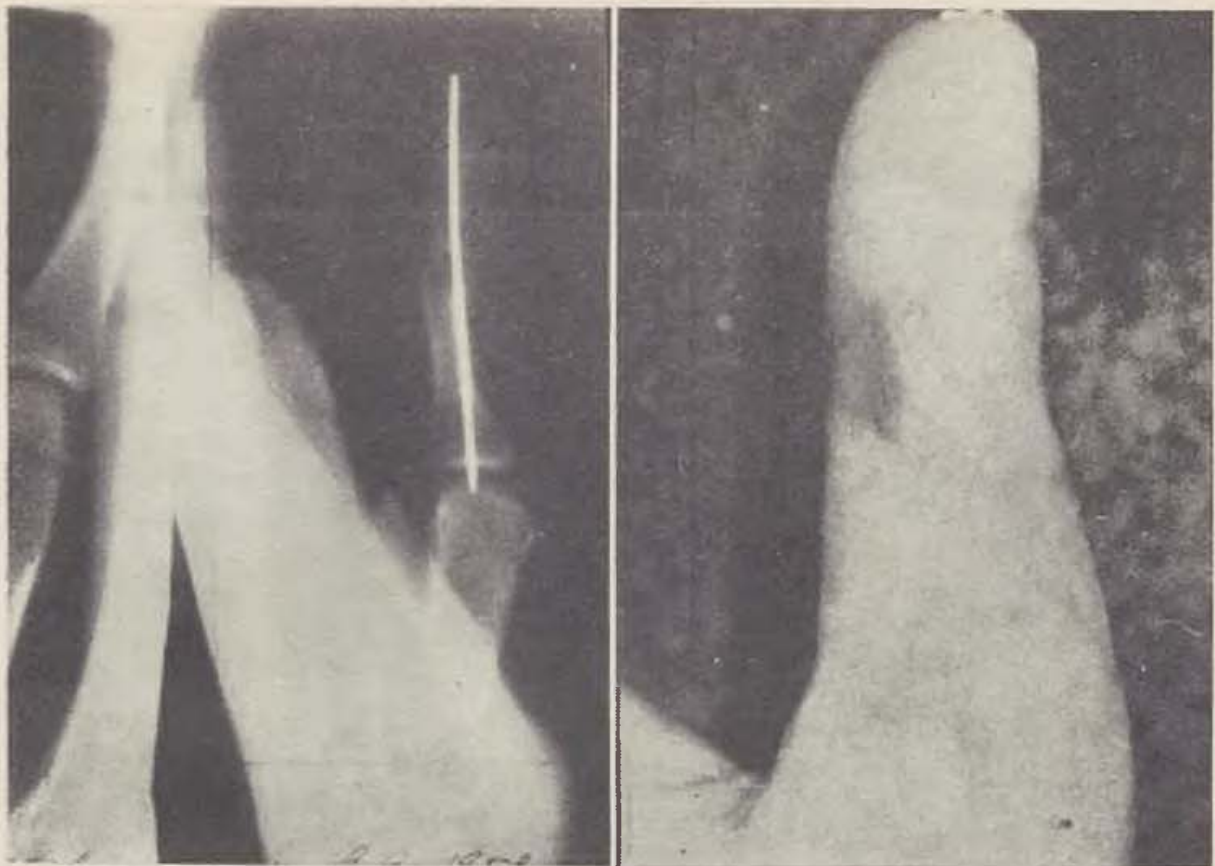


Fig. 5. The same patient. X-ray of the thumb with K-wire introduced. — Fig. 6. The same patient. Effect of treatment after 6 months

direct line for well over 2 thousand years and that the name of Scipio had been in existence form more than 80 generations [quot. Kelikian].

If the thumb is affected by polydactyly it may prove to be difficult to decide which of the two digits is to be amputated. The point is to preserve that of the two which can provide better function after the removal of the supernumerary one. However, amputation may often result in the development of axial deformity. This may be the case not only where the supernumerary thumb or its distal phalanx have been simply removed and the wound closed by a linear suture but also if the suture is wedge — shaped and cannot contract. In cases where the polydactylic phalanx articulated with the basic phalanx of the thumb (i.e. forming a pollex bifidus) the remaining distal phalanx will almost invariably deviate in that direction after the amputation of the supernumerary one. The degree of this kind of axial deviation may be different. Grave deformities of the thumb may thus sometimes ensue (Fig. 1). In childhood and during adolescence such a malformation mostly tends to deteriorate with the axial deviation growing until it eventually becomes stable and fixed. The interphalangeal articulation is often malformed preventing normal movement. The tendon apparatus is not physiologically disturbed either, being, as a rule, likewise deviated towards the amputated phalanx. This is mainly the case of the flexor tendon. In fact, the condition is one of angulated ankylozsis.

Previous treatment:

Deformities such as those described above were not always surgically treated for the simple reason that those affected had got used to them and hardly ever demanded any correction. If in spite of that an operation was

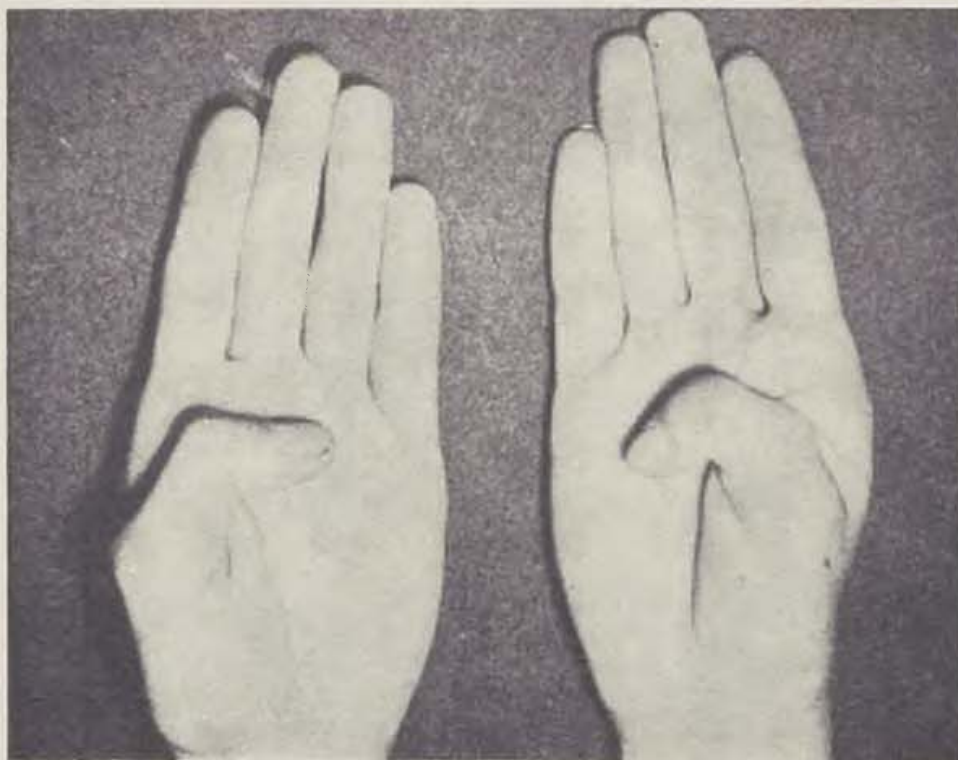


Fig. 7. Patient E. J., born 1958, No. clin. notes 49 394, axial deformity of right hand thumb

resorted to it was hardly ever performed without wedge osteotomy on the basic phalanx. Mutual skin 2-plasty in the area of the amputated phalanx scar was not sufficient to ensure the desired effect; the scarry contracting tissue deviat-



Fig. 8. The same patient. X-ray picture of deviated right hand thumb prior to operation.
Total dislocation of IP joint of the thumb

ing the phalanx had to be removed and replaced by direct flap, mostly from the arm of forearm. As soon as the flap has been healed in and the pedicle cut, the thumb was fixed using either plaster-of-Paris or some other splint. This was followed by rehabilitation. The results of such operation were, however, not always satisfactory.



Fig. 9. The same patient, state after adjustment of thumb, insertion of K-wire, and cross-finger-flap implantation from index dorsum



Fig. 10. The same patient. Result — one year after surgery

Our treatment:

Our own approach to the treatment of axial thumb deformities after the amputation of the supernumerary phalanx was based on the assumption that if we were able to replace the contracting scar tissue at the site of the amputated phalanx by some other tissue such as would provide support to the distal



Fig. 11. Severe deformity of the thumb in patient S. B., born 1953, No. clin. notes 46571 after amputation of supernumerary phalanx in childhood



Fig. 12. The same patient. A special suture used instead of K-wire introduced intra-medullarily, and tissue defect corrected by flap from the arm.

phalanx of the thumb so as to prevent its deviation, and if we could guarantee a sufficiently prolonged immobilization, no osteotomy of the basic phalanx would be necessary.

9 patients, part of whose pictorial documentation we present here, were used to verify the assumption. After the scar has been fully removed, the two

phalanges are repositioned into the axially correct position, sometimes even slightly exaggerating the effort. The resulting defect of the skin cover is considerable. In all the nine patients a cross-finger-flap from the index was employed to cover the defect. The axially correct position of the two phalanges is then maintained for a period of 3 months by K-wire inserted along their long

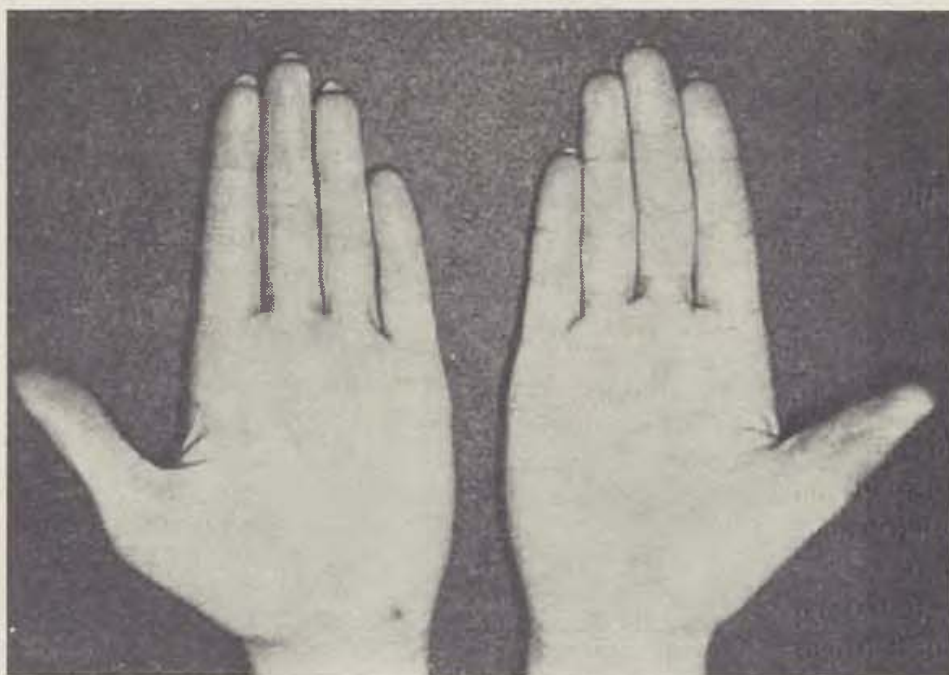


Fig. 13. State after termination of treatment in the same patient, two and a half years after surgery

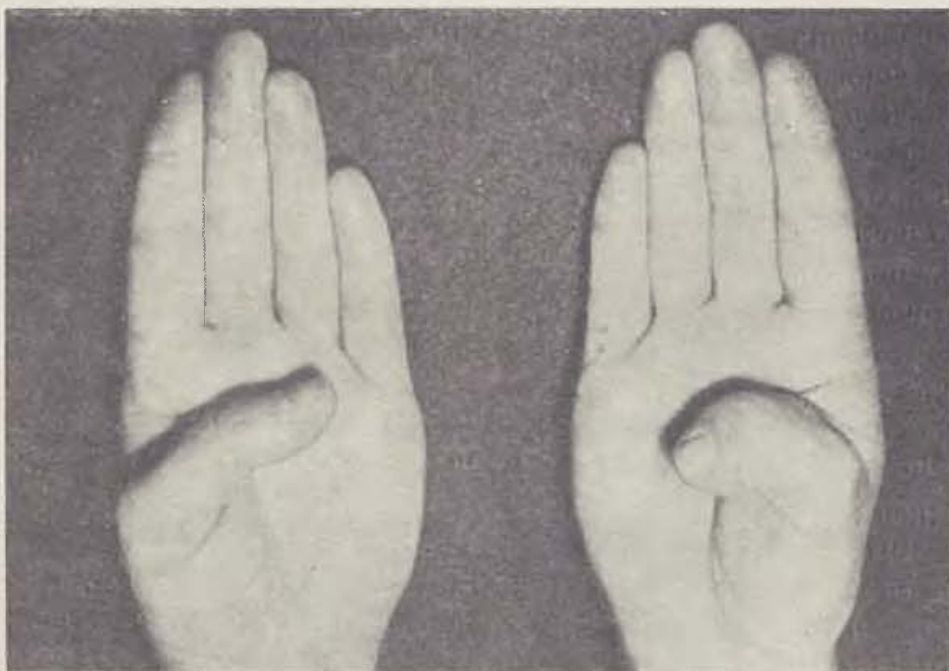


Fig. 14. Patient Z. R., born 1949, No. clin. notes 49 681. Severe thumb deformity after supernumerary phalanx amputation in childhood

axis. It was only in the first patient, a woman operated on in this manner, that a flap was transferred from her arm and special suture used instead of the K-wire.

DISCUSSION

The discussion on the thumb is to be made as proximally as possible (along the flexion crease) so as to preserve as much of the ball of the distal phalanx intact as possible. The scar after the amputated phalanx as well as all scarry blocks preventing the extension of the distal phalanx should then



Fig. 15. Splint of sanplast maintaining correct thumb position: pressing against distal phalanx from the radial side, against basal phalanx from ulnar side. The splint can hold thumb in correct position without having to resort to more surgical intervention

be excised. As soon as the axially correct position of the two phalanges is achieved a hole is drilled in them to allow the longitudinal insertion of a piece of thinner K-wire. We can also use a special suture specifically devised by us for such cases. K-wire is better as a stitch may cut through the skin or cause pressure sores. Fixation of the phalanges of the thumb by means of wire or stitch is as important and integral part of the treatment as the flap transfer.

In case the flexor tendon is also deviated, it should be repositioned and fixed with catgut. This is important as failure to do so might result in the pull of the tendon once again deviating the distal phalanx. The defect should then be covered by a cross-finger-flap from the dorsal area of the basal phalanx of the index finger, which should always be made rather bulky, a little bigger than the defect itself. The index is then easily brought into the correct flexion in the MP joint. The flap pedicle should then be cut off in three weeks' time, even on an out-patient basis. The K-wire should remain in the thumb for at least three months or even longer.

In cases where difficulties in the healing of the flap developed and where, as a result, deviation of the distal phalanx could not be fully prevented, effective remedy was provided by an individually shaped sanplast splint which proved to be adequate in maintaining the correct axis of the digit all through the critical period of scarring (Fig. 15). In some cases, the patient was made

to put up with the splint for half a year or even longer with the end result being, however, always very good.

After the termination of the treatment, movement in the interphalangeal joint of the thumb proved to be always limited; this was, however, rather due to its congenital impairment; we preferred not to put it down to the trans-articular fixation with the K-wire as employed in our type of operation. None of the patients, however, had any particular unpleasant sensation because of the limitation of the movement provided the axis of the thumb was straight and the thumb itself ensured good and strong opposition.

CONCLUSION

The above-described method of surgical treatment of secondary axial deformities of the thumb after operations for bifurcated thumb, consisting in intramedullary (3 months long) fixation with K-wire and in covering the defect with a cross-flap from the index, fully proved its worth. No osteotomy of the basal phalanx was necessary.

J. H.

SUMMARY

The article contains concise data by different authors describing the incidence of polydactyly. The author presents his own method of correcting the angular deformity of the thumb caused by amputation of the supernumerary phalanx in childhood. No osteotomy of the basal phalanx is necessary. After removal of the phalanx-deviating scar and after adjustment of the digit axis, K-wire is introduced intramedullarily into both phalanges of the thumb and left there for 3 months or longer. The skin defect is dealt with by a cross-finger-flap from the dorsal area of the basal phalanx of the index finger. Relapses of deviation due to possible healing disturbances can be prevented by individually formed sanplast removable splints kept in position for longer periods of time. A total of nine patients were treated by the method with good results.

RÉSUMÉ

Traitement chirurgical des déformations secondaires axiales existant après une opération des pouces redoublés

J. Jakubík

L'article comprend des données brèves provenant des différents auteurs et concernant l'incidence de la polydactylie. On décrit la méthode propre du traitement de la déformation d'angle du pouce causée par l'amputation de sa phalange supernuméraire au cours de l'enfance. L'ostéotomie de la phalange basale n'est pas nécessaire. Après avoir supprimé la cicatrice causant la déviation de la phalange et redressé l'axe du doigt, on introduit dans la moelle des deux phalanges du pouce un K-fil qui y reste pendant 3 mois ou encore plus longtemps. Le défaut cutané est traité par un cross-finger-flap de la surface dorsale de la phalange basale de l'index. La récurrence de la déviation apparaissant après les troubles de guérison est empêchée par une petite attelle de sanplast qui peut être enlevée et qui est appliquée à la long.

Chirurgische Behandlung der sekundären Axialdeformitäten nach Operation der Doppeldauen

J. Jakubík

Die Abhandlung enthält kurze Hinweise verschiedener Autoren hinsichtlich der Inzidenz der Polydaktylie. Man beschreibt eine eigene Methode der Behandlung von Winkeldeformationen des Daumens, die durch Abtragung seines überzähligen Fingerknochens verursacht wurden. Osteotomie des Grundgliedes ist nicht notwendig. Nach der Beseitigung der Narbe, die den Fingerknochen deviiert, und nach dem Ausgleichen der Fingerachse wird in beide Daumenglieder intramedullär ein K.-Draht eingeführt, der drei Monate oder länger an der Stelle gelassen wird. Den Hautdefekt löst man durch ein cross-finger-flap von der Dorsalfläche des Grundgliedes des Zeigefingers. Rezidive der Deviation nach Heilungsstörungen vermeidet man durch langfristige Applikation einer individuell hergestellten abnehmbaren Sanplastschiene. Insgesamt wurden nach dieser Methode neun Kranke mit gutem Erfolg behandelt.

RESUMEN

Tratamiento quirúrgico de las deformidades secundarias axiales después de una operación de pulgares doblados de la mano

J. Jakubík

En el artículo se presentan datos concisos de varios autores que conciernen la incidencia de polidactilia. Está descrito el método propio del tratamiento de la deformidad angular del pulgar causada por la ablación de una falange supernumeraria del mismo en la infancia. Después de quitar la cicatrix que desvía la falange y después de enderezar el eje del dedo se introduce un K.hilo a las dos falanges del pulgar dentro de la médula; el hilo se deja 3 meses o más. El defecto cutáneo se ajusta por un cross-finger-flap de la área dorsal de la falange del índice. Una recidiva de la desviación después de unos defectos de la cicatrización se impide individualmente por una tablilla de sanplast amovible, aplicada a larga duración. En total 9 pacientes fueron tratados por este método con un resultado bueno.

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VASCULAR SUTURE IN MICROSURGERY

J. FEDELEŠ, Š. ZBOJA, J. JANOVIČ, M. BROZMAN, V. SEKAN, J. DREXLER

More than seventy years have elapsed since Jasinowsky (1889), Carrel (1902), Guthrif (1908), and others described methods of vascular anastomosis and their practical uses.

In spite of the fact that it has been in use in practical surgery for a good fifty years, microscopy did not make its way into vascular surgery until sixteen years ago thanks to Jacobson and Suarez. The two also stressed the need for special instruments, thus laying the foundation stone of microvascular surgery. The concept of microvascular surgery is today understood to mean the surgery of blood vessels with diameters of under 2.00 mm.



Fig. 1. Exposed femoral neurovascular fasciculus in rabbit

Since a variety of techniques can now be found described in literature, we decided to test some of them at our department, including opportunities for their practical uses.

MATERIAL AND METHODS

Rabbits weighing 2.1 kg on the average were used for the experiments with Pentobarbital in infusion as the anaesthetic. Femoral vessels (Fig. 1) were then exposed using a minimum of manipulation to avoid spasms. However, spastic reactions did occur in spite of the vessels being prepared under the microscope,



Fig. 2. Femoral artery in rabbit after clamping and cutting

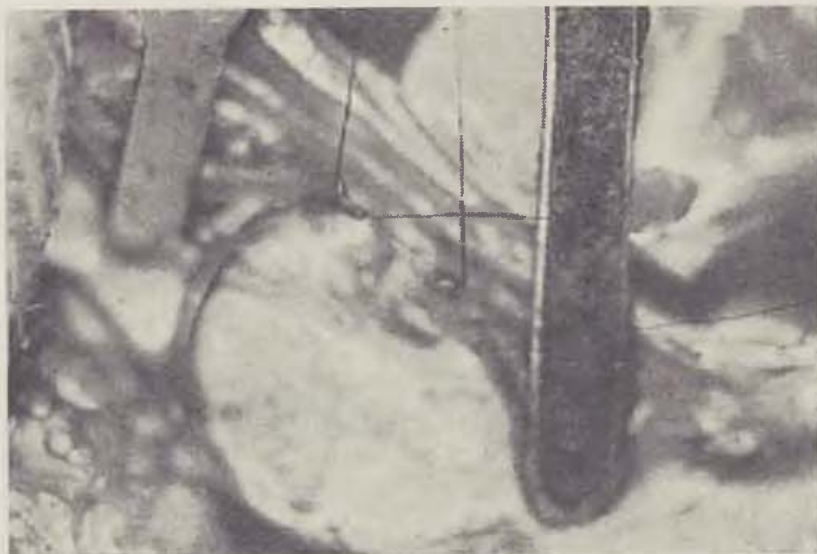


Fig. 3. Insertion of the second pilot stitch into the femoral artery in rabbit

to become exacerbated wherever the outer vascular wall came into contact with blood. For that reason, the wound kept being cleansed with saline solution in order to remove blood and get rid of vasoconstrictive substances. Standard microvascular instruments and a binocular operative microscope were employed. A working enlargement of 12.5X was found to be the most suitable one.

Microvascular clamps were attached and the femoral artery cut in two. Due to the elasticity of the arterial wall a gap of about 3—5 mm (Fig. 2) developed between the two ends. Since no microvascular clips with approximator were available, we tried to make use of different suture techniques and compare them. In order to make the suture as fine as

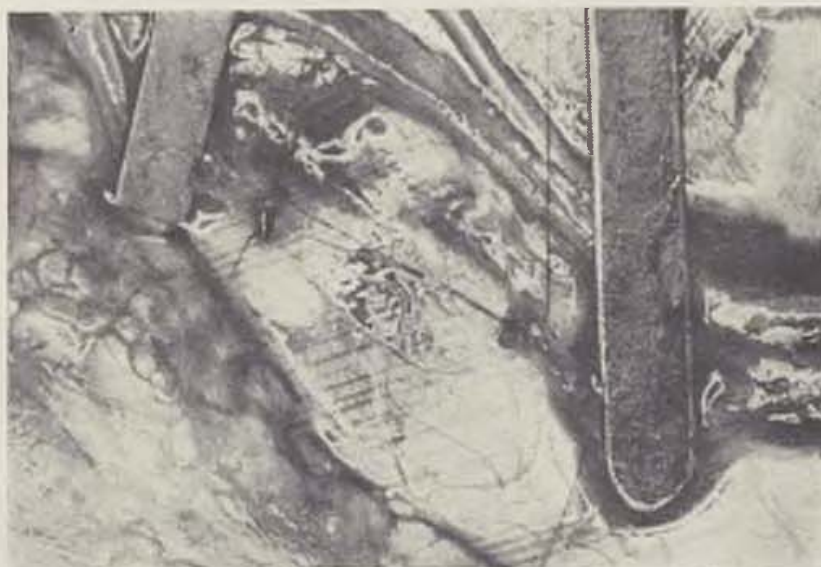


Fig. 4. Two pilot stitches with 8—0 silk inserted into the femoral artery in rabbit

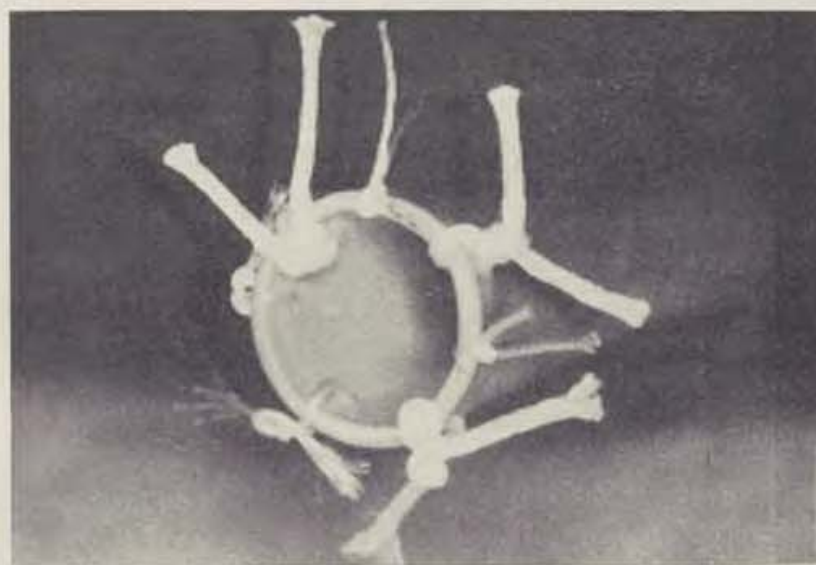


Fig. 5. A model of microvascular suture with three pilot stitches

possible, we started by using 10—0 nylon suturing the artery round in separate interrupted knot stitches. However, the tension at the ends proved to be such that immediately on placing them the very first stitches were cutting through thus preventing anastomosis performed in that particular way. Therefore, the next stage involved attempts at finding a substitute for the approximator.

In technical terms, the problem was approached by using small forceps to hold the microvascular clips together prior to cutting the artery apart in order to keep the distance between them constant. The artery was then severed and in turn sutured together by means of the above described technique using separate knot stitches of 10—0 nylon. 10 separate cases of anastomosis with



Fig. 6. Rabbit a. femoralis after suture

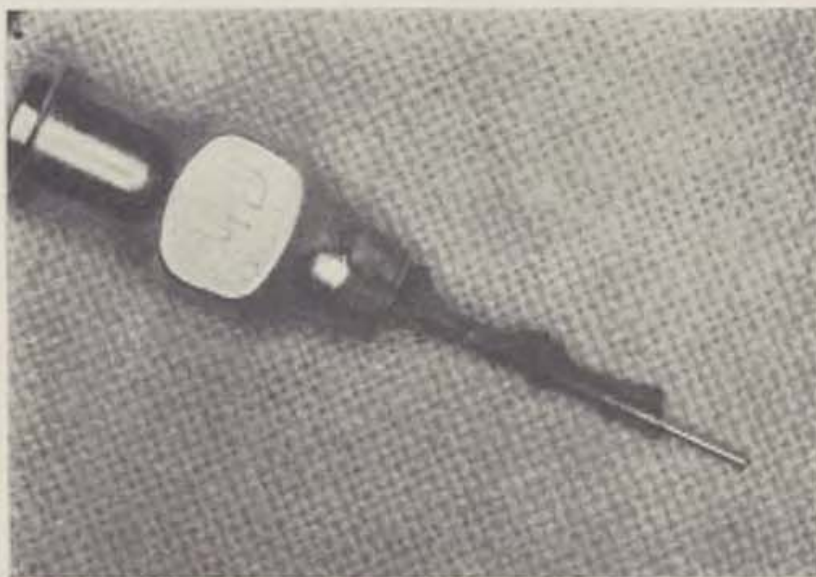


Fig. 7. Check-up on patency of anastomosis by means of anastomosis excision after 7 days

patency rates of 100 % were dealt with in this way. Nevertheless, even this particular method of microvascular surgery had to be abandoned because of the difficulties involved in its practical clinical application.

A decision was made to use a thicker suturing material, namely 8—0 silk, for the initial basic stitches, two of which were inserted in vessels with a dia-

meter of under 1 mm (Figs. 3., 4.) and three in vessels with diameters of over 1 mm at a distance of 120° from each other. Using that particular technique without an approximator we were able to prevent the stitches from cutting through. We proceeded by suturing with nylon 10-0 so as to avoid any insufficiency of the anastomosis after the microvascular clips had been re-

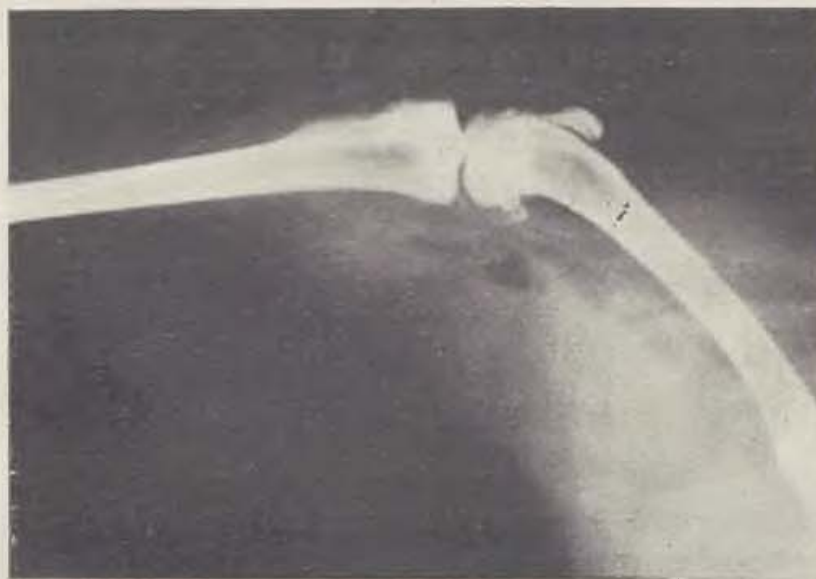


Fig. 8. Check-up on patency of anastomosis by arteriography



Fig. 9. Oblique arterial suture in narrow lumen

leased. 4—6 more, supplementary stitches had to be added, thus bringing the total number up to 6—8 (Figs. 5., 6.). In this way, 30 anastomoses with patency rates of 97 % were performed.

From the technical point of view it should be understood that the needle has to go through the whole of the vascular wall, and that about 80 microns

from the edge of the vessel. The two ends of the vessel are only brought near each other and the tissue encompassed in the stitch should not be strangulated. Once the stitch has been pulled taut correctly it should be visible through the vascular wall as a small circle of about the same diameter as the thickness of the artery wall. Another important factor is that of placing the stitches. The first stitch makes it possible to insert the suture away from the intima at both ends as there are two needles attached to the strand. Afterwards, all that is necessary is to pull with forceps at the already placed stitch and not at the vessel. After the foundation stitches have been placed the two ends of the suture should not be pulled taut at a time, but only one end at a time in order to avoid flattening it or having it pierced through both walls. When suturing the posterior wall, we simply attach the clips the other way round.

The patency rate of the anastomosis could be noted immediately on releasing the clips. The vessel was seen pulsating. Long-term check-ups were made either by operative exposure and visual control, by taking out the anastomosis (Fig. 7.), or by arteriography (Fig. 8.).

DISCUSSION

Despite the fact that literature includes the description of a number of techniques of sutureless anastomosis, the so called cuff techniques such as the Saran wrap, techniques making use of different plastic foils or even natural tissues such as dura mater employed by Tschopp (1975), or the interesting cuff technique by George (1975), our choice was one of direct suture as it appeared to be the most suitable of all, and we based our approach on works by O'Brien et al.

Working on microarterial anastomoses the surgeon should aim at achieving a perfectly fitting anastomosis with the least possible number of stitches to avoid necrosis of the tunica media or arterial occlusion.

The technique we employed enables a suture of the anastomosis with few stitches. Stitches going through the whole of the vascular wall are less injurious to the tunica media than those gripping only part of the wall. The reason a hare was chosen as an experimental animal was that the human artery has properties similar to that of the rabbit. Should the vessel seem to be too narrow, an oblique anastomosis can always be performed (Fig. 9.).

CONCLUSION

Judging by our own results, the above-described technique tested on 30 femoral arteries in hares with a success rate of 97 % provides ample evidence of being usable. There was even no need for any pharmaceuticals apart from general heparinization. It should be noted, however, that this involved the last thirty anastomoses we performed, since an adequate technique in vascular microsurgery is merely one of the most important factors on the way to achieving patency through anastomosis and that it calls for long-term training.

J. H.

SUMMARY

The study is based on an experimental microvascular suture of the femoral artery in rabbits. The authors endeavoured to test the techniques so far described and to make the necessary technical improvements. A technique is described involving two to three major pilot stitches with 8—0 silk and supplementary 10—0 nylon stitches. The technique was tested on 30 rabbits a. femoralis with a success rate of 97 %, checked up on in vivo, X-ray as well as excision and visual control of the anastomosis. The results justify using the technique in microvascular surgery, in plastic surgery and possibly in other branches of surgery as well.

RÉSUMÉ

Suture des vaisseaux dans la microchirurgie

J. Fedeleš, Š. Zboja, J. Janovič, M. Brozman, V. Sekan,
J. Drexler

Le travail traite la suture microvasculaire expérimentale de l'artère fémorale chez le lièvre. Les auteurs cherchaient à vérifier les techniques décrites jusqu'ici et les améliorer selon le besoin. Ils décrivent la technique à deux ou trois points fondamentaux plus gras 8—0 à l'aide de soie et des points complémentaires 10—0 en Nylon. La technique a été vérifiée sur 30 artéria femoralis de lièvre avec succès dans 97 p. 100 des cas. On l'a contrôlée in vivo, par la radiographie et même par l'excision et le contrôle de l'anastomose. Les résultats obtenus donnent le droit d'utiliser cette technique-ci dans la chirurgie plastique et éventuellement dans les autres disciplines chirurgicales.

ZUSAMMENFASSUNG

Gefäßsuture in der Mikrochirurgie

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J. Drexler

Die Arbeit beruht auf der experimentellen mikrovaskulären Suture der arteria femoralis beim Hasen. Die Autoren versuchten die bisher beschriebenen Verfahren zu überprüfen und sie technisch nach Bedarf zu vervollkommen. Sie beschreiben eine Technik mit zwei bis drei groberen Leitnahten mit 8—0-Seide und mit ergänzenden Nahten mit 10—0-Nylon. Die Technik erprobten sie in 30 Fällen an der arteria femoralis des Hasen mit 97 %-Erfolg, der in vivo, röntgenologisch sowie durch Exzision und Anastomosekontrolle überprüft wurde. Die Ergebnisse berechtigen das Anwenden dieses Verfahrens in der mikrovaskulären Chirurgie, in der plastischen Chirurgie und eventuell auch in anderen chirurgischen Fächern.

RESUMEN

Sutura de los vasos en la microcirugía

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J. Drexler

La obra está basada en la sutura microvascular experimental de la arteria femoralis en el liebre. Los autores trataban de probar las técnicas descritas hasta ahora y de mejorarlas según necesidad. Describen la técnica con dos hasta tres puntadas fun-

damentales más gruesas con seda de 8—0 y con puntadas completivas de nylon de 10—0. La técnica fue probada en 30 a. femorales de liebre con éxito de 97 % y fue controlada in vivo, por radiografía y también por excisión y así mismo por el control de la anastomosis. Los resultados dan derecho emplear esta técnica en la cirugía microvascular, en la cirugía plástica y eventualmente en las demás disciplinas quirúrgicas.

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PIERRE ROBIN SYNDROME

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The term Pierre Robin syndrome is understood to mean a congenital developmental anomaly with, as a rule, the following manifestations:

1. underdeveloped mandible and its backward displacement in different variations and degrees. Micrognathia is the most frequent feture of mandibular underdevelopment. The synonyms often used to describe the defect include retrognathia, mandibular hypoplasia. The maximum degree of total mandibular non-development is known as hypognathia.

2. underdeveloped tongue and its retroposition (glossoptosis, hypoglossia, retroglossia).

3. various degrees of cleft palate.

The Pierre Robin syndrome may also be oligosymptomatic, or again, it may be found associated with other anomalies or syndromes. Thus, e. g., there may be no cleft palate, or the condition may be found in combination with anomalies such as deformities of the spinal column, anomalies of the extremities, cranial anomalies, pterygium colli, Turner's syndrome, Klippel-Feil syndrome, Treacher Collins syndrome, microcephalus, Down's disease, hydrocephalus, etc. In terms of function, the Pierre Robin syndrome is often associated with respiratory tract obstruction aggravated by subsequent dysphonia or even asphyxia, an acute, emergency complication. The newborn infant is considerably cyanotic, at first showing signs of paradoxical respiration, and unless adequate aid is available in good time, acute asphyxia will result in death. In milder cases, asphyctic crises do not occur except in muscle relaxation just as the infant is getting off to sleep. This is followed by the baby being woken up, by an increase in muscle tone and by the subsequent feeling of relief. Failure to provide undelayed therapeutical aid is soon bound to bring on maximum respiratory muscle fatigue, severe asphyxia and suffocation. A number of cases, however, are seen taking an entirely asymptomatic course, or else are discovered accidentally at the time of palatal surgery (severe cases of malocclusion). Or else, the presence of the Pierre Robin syndrome fails to be thought of in cases of severe asphyxia and the neonate dies in the hands of the physician, the nurse, or the mother with the diagnosis of debilitas

vitae. Asphyxia occurs as a result of retrognathia and glossoptosis pressing against the epiglottis and thus obliterating the airways. In many cases, asphyxia develops just because the ptotic, underdeveloped tongue, in simultaneous retrognathia, will slip through the cleft in the palate and get stuck on to the posterior wall of the nasopharynx. This is further potentiated by the infant's unsuccessful attempts at respiration so that a vacuum gradually builds up under clining tongue. The greater the vacuum, the more difficult the expression of the tongue with the condition being aggravated and the neonate's life becoming increasingly endangered. In such cases, life can only be saved by prompt medical intervention.

Bearing in mind the gravity of respiratory disturbances as well as the risk of suffocation in neonates affected by the Pierre Robin syndrome, the authors decided to gear their attention to the possibilities of respiratory disorder management explored as part of their own experience and as a result of comparing it with data available in world literature.

MATERIAL

The author's experience is based on the successful treatment of 13 cases of the Pierre Robin syndrome in the period spanned by 1966 and 1976 (i.e. the past ten years).

Three of the cases involved sporadic asphyxia due to upper respiratory tract obturation caused by retroposed tongue and mandible, the other ten cases involved severe acute asphyxia due to the tongue slipping through the cleft palate and becoming stuck on to the posterior wall of the nasopharynx. Management of all the 13 cases proved to be possible thanks to close cooperation involving the neonatal ward, the orthodontist and the plastic surgeon.

METHOD

Theoretically speaking, a whole number of orthodontic and, in particular, surgical methods of therapy are available.

1. Orthodontic technique consists in the application of various types of obturators (Pielou and Allen, 1968); these however, are no longer regarded as effective and their use is on the decline.

2. Surgical operations on the tongue — glossopexy:

- a) Beverley Douglas operation: fixation of the tongue to the mucosa of the lower lip by means of book flaps supplemented by horizontal mattress suture passing from the middle third of the tongue via a button all along the tongue as far as the middle portion of the lower lip.

- b) Blocker-Lewis operation: suspension of the tongue from its root to the symphysis mandibulae by means of fascia lata.

3. Surgical operations on the mandible:

- a) Hadley operation — mandibular suspension by means of Kirschner's wire inserted through both mandibular angles.

b) Eschler operation (Eschler, 1969): transposition of the anterior portion of the masseter from the body of the mandible into the region of ramus ascendens mandibulae — knowns as "dorsal masseter transposition".

4. Tracheostomy.

Our own experience can be summed up as a clear rejection of sticking to merely one routine surgical approach. In our practical work we were able to see the importance of an early management of the asphyctic crisis in order to prevent any possible damage to cerebral tissue as a result of anoxia. As soon as an attack of asphyxia is diagnosed as being part of the Pierre Robin syn-

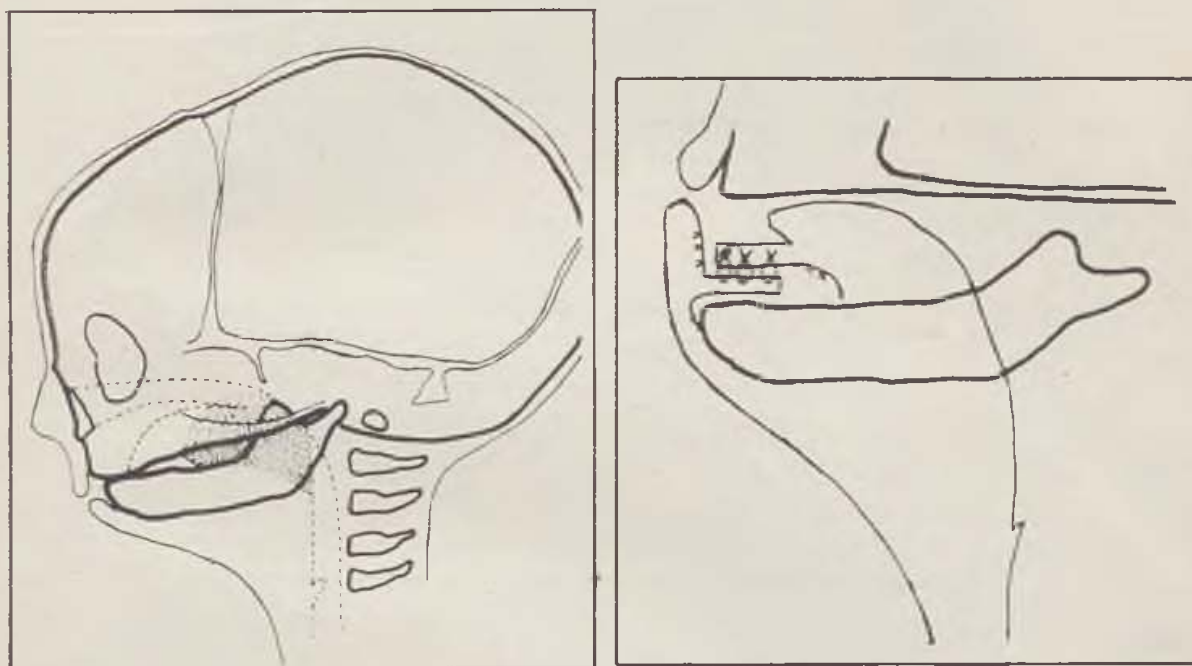


Fig. 1. Schematic representation of micro- and retrognathia as well as mandibular hypoplasia in the Pierre Robin syndrome

Fig. 2. Schematic representation of glossopexy in the Pierre Robin syndrome

drome, unblocking the respiratory tract by the expression of the tongue is immediately attempted, either manually or with the aid of instruments. In case the tongue is too firmly impressed to the nasopharynx, success is hard to achieve, in which situation an attempt is made to overcome the barrier by means of a catheter introduced through the nasal airway in between the posterior nasopharyngeal wall and the impressed tongue, though this may not always lead to success either. Where the above listed attempts fail, emergency decisions must be made without delay. At most of the non-surgical medical institutions tracheostomy can hardly be performed for technical reasons, which is why we prefer a simpler way: using a thick transfusion needle, we puncture the cricothyroid membrane to eliminate the vacuum under the impressed tongue, which, at the same time, makes it possible to provide the neonate with adequate oxygen supply. Simultaneously, another, assisting

worker will inform the nearest department of plastic surgery, arrange transport etc. so that the baby patient can be put on to the operating table immediately on arrival at the plastic surgery ward.

TECHNIQUES OF OPERATION

In five of the cases reported on, glossopexy was performed, namely the Wang-Macomber modification of the Gouglas operation. Since in almost each case the parents, fearing the loss of their child, failed to report for an elimination of the glossopexy in the period between the 10th and 18th months, which often resulted in severely deformed dentition, we decided to refrain

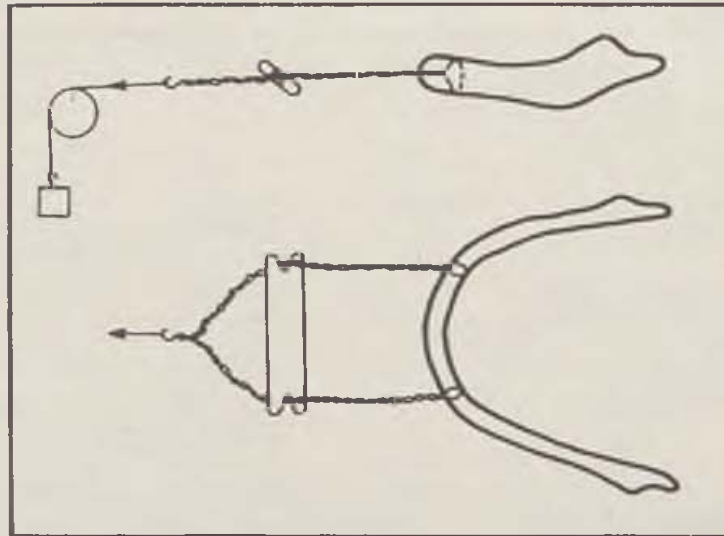


Fig. 3. Schematic representation of our own method of mandibular traction in the Pierre Robin syndrome

from the operation; instead, we began to use anterior mandibular suspension using Kirschner's wire. Medial suspension did not seem particularly suitable to achieve mandibular traction. Therefore, in cooperation with an orthodontist, we treated the remaining six cases by using a double anterior suspension of the mandible by means of Kirschner's wire which provided traction lasting, on the average, six months. The most effective method of making sure if the period of time of mandibular traction is sufficient consists in repeated attempts at releasing the traction while the neonate is asleep. If normal respiration is maintained even while the infant is fast asleep and if even after repeated attempts to release the traction there are no signs of asphyxia or cyanosis, the pull exerted on Kirschner's wires can first be eased and then, provided no respiratory embarrassment develops within the following week or so, the wires are finally removed.

Proper feeding care is extremely important while the traction is on. The newborn infant should be spoon-fed as soon as possible. Tube feeding ought to be seen as a necessary evil and the time needed for it cut down to a minimum. Hospital nursing is therefore extremely important and can, with success,

be combined with the mother's own care. All subsequent care is very much like care for children with clefts, since proper primary care is soon followed by improvement in the profile of the skeletal bones with the tongue assuming its normal position and size. Cleft palate should not be surgically corrected until in the 3rd year of the child's life.

DISCUSSION

A comparison between literary data and the authors' own experience suggests that:

a) in field practice, the life of a newborn infant in acute asphyxia due to the Pierre Robin syndrome (as well as any possible adverse consequences caused by cerebral anoxia) can be saved provided resolute steps are taken such as expression of the tongue, mandibular traction all through the length of the body of the mandible and, in emergencies, coniotomy using a thick transfusion needle as a temporary substitution for tracheostomy. After such operations, the infant should be transferred to hospital as soon as possible.

b) in top clinical practice, the authors are in favour of double suspension and traction of the mandible using Kirschner's wire for a minimum of the time necessary. This is an extremely simple and rapid method with no need to use narcosis and without any late unfavourable consequences.

c) the authors are definitely against complicated, sometimes even dubious or dangerous methods of operation such as the Blocker-Lewis technique, Hadley's technique, Eschler's technique, tracheostomy etc. Although the authors have no practical experience of the above techniques, they do not seem to be in keeping with the principles of physiological surgery judging by the authors' general views and experience in paediatric plastic surgery. The main principle to be observed in the treatment of the Pierre Robin syndrome must be maximum effectiveness at the cost of a minimum of early or late risk for the individual affected.

J. H.

SUMMARY

The possibilities of the management of acute asphyxia are discussed in the Pierre Robin syndrome, a relatively rare developmental defect. The authors' experience is based on 13 cases treated by them, all of them with success. The results achieved so far suggest the possibilities of the management of emergencies using relatively simple surgery with a minimum of risk. They recommend priority to be given to the method of double mandibular suspension using Kirschner's wire.

RÉSUMÉ

Syndrome de Pierre Robin

A. Kipikaša, E. Potocká

Dans leur travail les auteurs se sont orientés vers la possibilité de supprimer l'asphyxie aiguë dans un défaut de développement qui est relativement peu connu — le syndrome de Pierre Robin. Leurs expériences s'appuient sur 13 cas traités dont tous

étaient couronnés de succès. En conséquence des effets obtenus ils font remarquer la possibilité de supprimer l'accident menaçant la vie par une intervention chirurgicale relativement simple à un risque minimum. Dans le traitement ils recommandent de préférer la méthode d'une double suspension à l'aide du fil de Kirschner.

ZUSAMMENFASSUNG

Das Pierre-Robinsche Syndrom

A. Kipikaša, E. Potocká

In der Arbeit untersuchten die Autoren die Möglichkeiten der Bewältigung akuter Asphyxie bei dem wenig bekannten Entwicklungsdefekt, dem Pierre-Robinschen Syndrom. Ihre Erfahrungen beruhen auf 13 gelösten Fällen, von denen alle erfolgreich waren. Auf Grund der gewonnenen Ergebnisse weisen die Autoren auf die Möglichkeiten der Bewältigung des lebensbedrohenden Vorfalls durch verhältnismässig einfachen chirurgischen Eingriff mit minimalem Risiko hin. Bei der Lösung empfehlen sie die Methodik der zweifachen Einhangung mit Hilfe des Kirschner-Drahtes zu bevorzugen.

RESUMEN

El síndrome de Pierre Rubino

A. Kipikaša, E. Potocká

En esta obra los autores se ocuparon de la posibilidad como suprimir la asfixia aguda en el defecto evolutivo relativamente menos conocido — en el síndrome de Rubino. Sus experiencias se apoyan en 13 casos tratados de los cuales todos fueron exitosos. En base de los resultados conseguidos muestran las posibilidades de como suprimir este suceso que amenaza la vida por una intervención quirúrgica relativamente simple con un mínimo de riesgo.

Recomiendan dar preferencia al método de doble suspensión del maxilar inferior mediante el hilo de Kirschner al tratar el caso.

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TOTAL CORRECTIVE RHINOPLASTY BY RHINOMEGALY AND SIDE-DEVIATION OF NOSE PERFORMED IN ONE STEP

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A surgical treatment of rhinomegaly and rhinoscoliosis remains to be a problem of today for two reasons: 1. corrective rhinoplasty is the most frequent operation of the nose, and 2. after the World War II a new trend of corrective nasal operations appeared, i. e. a total (functional) corrective rhinoplasty performed in one step.

An idea of the total one-step corrective rhinoplasty was proposed by Cottle. As a matter of fact, Cottle improved the least demaging methods of corrective septoplasty, introduced a maxillo-premaxillary access in 1958 and thus solved a problem of corrective operations on deformed nasal septum in the frontal part of dorsum nasi and in the region of nasal crista of intermaxilla. Cottle founded a well-proportioned theory of one-step septorhinoplasty involving operation on the whole nasal pyramid and maximally sparing nasal mucosa and osseous-cartilaginous arch of nasal cavity. Having accepted the Cottle's ideas and based on methods of Anderson (1966) and Robin (1973) we devised our own method of total one-step corrective rhinoplasty.

METHOD

1. Planning of corrective rhinoplasty (Fig. 1).

The method of Robin (1973) is used for planning of the operation on nasal kyphosis. However, in contrast to his method, a photograph of the nose is made. The region of septal angle (point A), rhinion (point B) and nasion (point C) are marked with a dye (skin-marking pencil, methylene blue etc.) on epidermis of nasal hump. According to our opinion, the introduction of the three basic points increases security of calculations and of their transposition during the operation. Planning of corrective rhinoplasty of the apical part of the nose, corrective septoplasty and others mostly depend on size and form of the deformity. In such cases the methods of Joseph (1931), Anderson (1966) and Seltzer (1944) are most frequently applied.

2. Anaesthesia. A local anaesthesia is preferred.

3. Technique of the operation.

a) Correction of size, form and localization of apex nasi.

Correction is made from endonasal access according to Anderson (1966). Upper segment of the lateral pedicle and cupola are excised from two sides. Contrary to Anderson, in all cases we transfer a calculated decrease of dorsum nasi to region of septal angle, thus forming a reference point for vertical transcartilaginous incisions [Fig. 2].

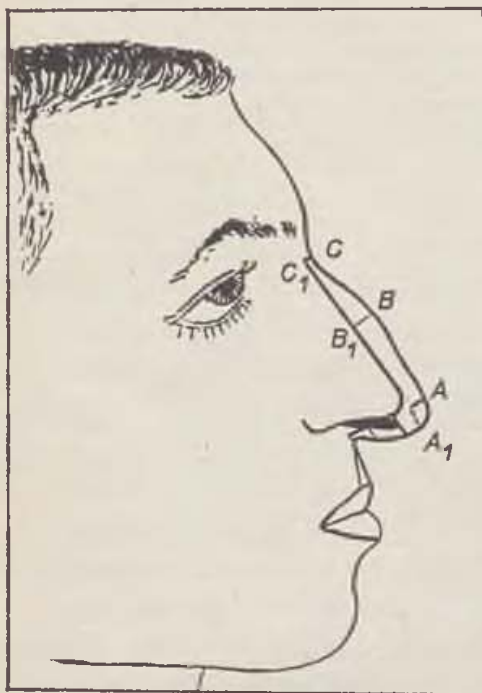


Figure 1. Planning of a corrective rhinoplasty.

b) Correcting septoplasty.

Skeleton of nasal septum is uncovered according to Cottle, while total expoliation of mucoperichondrium is performed only from the curved side. The frontal part of septum is mobilized according to Seltzer's method and the deformity in the form of "C" or "S" is straightened using our method (Madzharov, 1975) (Fig. 3). In the latter case, the incisions of a septal cartilage are 1—2 mm apart, oriented paralelly with dorsum nasi or paralelly with frontal margin of septum. By this way, the septal cartilage is in all its width dissected into small cubes with a side about 1 mm. Thus it is transformed into membrane-like structure, which can be easily straightened. This way of modelling is applied in the deformed zone. When the whole septal cartilage is affected, the incisions are 3—4 mm apart and reaching only to $\frac{2}{3}$ — $\frac{3}{4}$ of the cartilage's width, so that the frontal upper and lower margins of septal cartilage are preserved.

c) Extraperichondrial or extraperiosteal kyphectomy.

According to Robin (1973).

d) Shortening of the nose.

It is performed according to Joseph's method, but strictly subperichondrially.

e) Mobilization and straightening of osseous skeleton of nasal pyramid.

For this purpose, a lateral and medial osteotomy with external fracturing is made according to Aufricht [1943]. Contrary to it, we decided to perform osteotomy strictly subperiosteally. The medial osteotomy is followed by described

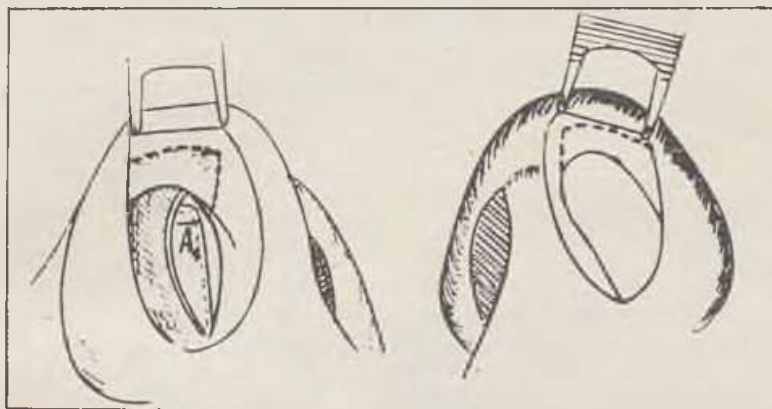


Figure 2. Endonasal access.

extraperiosteal kyphectomy and the lateral osteotomy is followed by removal of periosteum on both sides of frontal process of maxilla in the region of osteotomy (Fig. 4).

f) Final procedures.

The last examination and palpation, excision of the superfluous fat and connective tissue by thickened apex nasi; correction of deformed columella, ala nasi and nasolabial angle; securing of nasal breathing by "stenorhinia anterior"; conchotomy, etc.

g) Endonasal sutures.

Lower posterior margin of septum is sewn to vestibulum nasi and to premaxilla by means of two nylon sutures, going through two holes in a bone, which were previously prepared. According to our opinion, our method of attachment is much more reliable than well-known methods of Holmes [1959], Wright [1961] and Francesconi and Fenili [1973]. Thereafter, mucoperichondrium is sutured above the septal angle using mostly chromed catgut 3—0. Contrary to Jost [1973], the septal cartilage is sewn by mattress suture about 2 mm below the frontal upper margin of septum. In this way, a mucosal wrapping in the region of the septal angle is prevented. If necessary, the split apex nasi is narrowed using mattress suture (catgut 4—0). The endonasal incisions in the vestibulum nasi should be sutured with catgut 6—0.

4. Endonasal tamponade and external fixation by means of leucoplast strips and plaster bandage.

MATERIAL AND RESULTS

The total corrective rhinoplasty was performed by 160 patients: 60 patients were operated on according to routine Joseph's method, 100 patients were treated by our method of total one-step corrective rhinoplasty. The examination of the long-term results revealed significantly higher percentage of goods results, if one-step corrective rhinoplasty was performed (84 %), than by patients operated according to Joseph's method (50 %). In addition to it, the number of only satisfactory results decreased from 37.5 % to 11 % and the

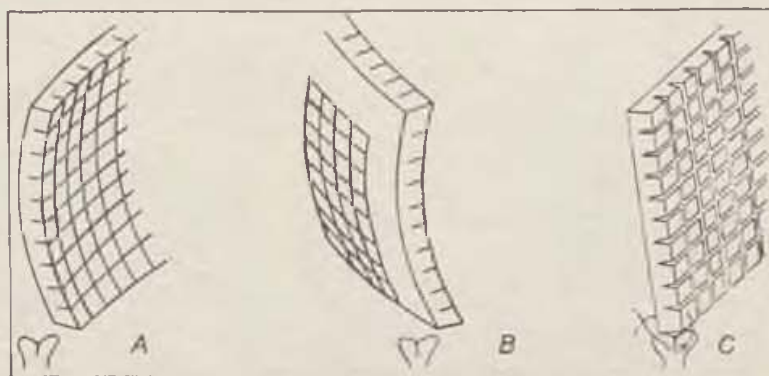


Figure 3. Straightening of a septal cartilage.

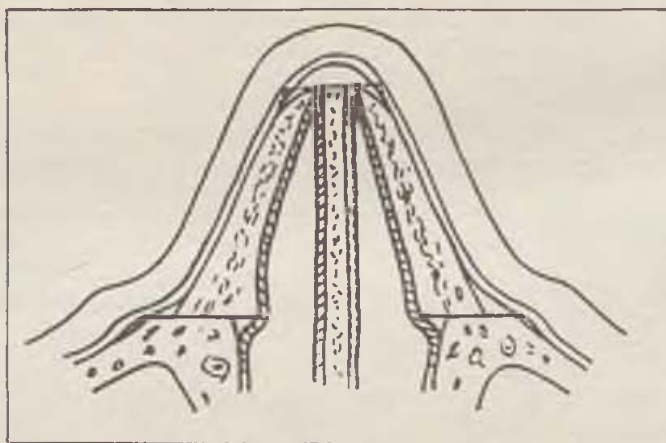


Figure 4. Subperiosteal lateral and medial osteotomy of nose.

number of bad results decreased from 12.5 % to 5 %. A comparison of frequencies of early (95.6 %) and late good results showed a tendency to lower percentage (84 %) of good results also in a sample operated according to our method. Therefore, the patients with corrective rhinoplasty should be actively further followed and adequate care of them should be taken even after their discharge from the hospital. Cosmetic and functional results are reported in respect to patient's own and his associates' estimation, clinical examination, rhinomanometry and olphactomery. Such an examination was made approximately by a half of all patients.



Figure 5. Combined nasal deformity (scoliosis, saddle, hump and deviation of a septum):
a) before operation, b) after operation.

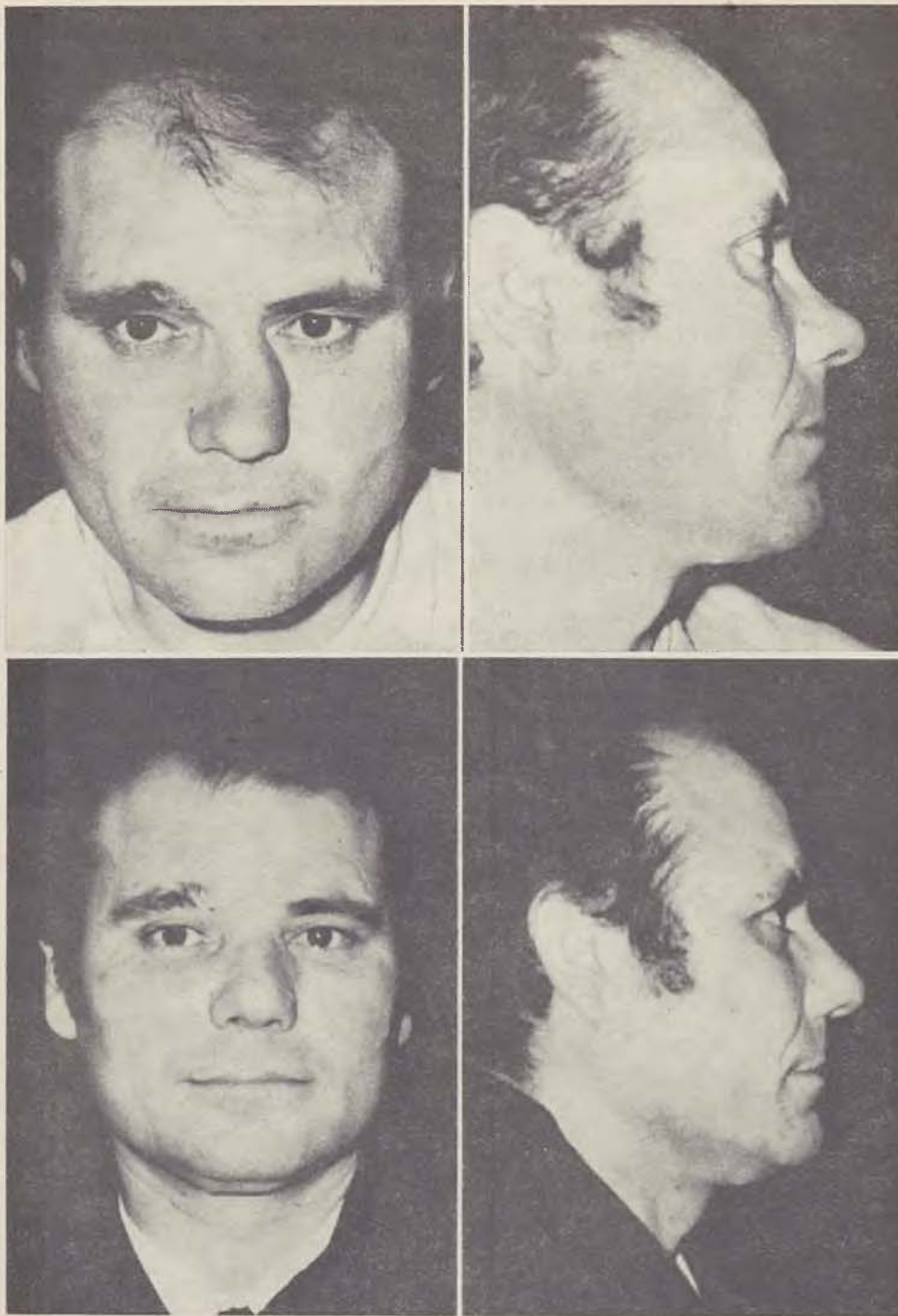


Figure 6. A Roman nose: a) before operation, b) after operation.

CONCLUSIONS

The application of our method of total one-step corrective rhinoplasty by rhinomegaly and rhinoscoliosis led to good cosmetic and functional results (Figs. 5 and 6). It is mainly due to exact planning and least damaging approach to soft and hard tissues during the operation. According to our opinion, the modifications of several steps of the operation also contributed to improvement of the results.

The recommended reimplantation of the nasal hump (Cottle, 1954; Skoog, 1966) is not, according to our experience, only one choice, as by 100 operated patients no case of an "uncovered nasal roof syndrome" was observed. When the excised nasal hump is reimplanted, the preoperative calculations of lowering the nasal profile should be obligatory. Otherwise, formation of the correct profile would be always uncertain. M. T.

SUMMARY

The author's method of total one-step corrective rhinoplasty by rhinomegaly and side-deviation of nose was proposed. The main steps of the method were described. The author suggested his own method of planning of the operation, cross-incisions of cartilage, subperiosteal lateral osteotomy, endonasal suture of septal cartilage etc., which render the corrective rhinoplasty more accurate and less damaging.

The method of total one-step corrective rhinoplasty was used by 100 patients. By 95 % of them, good cosmetic and functional effects were achieved.

RÉSUMÉ

Rhinoplastie correctrice totale à une étape dans la rhinomégalie et dans la déviation latérale du nez

M. Madjarov

L'auteur présente sa propre méthode de la rhinoplastie correctrice totale à une étape dans la rhinomégalie et dans la déviation latérale du nez. On décrit les points principaux du procédé d'opération. L'auteur propose sa propre méthode de planifier l'opération, de faire l'excision en croix du cartilage de septum, l'ostéotomie subpériostéale latérale, la suture endonasale du cartilage de septum etc. Celle-ci rend la rhinoplastie correctrice plus précise et plus délicate.

On a opéré 100 patients d'après la méthode de rhinoplastie correctrice totale à une étape. Il y avait de bons résultats cosmétiques et fonctionnels en 95 p. 100 des cas.

ZUSAMMENFASSUNG

Totale korrektive Einetappenrhinoplastik bei Rhinomegalie und Seitendeviation der Nase

M. Madscharow

Der Autor legt vor seine eigene Methodik der totalen korrektiven Einetappenrhinoplastik bei Rhinomegalie und Seitendeviation der Nase. Der Autor schlägt vor die eigen-

tlliche Methode der Operationsplanung, des Kreuzschnittes des Septumknorpels, der subperiostalen lateralen Osteotomie, der Endonasalsutur des Septumknorpels etc, die korrektive Rhinoplastik genauer und schonender macht.

Mittels der Methode der totalen korrektiven Einetappenrhinoplastik wurden 100 patienten operiert. In 95 % der Falle sind gute kosmetische und funktionnelle Ergebnisse erzielt worden.

RESUMEN

Rinoplastia corectiva total de una etapa en la rinomegalia y en la desviación lateral de la nariz

M. Madzarov

El autor presenta su propio método de la rinoplastia corectiva total de una etapa en la rinomegalia y en la desviación lateral de la nariz. Están descriptos los puntos principales del procedimiento operatorio. El autor propone su propio método de planear la operación del corte cruzado del cartilago septal, de la osteotomia subperiostal lateral, de la sutura endonasal del cartilago septal etc., que hacen la rinoplastia corectiva más precisa y más delicada.

Fueron operados 100 pacientes según el método de la rinoplastia corectiva total de una etapa. Resultados buenos cosméticos y de función fueron hallados en 95 % de este número.

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A CASE OF HETEROTROPIC OSSIFICATION IN THE HIP JOINT AREA FOLLOWING SKIN BURN

V. KUBÁČEK, M. FAIT, J. POUL

The problems of bone changes resulting from burns have been dealt with in detail in a number of works by Czechoslovakia's own authors such as Kolář, Vrabec, Šváb, and others. As regards world literature, the problem can be said to have received a most exhaustive treatment.

According to Kolář, changes resulting from burns can be divided in three groups. I. — changes confined to the bones, II. — changes affecting the joints, III. — changes in periarticular and other soft tissues. According to the author, the purely bone changes include: a) osteoporosis, b) the Sudeck syndrome, c) bone necrosis, d) periosteal bone neoplasia, e) osteolysis, f) bone growth disorders.

According to Kolář (1957), changes affecting periarticular tissue in the sense of calcification or ossification occur in 3.1 % of burn cases. The most frequently affected parts are the areas of the elbow, knee, and ankles, while hip joint or shoulder involvement is rather rare.

Evans et al. (1968) put their rate of incidence at 2 to 3 % of all severe burns. A communication by Munster et al. (1972), who investigated 100 patients with upper extremity burns to follow up by regular check-ups the development of heterotopica calcifications or ossifications in the elbow joint region, suggests that such changes, whether temporary or permanent, are liable to develop in about 13.6 % patients. Two points to be taken into account are that the elbow joint area in general shows an inclination to such changes in all types of physical trauma, and further that spontaneously resolving forms of calcification were also found and registered.

The pathogenetic mechanism of the development of heterotrophic calcifications and ossifications has not yet been convincingly accounted for. One possible explanation involves primary damage to tissue with calcium deposition in it as a secondary feature. Secondary infection of the burned area,

local circulation disorders with simultaneous changes throughout the body, no doubt, have an important role to play there, too. The above phenomena can also be explained in terms of Selye's theory of calciphylaxis.

Boyd [1959] insists that no surgical removal of paraarticular ossification is indicated as the whole formation is bound to be newly formed within three months with more movement limitation than before. In contrast, Evans et al. [1968] maintain that heterotropic ossifications had better be removed within



Fig. 1, 2, 3. Scarry changes following skin burns

an adequate period of time. The view presupposed the existence of other properties in such formations than in post-traumatic ossifications.

This should in no way detract from the significance of prevention to see that such changes do develop in general. Prevention includes, first and foremost, barring infection of the burned area, timely covering with skin grafts, mobilization of the at-risk joint using active exercise but eliminating forcible passive exercise which can only case more traumatization in the tissues affected.

Recently, we came across heterotropic ossification as a result of scalds in patient D.L. who fell into a pot of boiling water at the age of three and suffered 2nd and 3rd degree scalds in the lower portion of her body. She received treatment at a surgical ward and, on release, was able to live without any complaints for a longer period of time.

When she was 8, her parents noticed a limp in her left lower extremity. With regard to extensive scarring on both her lower extremities which gave

the impression of left hip joint contracture in flexion, the girl was recommended for admission at the department of plastic surgery in Brno for a surgical correction of the contracting scars. An X-ray picture of the hip joints revealed a consolidation suggesting heterotopic ossification. The patient was transferred to the department of paediatric orthopaedics.



Fig. 4. Bony formation extirpated in toto

The patient's condition on admission: extensive plastic scars found all over the skin of the trunk and lower extremities (Fig. 1, 2, 3). A pronounced flexion-adduction contracture was found in the left hip joint (ext./fl. $0^{\circ}/30^{\circ}/$



Fig. 5. State prior to surgery (deep consolidation extending along the upper edge of the neck from the greater trochanter to acetabulum)

45° ; abd./add. $0^{\circ}/20^{\circ}/20^{\circ}$; ZR/VR $0^{\circ}/10^{\circ}/10^{\circ}$). The right-side hip joint permitted free movement. Basic laboratory tests were well within normal values. Tomographical investigation of the left-side hip joint: extension and deepening of the acetabulum, head flattening and decalcination, with the head sunk lower

into the cotyloid cavity, the neck thickened, and the presence of a deep striped consolidation extending from the greater trochanter along the upper end of the neck towards the outer edge of the acetabulum (Fig. 5).

Surgical operation was decided on as a joint action of the specialists of both departments, particularly in view of the X-ray and clinical findings. Under general anaesthesia, angular incision to the left, incision of the subcutis and fascia, trochanteric region exposed. Afterwards, gluteal muscle insertion



Fig. 6. State four years after surgery (no signs of neoplasia at the site where newly developed tissue was removed)

removed from the greater trochanter, the hip joint capsule made visible and, by palpation, osseous tissue found to be extending from the dorsal of the greater trochanter to the dorsal edge of the acetabulum. It had the shape of a small plate with cortex developed and attached to the bones by no more than fibrous tissue. After the whole formation had been extirpated in toto, the range of movement in the hip joint was made considerably greater (Fig. 4).

During a check-up after 4 years, the following range of movement in the left hip joint was found (ext./fl. $10^{\circ}/0^{\circ}/120^{\circ}$; abd./add. $60^{\circ}/0^{\circ}/20^{\circ}$; ZR/VR $40^{\circ}/0^{\circ}/30^{\circ}$). An X-ray picture showed no signs of any such formation developing again (Fig. 6).

The patient feels exxeremely satisfied with her condition.

J. H.

S U M M A R Y

A brief communication warns of the development of heterotropic ossification following burns at an unusual site — in the hip joint area. Hip joint movement limitation was not due to scarry skin contracture after the burns, but to a newly developed bony formation in periarticular tissue. In the authors' view, surgical removal is indicated at an appropriate point in time with the heterotropic osseous tissue fully matured.

RÉSUMÉ

Cas d'une ossification hétérotopique dans la région de l'articulation coxo-fémorale après une brûlure de la peau

V. Kubáček, M. Fait, J. Poul

Avec un court rapport, nous avons voulu appeler l'attention sur la genèse d'une ossification hétérotopique après une brûlure d'une localisation rare, dans la région de l'articulation coxo-fémorale. La réduction du mouvement dans l'articulation coxale n'a pas été causée par la contracture cicatrisée de la peau après la brûlure, mais on a constaté que la cause était une formation osseuse nouvelle créée dans les tissus voisins de l'articulation.

Nous pensons que, dans un espace de temps convenable, qui suppose la maturité du tissu hétérotopique, il y a l'indication pour une ablation opératoire.

ZUSAMMENFASSUNG

Ein Fall von heterotopischer Ossifikation im Bereich des Hüftgelenks nach Hautverbrennung

V. Kubáček, M. Fait, J. Poul

Mit einer kurzen Information wollten wir auf den Beginn einer heterotopischen Ossifikation nach Verbrennung in einer ungewöhnlichen Lokalisation aufmerksam machen, im Bereich des Hüftgelenkes. Die Bewegungseinschränkung im Hüftgelenk wurde nicht durch eine Narbenkontraktur der Haut nach Verbrennung bewirkt und als Ursache wurde eine neugebildete Knochenformation in extraartikulären Geweben festgestellt.

Wir vermuten, dass zu einem zeitlich günstigen Termin, der eine Ausreifung des heterotopischen Knochengewebes voraussetzt, eine Indikation für eine operative Entfernung vorhanden ist.

RESUMEN

Un caso de una osificación heterotópica en la región de la articulación iliaca después de una quemadura de la cutis

V. Kubáček, M. Fait, J. Poul

Con un informe corto queríamos llamar atención a la creación de una osificación heterotópica después de una quemadura en una localización no corriente — en la región de la articulación iliaca. La reducción del movimiento en la articulación iliaca no fue hecha por la contracción cicatrizal de la piel después de la quemadura, sino se ha constatado que la causa de lo mismo fue formación oseosa nuevamente creada en los tejidos alrededor de las articulaciones.

Pensamos que en un espacio de tiempo conveniente, el que supone la madurez del tejido oseoso heterotópico, se muestra la indicación para una ablación operatoria.

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SURGICAL REPAIRMENT OF MAMMARY GLAND SCAR DEFORMITIES CAUSED BY BURN INJURIES

N. P. IVANOVA, L. A. BOLKHOVITINOVA

Posttraumatic deformities of a mammary gland caused by a burn injury are rather rare in comparison with occurrence of other burn injuries. Statistical data are not available.

Although the basic functions of the organism are not disturbed, the capability to work is practically not affected and no invalidity results from the injury, in many cases the defects make women deeply unhappy and leading to feelings of inferiority they influence their psychic condition unfavourably. There exist many reports on surgical treatment of mammary gland anomalies (Pešková 1971, Bames 1950, Berson 1945, Burian 1938, Conway and Smith 1958, Strombeck 1960 etc.), but only several communications are dealing with surgical treatment of deformities caused by burns (Ponomareva 1970, Donitskii 1971, Mukhin 1973).

Large scars on thorax may suppress development of the mammary gland, which is pressed and deformed, may cause limited movements of the arm and often lead to scoliosis.

Therefore, we worked out a special system of the surgical treating measures, in which the patient's age, character of thoracic scar deformities, presence of arm and neck contractures etc., are taken into account.

Our observations were carried on 23 patients. Four girls were 7—10 years old and others were in the age of 15 to 23 years.

If the mammary gland development had not yet started, the aim of the surgical treatment was to remove scars from this region and to form good skin cover, which would not interfere with growth and formation of the mammary gland. The skin plasty performed by means of transferred flaps or Filatov's flap plasty can be used, while local conditions (presence of scar massifs and bands and their localization) are considered. The patients must be followed untill they reach their maturity.

Almost in all patients the mammary gland deformities were combined with contractures of upper extremities and neck and with large scars of the trunk (Fig. 1). Both glands were affected in 5 patients, in 14 patients the scars were present only on one half of thorax. The mammary gland is usually flattened,



Fig. 1. Types of mammary gland deformities



due to stretch applied by scars, and moved laterally and distally to the level of the 8th—10th rib. In most cases the glands were deformed by scar bands. A mastoptosis was observed in two patients, caused by large scars in the lower half of thorax and abdomen. A mammary gland aplasia was not found, however, in one patient a marked hypoplasia of one gland was encountered. In the case of bilateral injury, the glands are mostly moved to the midline and interconnected by scars.

The most complicated problem seems to be the source of available plastic material for treatment of such patients. The skin resources are always limited, especially in the adjacent regions of the trunk. It should be also considered, that the patients need repairment of other deformities and contractures, as well. Therefore, we usually use free skin autografts for operations on mammary glands.

An analysis of results obtained by treatment of adult patients suffering from this kind of injury led us to conclusion that it was purposeful to create a mammary gland not sooner than contractures of upper extremities and neck had been repaired and stretching bands of scars in the mammary region of the trunk had been removed. Formation of good skin cover of the gland is of great significance, as it is an inevitable condition of construction and modelling of the gland (mammaplasty). It is very important to remove stretching and pressing scars of the altered skin. If it is impossible to remove massive scars surgically, a massage is used with the aim to release the scars by their lengthening and by pulling out the skin. Finally, deformities are removed and the breast is created.

A history of some patients will be described as an example.

Patient P., 10 years old, firstly came to the institute in 1968. She had large keloid scars of upper extremities and trunk. Large scars in the neck region caused contractures of both shoulder joints of the IIIrd—IVth degree and flexion contractures of elbow joints of the IInd degree (according to Parin).

Results of examination made after admission to the hospital: The head is bended to the neck due to attraction by a large keloid massif arising from the chin. All the anterior surface of chest is covered by keloid scars. The transferred flaps are surrounded by scars resembling twisted tights. The scar massif goes over to shoulder joints, limiting abduction of arms. Scar bands proceed to forearm, causing flexion contractures of elbow joints (Fig. 2a). The scars are bright red, firm, their surface is glossy. The girl is bothered by itching, pains in scars and defective movements of joints. She was intermittently treated in our department till 1973 and five times was hospitalized.

An operation on the neck was performed in 1968: excision of scars and free skin plasty. In the postoperative period the neck was fixed by a plastic cast.

The second operation was: excision of scars in the region of the left shoulder, release of the contracture and the free skin plasty. The contracture of the left elbow joint was released simultaneously. Subsequently, the girl was permitted to go home, obtained two series of Pyrogenal injections and performed therapeutic gymnastics.

The next step was operation on the right shoulder and elbow joints (October 15, 1969): excision of scars in the region below the muscles, plasty by means of a free autograft; excision of scar band in the elbow region, plasty

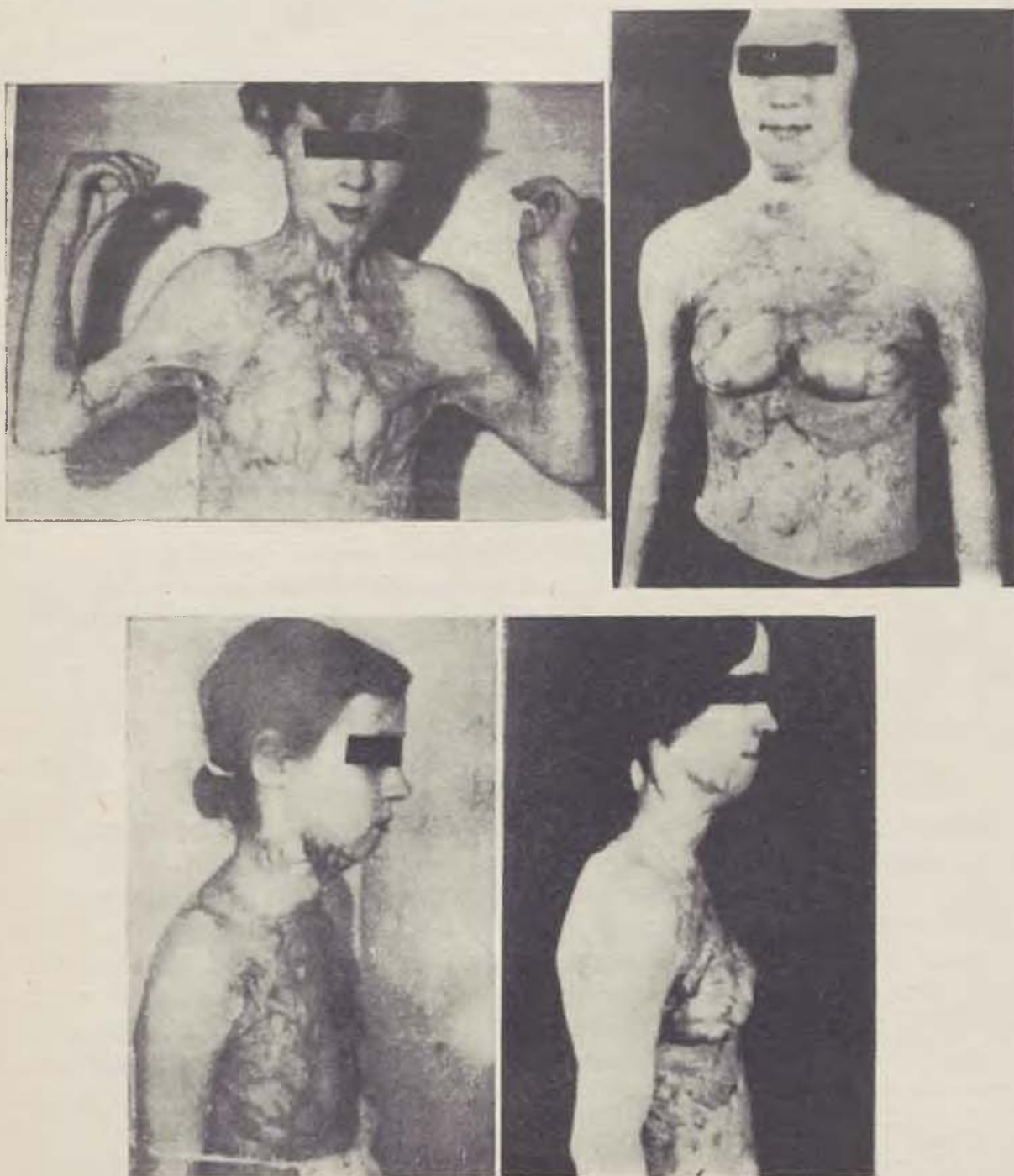


Fig. 2. Patient P., before and after treatment of numerous contractures and deformities caused by burn injury

utilizing local tissues (complementary flaps from the opposite sides). In the time period preceding operation a series of Pyrogenal injections was applied and therapeutic gymnastics, massage and mud cure were performed. The

operation resulted in full recovery of elbow joint movements, abduction in right shoulder joint was as much as 130° . However, the graft transferred to the neck was transformed to a scar and a deformity of a lesser degree developed.

On the 25th November, 1970, the operation on the neck was repeated: excision of scars, release of the flexion contracture. The skin defect was covered by two flaps on pedicles, taken from suprascapular and upper pectoral regions. A wound on chest was covered by a free autograft (Fig. 2b).

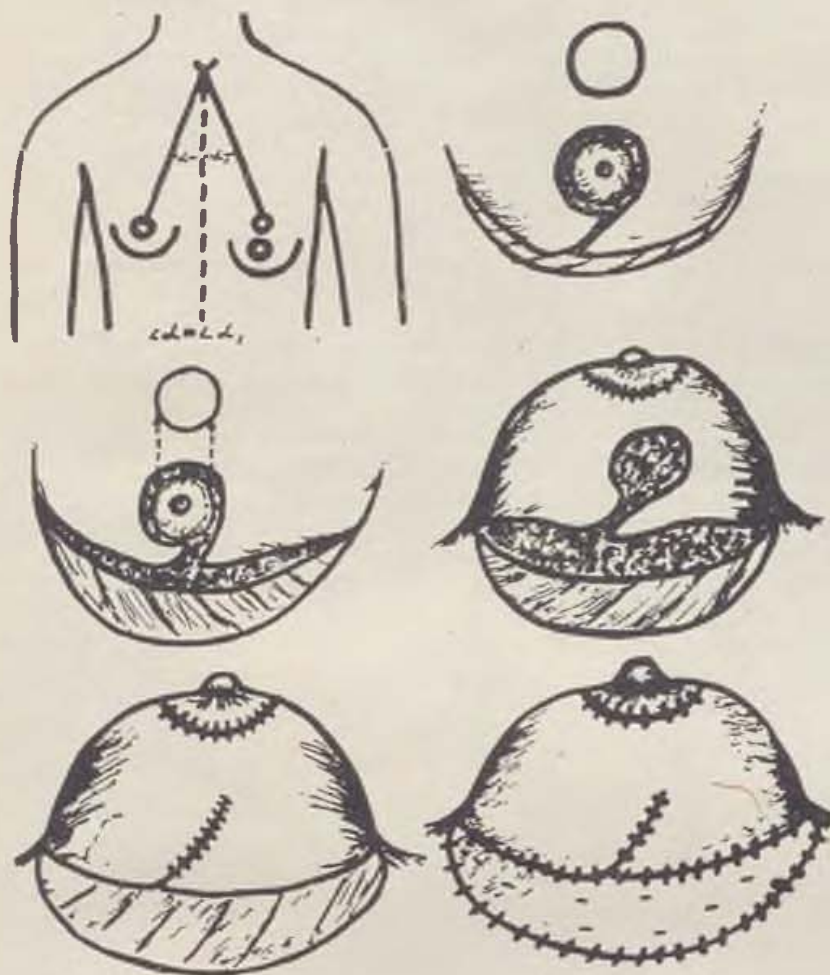


Fig. 3. Surgical removal of mammary gland deformity caused by burn injury, shown diagrammatically

An uneven healing of the flaps' margins led to development of a shrinking keloid scar inbetween the flaps. Therefore, another operation was performed on June 20, 1972: excision of a scar, plasty by means of transferred triangular flaps. Another series of Pyrogenal injections was given to the patient. She regularly performed gymnastics and massage of scars on the chest. A mud cure was repeated.

The girl strengthened during the time and development of mammary glands started in the age of 13. However, their normal formation was disturbed by presence of shrinking scars. On February 7, 1973, an operation of mammary glands was done: they were liberated from the scars as much as possible and

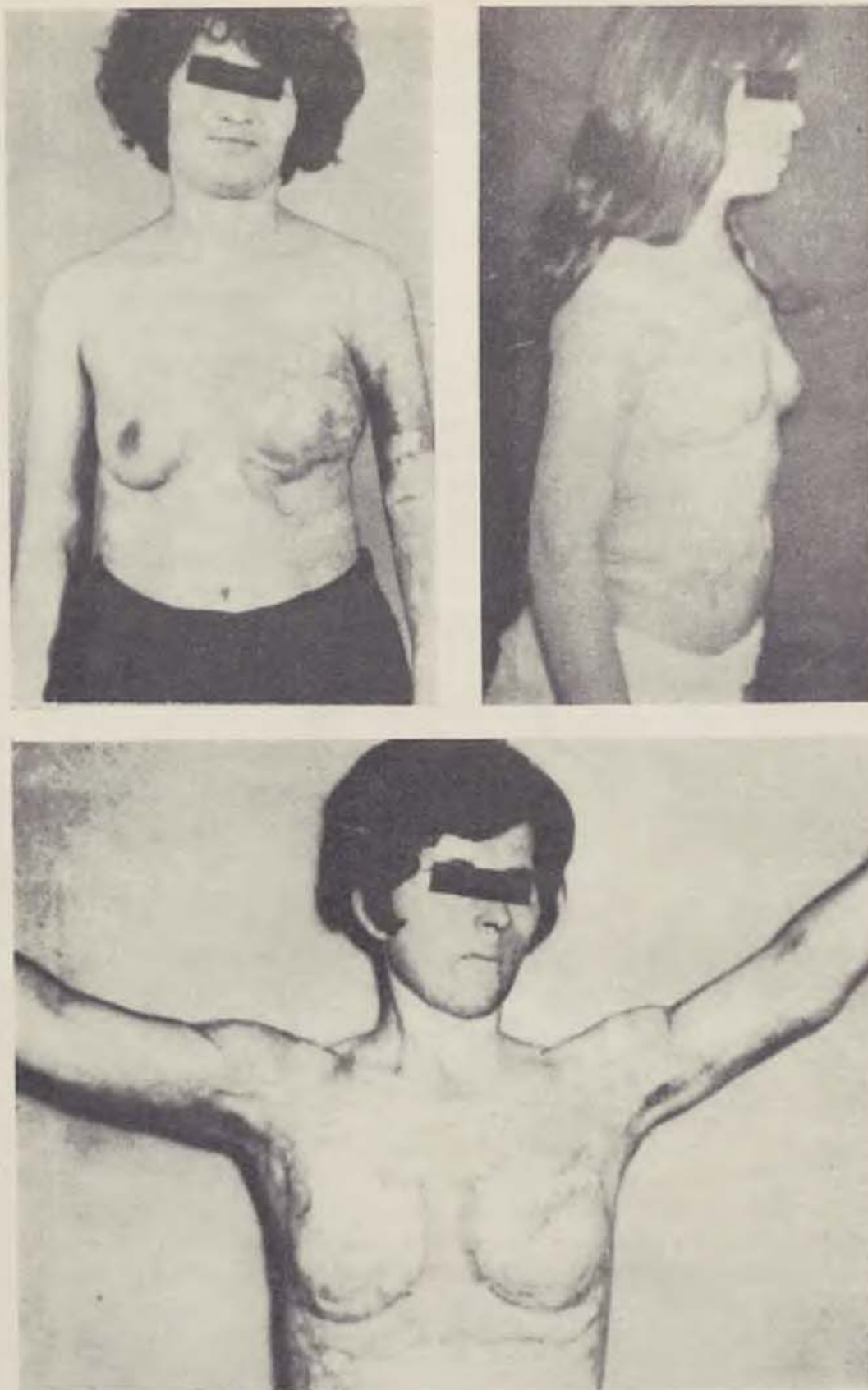


Fig. 4. The results of surgical treatment of mammary gland deformities. (The same patients are shown on Fig. 1 in the state before operation)

a free skin plasty was performed. A linear incision was led along the midline of the trunk from the upper border of mammary glands downwards. On the level of their lower border the incision continued in two opposite directions and encircled both mammary glands from below. The glands were liberated, moved upwards and slightly laterally. Their lower pole was formed. On the chest remained a wound of irregular butterfly-like form, which was covered by three split skin flaps of $\frac{3}{4}$ thickness. Postoperative period ran smoothly. Thus, the treatment of the patient, consisting of many steps, was completed: the contractures of shoulder and elbow joints were fully released, the form of a neck was restored, the mammary gland deformity was repaired (as much as possible; Fig. 2c, d).

If the mammary gland tissue is preserved, the operation consists of the following steps: A preliminary position of the nipple and of the breast is chosen; if both breasts are deformed, the level of nipples is placed approximately in the middle of humerus, otherwise a normal breast serves as a reference point. All the tissue above the muscles is cut in the form of a semicircular incision slightly below the level of the breast displaced downwards. The areola is encircled by a circular incision reaching to the connective tissue. An area of the skin is removed in the region of the planned nipple, being slightly smaller than is the size of the nipple. The epidermis and subcutaneous connective tissue are cut from the lower border of areola to the semicircular incision below the gland. The flaps that have been formed are carefully separated from the lower segment of the gland. The gland together with connective tissue underneath it is separated from the muscle and is moved upwards. The nipple and areola are transferred together through a tunnel to the previously prepared place and are sutured to the borders of a wound. As far as possible, a shaping of the breast is done by means of sutures going through it in the transversal direction underneath the nipple. The mammary gland is suspended on two flaps (skin with subcutaneous-fat tissue layer) that are formed from its caudal-lateral surfaces (Fig. 3). The defects remaining on the chest wall after displacement of the mammary gland and after creation of the flaps are covered by free skin autografts (almost of full thickness), which are sutured to the borders of the wounds.

The bilateral deformity is treated successively — after one correction having been completed the another one is operated on. However, recently we make both operations simultaneously.

After the operation, the patient has to stay in a bed for 3 weeks and antibiotics are applied.

Among complications observed by the patients, a marginal necrosis of the lateral flaps, on which the breast was suspended (3 patients) and dystrophic processes in the free autograft (4 patients), should be mentioned. However, these complications did not influence the final result of the surgical treatment (Fig. 4).

M. T.

SUMMARY

Surgical treatment of mammary gland deformities caused by burn injuries was described. The total of 23 patients in the age of 7—23 years was followed. The long-term observations indicated that the glandular tissue usually is not damaged by injury of this kind. Massive scars interfere with normal development of the mammary gland and cause its deformation. It is necessary to follow up regularly the girls, who suffered from burn injury of the anterior chest wall. Early surgical treatment enables normal development of mammary glands. The method of choice is free skin grafting. The bilateral deformity can be treated simultaneously, thus shortening the period of treatment considerably. According to our opinion, it is important to remove in the first place the deformed parts and pulling scars on the neck, upper extremities, chest and abdomen. Then the good results can be achieved.

RÉSUMÉ

Traitement opératoire des déformations cicatrisées de la glande mammaire après la brûlure

N. P. Ivanova, L. A. Bolkhovitinova

Nous avons décrit le traitement des déformations de la glande mammaire causées par la brûlure. Nous avons examiné 23 femmes malades en âge de 7 à 23 ans. Les observations de longue durée ont démontré que, d'habitude, le tissu propre de la glande mammaire n'était pas altéré, s'il s'agit de cette lésion-ci. Les cicatrices étendues empêchent le développement normal de la glande et sont à l'origine de sa déformation. C'est dans un dispensaire ou il faut se préoccuper des jeunes filles ayant la paroi antérieure du thorax brûlée. L'opération opportune permet le développement normal des glandes mammaires par la méthode d'une plastie cutanée libre. L'atteinte bilatérale peut être corrigée pendant une opération ce qui raccourcit considérablement le temps de traitement. D'après nos expériences, il faut tout d'abord éliminer les déformations et les cicatrices contractant dans la région du cou, des extrémités supérieures, du thorax et de l'abdomen pour pouvoir obtenir de bons résultats.

ZUSAMMENFASSUNG

Operative Behandlung der Narbendeformationen der Milchdrüse nach Verbrennung

N. P. Iwanowa, L. A. Bolchowitinowa

Wir haben die Behandlung der Deformationen der Milchdrüse beschrieben, die durch Verbrennung entstanden. Wir untersuchten 23 Patientinnen im Alter von 7—23 Jahren. Langfristige Beobachtungen zeigten, dass das eigentliche Gewebe der Milchdrüse bei dieser Art der Verletzung in der Regel nicht geschädigt ist. Umfangreiche Narben verhindern die normale Entwicklung der Drüse und deformieren sie. Es ist nötig, Mädchen mit verbrannter Vorderwand des Brustkorbes in Dispensairebetreuung zu nehmen. Eine frühzeitige Operation ermöglicht normale Entwicklung der Milchdrüsen. Die Methode der Wahl bei Operationen an der Milchdrüse ist die freie Haupt-

plastik. Beiderseitige Läsion kann durch eine einzige Operation korrigiert werden, was die Behandlungsdauer wesentlich verkürzt. Nach unseren Erfahrungen ist es nötig, erst die Deformationen und kontrahierenden Narben im Bereich des Halses, der oberen Extremitäten, des Brustkorbes und Bauches zu entfernen, um gute Ergebnisse zu gewinnen.

RESUMEN

Tratamiento operativo de deformaciones cicatrizales de la glándula mamaria después de una quemadura

N. P. Ivanova, L. A. Boljovitinova

Hemos descrito el tratamiento de las deformaciones de la glándula mamaria hechas por una quemadura. Fueron observados 23 pacientes en la edad de 7—23 años. Una observación de larga duración mostró que el tejido propio de la glándula mamaria generalmente no estaba dañado en este tipo de lesión. Las cicatrices vastas impiden el desarrollo normal de la glándula y son origen de la deformación de la misma. Es necesario en dispensarios ocuparse de las muchachas con la pared anterior del pecho quemada. Una operación oportuna hace posible un desarrollo normal de las glándulas mamarias.

Es la plástica cutánea libre que es el método para elegir en las operaciones en la glándula mamaria. Una afección bilateral puede ser corregida en una sola operación lo que acorta la duración del tratamiento considerablemente. Según nuestra experiencia hay que primero quitar la deformación y las cicatrices contraentes en la región del cuello, de las extremidades superiores, del tórax y del abdomen para poder acertar resultados buenos.

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CORRECTION OF DEFORMED AREOLA AND INVERTED NIPPLE

NABIL I. ELSAHY

Deformity of the areola, hypertrophy of the scar around it and inversion of the nipple may be encountered as complications of reduction mammoplasty. Reviewing the literature failed to reveal any operative technique that could correct these complications in one stage.

In 1976, I described a new operative technique that corrected inverted nipple (1). The principle of this technique is based upon using two crossed dermal flaps passing through a tunnel in nipple's pedicle. These flaps increase the density of tissue underneath the nipple to help in its protrusion and the act as slings to prevent recurrence of the inversion. Using the same principle, but with a modified technique, correction of deformed areola, excision of hypertrophied scar and correction of inverted nipple may all be achieved with one single operation.

OPERATIVE TECHNIQUE

The skin incision is outlined with methylene blue (Fig. 1). First, a circle is drawn around the areola; then a crescent shaped area is drawn on its medial side within the circle. The nipple is caught by a traction suture and pulled forward. Dissection is carried in along the pedicle of the nipple, cutting fibrous bands and any muscle bundles that restrict the forward pulling out of nipple. The nipple is raised with the surrounding deformed areola. The epithelium of the crescent area is removed, the scar is excised, and a split thickness skin is removed from the remaining area within the circle. The crescent area is then dissected creating two triangular flaps attached to each other at the base and at the medial margin of the circle. The two flaps are sutured side to side using 5—0 chromic catgut. With a small pair of blunt scissors, a small longitudinal tunnel is made through the nipple's pedicle. Polyethylene suture (5—0) is put in the tip of the joined dermal flaps and pulled through the tunnel to the opposite side and stitched to the subcutaneous tissue of the opposite side. The areola is then sutured all around to the created circular defect.

DISCUSSION

If the areola is irregular in shape and small in size, it may be changed to a perfect circle of larger size if it is sutured to a created circular defect. This is due to the great elasticity of the areolar tissue. When the areola and nipple are raised and remain attached to the breast with the nipple's pedicle, they

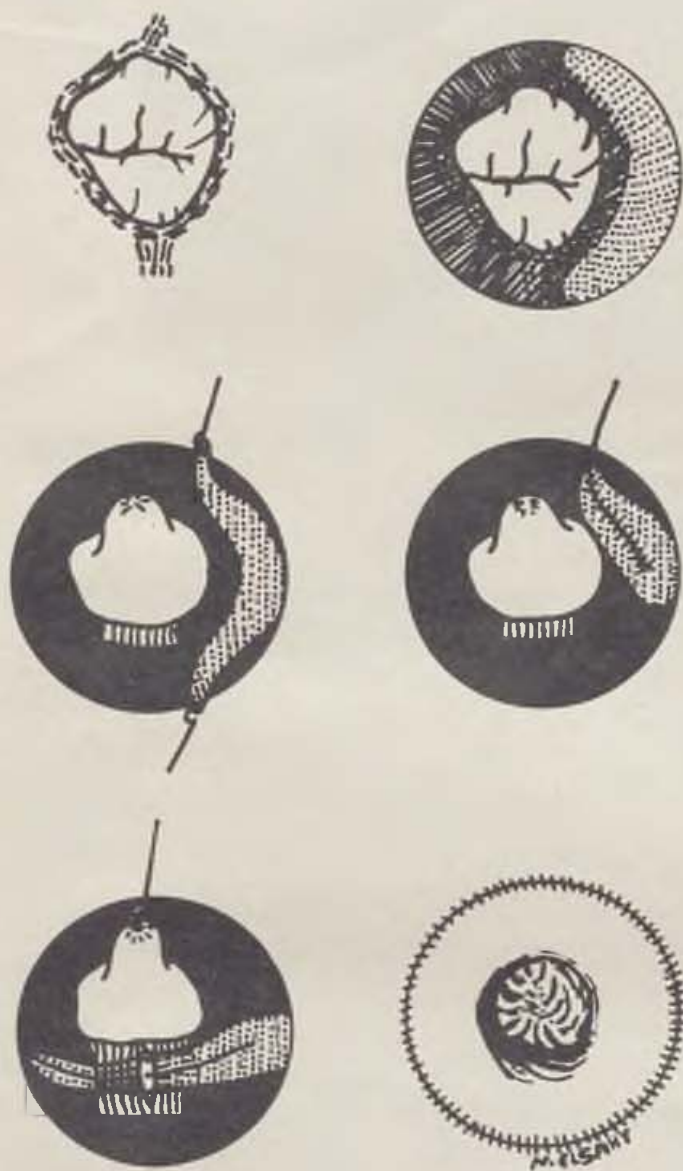


Fig. 1: The Technique. Above left: the deformed areola, the surrounding hypertrophied scar, and the inverted nipple. Above right: the epidermis is removed from the crescent (dotted) area. The scar around the areola is excised. A split thickness skin is removed from the crosshatched area. Middle left: the crescent area is dissected, creating two flaps attached to each other at the base and at the medial margin of the circle. The nipple and areola are raised. Middle right: the two dermal flaps are sutured side to side. Below left: the joined flaps passed through a tunnel in the nipple's pedicle to the opposite side and sutured in place. Below right: the areola is stretched and sutured all around to take the shape of a perfect circle.

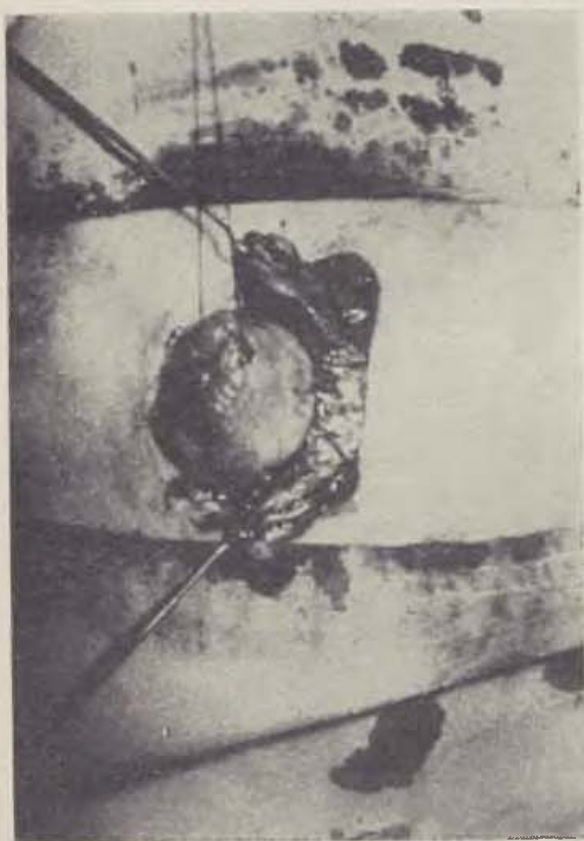
will survive; especially if the areola is then lain on the dermis of the surrounding tissue. The operation is fast and easy and can be done under local anesthesia.

SUMMARY

An operation to correct deformed areola, surrounding hypertrophied scar and inverted nipple in one stage is described.



Fig. 2: 2a. A typical case with a deformed areola, wide scar and inverted nipple



2b. The nipple and areola are raised. The two dermal flaps are dissected
2c. The end result

RÉSUMÉ

Correction de l'aréola déformée et du mamelon enfoncé

Nabil I. Elsayhy

On décrit la correction chirurgicale de l'aréola déformée et du mamelon enfoncé en même temps avec l'écartement des cicatrices hypertrophiées.

ZUSAMMENFASSUNG

Korrektur des deformierten Brustwarzenhofes und der eingezogenen Brustwarze

Nabil I. Elsayhy

Beschrieben wird die chirurgische Korrektur des deformierten Brustwarzenhofes und der eingezogenen Brustwarze mit gleichzeitiger Entfernung hypertrophischer Narben.

RESUMEN

Corrección de la areola deformada y de la tetis hundida

Nabil I. Elsayhy

Está descrita la corrección quirúrgica de la deformación de la areola de la tetis hundida a la vez con la separación de las cicatrices hipertróficas.

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PROBLEMS OF ANAESTHESIA AND ANALGESIA IN BURNS

T. SOTORNÍKOVÁ, K. LEIKEP, M. ADÁMKOVÁ

Burns are always associated with pain which causes discomfort to the patient not only throughout the period of treatment but also long after the burned areas have been healed.

In general terms, pain is by definition a subjective sensation, a cerebral interpretation of afferently conducted peripheral stimuli. Pain perceptivity is different in each individual, with changes in the external environment, the thyroid gland, the adrenal gland, the autonomic nervous system, a number of vasomotor reactions and, last but not least, the condition of the patient's higher nervous activity all taking part in the process.

At the present time, three theories on the development of pain are discussed:

1. Theory of specificity — based on the assumption of the pain stimulus being translated from a specific pain receptor to the brain centre for pain. However, the theory is incomplete; no existence of receptors for pain has yet been conclusively demonstrated.

2. Theory of central summation — regards pain as the result of intensive stimulation of multiple non-specific receptors in space and time. Input modification and central summation are believed to account for different types of pain.

3. Gate control theory — based on the assumption that the substantia gelatinosa cells of the spinal cord modulate impulses travelling from the periphery to the primary central transmission cells which, in turn, stimulate a response-creating system. The theory takes for granted the existence of presynaptic inhibition and presynaptic facilitation to close or open the passage of impulses. Limbic and reticular structure activation then gives rise to a powerful response, emotional in nature, and a discomforting sensation which provokes the body. The perception of pain is due not only to the presence or absence of nociceptive stimuli but quite evidently also to a whole complex of cerebral functions such as fear, anxiety, attention, hypnosis, previous experience and other cognitive processes. All this acts in the form of feedback

on the efferent fibres by way of the cortical connection to influence the input system at spinal cord level; in the form of either opening or closing the "gate". It follows then that pain is perceived on the principle of interaction of the systems involved.

The intensity of pain in the burned patient is determined primarily by the depth and the extent of the area affected. Although 1st and 2nd degree burns are no quite so dangerous for the patient's body as 3rd and 4th degree burns, given the same extent, pain in the former is a much more intensive sensation and is also, to no small degree, coresponsible for shock from burns.

Theoretically speaking, 1st degree burns involve pain receptor stimulation resulting from direct exposure to heat as well as from the release of histamine substances. Deeper, 2nd degree burns probably involve nerve ending exposure thus making pain particularly excruciating. 3rd and 4th degree burns are characterized by the destruction of skin receptors and nerve endings so that pain is not quite so intensive. The sensation is rather that of pressure or constriction for there is dehydration in the portions involved while oedema develops in the unaffected tissue.

The methods of relieving pain are closely connected with the depth and extent of affection. In less extensive 1st and 2nd degree burns, pain inhibition at the 1st neurone level will do. Physical methods are used, among them:

- cooling by means of alcohol compresses
- application of ice bags
- immersion of the burned portion in cool water [particularly suitable as a first-aid measure].

To make the therapy really effective, cooling must take a sufficiently long time and therapy ought to be commenced immediately, within 30 minutes of the accident at the latest. Pharmacological methods include:

- direct application of local anaesthetic to the burned area [suitable for first aid and 1st degree burns]
- block anaesthesia.

In more extensive and deeper burns, analgesia must be coupled with the patient's general tranquilization and automatic stabilization. This, together with keeping the vascular bed adequately supplied with fluids, is the basis of therapy in the first phase of burns — shock.

The use of neuroplegic M 1 mixtures (Dolsin 100 mg, Chlorpromazin 50 mg, Prothazin 50 mg) and M 2 mixtures (Dolsin 100 mg, Prothazin 50 mg, DHErgotoxin 0.6—1.8 mg) is commendable at that stage, a fact proved not only theoretically but also by long years of experience.

Neuroleptanalgesia, type II, is a valuable improvement. Apart from neurolepsy, Dehydrobenzperidol brings on the much desired autonomic stabilization and as alpha blocker substantially improves microcirculation. The drugs are administered intravenously in small fractionated doses.

As far as achieving analgesia is concerned, using analgetics such as pentazocin (Fortal) or piritramide (Dipidolor) offers some advantage. The risk of drug dependence development is substantially less than in analgetics of the opiate series. Valoron did not prove to be of much value in burned patients.

Of the group of analgetics of medium effect, Cibalgin, Euprogan, Eunalgit and other routinely used drugs proved their worth. Where desirable, their effect can be augmented by the simultaneous administration of Prothazine or other antihistaminic drugs. In patients with mental structure dominance, diazepam is a valuable drug.

General anaesthesia is often indispensable in major dressing procedures and surgical operations. The modern and relatively rich assortment of anaesthetics and analgetics permits the selection of such pharmacological agents as would present the least burden for the patient, with a view to concomitant diseases, tolerance, and to the patient's overall condition in general. At the present time, ketamine anaesthesia occupies one of the prominent positions, particularly in children.

In the 2nd phase of the burn disease — toxic and septic — the gradual sloughing of necrotic tissue occurs; pain intensifies due to the growth of newly formed nerve fibres. Infection and catabolic reaction in the body are responsible for a general deterioration of the patient's condition. Persistent pain is aggravated during rehabilitation, which is one of the conditions for perfect functional healing. As the patient's active co-operation is indispensable, the clinician should try and reduce as much as possible the dosage of drugs with a predominantly inhibitive effect on the CNS. This kind of approach is also commendable in subsequent treatment.

Anabolic processes take place in the 3rd phase of the disease — the burned area is restored in the process of healing. The patient continues to be traumatized by repeated redressing, his reaction to pain often being inadequate. Sedatives will do in most cases, the best results being achieved with diazepam.

In the 4th phase of burns healing — convalescence — the wounds are already healed. However, the scars are painful and the patient experiences persistent itching. In such cases peroral antihistaminic and analgetic drugs will cope with the problem, e.g. Dithiaden, Prothazin, Travegyl, Fortral. the A mixture, Sedolor, Alnagon. To alleviate pruritus, Mesosept spray (trimekain + septonex) or alcohol compresses can be used locally.

In conclusion, it should be stressed that burns deserve special attention. The burned subject is suddenly hospitalized after enjoying complete health, and is troubled with pain throughout the period of hospitalization. Physical suffering is aggravated by psychological deprivation, while major cosmetic defects may have to be tolerated for the rest of the burned patient's life. For that reason, efforts at alleviating the burned patient's suffering must be taken for granted in the clinician's daily work.

J. H.

SUMMARY

Present-day theories of pain are discussed by way of introduction. Burns are divided according to the particular stages and a list is given of the relevant techniques of analgesia and anaesthesia in current use at the department for the treatment of burns in Ostrava.

In the choice of anaesthesia and its use, the extent and depth of the burn, the patient's age, complications, as well as the site of the burn all have to be taken into account.

The choice of analgetic and anaesthetic drugs involves particular responsibility of decision in terms of their hepatotoxicity, for in cases of burns the liver parenchyma is affected far more than in injuries of other aetiology.

The aim of the present communication was not to bring in any revolutionary knowledge or views; but rather to stress some of the evident requirements based on time-honoured experience of the authors' own clinical practice.

RÉSUMÉ

Problématique de l'anesthésie et l'analgesie des personnes brûlés

T. Sotorníková, K. Leikep, M. Adámková

D'abord, on examine les opinions actuelles de la théorie de douleur. La maladie causée par une brûlure est partagée en stades particuliers ce qui introduit les modes correspondants de l'analgesie et l'anesthésie qui sont employés au service traitant des brûlures à Ostrava.

Ce sont l'étendu et la profondeur de la brûlure, l'âge du patient, les maladies qui viennent compliquer le traitement, la localisation de la brûlure dont il faut tenir compte en choisissant et appliquant l'anesthésie.

Le choix de l'analgesique et l'anesthésique est particulièrement responsable quant à l'hépatotoxicité du préparat, parce que, pendant la maladie provenant d'une brûlure, le parenchyme hépatique éprouve une charge beaucoup plus grande que dans les accidents ayant une autre étiologie.

Le but de ce rapport n'était pas de présenter des connaissances et idées révolutionnaires, mais on a trouvé nécessaire de souligner quelques prétentions évidentes qui étaient vérifiées par les expériences du traitement de nos malades.

ZUSAMMENFASSUNG

Die Problematik der Anästhesie und Analgesie bei Verbrannten

T. Sotorníková, K. Leikep, M. Adámková

In der Einleitung erörtern die Autoren die gegenwärtigen Ansichten auf die Theorie des Schmerzes. Die Verbrennungskrankheit wurde in Einzelstadien eingeteilt und es wurden entsprechende Analgesie- und Anästhesieverfahren angeführt, die an der Abteilung für Behandlung von Verbrennungen in Ostrava benutzt werden.

Bei der Wahl und Leitung der Anästhesie ist der Umfang und die Tiefe der Verbrennung, das Alter des Patienten und die komplizierenden Erkrankungen und Lokalisierung der Verbrennung zu beachten.

Die Wahl des Analgeticums und Anästheticums ist besonders verantwortlich vom Gesichtspunkt der Hepatotoxizität des Präparates, da das Leberparenchym bei der Verbrennungskrankheit einer weit grösseren Belastung ausgestellt ist, als bei Unfällen anderer Ätiologie.

Es war nicht das Ziel unserer Mitteilung revolutionäre Erkenntnisse und Ansichten vorzulegen, sondern wir hielten es für erforderlich einige selbstverständliche Anforderungen hervorzuheben, die durch Erfahrungen aus der Behandlung unserer Kranken überprüft wurden.

RESUMEN

Los problemas de anestesia y analgesia en los pacientes con quemadura

T. Sotorníková, K. Leikep, M. Adámková

En la introducción están discutidas las opiniones contemporáneas en la teoría del dolor. La enfermedad por quemadura está dividida en unos estadios y están indicados los métodos de analgesia y anestesia correspondientes que se usan en el departamento para el tratamiento de quemaduras en Ostrava.

Al escoger y aplicar anestesia hay que tener en cuenta el tamaño y la profundidad de la quemadura, la edad del paciente, que complica la enfermedad y la localización de la quemadura.

La elección del analgético y anestético es especialmente responsable del punto de vista de la hepatotoxicidad de la preparación, porque el parénquima hepático está expuesto a una carga más grande en la enfermedad de la quemadura que en accidentes de otra etiología.

En fin de nuestra comunicación no era presentar conocimientos e ideas revolucionarias sino suponíamos ser necesario subrayar algunas exigencias evidentes probadas por la práctica en el tratamiento de nuestros enfermos.

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NEWS

Report from the 3rd International Congress on Clefts and Associated Craniofacial Anomalies Held in Toronto (Canada) on June 5-10, 1977

The first congress on clefts of the lip and palate and other congenital facial defects only took place 8 years ago but these global meetings of experts in all the specializations involved in the treatment of facial anomalies have since reached such a degree of respect and attraction that the latest, third Congress was already attended by 950 participants who could hear 344 selected papers and see some 50 films projected there.

Among those present were the most prominent specialists from all over the world engaged in one way or another in the problems of clefts: plastic surgeons, phoniatricians, otolaryngologists, stomatologists, anaesthesiologists, psychologists, anthropologists, geneticists, teratologists and others.

The considerable progress that has in the past decade been achieved in the treatment and prevention of congenital anomalies has been the result of intensive multichannel research as well as of the vast clinical experience accumulated. It is exactly at gatherings with more narrowly defined programmes such as this particular Congress that fruitful confrontation of different ideas, knowledge and results of work at different research and clinical institutions is best possible and most useful.

The Congress was held and those attending it were accommodated in the spacious Royal York Hotel very well equipped and suited for such gatherings. Papers were delivered Monday through Friday, i.e. for a full five days, most of them in four halls of the hotel simultaneously. The standard of the specialized and social parts of the Congress was very high in terms of organization, too.

The papers were arranged in groups determined by the subjects discussed followed by panel discussions by leading experts in each particular range of problems and supplemented by comments from the floor.

The most significant cycles of problems discussed that deserve special reference were as follows:

1. Harelip Surgery

Reconstruction of the lip and nasal base now generally proceeds from an anatomically correct reconstruction of the m. orbicularis oris. Discussions on the advantages of primary osteoplasty or periosteoplasty still continue.

2. Cleft Palate Surgery

Here, too, the main emphasis is laid on reconstruction of the muscles of the soft palate. Two-phase operations of the palate (velum in infancy, the hard palate later on) are now rarely performed.

3. Supplementary Operations on the Palate

A considerable number of papers were presented on this particular subject though only some of them had anything new to say. New types of surgery are being tested

with the aim of improving the palatopharyngeal occlusion, ranging from fairly simple operations such as a mere narrowing of the pharynx, various pharyngoplastic operations and pharyngeal flaps, up to considerably complicated muscles transfers and transpositions.

4. Speech in Children with Cleft Palate

A variety of views of this particular problem was demonstrated in this section with assessments of the reliability of methods of speech quality testing, methods of testing speech after different techniques of cleft palate reconstruction, with stress laid on the risk of middle ear complications for practising correct speech etc.

5. Orthodontia in Clefts

This group included scores of papers on the development of jaw segments in uni- and bilateral clefts prior to operation as well as after different types of surgery. The results were presented of various techniques of orthodontic therapy in labial and palatal clefts. Once again, more emphasis is put on preoperative stomatoorthopaedics.

6. Operations on Jaws

The bulk of the papers dealt with shaping and supplementary operation on the maxilla and mandible in typical clefts and syndromes, as well as with following up bone transplants. Bone autografts are now generally used everywhere. While in syndromes, such as Crouzon's, and in hypertelorisms extensive operations lasting many hours are the rule in dozens of specialized workplaces at present, the trend in post-cleft deformations is to refrain from major operations on the facial skeleton in favour of minor operations performed in stages.

7. Psychological Approach to Children with Clefts and to Their Parents

The papers delivered in this section were concerned not only with the problem of winning the confidence and developing mutual understanding between the physician, or possibly logopedist, and the patient and his parents in order to achieve the most satisfactory therapeutic and rehabilitation results, but also with the problem of the different behaviour of children with clefts as opposed to healthy children. This cycle also included papers on the subject of the prevention of clefts.

8. Animal Experiments

This line of research involved mainly experiments on dogs, rats, and guinea-pigs with the aim of detecting the teratogenic effects of different drugs on the developing fetus, producing cleft-affected animal models, studying the development of the upper and lower jaws after different surgical operations, etc.

The rest of the cycles of papers dealt with craniofacial development, velopharyngeal function and dysfunction, some of the rare craniofacial malformations, anatomical studies on the human fetus, the development of jaws in various types of clefts, prosthetics, and the participation of otolaryngology in the treatment of clefts.

The films were projected in subject-bound succession, always in the same hall. Most of them were of a high technical standard and were usually commented on by the respective authors themselves.

Taking part in the Congress were 4 members of the J. E. Purkyně Czechoslovak Medical Society of Plastic Surgery, three of them actively.

In Conclusion, a secret vote was taken to decide on the place of holding the next Congress on clefts in 1981. Mexico-City was chosen. One can rest assured that even this next Congress will live up to the high standard established by the preceding events.

Prof. Miroslav Fára, M.D., DrSc, Prague, Czechoslovakia

P. P. Kovalenko: **The Grafting of Tissue and Organs** (Peresadka tkanej i organov) Rostov on Don 1976. 48 pages, format 16,5X20 cm, 6 black and white photographs, 15 drawings and diagrams, 3 tables.

The book by Prof. P. P. Kovalenko, *Grafting of Tissue and Organs*, published by the Rostov Medical Institute, is intended for students in the fifth and sixth year at Soviet medical institutes and for starting physicians.

After a brief introduction, discussing scientific discoveries which afforded the development of the grafting of tissue and organs, the author submits the definition of a new independent branch, the transplantology. He characterizes it as a medico-biological science studying the theory and practice of collecting, preserving and grafting tissue and organs, as well as the possibilities of their take and longterm function in the body of the recipient. Then a survey of internationally accepted terminology used in transplantology (Vienna 1967).

The further text may be divided into 3 main parts. The first part discusses the collection and preservation of tissue and organs, the second part is about the fundamentals of immunology of grafting and the third part is dedicated to clinical transplantology. The first part begins with the chapter on the sources of tissue. The reader learns about the sources and application of isogenic, autogenic, alogenic and xenogenic tissue. Special attention is paid to the collection of tissue and organs from deceased donors and to the problems of warm ischaemia.

The author characterizes the preservation of tissue as the maintenance of the basic grafting, biological and anatomic properties of tissue. He lays down the conditions for successful preservation and surveys the various methods of tissue preservation. The chapter on preservation of organs analyses the problems of perfusive and non-perfusive methods of

preservation. In connection with preservation the author mentions the importance of tissue and organ banks.

In the part on grafting immunology, the author discusses the nature of tissue antigens, analyzes the task of T and B lymphocytes and antidotes in immunitive grafting reactions and surveys the immunologic tests applied for their diagnostics. He informs furthermore on the problems of histocompatibility and on methods of its testing. In the conclusion of this part we find information on the principles and the clinical symptoms of the rejection crises and methods of immunosuppression. The last part is dedicated to the clinical application of tissue and organ grafts.

The author divides the tissues according to the developmental origin of anatomic, physiologic and plastic properties into 5 groups

1. Tissues of the motoric apparatus
2. Blood vessels
3. Seros membranes
4. Tissue of the reticuloendothelial system
5. Covering tissue

The organs are divided into 4 groups according to the functional importance of the origin and grafting properties

1. Endocrine organs
2. Organs of the reticuloendothelial system
3. Vital organs
4. Extremities

In the further text we find brief characteristics of the individual groups of tissue and organs and the methods of their application in clinical practice. Special attention is paid to the grafting of bones, cartilage and joints, blood vessels, bone marrow, skin and cornea. In the chapter of grafting organs, the most extensive part deals with the grafting of vital organs (heart, kidney, liver, lung, pancreas). A brief historic survey is submitted here on the grafting of vital organs and a table on the results up to the year 1976 is included.

The individual parts of the book are of approximately equal length, in the introduction the author always defines the basic conceptions which are continued by further explanation documented by black and white photographs, instructive drawings, diagrams and tables.

The book by Prof. Kovalenko, which is the first text book of its kind in the world, is proof of the attention paid in the Soviet Union to problems of grafting tissue and organs.

The text book sums up and supplements the findings which the student of medicine gains in different non-clinical and also clinical branches. This removes the present fragmentation of the teachings of transplantology and affords the students the possibility to obtain a complete idea on the theoretical foundations, experimental and clinical results and also on the most recent successes of this modern rapidly developing discipline.

H. S.

Dr. Pavel Měříčka, Hradec Králové

Clodius, L. et al.: **Lymphedema.** Stuttgart, G. Thieme Verlag, 1977. pp. 192, 158 fig., 35 tab.

The book is an extensive and elaborate treatment of the clinically highly relevant problems of lymphedema by internationally prominent lymphologists. The work features experimental and clinical experience from 18 scientists. The weightiest chapters are those by Clodius, Casley-Smith, Földi, and Olszewski. Of Czechoslovak authors, Bařinka has contributed a chapter on the techniques of surgery for lower extremity lymphedema, using a new instrument (Dermatome Super). Földi discusses the physiology and pathophysiology of lymphedema to define the fundamental laws of lymphology and to deal with the relationship between tissue fluid and lymph as well as with the function of lymphatic vessels. He also outlines his own previously published classification of lymph drainage insufficiency.

In his chapter on the structural basis of conservative treatment in lymphedema, Castley-Smith gives details of and, using electronmicroscopic photographs, demonstrates his theory of prelymphatics, their relationship to lymphatics, as well as the theory of closed or open endothelial junctions in lymphedema. In a chapter written jointly with Piller Castley-Smith explains the action of coumarin and related preparations in the treatment of lymphedema (increased lymph flow, diminished lymphatic vessel patency, elimination of proteins from tissues by means of extra- and intracellular proteolysis or endocytosis). In an extensive chapter, Clodius discusses the experimental foundations of surgery in lymphedema, listing different types of operation, their advantages and shortcomings, and showing lymphographic pictures of lymphedema prior to and after operation. Olszewski deals with the pathophysiology and clinical observations of obstructive lymphedema of the extremities, paying special attention to the surgical treatment of lymphedema particularly by means of lymphovenous anastomoses. The chapter on secondary lymphedema of the arm (L. Clodius) is rendered in an excellent and most comprehensive way documented, as it is, by a number of roentgenograms, photographs, and tables as well as by a clinical evaluation of all known methods of treatment of this serious condition. The lesser chapters are devoted to palpebral lymphedema, filarial elephantiasis, particularly from the point of view of their surgical treatment. The book has an outstanding technical standard with a list of references attached to each of the 15 chapters and an index of subjects discussed at the end. It deserves to be warmly recommended to anybody interested in lymphedemas.

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