

L 5046

L

ACTA CHIRURGIAE PLASTICAE



INTERNATIONAL JOURNAL
OF PLASTIC SURGERY

24 · 3

1982

CS ISSN—0001—5423

AVICENUM · CZECHOSLOVAK MEDICAL PRESS
PRAGUE

Exclusive Distributors for all Western Countries
KARGER-LIBRI AG, Petersgraben 31, CH-4000 Basel 11 (Switzerland)

EDITORIAL BOARD

H. PEŠKOVÁ, *Head of the Editorial Board*

R. VRABEC, *Scientific Secretary*

INTERNATIONAL

W. Bethmann, Leipzig	A. Ionescu, Bucuresti
S. I. Degtyareva, Moscow	M. Kraus, Polanica Zdrój
F. M. Khitrov, Moscow	H. Mennig, Berlin
+D. S. Ranev, Sofia	J. Zoltán, Budapest
V. P. Ippolitov, Moscow	

Distributed by PNS. Information on subscription can be obtained from and orders are accepted by every administration of PNS, post-office, postman and PNS Central Expedition Prague. Orders for abroad are accepted by PNS Central Expedition and Press Import, administration of press export Kafkova 13, 160 00 Praha 6.

© — Avicenum, zdravotnické nakladatelství, n. p. — 1982

Published four times (in 1959: two times) a year by Avicenum - Czechoslovak Medical Press, Malostranské nám. 28, Praha 1. Editor in Chief Prof. H. Pešková, M. D. — Address of the Editorial Office: Acta Chirurgiae Plasticae, 120 00 Praha 2, Lidových milicí 63, Czechoslovakia. — Press: Tiskářské závody, n. p., Praha, závod 1 — provoz 11, Praha 2, Háfkova 2.

Subscription rate: sFr 109,— plus postage Exclusive distributors for all countries with the exception of Albania, Bulgaria, China, Cuba, Czechoslovakia, German Democratic Republic, Hungary, North Korea, Vietnam, Mongolia, Poland, Rumania, Union of Soviet Socialist Republics and Yugoslavia:

KARGER LIBRI AG, Petersgraben 31, CH-4000 BASEL 11 (Switzerland)

APPEAL TO THE EUROPEAN MEDICAL PROFESSION

Dear Colleagues,

the following message is intended for you on the occasion of the 2nd Congress of International Physicians for the Prevention of Nuclear War. This year, we have held some detailed and open discussions of all available medical information on the probability and consequences of nuclear war with a special view to the countries of Europe.

We are of one mind as to the estimate that a nuclear war would result in an unprecedented catastrophe and destruction of European civilization. In global terms, its immense immediate as well as long-term effects would pose a great danger even for countries and nations indirectly involved, as they would have devastating aftermaths for future generations and for the whole biosphere. By affecting everyone and everything, a nuclear holocaust would not spare hospitals or health personnel either. Those of us responsible for the protection of people's health would be unable to provide adequate medical aid.

Today, we feel bound to express our deep concern about the continuous stockpiling of huge quantities of increasingly insidious lethal weapons of mass destruction. The situation in the European continent gives rise to even deeper concern in view of the particularly large numbers of nuclear missiles already deployed and planned for deployment in the countries of Europe. The likelihood of nuclear war being started in Europe is made greater by the view that a "limited" nuclear war is possible or even acceptable. As physicians we are again bound to state that there are no "limits" to the health hazards implied in a nuclear war. Nuclear war poses a lethal danger not only for the lives of all people of Europe but, indeed, for all life on our Earth.

We are convinced that in the continent of Europe an end must be put to the arms race, particularly to its most explosive part — nuclear armaments. It is essential that military expenditures should be cut, and that part of the resources thus released should be used to cover the needs of medical care and public health services. Nuclear weapons must be destroyed before they can destroy mankind. Any idea of the possible use of nuclear weapons in any form or to any degree is tantamount to an inconceivably hideous crime.

We appeal to you to join the growing numbers of physicians sternly opposed to what once seemed the height of madness. Developments in the past year far exceeded the expectations of participants in the 1st Congress. The Congress

proceedings were communicated to scores of millions of people, thus contributing to a world-wide change of opinion of the nuclear arms race. The medical profession found itself committed to a new obligation, to help prevent nuclear war. The World Health Organization and the World Health Association came forward with resolutions supporting the medical professions involvement in nuclear war prevention. In May 1981, the World Health Assembly adopted a resolution stipulating that a thermonuclear conflict "in any form or degree would inevitably lead to irreversible destruction of the environment, to the deaths of hundreds of millions of people, and also to grave consequences for the life and health of people of all countries of the world as well as for future generations..." National health organizations such as medical institutions of the United States, the Academy of Medical Sciences of the Soviet Union, the British Medical Association and the American Medical Association have turned their attention to the health hazards of nuclear warfare.

In many countries, special organizations have come into being to help prevent the outbreak of nuclear war. The bulk of those organizations' public activities is to give a detailed account of the health consequences of the use of nuclear weapons. Their work has helped to overcome wrong ideas and denial of both the consequences and the likelihood of a nuclear war, notions which previously permitted the nuclear arms race to continue unabated.

We appeal to you to join in our efforts to avert the danger the world would be exposed to.

We ask you specifically:

1. Join the respective national organization in your country, or help create such an organization where it does not exist yet, and join in and support the work of international organizations aiming at nuclear war prevention.

2. Find facts and figures concerning the nuclear arms race and pass that information on to your co-workers.

3. Organize courses on nuclear war at our medical schools.

4. Pass on facts about nuclear war to your Government representatives and to the public using the form of personal discussions and public education campaigns in the mass media.

5. Prepare articles on the health hazards and consequences of nuclear war for specialized periodicals and medical journals, and try and see that the problem of nuclear war prevention should become the subject of special discussions in medical associations, and at medical symposia and conferences.

6. Preserve the tradition of the widest possible exchange of views among the physicians and scientists of many countries as a step towards the establishment of that true and mutual understanding which can facilitate co-operation of the international medical profession in its efforts to reach nuclear disarmament.

With the help of many of the physicians who decide to join in this campaign it will, indeed, be possible to save from nuclear destruction those, whose health we solemnly pledged to protect. People and nuclear weapons cannot co-exist indefinitely.

Participants in the 2nd Congress of International Physicians
for the Prevention of Nuclear War

The Second Congress of International Physicians for the Prevention of Nuclear War took place in Cambridge, England, April 3—6, 1982. Taking part were some 200 physicians from 31 countries, observers of the UNO, WHO and the International Red Cross Society as well as members of parliaments of some countries. Czechoslovakia was represented by Prof. Dr. Zdeněk Dienstbier, DrSc, head of the Biophysical Institute, Charles University Medical Faculty, Prague.



Tselinograd Medical Institute, Tselinograd (USSR)
Department of Surgery
Director Prof. G. V. Tsoy, DrSc

CHEILOPLASTY OF ACQUIRED OPEN DEFECTS

V. S. Bondar

An injury, an inflammatory necrotic process or a radical removal of neoplasma are the most usual causes of large open defects of the lips. It would be hardly possible to conceal such a serious cosmetic defect under a bandage. The speech and food intake are impaired as well. The only solution is a plastic reconstruction of the defect.

Academician F. Burian [1962] was right when considered a partial reconstruction of the lips as a very difficult task. The lips are extremely mobile. They consist of several layers, the muscle layer being very important for their normal function. They are required for correct speech and food intake. Together with eyes, the lips gave liveliness and spirituality to the face.



Fig. 1a, b. Plasty of a traumatic defect of the lower lip by local tissues. A channel plasty of its red margin was performed, utilizing a mucosal flap on a nutritive pedicle

MATERIALS AND METHODS

The basic principles of plastic repairment of the lip defects were devised by Diffenbach, who shifted the neighbouring tissues to the defect. This technique has been several times modified [methods of Ombredan, Bruns, Penna, Sedillo, Abbe, Shimanovskii, Burian, Aleksandrov and others].



Fig. 2a, b, c, d. Corrective plasty of a traumatic defects occurring in the middle segment of the lower lip. For its reconstruction, the local tissues were utilized. The mucosal flap collected on a cheek was used for the channel plasty of the lip's red margin. The plasty was performed in stages

According to Khitrov and Mamontov (1965), it is very important to preserve anatomical features of the tissues used for plastic reconstructions. They are collected in vicinity of the defect, transferred to it on a nutritive pedicle

and then become healed in a new place. All their properties should be preserved.

A number of 13 men and 7 women (in the age from 2 to 57 years) suffering from total or subtotal lip defects was treated by us. Especially in the middle and old age, when the face tissues are wrinkled and pliable, the technique utilizing local tissues leads to fully satisfactory functional and cosmetic results (Fig. 1). More complicated plastic operations are unnecessary.



Fig. 3a, b. Plasty of a marginal traumatic defect of the lower lip. The flap was transferred from the upper lip

Several consecutive plastic operations are usually required, if the open lip defects are planned to be repaired by tissues collected in vicinity of the defect and transferred to it on a nutritive pedicle. In the first place, the anatomical and functional defects are repaired, then the cosmetic deviations are corrected. Otherwise, the transferred tissue might not survive, if the defect would be fully reconstructed in one operation (Fig. 2).

It is feasible to utilize mobilized tissues of the upper lip for reconstruction of marginal defects of the lower lip. Some time later, a microstomia may be corrected and the mouth angle can be formed (Fig. 3).

In treatment of large defects of the upper lip, it is advantageous to combine the local tissue plasty with Abbe's plasty. Philtrum covered by hairs can

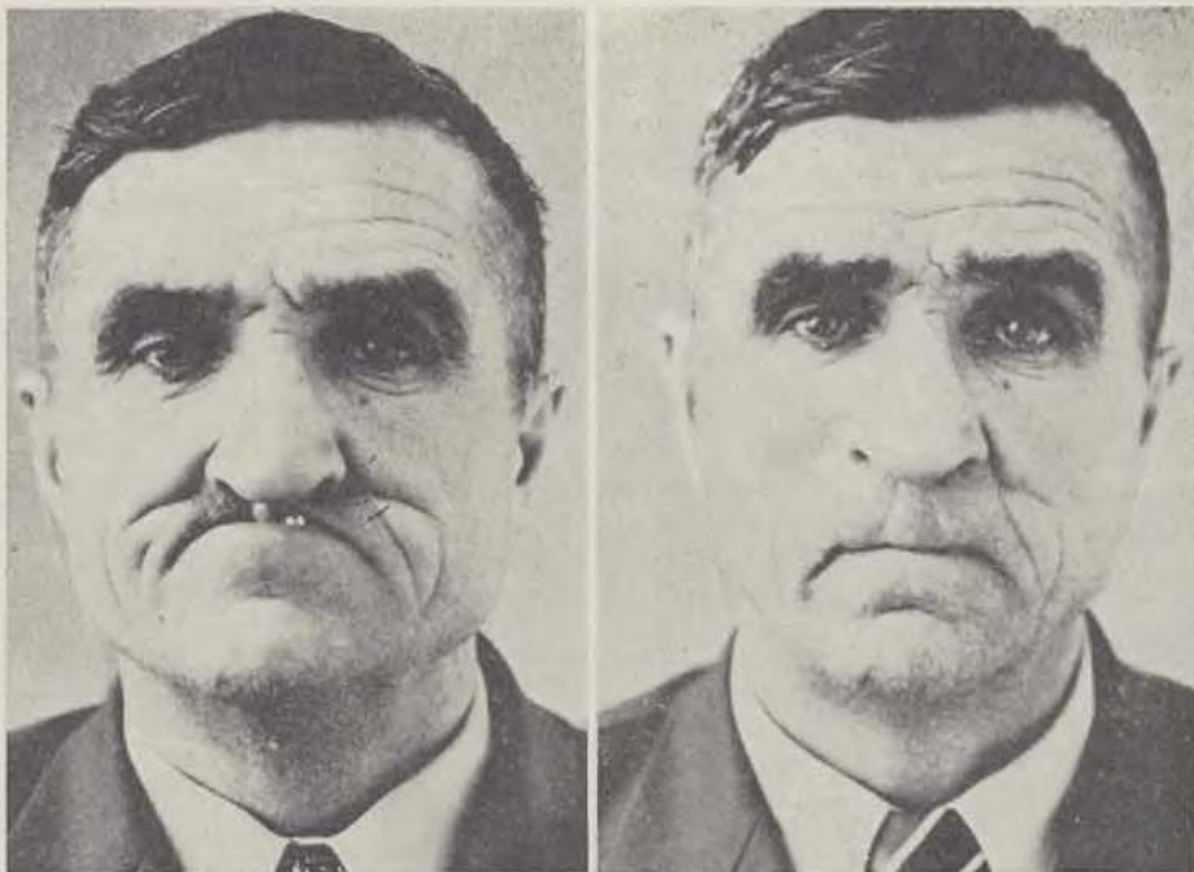


Fig. 4a, b. Reconstruction of the upper lip by local tissues and by a tissue fragment collected on the lower lip according to Abbe



Fig. 5a, b. Reconstruction of a non-penetrating defect of the upper lip by a flat flap with a connective tissue layer

be formed on the upper lip and, subsequently, a size of the lower lip may be corrected properly (Fig. 4). This method was used in 5 patients with good results.



Fig. 6a, b. Plasty of the totally missing upper lip and of the oral vestibulum by a rhomboid flat flap, prepared on an inner side of the shoulder. Cicatricious contractures developed on mandibula

It is better, when the lip defects in men are reconstructed with hairs. For this purpose, Lekser's plasty is recommended. The flap should not be collected from the head regions, as further cosmetic defects would arise. It is better to collect it in a submandibular region according to Mukhin (1961). This method was successfully utilized by us for repairment of burn deformities of the lips and of adjacent regions.

Skin flaps are utilized in many cases of acquired defects of the lips. According to our opinion, a rhomboid flat flap proved to be the most suitable type of a skin duplication on a nutritive pedicle. The technique of its preparation has already been described (Bondar, 1978).

Sometimes, it would be senseless to collect the tissue in vicinity of the defect and to apply complementary incisions on the face. The free skin grafts may be inappropriate for modelling of the correct lip contours. Then, even the nonpenetrating defects of the lips can be most properly repaired by flat flaps possessing a thin layer of connective tissue (Fig. 5).

Preparation of a flap on a nutritive pedicle from the adjacent regions causes more problems to women. The combined or rhomboid flat flaps are recommended as a method of choice for reconstruction of total or subtotal lip defects surrounded by cicatricized (Fig. 6).

Reconstruction of the red mucosal margin of the lips is a basically important component of the cheiloplasty of the open lip defects. The mucosal flaps are collected from cheeks and transferred on nutritive pedicles to the defect through a channel.

In the vicinity of the reconstructed lip defect, the mucosal flap of appropriate length and width and their pedicles are prepared on one or both sides of the oral vestibulum. The top of the flap should be turned to molars. The flap's bed is covered by local tissues. Below the flap's nutritive pedicle, a channel is formed leading to the reconstructed part of the lip. The flap is drawn through the channel with its top first, while being turned continuously and then it is sewn to the reconstructed lip segment.

The nutritive pedicle is cut off 15—20 days later, the exposed part of the mucosa is excised and the defect is covered by local tissues. Utilizing this method of plasty, no uncovered wounds persist in the oral cavity and, consequently, the danger of infections is negligible. Turning of the mucosal flap near its nutritive pedicle did not interfere with its blood supply. This method was applied by 16 patients and no complications occurred.

DISCUSSION

The short- and long-term results of plastic reconstructions of the acquired open lip defects were followed by 20 patients. It was concluded that correctly designed and performed operations utilizing local tissues and combined with reconstruction of the lip red margin yielded the best functional and cosmetic results.

The most prospective approach to repairment of the lip defects consists in combination of different methods. It was suggested by Khitrov and Mamontov (1965) that "simultaneous utilization of different plastic methods would enable to reconstruct even the most complicated defects".

It should be noted that the flap plasties of the total lip defects do not restore a mimic activity. Therefore, a reconstruction of an active muscle layer in the skin fold represents the next task of our investigations.

M. T.

SUMMARY

The acquired open lip defects were reconstructed by 20 patients and the clinical data were analyzed.

It is recommended to utilize local tissues and a mucosal flap on a nutritive pedicle, which is drawn through a channel and used for reconstruction of the lip's red margin. A rhomboid flat flap collected from an inner pectoral surface is used for reconstruction of large open lip defects by women.

In cases of missing teeth or defective alveoli, prostheses are applied during the preparatory period or after excision of the deforming scars. Restitution of normal facial contours is possible.

RESUME

Cheiloplastie des défauts ouverts non congénitales

Bondar, V. S.

On a jugé l'expérience clinique, obtenue par le traitement de 20 malades. Les auteurs ont effectué des plasties des défauts ouverts sur les lèvres (dont provenance n'est pas congénitale).

Selon les possibilités, on exécute des opérations plastiques locales. Les bords rouges de la muqueuse sont modelés comme lambeaux à pédicule par la «méthode de tunnel». Les plasties de grands défauts ouverts exécutées sur des femmes peuvent être réalisées en utilisant un lobe plat rhombide, formé sur la surface intérieure du bras.

Si les dents ou des alvéoles dentaires sont absentes, on applique des prothèses soit dans la période préparative soit après la réflexion des cicatrices déformantes. De cette manière, on peut former des traits réguliers.

ZUSAMMENFASSUNG

Cheiloplastik der offenen erworbenen Defekte

Bondar, V. S.

Es wurde die klinische Erfahrung mit der Plastik der erworbenen offenen Defekte bei 20 Patienten ausgewertet.

Je nach Möglichkeit werden lokale plastische Operationen durchgeführt und der rote Rand der Schleimhaut wird am Ernährungsstiel mittels der Tunnelplastik gebildet. Für die Plastik grosser offener Defekte bei Frauen ist es zweckmässig einen rhomboidförmigen flachen Lappen anzuwenden, der an der inneren Schulterfläche gebildet wird.

Wenn Zähne oder ein Teil des Alveolarfortsatzes fehlen, applizieren wir Prothesen — und zwar entweder in der Vorbereitungsphase oder nach der Entfernung der deformierenden Narben. Auf diese Weise können regelmässige Gesichtskonturen gebildet werden.

RESUMEN

Plástica de defectos abiertos adquiridos del labio

Bondar, V. S.

Se evalúa la experiencia clínica con las operaciones plásticas de los defectos abiertos adquiridos de los labios en 20 pacientes.

Según las posibilidades se efectúan operaciones plásticas locales conformándose el borde rojo de la mucosa sobre un pecíolo de nutrición por método de túnel. En las plásticas de grandes defectos abiertos en las mujeres conviene utilizar un lóbulo llano romboidal conformado sobre la superficie interior del hombro.

Si faltan dientes o una parte del tubérculo alveolar, aplicamos las prótesis — o en el período de preparación o tras remover las cicatrices deformadoras. Es así como se pueden reconstruir las conturas regulares de la cara.

REFERENCES

1. **Bondar, V. S.:** A Plasty of Long Time Persisting Wounds on Shin and Foot Utilizing a Flat Flap. *Acta Chir. plast.*, 20, 2, 68, 1978.
2. **Burian, F.:** Plastic Surgery. Prague 1962, p. 80.
3. **Mukhin, M. V.:** Treatment of Burns on Head, Face, Neck and of their Consequences. (In Russian.) *Meditsina*, Leningrad 1961, p. 93.
4. **Khitrov, F. M., Mamontov, G. P.:** Advances of Plastic Surgery. (In Russian.) Moscow 1965.

Dr V. S. Bondar, Tselinograd Medical Institute,
Mir Street 51-a, 473012 Tselinograd, USSR

Leningrad Scientific Institute of Prosthetics, Leningrad (USSR),
Director V. I. Filatov, DrSc

RECONSTRUCTIVE SURGERY IN THE PREPROSTHETIC PERIOD

V. I. Filatov, L. E. Voinova

The design and production of prostheses has advanced remarkably during the last several years. Highly efficient prostheses of upper extremities driven energetically from external sources were introduced, as well as prostheses designed for work or for children. In construction of all these appliances, organic polymers were widely utilized. Such developments induced the surgeons working in this field to examine, whether the contemporary methods of reconstructive surgery could help in preparing the patients to application of the prostheses.

In fact, we have seen a prosthetic reconstructive surgery to develop into an independent new branch.

During the last 45 years (i. e. till 1980), more than 1800 reconstructive operations performed in a preprosthetic period have been carried out in the Leningrad Scientific Institute of Prosthetics (LSIP). The plastic surgery has been greatly promoted in this Institute. The main types of the reconstructive operations are summarized in Table 1.

As could be seen on the Table 1, the reconstructive operations related to prosthetics may be classified into two basic groups: the kinematic operations enriching functional capabilities of the essentially new patient's organ that appeared as a consequence of an injury or a disease, i. e. of the stump, and the operations treating the stump's defects and diseases, which could lay obstacles to the effective functioning of the prosthesis.

During last several years, the number of kinematic operations has increased. The ratio of the described two types of the reconstructive operations was 1 : 9 in 1969, but 1 : 3 in 1979.

Among the operations of the second type, the reconstructive operations have prevailed over the mutilating reamputations. The ratio between the reamputations and the reconstructive operations decreased from 2 : 1.5 in 1969 to 1 : 8 in 1979.

At present, a special importance has been ascribed to kinematic plastic operations, i. e. to formation of a skin-muscle channel. This operation enables effective functioning of electronic prostheses with external sources of energy, of self-service and sport appliances. The technique of the operations has had

Table 1, Main types of reconstructive operations performed in the Leningrad Scientific Institute of Prosthetics (1969 — 1978)

Type of the operation	Number of operations	
	abs.	rel. (%)
1, Kinematic operations increasing functional capabilities of the stump:		
functional operations on hand	282	20,9
operations increasing size of the stump (functional elongation, elongation of the bone stump etc.)	160	11,8
kinematic plasties	102	7,6
forearm splitting	74	5,5
other operations	23	1,8
2, The operations leading to recovery of the sump defects and diseases:		
local tissue plasties	474	34,2
dermatome plasties	162	12,1
skin-flap and „Italian“ plasties	82	6,1
Total	1359	100,0

to be modified. Any superficial muscles can be utilized. Independently from the length of the stump, minor flaps are cut out, while the place is preserved for fixation of the muscles.

The operation consists in formation of the skin-muscle channel, which is led under the muscles of the upper-limb girdle (i. e. under m. deltoideus, m. pectoralis maior, m. latissimus dorsi etc.). The muscle contractions are transmitted to the electronic prostheses or are directly used for holding of the special self-service devices (spoon, tooth-brush, handle) or sport tools (e. g. table tennis). The kinematic plastic operations are indicated in amputation and inborn defects of the upper extremities in children and adults. It is absolutely indicated, when both hands are missing.

Now, the technique of the operation will be described (Fig. 1). A skin flap is cut out containing subcutaneous connective and fat tissue and fascia. Then, it is rolled, the skin covering an interior of the tube. From the underlying muscle, a portion of muscle fibres is bluntly separated using a special instrument. It will compress the lumen of the skin channel. The skin tube is introduced underneath the layer of the separated muscle fibres. If the soft tissues are available in a sufficient quantity, they can be used for suturing of the defect formed above the channel. In majority of the cases, however, surrounding tissue reserves should be mobilized. The wound remaining above the channel is then covered by a full skin layer collected from an adjacent region and transferred with a nutritive pedicle. Recently, the methods utilizing local tissues for healing of the wounds have become most popular, e. g. Limberg's technique suggested for covering of quadrangular defects and Khole-



vitch's technique. In cases, when the local tissues do not meet the demands, dermatome skin grafts are supplemented.

The patients are trained for 3—4 weeks and then prostheses can be applied: appliances for self-service at first and for sport activities later on.

The reconstructive operations may help to recover grip function even when an amputation had to be performed in a forearm region. For this purpose, Krukenberg suggested a forearm splitting in 1917. It served as a basis for many subsequent modifications of skin-muscle and bone plasties.

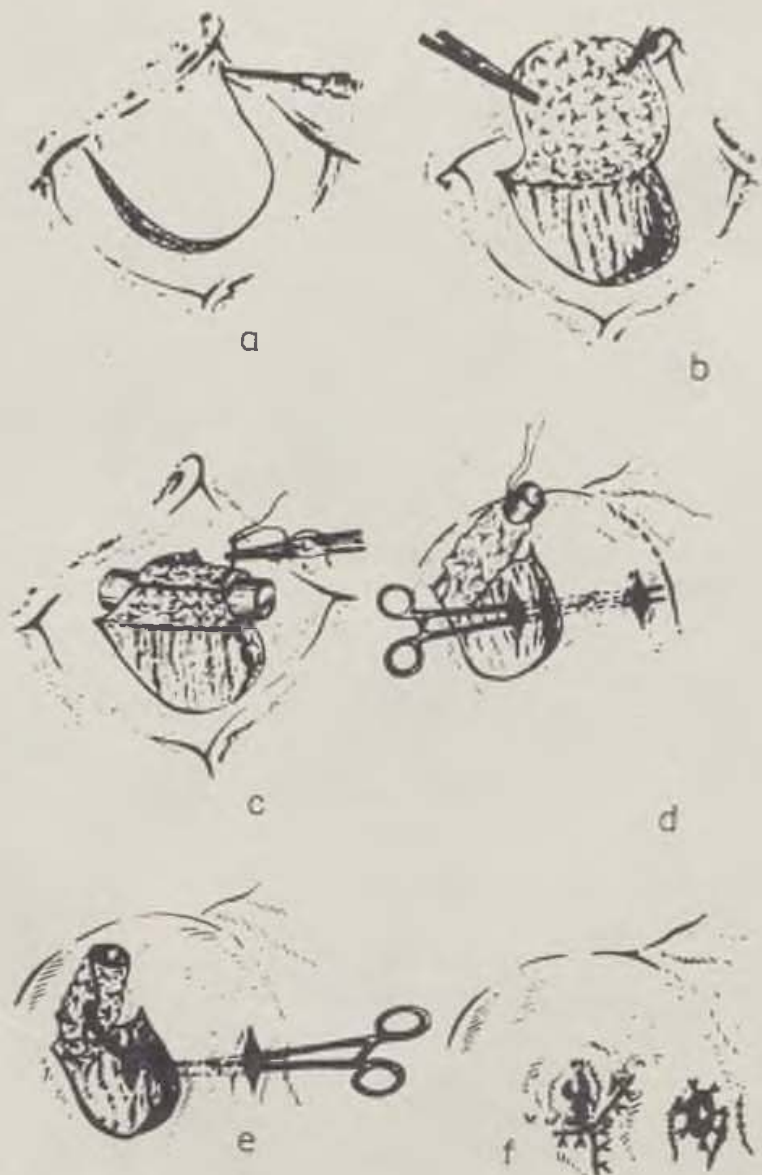


Fig. 1. Stages of formation of the skin-muscle channel. a — cutting out of the skin flap, b — its liberation from the deeper tissues, c — formation of a skin tube, d — formation of a muscle channel, e — drawing of the tube through the channel, f — appearance of the suture after the operation

The Krukenberg-Albrecht method of the forearm stump splitting was modified by Filatov and Regentov (1974) and has been used in our Institute since 1973. It is specific for this operation, that a latero-distal part of the ulnar branch is artificially thickened by grafting of a bone with adhering periosteum, that follows after reamputation of ulna.

This small thickening localized on the distal end of the ulna allows for a more convenient fixation of the prosthesis just on the ulnar branch (Fig. 2). In this way, the elbow joint remains free of binding. It is important to prevent skin necroses which may occur following wound suturing, especially on long forearm stumps. The tissues are relieved from a tension by several 4—8 cm long longitudinal incisions that are cut on the non-working sides of the ulnar and radial branches and are followed by application of dermatome skin grafts on the defects. The interosseal space is covered by a tongue-like flap, whose base is turned to the elbow joint.

The split forearm stump, as prepared in our Institute, is quite suitable for self-service and prosthesis application. A special electronic hand prosthesis was proposed, which is fixed to the split forearm stump. Its movements are controlled by supination and pronation of the ulnar branch.

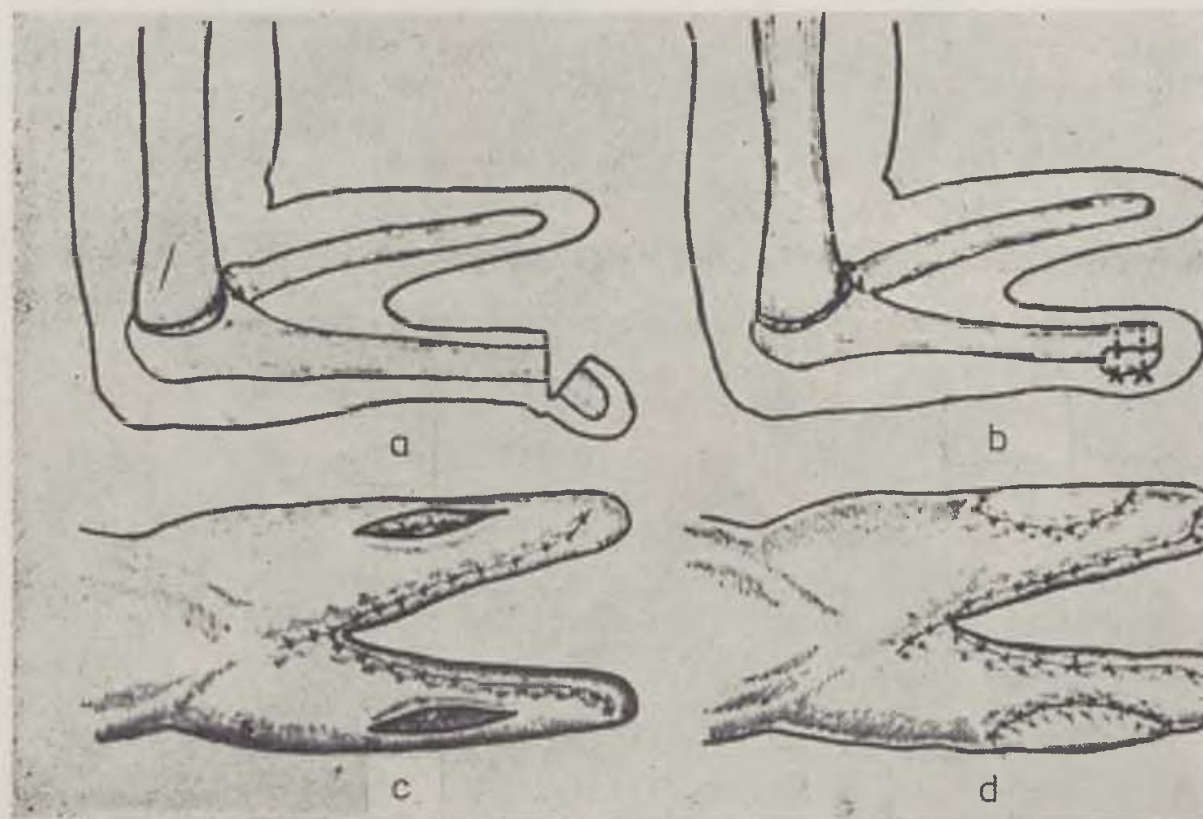


Fig. 2. Splitting of the forearm stump — our modification. a — preparation of the bone graft, b — its fixation, c — longitudinal incisions lead on non-working surfaces of the ulnar and radial branches, d — appearance of the stump after the operation

A functional and anatomical lengthening of the stumps represents another practical application of the kinematic concept. Formerly, the stump was skeletonized (the surrounding scars and soft tissues were liberated and the muscles' fixations to humerus were cut) and pieces of a preserved bone or metal constructions were applied [Keier 1969]. Recently, distraction methods utilizing apparatuses of Ilizarov, Kalubertz and others have been widely used.

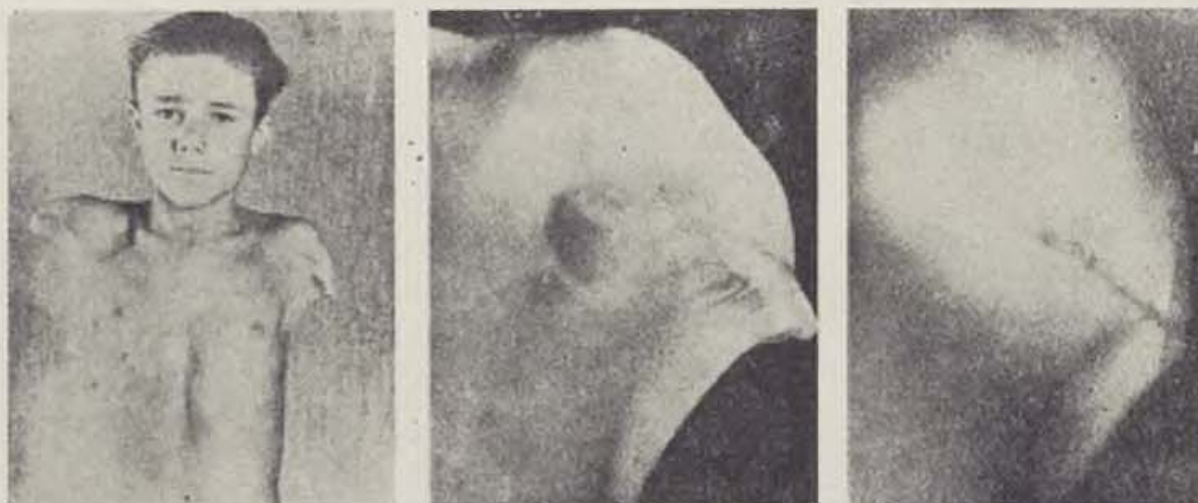


Fig. 3. Stages of functional and anatomical lengthening of the short arm stumps. a — a patient injured by electricity, his condition before operation and after removal of scars from the left arm stump

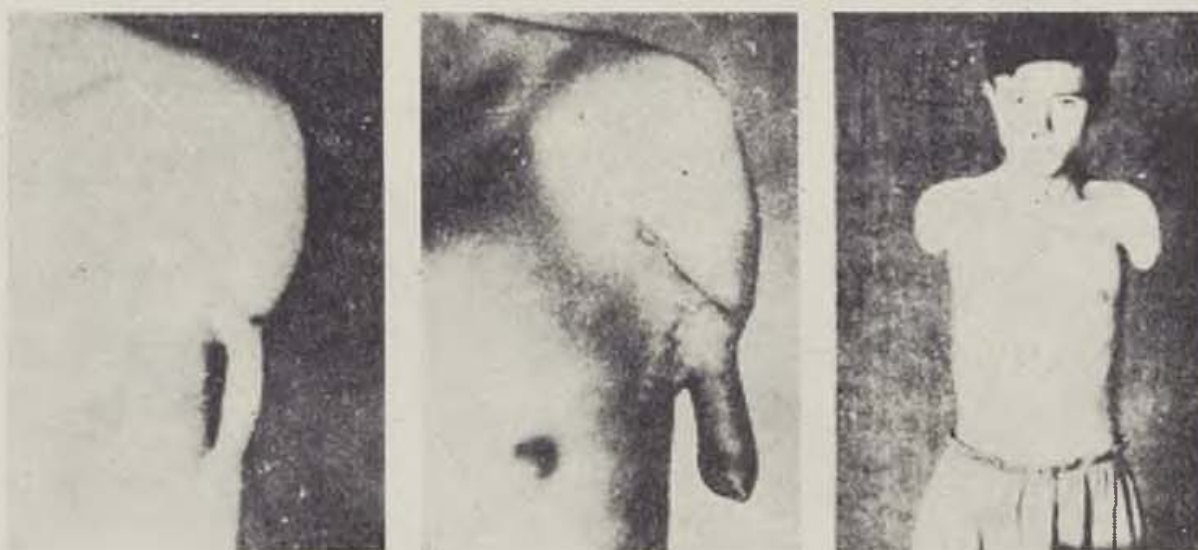


Fig. 3b — stages of acute flap formation, condition of the patient following the functional lengthening



Fig. 1b. 4 1/2 months after the operation; the superficial cartilage layer is partially replaced by fibrous bands



Fig. 1c. 6 months after the operation; the articular cartilage layer is preserved on surface on the replanted mandibular head

V. A. Kozlov, R. K. Kamalov, A. V. Tsimbalistov

REPLANTATION OF ARTICULAR PROCESS OF MANDIBULA

[A clinical and experimental study.]



Fig. 1. An experimental study. Condition of the articular process of mandibula following replantation. a — 3 months after the operation; the articular cartilage and synovial villi are preserved on the articular surface of the mandibular head



Fig. 3c — following application of the prosthesis

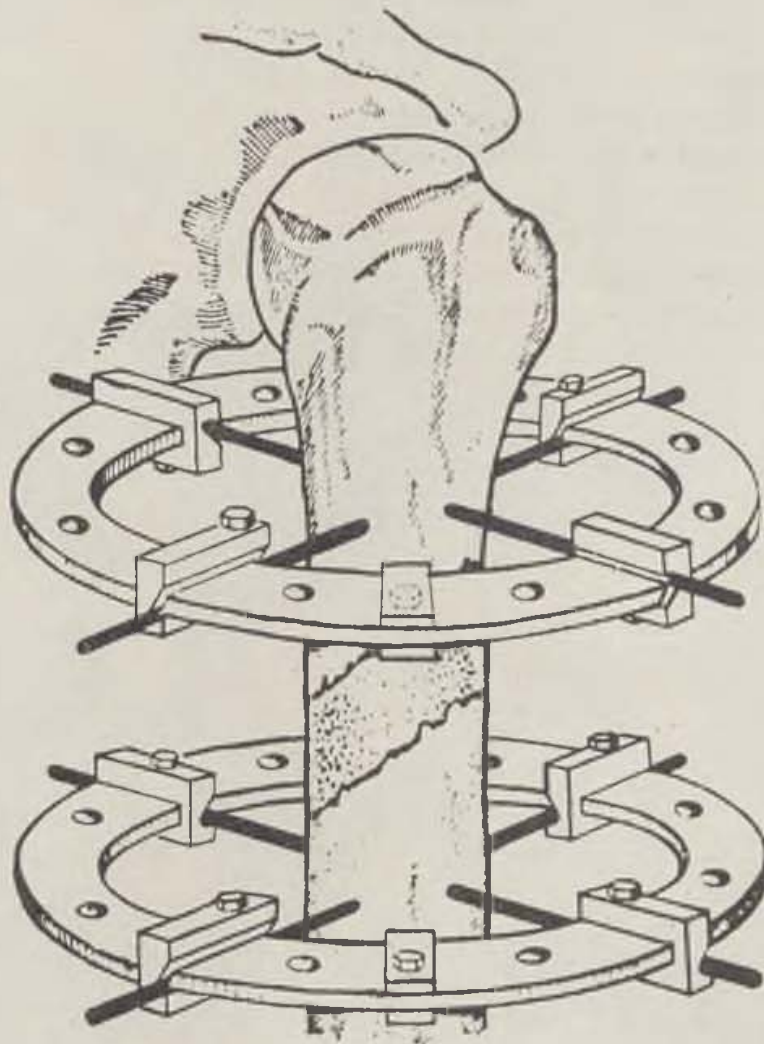


Fig. 3d — diagramm showing anatomical lengthening when a compression-distraction apparatus is used

Unfortunately, the methods of stumps lengthening have been quite rarely practically applied, due to their disadvantages. They are highly labor — consuming, consist of many steps and their final results are vague. Utilization of distraction apparatuses is the only exception to the rule.

The functional lengthening of the stump is indicated, if the stump adheres massively to the surrounding pectoral tissues or if it is short and lacking distinct contours. When the stump is lengthened functionally, a tubular flap is prepared simultaneously as a reserve of soft tissues for anatomical lengthening of the osseous stump. The tubular flap is prepared on the lateral side of thorax. Its skin tube is oriented in such a way that it directly elongates the short stump, i. e. as an acute flap (Fig. 3a, b, c).

An introduction of distraction-compressive apparatuses represented an essential improvement in the way, how the anatomical lengthening could be achieved. In clinical practice, this method has been widely used since 1973 (Filatov et al. 1973).

The principle of the method consists in starting the microdistraction procedure (Fig. 3d) after transversal or oblique osteotomy (depending on length of the osseous stump) or following the epiphyseolysis performed by children. A germinative layer of periosteum, which adheres to a cortical layer of a bone, serves as a source of osteogenesis. It enables elongation of the regenerate during the distraction. The elongation progressed gradually, not more than 1 mm a day. It was regularly controlled by x-ray examination. Even when the distraction procedure had been finished, the apparatus was removed not sooner as 3—4 weeks after the x-ray examination confirming finished rebuilding of the newly formed regenerate into the bone tissue. If

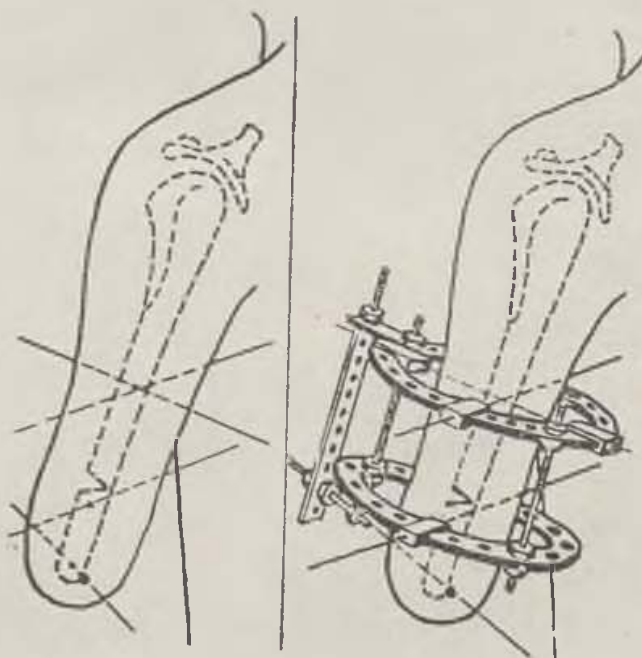


Fig. 4. Stages of angular osteotomy. a — angular osteotomy and a way of application of the compression-distraction apparatus

the length of the distracted segment did not diminish after loosening of the distraction circles, it also could be concluded that the regenerate's rebuilding was completed.

It is possible to lengthen the bone stump by 8—10 cm during 4—6 months since starting of the distraction. However, a condition of the surrounding soft tissues should also be taken into account, if the prognosis of the short stump's lengthening is considered. If an uninjured short extremity is distracted, the soft tissues follow the distracted bone segment coordinately. But it is not true for cicatricized short stumps.

From this point of view, three groups of short stumps can be distinguished:

1. short stumps that are rich in soft tissues, with mobile unfixed scars, not requiring preparatory skin plasties,

2. short stumps that are moderately deficient in soft tissues on their ends; this deficit may be substituted by shifting the adjacent sources of the soft tissues to the stump's end (an Indian plasty), or by an "Italian" plasty, by which, however, a just small increment of the soft tissues can be ensured,

3. short stumps with large fixed scars and considerable deficit of the soft tissues, that can be substituted by Filatov's tubular flap.

It should be noted, that the lengthened stumps are destined to subsequent application of mechanical prostheses controlled by a system of tractions. At present, this kind of prostheses prevails in production of the prosthetic industry. However, they are gradually substituted by externally powered prostheses (electric, pneumatic and others), which are more perfect and perspective.

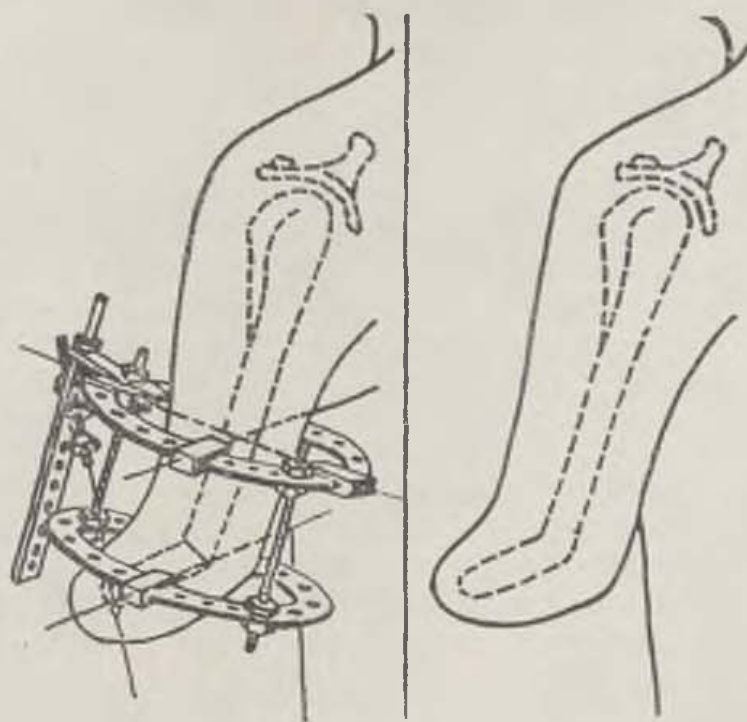


Fig. 4b. — fixation of the bone fragments in this apparatus and appearance of the stump after the operation

In future, therefore, the preprosthetic plastic surgery will have to be reoriented to development of kinematic plastic techniques enabling the use of such prostheses.



Fig. 5. Preprosthetic surgery and prosthesis application by an amputee, who lost upper limbs. a — an amputee, who lost upper limbs due to electric injury

In our Institute, the Marquardt's angular osteotomy of the long above-elbow stump [Marquardt and Neff, 1974], was modified in 1976. According to this method, a wedge-like bone fragment (with its basis oriented forwards) is subperiosteally resected in the distal fourth of humerus, and the distal humeral fragment (5—7 cm long) is situated under an angle of 110° — 115° and is fixed by Ilizarov's apparatus or a fixing wire (Fig. 4).

It was the aim of this operation to enable the use of prostheses provided with totally adhering sockets, avoiding a contact of the proximal stump's part with splints of the uncovered constructions. Any movement of the stump is transferred directly to the prosthesis. The weight load affects the end of the stump. The skin in the dorsal side of the stump's end may transfer sensory perceptions. The extent of actions is enlarged, the prosthesis may be lighter and its cosmetic design may be improved.

As documented in our Institute, almost 70 % of the patients obtaining a primary prosthesis suffered from defects and diseases of the stump; among them, unsoundness of the skin, hypertrophic scars, chronic granulating wounds,

trophic ulcers, ulcerated scars occurred most frequently. The stump defects were repaired by 645 reconstructive operations and various kinds of plasties were utilized.



Fig. 5c. — normal skin on the forearm stump achieved by an "Italian" plasty, d — patient's self-service capability following the "Italian" plasty and splitting of the forearm stump



Fig. 5b. — forearm stump with cicatricized skin

The following indications of the reconstructive skin plasties performed on the stumps of the extremities are based on experience having been gained in our Institute:

- deformities of the skin covering the stump: compressing scars, amniotic bands,
- skin deficit in respect to the bone stump: large fixed scars of the stump's end, ingrowth of a bone to soft tissues,
- ulcerated scars, chronic granulating wounds, trophic ulcers,
- cosmetic defects of the stump.

Future development of prostheses for extremities will have special requirements to a choice of skin plasties. In general surgery, covering of any wound by a free dermatome skin graft is considered quite correct and justified. However, the surgeon operating on the stump must be aware of the fact that the transferred tissues will have to endure a functional stress (pressure, friction) exerted by a socket of the prosthesis. Therefore, the most stressed part of the stump is covered by local skin plasties, e. g. by a shifting of counter-positioned triangular flaps or by an "Indian" plasty. The displaced flaps remain connected with their bases. It enables their nutrition and survival and preserves all kinds of skin susceptibility. It is, of course, very important for function of the prosthesis.



Fig. 5e. — condition after application of the prosthesis

For using the technique of counter-positioned triangular flaps, unaltered skin resource have to be available nearby and rather small defects are to be covered. The "Indian" plasty characterized by turning of the flap on a pedicle is able to cover considerably large defects, while all advantages of the local tissue plasties are present. It is possible to enlarge the size of a flap on a pedicle by a free skin dermatome plasty used for covering of its bed on the unstressed surface of the stump.

The dermatome skin grafts are used as auxiliary skin plasties in combination with other plastic methods or for covering of the granulating wounds localized on unstressed surfaces of the stumps of the extremities.

A direct functional load should be diverted from the free skin grafts. They should not be placed on the surface contacted by interior of the socket of the prosthesis. If the contact is inevitable, "relieving" holes should be prepared in the socket.

The "Italian" or tubular flap plasties (Fig. 5) are used when the skin on the stump's end is greatly altered and soft tissues are deficient in respect to the bone stump.

Thus, the advancement of reconstructive surgery of the limb stumps, based mainly on development of kinematic methods, lead to improved rehabilitation of the handicapped patients.

M. T.

SUMMARY

This paper presents modern methods of reconstructive surgery applied to the patients with limb amputations in the preprosthetic period, over 1800 operations being performed with the help of these methods.

The wide application of different kinematic operations (the formation of skin-muscular canals, the splitting of the forearm stumps, the functional and anatomic lengthening of the short stumps, the angular osteotomy) is closely connected with the development of highly functional prostheses.

The operations eliminating stump defects and diseases have been improved. At present the reamputations are being gradually replaced by plastic surgery. The skin-plastic method developed with regard to the following loading on the stump has been chosen according to the specified indications.

This complex surgical and conservative treatment enables the amputees to control not only the prostheses but also aid and working appliances.

RESUME

La chirurgie réconstructive dans la période pré-prothétique

Filatov, V. I., Vojnova, L. E.

Dans cet article, les auteurs décrivent des méthodes modernes de la chirurgie réconstructive qui ont été utilisées dans la période pré-prothétique chez des malades avec une extrémité amputée. Ces techniques ont été appliquées chez plus de 1800 opérés.



La multiplicité des opérations kinématiques (modelage des canaux dermo-musculaires, prolongation fonctionnelle et anatomique des moignons courts, ostéotomie angulaire) est jointe au développement des prothèses fonctionnellement bien efficaces.

On a perfectionné des opérations qui permettent la guérison des défauts et des maladies du moignon d'amputation. En ce temps, des réamputations sont de plus en plus remplacées par des opérations plastiques. On a précisé des indications qui déterminent la méthode de la plastie cutannée vu charge attendue du moignon.

ZUSAMMENFASSUNG

Wiederherstellungschirurgie in der präprothetischen Phase

Filatow, V. I., Wojnowa, L. E.

Im Artikel werden moderne Methoden der Wiederherstellungschirurgie beschrieben, die in der präprothetischen Phase bei Patienten mit Extremitätenamputationen benutzt wurden. Diese Techniken wurden in mehr als 1800 Operationen angewandt.

Die breite Anwendung verschiedener kinematischer Operationen (Bildung von Haut-muskelkanälen, funktionelle und anatomische Verlängerung kurzer Stümpfe, angulare Osteotomie) ist eng verbunden mit der Entwicklung hoch funktionell wirksamer Prothesen.

Es wurden Operationen vervollkommen, die die Heilung der Defekte und Krankheiten des Amputationsstumpfes ermöglichen. In der Gegenwart werden die Reamputationen allmählich durch plastische Operationen ersetzt. Es wurden Indikationen für die Wahl der Methode der Hautplastik angesichts der zu erwartenden funktionellen Belastung des Stumpfes bestimmt.

RESUMEN

Cirugía reconstructiva en el período preprotético

Filatov, V. I., Vojnova, L. E.

En este artículo se indican los modernos métodos de cirugía reconstructiva utilizada durante el período preprotético en pacientes con extremidad amputada. Estos métodos fueron utilizados en más de 1800 operaciones.

La amplia utilización de diferentes operaciones cinemáticas (la conformación de canales dermomusculares, alargamiento funcional y anatómico de muñones cortos, osteotomía angular) está estrechamente vinculada con el desarrollo de prótesis de alta eficiencia funcional.

Se han perfeccionado operaciones que permiten la curación de los defectos y las enfermedades del muñón postamputatorio. En la actualidad, las reamputaciones van siendo gradualmente reemplazadas por operaciones plásticas. Se han determinado indicaciones para la selección del método de la dermatoplastia teniendo en cuenta la futura carga funcional del muñón.

REFERENCES

1. Keier, A. N.: Surgical Treatment of Shoulder Asymmetry by an Inborn Upper Limb Defect. [In Russian.] *Ortoped. Travmatol.*, 10: 74, 1969.
2. Filatov, V. I., Regentov, S. A.: Treatment and Prosthetics of Patients with Forearm Stumps Following Thermal Injuries. [In Russian.] In: *Problems of Burn Pathology*, p. 192, Saransk 1974.

3. Filatov, V. I., Shatilov, O. E., Voinova, L. E.: Some Results of Lengthening of Short Forearm and Arm Stumps. [In Russian.] Ortop. Travm. Protez., 11: 23, 1973.

4. Marquardt, E., Neff, G.: The Angulation Osteotomy of Above Elbow Stumps. Clin. Orthop., 104: 232, 1974.

Dr V. I. Filatov, Leningrad Scientific Institute of Prosthetics,
K. Marx avenue 11, 194175 Leningrad, USSR

J. E. Purkyně Brno University Press, ACTA FACULTATIS MEDICAE UNIVERSITATIS BRUNENSIS, announce the publication of an extensive monograph by Prof. MUDr. V. Kubáček, DrSc et al. **SURGERY OF THE HAND**. 508 pp., 527 illustrations, price 50,— Kčs.

Compiled by a team of surgeons of the Department of Plastic Surgery, J. E. Purkyně University Medical Faculty, Brno, the book sums up in the general part the latest theoretical knowledge of the surgical and functional anatomy of the hand, including chapters on wound healing, sur-

gical techniques, tissue transplantation, diagnostic procedures, first aid in hand injuries. The special part is devoted to the diagnosis and treatment of congenital hand defects, to the treatment of all types of hand injury, to the treatment of serious hand affections, to rehabilitation techniques, and to reconstructive operations for hand injuries.

The book is expected to rouse the interest of surgeons, orthopaedic surgeons, traumatologists, but also of medical students and postgraduates working for higher qualification certificates. It should not be missing from any medical library.

Burn Unit of the Central Hospital, Budapest [Hungary]

RELATIONSHIPS OF THERMAL INJURIES AND MEDICINE

K. Szabó

30 years ago the question at issue was whether treatment of thermal injuries should be performed by dermatologists or surgeons. The pathological phenomena recognized during the past decades revealed however that burns were a disease requiring essentially medical treatment, while definitive recovery was to be expected in most cases from an operation. The aim of the present paper was to review the basic pathological events of burns, as well as the associated complications. Knowledge on the pathological events is, namely, a prerequisite of medical therapy.

Neuroendocrine and metabolic disorders

Thermal injury induced severe stress exerts also a prolonged action since anatomical healing of the burned wound surfaces may require months. In addition to the mentioned somatic effects psychic involvement is of great importance, i. e. initial fear of death, then anxiety concerning social, existential, and esthetic consequences dominate. Stress induced characteristic hormonal changes develop, such as increased catecholamine, cortisol, glucagone, aldosterone, renin, and angiotensin secretion present for months. T₃, T₄, and testosterone level are low. The extremely high cortisol and catecholamine levels during the first days after the injury decrease thereafter, remain however the tenfold of normal during the entire period of the disease. Glucagon reaches its peak on day 4 and remains high thereafter. In general, insulin secretion is initially depressed, sometimes increased, later it becomes high, the insulin/glucagon quotient will however be throughout just a fraction of normal ratio.

Moreover, the smallest intervention (sitting up, dressing, walking) lead to the substantial increase of catecholamine secretion. It should be mentioned however that, in spite of the high catecholamine level no desensibilization to catecholamines develops, increase of adenylcyclase activity in response to catecholamine remains unchanged throughout the disease.

During the shock period alpha adrenergic response of the autonomous nervous system prevails and shifts to beta adrenergic response during the toxic phase. The shift occur probably on day 4 after the injury and is due to metabolic and intracellular disturbances of endocrine origin. In consequence of the hormonal changes basal metabolism considerably increases, i. e. depending on the size of the burned surface it shows a linear increase up to 50 per cent burns. Cachexia develops, energy requirement reaches 300 cal/m²/h [1,2 MJ/m²/h]

energy and 200 g/day protein requirement. At the same time this enormous energy requirement is associated to an inadequate and quantitatively insufficient energy production being consequence of uneven hormone levels. The most conspicuous consequences are cachexia, hypoproteinemia, hypoalbuminemia, diabetoid metabolic disorders, and substantial deterioration of immune response. Disturbance of carbohydrate metabolism is twofold. At the early stage it is due to insulin suppression and cortisol preponderance, as well as to catecholamine action, later it is consequence of peripheral insulin resistance, as well as of decreased insulin/glucagon ratio and pathological accumulation of intermediary metabolites.

Impairment of the central nervous system is consequence of the continuous substrate deficiency and the frequently increased serum ammonia content. Energy loss leads to the "sick cell" syndrome, the cell-membrane pump becomes impaired, intracellular sodium, water, and H^+ content rises. They may be partly responsible of disturbed consciousness in burned patients. In addition function of all the parenchymatous organs will be affected. These disorders modify pre-existing diabetes and might compel administration of exogenous insulin to patients receiving no parenteral alimentation and having been healthy before the injury. In consequence of the altered insulin resistance (septicemia, exogenous aminoacid) the administration of insulin may induce unexpected hypoglycemia.

The alteration of hypothalamic function should, too, not be omitted. Following thermal injury the organism's thermoregulation settles at a higher temperature — between 38–39 °C — therefore the comfortable external thermoneutral temperature should amount to 32–34 °C. This is the only means of reducing substantial heat loss associated to energy deficiency. Heat loss is not cause but consequence of the increased basal metabolism. Raised basal metabolism and basic temperature can be reduced by the administration of beta+alpha adrenergic blocking agents. Prolonged administration of beta-adrenergic blocking agents will prevent cachexia and hypoproteinemia.

Cardiovascular disturbances

In consequence of the mentioned neuroendocrine and metabolic changes, as well as on the effect of fluid loss and increased permeability, moreover the action of shock treatment substantial hemodynamic changes evolve. In the initial phase of shock hypovolemic circulatory failure, vasoconstriction, and hypoperfusion are characteristic observations. After 24 to 36 hours hyperkinetic and hypervolemic circulation associated to peripheral and pulmonary shunts develops. Due to perfusion disorders, reduced oxygen retraction, decreased oxygen transport capacity, as well as disbalance of lung ventilation/perfusion and the increase of shunt circulation tissue oxygenization substantially deteriorates and leads to metabolic acidosis.

Shock dependent heart failure in burn injuries differs from decompensation of other origin. During shock cardiac output and left ventricular stroke work

decrease, systemic vascular resistance increases. Despite the normal myocardium heart failure develops due to the reduced venous backflow. Simultaneously, acidosis and hypoxia, then the increase of catecholamine content, as well as fluid substitution heighten cardiac output, the index of left ventricular stroke work, oxygen supply and consumption. Because of the high oxygen demand not to be coped with the hyperkinetic circulation may finally induce heart failure. In addition to the insufficient ventricular filling factors released by the burned surface and the pancreas with impaired circulation depress the myocardium and deteriorate the mentioned events. During the later hyperkinetic phase the catecholamine induced strained heart has to pass a twice as high cardiac output through the often essentially resistant peripheral vessels. The mentioned affect left ventricular function impaired already by energy loss and, due to metabolic acidosis, is susceptible to ectopic impulse formation. Ion transport changes substantially, ECG records reveal repolarization disturbance. Cardiac changes and anemia are almost always accompanied by a variety of sound phenomena.

It is not unusual that, event in leading hospitals, carditis associated to burn sepsis will not be recognized *in vivo*. At the same time carditis might be source of the septic focus hampering reconvalescence. Control of central venous pressure, as well as parenteral hyperalimentation are unavoidable and might be required for weeks. Nevertheless catheter induced intimal injuries are not uncommon and often the starting point of carditis. Moreover carditis may develop in consequence of gram negative or fungus sepsis without any intimal injury.

According to Sevitt myocardial infarction in patients with burn injuries frequently occurs in consequence of prolonged hypercatecholaminemia and tissue hypoxia. Moreover, the mentioned metabolic disorders induce minor or large myocardial alterations in almost each case. Severe arrhythmia is frequent and, in want of adequate monitoring the reconvalescent patient may suddenly die.

Coagulation disorders

Thermal injury induces characteristic changes in coagulation homeostasis. During shock microaggregates develop in the lungs and kidneys and lead to incipient thrombocyte consumption. They play an important role in the development of subsequent pulmonary and renal complications. At the same time the decrease of thrombocytes involves coagulation disorders. Moreover fibrinogen passes into the interstitial space, the intravasal fibrinogen content becomes reduced. Degraded fibrinogen reentering circulation in form of FDS might simulate DIC. Sometimes however these changes disclose the presence of true DIC. In consequence of liver the damage prothrombin content becomes reduced already during the first week. In the majority of the cases the thrombocyte number increases between day 4 and 7 and heightens susceptibility to thrombosis. It should be mentioned however that every single stress effect induces the additional decrease of thrombocyte number, primarily in consequence of consumption. Control and adequate evaluation of these changes requires a well-equipped and round the clock laboratory service, as well as a skilled expert.

Pulmonary complications

At burn departments pulmonary complications are the most common death cause. PPI is of particular importance and is a special form of adult respiratory distress syndrome. Pulmonary circulation disorder enhances its development, though the part of nutritive factors is decisive for reduced surfactant production and the development of the syndrome. It generally develops during the first posttraumatic week in patients having inhaled combustion degradation products. In patients with burn injuries direct alveolar damage contributes, too, to the development of adult respiratory distress syndrome beyond other pathogenetic factors. Discrepant clinical picture, roentgenological findings, and blood gas analysis hamper early detection. In accordance with reports from other burns units PPI has been responsible for 50 per cent of the total mortality in our material. Continuous positive pressure breathing is the only promising treatment. The late development of the syndrome is almost always a symptom of sepsis.

In consequence of the mentioned coagulation disorders and the veins exposed for weeks non-septic embolization might occur. In cases of pulmonary embolism fibrinolytic therapy, which is considered to be the most effective treatment, is contraindicated due to concurrent sepsis and/or low fibrinogen content. Liver damage impedes Syncumar treatment, thus prolonged, carefully controlled, large doses of heparin is the only means of therapy. "Simple" pneumonia is not infrequent due to the virulent bacterial flora in wards and the continuous bacterial invasion of the septic patients. Pneumonia is induced first by the inhaled pathogens and later by the septic hematogenous dissemination of the bacterial flora. The course of the disease is much more severe than in conventional pneumonia.

Renal complications

Renal circulation shows substantial changes during shock, however, stress, septic condition, and drug effect during the long period of the disease cause primarily tubular necrosis. Nevertheless, tubular and glomerular impairment will be also responsible in the development of the early and late forms. Post-combustion hypertension is due mostly to the increased renin-angiotensin secretion, though occlusion of the renal artery might be present, too. Hazards of iatrogenic urinary tract infection subsequent to prolonged catheterization, as well as shock kidney may hardly be prevented. The non-oliguric form of renal insufficiency in patients with thermal injuries is less known. In the initial phase careful control and correction of osmolality might be helpful, at a later stage however dialysis will be the only means of preventing lethal outcome of progressive renal insufficiency.

Gastrointestinal and liver involvement

Splanchnic blood supply is substantially impaired during the shock period. It involves the early impairment of liver and pancreas, as well as to the development of Curling's ulcer in addition to the recently detected arteria mesenterica superior syndrome. Mitochondrial impairment due to toxin release af-

fecting the liver might be present, too. Because of atony, the difficulty to perform endoscopic or radiological examination diagnosis and therapeutic intervention are of major problem. Serum enzyme concentrations are of no pathognomonic value though it has been found that these values may be raised depending on burn severity. Jaundice of thermal injury might be induced also by toxemia. Hemolytic complications of the transfusions, hepatitis or cytomegalovirus induced infections, and late complications of septic icterus increase diagnostic and therapeutic difficulties. Liver damage induces decrease of pseudocholinesterase, prothrombin, and fibrinogen concentrations, as well as of albumin and certain globulin fractions. Prognosis might be improved in general beyond parenteral hyperalimentation by adequate substitution therapy and aimed amino-acid treatment.

A n e m i a

In spite of the importance of anemia of burns discussion will be brief, since the excellent reports are of common use. Disorder of globin, hem-synthesis, and iron metabolism are of primary importance in addition to the secondary effect of hemolysis and the reduced length of life of red blood cells.

The enzyme systems of red blood cells become impaired, their adenylphosphate content changes, the K^+ content of cell decreases, Na^+ concentration increases. The condition can be improved by insulin and sugar administration. It should be emphasized however that, for the time being blood transfusion is the only means of treatment. It has to be supplied repeatedly to patients in a condition that represents, according to textbooks, a contraindication of blood transfusion.

I m p a i r e d i m m u n i t y

Last but not least immunoparesis of burn injury affecting both, the cellular and humoral immunity has to be mentioned. The decrease of the total leukocyte count is consequence of impeded myelopoiesis and increased consumption. Phagocyte capacity, monocyte function, and RES are impaired in addition to the decreased globulin level and complement content. No wonder that sepsis develops due to the continuous bacterial invasion through the open wound surface. The only means of prevention would be to keep the patients under "sterile" conditions. Substitution therapy (leukocyte suspension, globulins) will be, for the most part, too late if septic symptoms developed. The use of levamisol and other agents affecting immunity seem promising, though clinical experiences are scanty.

The severity of thermal injury induced sepsis could be subject of a separate conference. Outcome of sepsis of whatever origin in a previously healthy organism has to be considered doubtful. In thermal injury the energetically exhausted patient with impaired metabolism, immunological and cardiopulmonary dysfunction is faced with the continuous invasion of polyresistant, for the most part gram-negative, nosocomial bacteria. At the same time the only means of recovery is a series of unavoidable operations that have to be performed in spite of the significant stress involvement and the substantial blood loss.

Obviously, mortality rate is salient in patients with preburn disease. Years ago we found that from 160 aged patients with of 11 % B.B.S. on the average, mortality amounted to 16 % in previously healthy. However it rose to 19 % in emphysema senile, 30 % in C.O.L.D., 33 % in heart disease and arteriosclerosis, 50 % in dementia senile, 60 % in chronic liver disease and 69 % in chronic renal disease. Either the diagnosis concerning the previous diseases or treatment on these may be modified by the burn disease. At the same time a poor condition of the patients as a consequences of a previous disease can hamper the adequate surgical intervention increasing the risk of sepsis.

On the basis of the aforesaid it seems to be evident that thermal injury is a medical disease necessitates surgical treatment. Moreover, the patient with burn injuries may possibly require intensive therapy for months. Accordingly, treatment necessitates cooperation of the various specialities, primarily and active, continuous medical attendance.

SUMMARY

On the effect of the thermal injury induced intense, protracted stress severe disturbances of homeostasis develop, it affects the function of other parenchymatous organs and induces the so-called "burn disease". Pathology, clinical symptoms, and characteristic complications have been reviewed. It has been concluded that thermal injury was a medical disease compelling surgical treatment. The author emphasizes the difficulties of differential diagnosis and therapy. Pretraumatic medical diseases essentially heighten lethal outcome.

RESUME

Rapport de la brûlure à la thérapie

Szabó, K.

En conséquence du trauma thermique, selon son intensité, de graves troubles apparaissent. Il s'agit des troubles stressants de l'homéostasie, des dysfonctionnements des organes parenchymateux et de soi-disant «maladie de brûlure».

Dans l'étude, on expose pathologie, symptômes cliniques, complications caractéristiques pour cette «maladie de brûlure». On exprime l'opinion que le trauma thermique est une maladie interne qui exige le traitement chirurgical.

L'auteur accentue la difficulté du diagnostic différentiel et de la thérapie. Des maladies internes en anamnèse augmentent significativement le nombre des résultats létaux.

ZUSAMMENFASSUNG

Beziehung zwischen der Verbrennung und Therapie

Szabó, K.

Entsprechend der Intensität des erlittenen thermischen Traumas entstehen lange und schwere stressbedingte Homeostasestörungen, Dysfunktion der parenchymatösen Organe und sog. „Verbrennungskrankheit“. Ihre Pathologie, klinische Symptome und charakteristische Komplikationen wurden erörtert und es wurde die Ansicht formuliert, dass das thermische Trauma eine innere Krankheit ist, die chirurgische Behandlung er-

fordert. Die Autoren betonen die Schwierigkeit der Differentialdiagnostik und Therapie. Vor der Verbrennung erlittene innere Krankheiten steigern die Zahl der letalen Ergebnisse wesentlich.

RESUMEN

La correlación entre la quemadura y la terapia

Szabó, K.

De acuerdo con la intensidad del trauma térmico que se haya sufrido se producen graves trastornos homeostáticos, disfunciones parenquimatosas de los órganos y la llamada „enfermedad por quemaduras“. Se da su patología, síntomas clínicos y complicaciones características formulándose la opinión de que el trauma térmico constituye una enfermedad interna que requiere un tratamiento quirúrgico. Los autores subrayan lo difícil que resulta el diagnóstico diferencial y la terapia. Las enfermedades internas que el paciente haya pasado en el período de vida anterior a las quemaduras aumentan considerablemente el número de los resultados letales.

REFERENCES

1. Artz, C. P., Moncrief, S. A., Pruitt, B. A. (eds.): Burns. Team Approaches. Saunders. Philadelphia—London—Toronto 1979.
 2. Baar, S.: Anaemia of Burns. Burns, 6:1, 1980.
 3. Batstone, G. F. et al.: Metabolic Studies in Subjects Following Thermal Injury. Burns, 2: 207, 1976.
 4. Bernáth, I.: Az égési anaemia pathogenesis. Akadémia Kiadó, 1971.
 5. Czaja, A. J. et al.: Acute Liver Disease after Cutaneous Thermal Injury. J. Trauma, 15: 887, 1975.
 6. Davies, A. M. et al.: Acute Renal Failure in Burns. Scand. plast. reconstr. Surg., 13: 189, 1979.
 7. Dolecek, R.: Metabolic Response of the Burned Organism. Thomas. Springfield, 111. 1969.
 8. Eurenus, K. et al.: Blood Coagulations in Burn Injury. Proc. Soc. exp. Biol. Med., 147: 878, 1974.
 9. Munster, A.: The Early Management of Thermal Burns. Surgery, 87: 29, 1980.
 10. Schoemaker, W. C. et al.: Burn Pathophysiology in Man. I. Sequential Hemodynamic Alterations. J. surg. Res., 14: 64, 1973.
 11. Sevvitt, S.: Reaction to Injury and Burns. Heinemann Med. London 1974.
 12. Sevvitt, S.: A Review of Complications of Burns, their Origin and Importance for Illness and Death. J. Trauma, 19: 358, 1979.
 13. Vladek, B. C. et al.: Burn Pathophysiology in Man. II. Sequential Oxygen Transport and Acid-base Alterations. J. surg. Res., 14: 74, 1973.
 14. Wilmore, D. W. et al.: Insulin Response to Glucose in Hypermetabolic Burn Patients. Ann. Surg., 183: 314, 1976.
 15. Zawacki, B. E. et al.: Smoke, Burns, and the Natural History of Inhalation Injury in Fire Victims. Ann. Surg. 187: 288, 1977.
- Further references are available by the author.

K. Szabó, M. D., Eötvös utca 5, H-1067, Budapest, Hungary

*) Paper read at the joint Conference of the Burn Section of the Hungarian Society of Traumatology, the Hungarian Medical Association, the Hungarian Society of Pediatricians, and the Hungarian Society of Pediatric Surgery, Szolnok (Hungary), 14–15, November 1980.

Charles University, Medical Faculty of Hygiene, Prague (Czechoslovakia)
Department of Plastic Surgery, Burn Centre
Head Prof. M. Fára, M. D., DrSc

NEUROLOGICAL AND PSYCHOLOGICAL COMPLICATIONS IN THE BURNED

I. Pondělíček, F. Véle, R. Königová

I.

There appears to be a sort of neurodermatological affinity, an intimate relationship between the skin and the nervous system, due to the fact that both take their origin from ectoderm. Hence why a burn interferes with the nervous system regulatory functions albeit by merely damaging some of the receptors in the skin, the gateway to the nervous system.

Burn-induced nervous system disorders can be divided into two basic groups:

Table 1

- I. Peripheral nerve damage
- II. Central nervous system damage

a) Direct peripheral nerve damage resulting from coagulation, necrosis or burn may be responsible for the complete or partial disruption of the nerve structure and function. Reversibility depends on the extent and size of the lesion. Indirect damage due to pressure from oedema or scarring is also likely to cause temporary or lasting disorders.

To use Seddon's classification, there are three degrees of the nature of the disorder: 1. *Apraxia* — this is reversible with return ad integrum taking a few days, a maximum of two weeks. — 2. *Axonotmesis* where repair takes the form of either collaterals sprouting from preserved axons or axons growing full length again in denervated fibres so long as Schwann's sheath has been preserved intact. Function restoration occurs in two phases: first — within 2 months, second — within 1 to two years, depending on the nerve length. — 3. *Neurotmesis* where surgery is necessary to restore nerve continuity.

The anterior tibial muscle syndrome is a serious case of indirect peripheral nerve damage. Tension develops in the fascia cruris to damage nerve and muscle fibres in the leg inside the fascia to the point of loss of function.



More pressure leads to the destruction of the structure, which is why the fascia has to be cut in time to ease the tension.

b) Central nervous structure damage develops mostly indirectly under the toxic effects of necrotic tissue. In clinical terms, this may become manifest through the patient's altered behaviour due to inhibition but also in the form of increased excitability.

Generalized inhibition takes the form of reduced vigilance, different degrees of consciousness impairment including semicoma or even comatous states. The degree of consciousness impairment may be proportional to the extent of necrosis; sometimes it may prove quite considerable even in smaller-sized necrosis, depending on the patient's stability or lability prior to injury. Other symptoms include increased irritability, anxiety, restlessness, central motor disorders, tonus deviation, tremor, impaired motor co-ordination. Integumentary mutilation resulting from scarring gives rise to psychological disturbances with corresponding alterations in the patient's behaviour.

Generally speaking, neurological complications are fairly frequent in burns and, in some cases, quite serious, too. Peripheral neurological disorder require long-term motor function rehabilitation. Central disorders call for pharmacological therapy depending on the nature of the complaint. A psychological approach to the patient is extremely important during treatment and rehabilitation.

Table 2

I. Diffuse sensation of mental potentialities

II. Mental state decompensation

ad I. Diffuse sensation of mental potentialities may sometimes develop alongside with the patient's diffuse sensation of physical potentialities and subvalidity of physical and physiognomic functions. The mind-body unity is demonstrated there in its clinically negative and pathological consequences. The deviation may be due to just the awareness of an aesthetic defect or to the subvalidity or invalidity of psychomotor manifestations

ad II. The process referred to as mental state decompensation is a far more serious clinical condition. Two types of situation may precede it: a) prior to the thermal injury the patient's CNS had been compensated but not intact (invulnerable), or it had been previously indisposed, disturbed, unbalanced, debilitated, deviant, damaged, or otherwise affected but preserved in a compensated condition until the point of thermal injury

II.

Burns can often be classified as cases of somatopsychic diseases. A thermal injury is likely to cause secondary psychic symptoms or even personality alteration. In predisposed individuals (a history of psychosis or depression), in cases of developing infection (necrosis) or as a result of defects in the patient's personal history (abusus ethanoli) the acute phase of a burn may be accompanied by psychiatric symptomatology such as amentia or deliriant hallucinatory states.

Apart from that, there may be also concomitant psychological changes and pathopsychological symptoms, particularly during the rehabilitation period in individuals free from any really apparent consequences, or even later on in individuals with scarry deformations of the visible parts of the body (face, hands). These may be: 1. diffuse sensation of mental potentialities, or 2. mental state decompensation.

Mental state decompensation should be understood to mean a dynamic phenomenon capable of putting the individual's mental manifestations and even biophilic or "self-defence" personality constituents off their natural stability. The patient often start manoeuvring unconsciously with his internal defence techniques in order to cope with his stress situation sometimes bordering on a state of vital endangerment. Three factors influence the emergence and development of decompensation: 1. Degree of injury and possible complications (infectious, respiratory, circulatory). — 2. Premorbid personality, the patient's mental resistance and disposition for the activation of defence mechanisms. — 3. Approach and style of treatment as well as the hospital atmosphere.

Table 3

1. Strong biophilic orientation, desire to survive
2. Simple emotional lability
3. Major reaction to stress requiring the activation of the positive mechanisms of denial
4. Negative mechanisms: infantile reaction and tendency to resignation
5. Reactive depression
6. Apathy-abulia syndrome
7. Necrophilic orientation, desire to die

The first three degrees are still quite adequate reactions to the burn trauma. Thus, for instance, the mechanism of denial is the burned patients' most significant psychological manoeuvre — psychotherapeutic induction is often necessary. According to Hackett, according to Gentry, and according to Šimek and Höschl the patients who die mostly belong in the group of "poor deniers" while absolute "deniers" hold on, there is no mention of their death in the relevant literature

Table 3 gives an idea of our own empirical classification of the degrees of mental response to thermal injury.

As part of comprehensive care, burned patients treated at our centre receive systematic psychotherapy and, later on, mental rehabilitation as well. As for bed-side care, we seem to have had good results using rather brief, five to ten minute but repeated psychotherapeutical interventions every day. Depth psychotherapy of long duration is restored to in only certain special cases, e. g., for the reconstruction of the accident to cope with feelings of guilt, or in cases of psychogenic chronic pain.

The psychological approach to burned patients is also used for the prevention of mental complications following disfiguration (including prevention of suicides), and for readaptation to the patients' new conditions or opportunities for employment.

J. H.

SUMMARY

Drawing upon several years of their clinical experience of burn treatment the authors discuss some of the main neurological and psychological complications in burned patients. Peripheral as well as central nervous system damage is a fairly frequent and serious condition accompanying thermal injuries requiring long-term rehabilitation and pharmacological therapy. There are also somatopsychic disorders with a number of concomitant pathopsychological symptoms and changes. Special reference is made to the process of mental state decompensation. Finally, stress is laid on the significance of a psychological approach to the patient, and on the potentialities of psychotherapy and mental rehabilitation and readaptation in burned patients.

RESUME

Complications neurologiques et psychologiques des brûlures

Pondělíček, J., Véle, F., Königová, R.

Sur la base des expériences cliniques, les auteurs avertissent de principales complications neurologiques et psychologiques des brûlés. Des lésions du nerf périphérique de même que des lésions des systèmes centraux représentent un type de la détérioration bien courant et bien grave, chez les traumatismes thermiques. La longue réhabilitation et la pharmacothérapie sont nécessaires. Les traumatismes thermiques sont accompagnés des lésions somatopsychologiques qui se manifestent par une série de symptômes patopsychologiques et de changements psychiques.

Les auteurs avertissent du processus de la décompensation de l'état psychique. Enfin, on accentue l'importance de l'accès psychologique au malade, l'importance de la psychothérapie et de la réhabilitation psychique même que la réadaptation des brûlés.

ZUSAMMENFASSUNG

Neurologische und psychologische Komplikationen bei den Verbrannten

Pondělíček, J., Véle, F., Königová, R.

Auf Grund mehrjähriger klinischer Erfahrungen machen die Autoren auf die bedeutendsten neurologischen und psychologischen Komplikationen bei den Verbrannten aufmerksam. Sowohl die Schädigung des peripheren Nerven als auch das Trauma der zentralen Systeme sind bei thermischen Unfällen ziemlich häufige und schwerwiegende Störungen. Sie erfordern langfristige Rehabilitation und pharmakologische Therapie. Es gibt hier auch somatopsychische Störungen mit einer Reihe begleitender patopsychologischer Symptome und Veränderungen. Es wurde besonders auf den Prozess der Dekompensation des psychischen Zustandes hingewiesen. Abschliessend wurden die Bedeutung des psychologischen Herangehens an den Patienten, sowie die Möglichkeiten der Psychotherapie und der psychischen Rehabilitation und Readaptation der Verbrannten hervorgehoben.

RESUMEN

Complicaciones neurológicas y psicológicas en los quemados

Pondělíček, J., Véle, F., Königová, R.

A base de varios años de experiencias clínicas en un equipo de tratamiento de quemaduras, los autores señalan las principales complicaciones neurológicas y psicológicas en personas quemadas. Son con frecuencia los deterioros tanto del nervio pe-

riférico como de los sistemas centrales. Estos trastornos de considerable gravedad que suelen producirse como consecuencia de lesiones térmicas requieren una rehabilitación y terapia farmacológica a largo plazo. Aparecen, además, defectos somato-síquicos con una serie de síntomas y alteraciones patosicológicas secundarias. Se llama una atención particular sobre el proceso de decompensación del estado síquico. Al final se subraya la importancia de un acceso psicológico al paciente así como las posibilidades de sicoterapia y rehabilitación y readaptación síquicas de los quemados.

REFERENCES

1. **Goldin, M. D. (ed.):** Intensive Care of the Surgical Patient. 2nd edition. Year Book Medical Publ., Chicago, 1974.
2. **Pavlovský, P., Hellerová-Pokorná, P., Smolík, P.:** Burns from the Psychiatric Point of View. (Manuscript in Czech), Prague, 1980.
3. **Rodanová, J.:** Adaptational and Emotional Problems in Burned Patients. (In Slovak.) Čs. Psychiat., 73, 4, 275, 1977.
4. **Steiner, H., Clark, W. R.:** Psychiatric Complications of Burned Adults: A Classification. J. Trauma 17, 2, 1977.

Dr I. Pondělíček, Burn Centre, Třída Lidových milicí 63, 120 00 Prague, Czechoslovakia

Kirov's Leningrad Institute of Postgraduate Medical Education, Leningrad (USSR)
Department of Stomatologic Surgery and Orthodontics
Director Prof. V. A. Kozlov

REPLANTATION OF ARTICULAR PROCESS OF MANDIBULA (A clinical and experimental study.)

V. A. Kozlov, R. K. Kamalov, A. V. Tsimbalistov

Dislocation of a head of mandibula is a relatively rare complication of mandibular fractures affecting a region of its articular process. Just 57 such cases occurred among 1814 patients who suffered from fractures of the ramus mandibulae and were examined by us during a time period of 10 years [1970—1979].

However, such patients with complicated fractures represent a difficult therapeutic task for the clinicians and studies on this problem are of great importance.

It was reported in many papers that the mandibular head, which had been dislocated externally from the articular capsule, was resolved eventually. According to opinion of many authors, replantation of the head did not prevent it from the same fate. For example, Gerbert claimed that supply of nutrients to dislocated mandibular head was interrupted and its aseptic necrosis resulted [cit. by Halmoš, 1975]. French authors recommended to remove the dislocated mandibular head and the broken off bone fragments, as they have become resolved due to interrupted blood supply [cit. by Halmoš, 1975]. Sysolyatin et al. [1977] and others admitted a possibility of mandibular head resolution following its dislocation.

In order to obtain exact data on fate of the replanted head of the mandibula, and experimental study was undertaken.

MATERIALS AND METHODS

The articular process of mandibula was unilaterally broken off in 15 anaesthetized dogs, extirpated and then replanted. The animals were sacrificed 3, 4½ and 6 months after the operation. The mandibula was removed, examined by X-rays, fixed in 10 % neutral formaldehyde, decalcified in a solution consisting of 100 ml concentrated formic acid, 80 ml concentrated hydrochloric acid [specific weight 1.19] and 820 ml distilled water. Decalcified bone fragments 1.0—1.5 mm thick were cut off and processed histologically. They were rinsed in tap water, dehydrated by alcohols of increasing concentration and embedded in celloidin. The sections were stained by haematoxylin-eosin.

RESULTS OF THE MORPHOLOGICAL EXAMINATION

Three months after the operation, a net of osteoid and osseous structures was observed on broken off surfaces of the bone fragment and of the replanted mandibular head. A granulation tissue prevailed in the zone between the fragments. Dissolution of the bone tissue was noticed in the cortical layer of the bone fragment and of the replanted head of mandibula. Basically, the same situation was found 4½ months after the operation. The cartilaginous layer forming an articulation surface of the replanted mandibular head was partially replaced by fibrous bands. Six months following the replantation, islets of compact bone appeared in the callus tissue. The bone regions of the callus were thin. They were covered by large osteoid masses superficially. An osteoporosis affected the articular process, especially the mandibular head. Dystrophic changes were seen in the hyaline cartilage covering the articular surface. A framework of bone lamellae could be observed in the bone fragment, in the replanted mandibular head and in the newly formed bone regions of the callus, although their orientation could not always be followed distinctly (Fig. 1).

Thus, it was shown that a general morphology and structure of the articular process was preserved after its replantation, i. e. following a total interruption of its original blood supply, if it was early functionally exercised. In the replanted articular process, not only moderate signs of osteoporosis appeared, but also newly differentiated bone structures were formed and the original ones were rebuilt.

It is well known that orthopaedic treatment of mandibular fractures affecting its articular process and complicated by dislocation of the mandibular head does not lead to restitution of the form of the mandibula. A pseudo-articulation is formed or the bone fragments become united incorrectly. In the latter case, a persistent contracture develops totally disabling the mandibular function. Mouth may be opened, only if the mandibular head would be dislocated from the normal temporomandibular joint. A condylectomy cannot be recommended as a method leading to bite improvement and functional restitution. A deforming arthrosis, subluxation or luxation of the mandibular head belonging to the originally normal joint developed in all the 13 patients of different age, who were examined 6 months to 10 years after such an operation. Similar complications were associated with pseudoarticulations (Kozlov 1975).

Unsuitability of the orthopaedic treatment and of condylectomy for repairment of fractures affecting the articular process of mandibula was proved by our results of clinical, X-ray and functional examination of the patients. In our opinion, the surgical repositioning and fixation of the bone fragments by a wire loop should be performed by all fractures of the mandibular branch that are combined with dislocation of the mandibular head. It can be done during several days after the injury. If the mandibular head cannot be repositioned, it should be removed and replanted subsequently.

Only few reports on replantation of the mandibular head have been published (Malyshev 1972, Kozlov 1975, Sysolyatin et al. 1977 and others). Our sample of 23 patients, in whom 27 replantations of the mandibular heads had been

performed, was followed for 9 years. It consisted of 10 females and 13 males in the age of 12—43 years. The unilateral replantation was done by 19 patients, bilateral replantations in 4 patients. Incorrectly healed fractures (10 cases) and chronically unhealed ones (7 cases) were the most common indications of the operation. To these 17 patients, 21 heads were replanted. Six heads were replanted to 6 patients quite early, i. e. not later than 12 days after the injury. Repositioning of the heads was unsuccessful. They had to be removed and then replanted.

Patient B., 37 years old, suffered from traumatic multiple fractures of mandibula affecting its mental region and the right and left articular processes on the level of their necks. The fractures were combined with inward dislocation of both articular heads. Due to complexity of the injury and simultaneous contusion of brain, the patient was admitted to neurosurgical department. Six months later, he was transferred to the Department of maxillo-facial surgery.

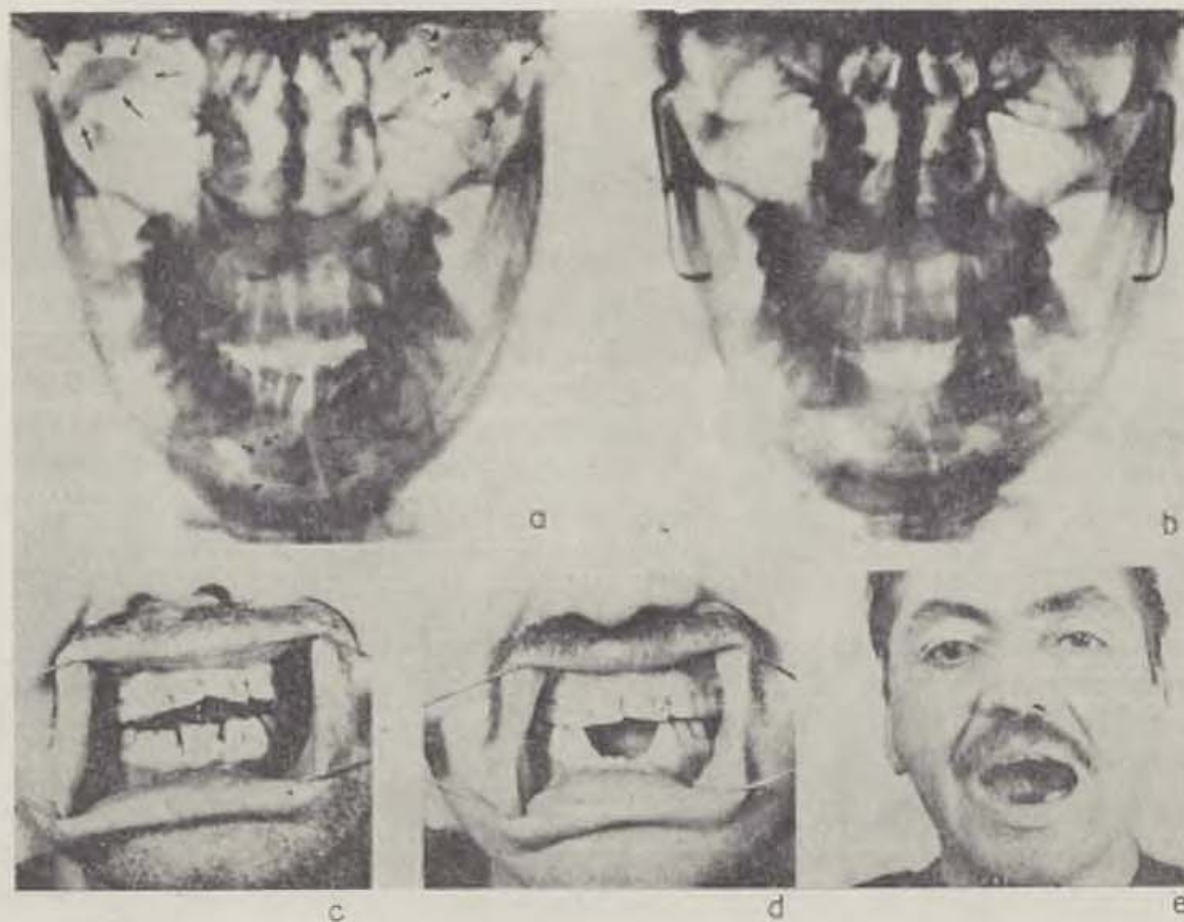


Fig. 2. X-ray examination of mandibula, face and modes of bite of the patient B. Diagnosis: incorrectly healed bilateral fracture of mandibula affecting neck regions of both articular processes; open bite; dislocated $\overline{1} \mid 1$. a, b — roentgenograms of mandibula taken before treatment and after the operation (the dislocated articular heads are pointed out by arrows), c — mode of bite before treatment of the patient, d, e — mode of bite and patient's face after the treatment

The diagnosis was: incorrectly healed fractures of mandibular articular processes combined with inward dislocation of right mandibular head; open bite; dislocated 1 | 1.

Bilateral osteotomy of the articular processes was performed in February, 1976, and the heads were replanted. In this way, anatomical form of mandibula was improved and normal occlusion was achieved.

Subsequently, the function of the mandibula fully recovered and no complaints occurred (Fig. 2).

Patient P., 36 years old, was admitted to the Department of maxillo-facial surgery in January, 1978. The initial diagnosis was: incorrectly healed fracture of the left articular process of mandibula, dislocation of the mandibular head from the right temporo-mandibular joint; crossed bite.

The injury had taken place 6 months ago. She suffered from a fracture of the left articular process, which was combined with inward dislocation of the articular head. When wire splints were removed from the teeth after a month of orthodontic treatment, a contracture became apparent. The mouth could be



Fig. 3. X-ray examination, face and modes of bite of the patient P. Diagnosis: incorrectly healed fracture of the left mandibular articular process, dislocation of the mandibular head from the right temporo-mandibular joint; crossed bite. a, b — roentgenograms of mandibula taken before treatment [the inwardly dislocated articular head is indicated by arrows], c, d, e — roentgenograms of mandibula taken immediately after the operation and one year later, f, g — the patient's mode of bite and face before operation, h, i — the patient's mode of bite and face after the operation

opened only by 0.3 cm. An active functional therapy improved the mouth opening to 3.5 cm, however, a total dislocation of the mandibular head from the normal temporo-mandibular joint took place and the occlusion was disturbed.

An osteotomy of the mandibular left neck was performed on November 21, 1978. The articular head was removed and replanted subsequently. The dislocation of the right mandibular head was corrected. The anatomical form of mandibula and the mode of bite became quite normal.

The patient was reexamined 6 and 12 months later on. The mandibular function remained fully recovered (Fig. 3).

No complications were observed in a time period following replantations of the mandibular heads. The patients were allowed to eat 3—5 days after the operation. A month was sufficient for practically complete recovery of the mandibular function. No complains appeared.

In conclusion, the results of our experimental study and long-term experience with 23 patients, to whom 27 mandibular heads were replanted, indicated the possibility of complete recovery of normal anatomical form and function of the injured mandibula. No complications occurred after the operations. This surgical method is recommended as a method of choice in the clinical practice.

M. T.

SUMMARY

Mandibular heads were replanted to 15 dogs and then examined morphologically and histologically. The short- and long-term results of the surgical treatment of mandibular fractures combined with inward dislocation of the articular heads were evaluated in 23 patients, to whom 27 articular processes were replanted. The indications of the operation were outlined. The possibility of full recovery of normal mandibular form and function was documented.

RESUME

Replantation de la saillie articulaire du maxillaire inférieur (Etude clinico-expérimentale)

Kozlov, V. A., Kamalov, R. K., Tsimbalistov, A. V.

Les têtes articulaires du maxillaire inférieur ont été examinées en 15 chiens du point de vue de la morphologie et de l'histologie. On a fait des interventions sur 23 malades avec la fracture du maxillaire inférieur, compliquée par luxation de la tête articulaire, en dedant. On a implanté 27 têtes articulaires. Les résultats immédiats même que ces de longue durée ont été appréciés. Nous avons déterminé les indications de l'intervention décrite et nous avons prouvé qu'il est possible restituer la forme anatomique aussi que la fonction du maxillaire inférieur.

ZUSAMMENFASSUNG

Replantation des Gelenksfortsatzes des Unterkiefers (Klinisch-experimentelle Studie)

Kozlov, V. A., Kamalov, R. K., Tsimbalistow, A. V.

Die Gelenksköpfe des Unterkiefers wurden bei 15 Hunden replantiert und dann morphologisch und histologisch untersucht. Operativ behandelt wurden 23 Patienten

mit Unterkieferfrakturen, kompliziert durch Gelenkskopfluxation nach innen. Es wurden ihnen 27 Gelenksköpfe replantiert. Die Sofort- und Langzeitergebnisse wurden ausgewertet. Wir führten die Indikationen dieser Operation an und zeigten, dass auf diese Weise die anatomische Form wiederhergestellt und die Funktion des Unterkiefers erneuert werden können.

RESUMEN

Replantación del saliente articular de la mandíbula inferior (Estudio clínico-experimental)

Kozlov, V. A., Kamalov, R. K., Tsimbalistov, A. V.

Cabezas articulares de la mandíbula inferior, replantadas en 15 perros, fueron examinadas morfológica e histológicamente. Se operaron 23 pacientes con fracturas de la mandíbula inferior, complicadas con luxación hacia adentro de la cabeza articular. En estos pacientes se replantaron 27 cabezas articulares. Fueron evaluados los resultados tanto inmediatos como a largo plazo. Hemos presentado las indicaciones de este tipo de operación, señalando el que mediante tal operación resulta posible renovar la forma anatómica y reanudar la función de la mandíbula inferior.

REFERENCES

1. Kozlov, V. A.: Surgical Treatment of Fractures Affecting Ramus Mandibulae (In Russian), GIDUV, p. 16, Leningrad 1975.
2. Malyshev, V. A.: Replantation of the Articular Process of Mandibula by Fractures Affecting Its Neck Region and Combined with Dislocation of the Articular Head (In Russian). Stomatologiya, 1: 25, 1972.
3. Sysolyatin, N. G., Ishtchenko, N. A., Zheleznyi, P. A., Golod, B. B.: Surgical Treatment of Fractures Affecting the Articular Process of Mandibula and Combined with Dislocation of the Articular Head. (In Russian.) Stomatologiya, 2: 41, 1977.
4. Halmoš, J.: Traumatology of the Maxillo-Facial Skeleton. Veda, Publishing House of the Slovak Academy of Sciences, Bratislava 1975, p. 233.

Dr. V. A. Kozlov, Leningrad Institute of Postgraduate Medical Education,
Saltykov-Shtchedrin Street 41, 193015 Leningrad, USSR



Tselinograd Medical Institute, Tselinograd (USSR)
Department of Surgery
Director Prof. G. V. Tsoy

CAVITY FORMATION IN OBLITERATED ORBITA BEFORE APPLICATION OF A COSMETIC PROSTHESIS

V. S. Bondar

Not only sight, but also an eye ball may be lost due to injuries or diseases of eyes and of adjacent regions. As a result, the patient is invalid and has to wear all the time a black headband masking the cosmetic defect. By anophthalmos, the cosmetic prosthesis of orbita plays an important role in the social rehabilitation of the patients.

"He who saw the patients with disfigured face" — wrote academician V. P. Filatov — "particularly in situations when application of a prosthesis was impossible, he knew how greedily they dreamt of possibilities that would enable wearing the prosthesis to them. If the value of cosmetic operations would be considered, not only appearance of the patients, but also their personality should be taken into account. Depressions are quite frequent. When the patient's condition could be improved, his courage and capability to work might be restored" (Filatov, 1943).

If a simple enucleation of the eye ball is performed and no stump formation or primary application of prosthesis follows, the orbita becomes obliterated by fibrous tissue in a relatively short time period. Then, a cavity for the cosmetic prosthesis would have to be prepared surgically.

The commonly used method consists in a free transfer of mucosal or skin grafts attached to gauze balls or to insets prepared from a stent or from a rapidly polymerating resin into orbita and in suturing the eyelids for 2—3 weeks. However, this method possesses several essential drawbacks.

The sutured eyelids are deprived of their function for a long time. They are traumatized and deformed. Being rather delicate and extensible organs, the eyelids are unable to apply sufficient pressure on the graft transferred to the orbita. The sutured eyelids interfere with a free outflow to exsudate from the orbita. Perfusion of the orbita is also difficult. As a result of this method, a bed of variable form and size may be obtained. The standard eye prosthesis might not fit appropriately and the cosmetic effect is then unfavourable.

Method of the plasty

A more acceptable and reliable method of orbital plasty by anophthalmos was worked out. It was supposed to be applicable in patients, in whom an or-

bital plasty for cosmetic prosthesis has already been carried out without success, in some cases even repeatedly. It was our aim to find a new method lacking the described drawbacks of the original one. The Limberg's well-known proposition that application of the optimal pressure (28 mm Hg) on a free skin graft should improve its healing, was also considered.

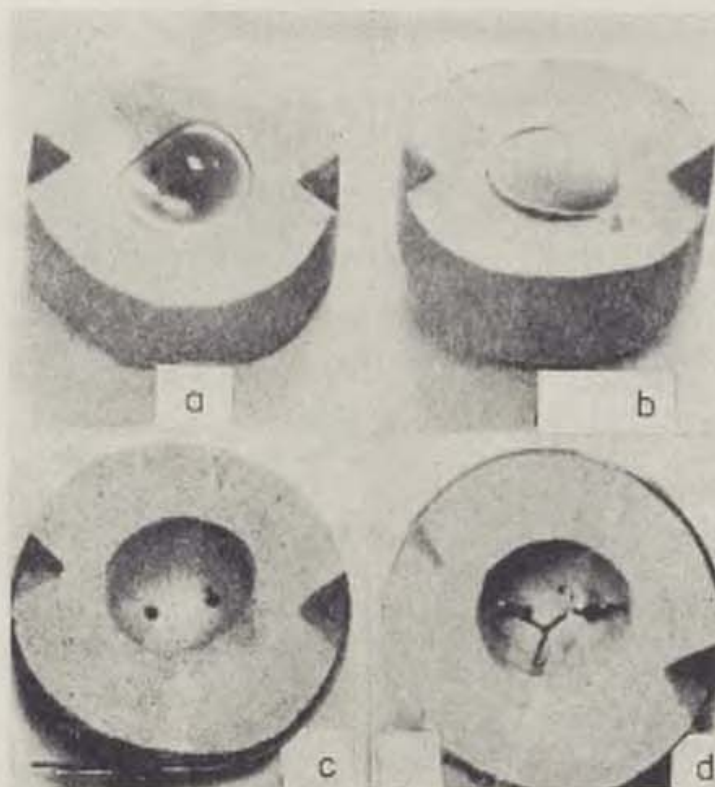


Fig. 1. Preparation of a model of the standard cosmetic eye prosthesis. a — the standard cosmetic eye prosthesis inserted into a lower part of a plaster template, b — upper part of the plaster template, c — concavity remaining in the lower part of the template after removal of the cosmetic eye prosthesis and appearance of the perforations, through which stanchions will be drawn, d — wire stanchions placed inside the lower part of the template

A stabile fixation of the graft transferred to orbita is also very important, as the stump moves concomitantly with movements of the normal eye. In practice, a cavity should be formed in orbita, which would precisely resemble the size of the standard eye prosthesis.

The standard eye prosthesis of appropriate colour, size and form is chosen before the operation. A plastic copy is prepared, which is equipped with an external platform enabling a stabile fixation of the prosthesis in orbita and an application of pressure on the transferred graft.

A preparation of such a model of the prosthesis will be now described. A plaster powder is stirred up with water. To this soft mass, an anterior part of the standard eye prosthesis is immersed, its posterior (curved) part remaining

free (Fig. 1a). When the plaster becomes solid, its surface and the surface of the prosthesis is greased and a soft plaster mass is added on top of it. The plaster mass is let to solidify. Then, the parts of the plaster column are easily separated and the eye prosthesis is drawn out. As a result, lower and upper parts of the template are obtained, that can be used for preparation of a corresponding plastic model (Figs. 1a, b).

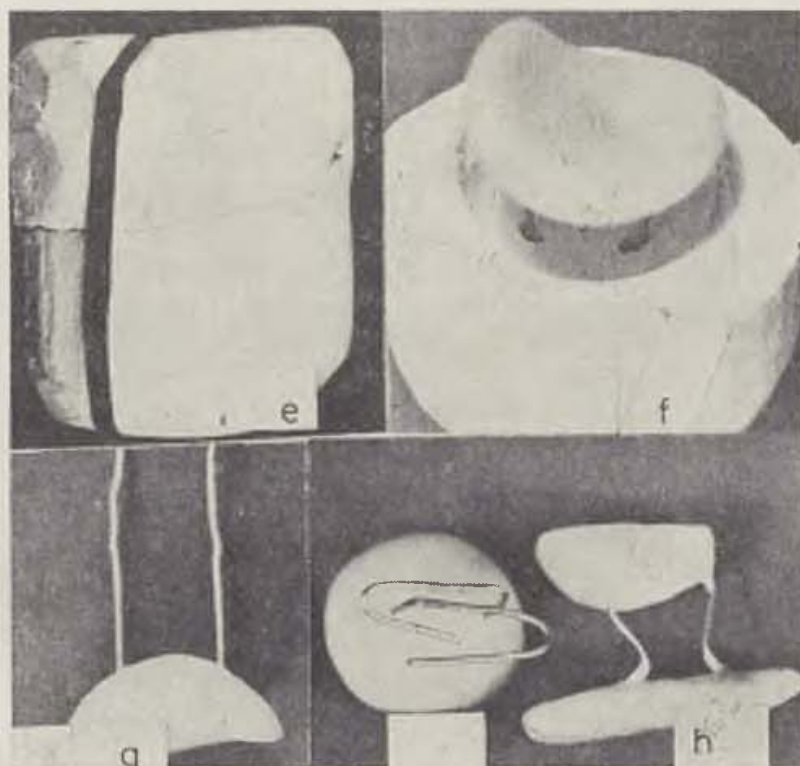


Fig. 1. e — position of the upper and lower parts of the template filled with a rapidly polymerizing plastic, f — extraction of a plastic copy together with the anchored wire stanchions from the template, g — the plastic model of the cosmetic eye prosthesis provided with wire stanchions, h — bending of ends of the wire stanchions in order to enable fixation of an external platform to them, i — lateral view on the plastic model of the cosmetic eye prosthesis equipped with the external platform; the model is ready to use.

A projection of the eye prosthesis' longitudinal axis is marked on bottom of the lower template's cavity and two apertures are perforated. Two wire stanchions (each is 1 mm thick) will be drawn through them, separated by a distance equal to diameter of iris (Fig. 1c). A wavy form of the wire running inside the template will improve its fixation in the plastic model (Fig. 1d).

A rapidly polymerizing plastic mixture, commonly used in orthodontic practice, is prepared. Slightly more than necessary is poured into the lower part of the template (socket of the standard eye prosthesis) and covered by the upper part of the template, while applying a moderate pressure (Fig. 1e). Excess of the plastic mass is squeezed out between the two halves of the template.



Fig. 2. Application of the eye prosthesis. a — before application of the eye prosthesis, b — the plastic model equipped with external platform was inserted into the orbita



Fig. 2. c — the eye prosthesis was applied

The plastic mixture is let to polymerize. Then, the plaster column is opened and the plastic model can be drawn out. The wire stanchions that have been fixed inside the model (Figs. 1f, g), are curved circularly in a plane situated 1 cm above the surface of the model. An oval external platform is formed from the same plastic on them (Fig. 1h). The prepared plastic model is polished and sterilized by boiling. Then, it is ready to use.



Fig. 3. Application of the eye prosthesis. a — a healed skin graft can be seen in the orbita when the plastic model of the eye prosthesis has been removed, b — the cosmetic eye prosthesis introduced into the prepared orbital cavity

The operation is better to be performed under a general anaesthesia, as a local anaesthesia makes formation of the graft's bed more difficult due to infiltration of the orbital tissues and inflexibility of the orbital walls.

A circular split skin graft is collected from inner surface of the shoulder. It should be 0.3—0.4 mm thick and its diameter should be equal to the length of the horizontal axis of the eye prosthesis plus 2.0 cm. It is preferred to cover the bed remaining after removal of the graft by local tissues. In this case, more perfect healing is achieved, although an ointment bandage may be sufficient as well.

The skin graft is cut out according to the technique suggested by Khitrov (1944). In this way, the graft of required shape is economically collected, formation of haematomas is prevented and its plasmatic nutrition is improved. The epidermal side of the skin graft is attached to the model of the eye prosthesis and is fixed by a tobacco suture.

The scars in orbita are excised and a cavity is formed for the cosmetic eye prosthesis. A sufficiently wide separation of conjunctival archs is important. The

plastic model with the attached skin graft should be correctly situated in the orbital cavity. A correct orientation of the cosmetic prosthesis and function of eyelids depends on these two factors. The inserted plastic model is fixed by plaster bandage and a pressing gauze bandage is applied on top of it (Fig. 2).



Fig. 4. Plasty of left orbita before application of the cosmetic eye prosthesis. Function of eyelids was demonstrated in the time when the patient was leaving our clinic (c).

When applying the pressing bandage, the experience of Khitrov and Mamontov (1965) was considered. The too firmly applied bandage may cause compression of cells and of intercellular spaces in the grafted skin, thus impeding a transport of nutrients and interfering with vascularization of the graft later on. The extremely light bandage might lead to exfoliation of the graft by accumulated products of its metabolism.

The wound is redressed usually 5—7 days after the operation. Following 2—3 weeks, the plastic model is extracted and the cosmetic prosthesis is introduced (Fig. 3).

DISCUSSION

Our clinical experience was gained during treatment of 12 males and 1 female in the age of 14 to 48 years, suffering from cicatricious obliteration of orbita by anophthalmos. It has been documented that the described technique of free split-skin autografting is an effective and widely accessible method of the cosmetic eye prosthetics.

In spite of the fact that the epidermis of the transferred graft is torn away quite commonly after such operations, a good healing was achieved in all our patients.

It was noted on histological sections prepared from the transferred graft that the multilayered flat epithelium became thinner and some acanthotic processes grew into the supporting stroma. A marked collagenization of the stro-

ma, its infiltration by lymphocytes, plasmatic cells and histiocytes, and inflammatory haemorrhages were observed.

The good healing of the skin grafts in the orbital cavity is also indicated by preservation of skin appendages. The healed skin grafts represents a firm skin lining of the orbital cavity for the cosmetic prosthesis and reliably prevents further formation of scar deformities.

The use of the plastic model of the eye prosthesis, which was equipped with the external platform for application of a pressure, enabled formation of a prominent stump in orbita. The eye prosthesis was partially mobile, traumatization and functional disturbances of the eyelids were prevented (Fig. 4a, b, c).

The described method is suggested to be widely used, because the cosmetic eye prosthetics is greatly simplified by this means. This technique of the orbital plasty can easily be performed by young ophthalmologic or maxillo-facial surgeons in cases of anophthalmos. The operation is accomplished in one stage. The patients remain in the hospital for 15—18 days.

It is of great practical importance that the eye prosthesis need not be chosen individually, as the size and form of the cavity formed in the orbita has already been matched with the form and size of the initially selected standard cosmetic eye prosthesis. If the original eye prosthesis would be broken, a new analogical one can easily be supplied to the patient.

M. T.

SUMMARY

A method of cavity formation designed for application of a cosmetic eye prosthesis was described. It is indicated in patients suffering from anophthalmos, in whom the orbita has been cicatriciously obliterated. A split skin graft is attached to a plastic copy of the eye prosthesis and then is transferred to the orbita. The plastic model is equipped with an external platform for application of a pressure.

The clinical applicability of the described technique is discussed. Preparation of the plastic copy of the standard cosmetic eye prosthesis, technique of the operation and clinical cases are described.

The treatment of 13 patients has been analyzed. Significant advantages and benefits of the suggested method are stressed.

RESUME

La construction de la cavité pour l'application d'une prothèse cosmétique chez des oblitérations cicatricielles de l'orbite

Bondar, V. S.

Nous avons décrit une méthode de construction de la cavité, ce qui nécessite l'application d'une prothèse cosmétique, chez des malades avec anophthalmie, dont l'orbite a oblitéré. La greffe cutanée a été appliqué dans l'orbite sur une prothèse en matière plastique qui a été pourvu d'une superficie qui sert à application de la presse.

On a discuté l'effet clinique de la méthode ci-dessus. Nous avons décrit le procès de construction de la prothèse en matière plastique qui représente une copie précise d'une prothèse oculaire standardisée, nous avons décrit aussi notre technique opératoire qui est documentée sur les images.

Sur la base des expériences avec le traitement de 13 malades, nous avons apprécié les traits principaux de notre méthode et ses avantages.

ZUSAMMENFASSUNG

Bildung einer Höhle für die kosmetische Prothese bei narbigen Obliterationen der Orbita

Bondar, V. S.

Wir beschrieben die Methode der Bildung einer Höhle für die kosmetische Prothese bei Patienten mit Anophthalmie, bei denen die Orbita obliterierte. Das Hautautotransplantat wurde in die Orbita auf einer Kunststoffprothese übertragen, die ausserlich mit einer Fläche für die Applikation von Druck versehen war.

Wir diskutierten die klinische Bedeutung des beschriebenen Orbitalplastikverfahrens. Wir beschrieben die Herstellungstechnik der Kunststoffkopie der standardisierten kosmetischen Augenprothese sowie die Operationstechnik, die mit klinischen Illustrationen belegt ist.

Auf Grund des Behandlungsverlaufes bei 13 Kranken beurteilten wir die wesentlichen Grundzüge und Vorteile der vorgeschlagenen Methode.

RESUMEN

Creación de la cavidad para prótesis cosmética en caso de obliteraciones cicatrizales de la órbita

Bondar, V. S.

Hemos descrito el método de conformación de la cavidad para la prótesis cosmética en los pacientes con anoftalmia, en los que la órbita ha obliterado. El autotransplante de piel fue trasladado a la órbita sobre una prótesis de plástico, dotada por fuera de una plaquita para aplicar presiones.

Hemos discutido la significación del mencionado método de plástica de la órbita. Hemos descrito la confección de plástico de una copia de la prótesis oftálmica estandar así como la técnica operatoria que documentamos con ilustraciones clínicas.

Partiendo de la aplicación del tratamiento sobre 13 pacientes hemos caracterizado los rasgos principales y las ventajas del método propuesto.

REFERENCES

1. Filatov, V. P.: Tubed Skin Flap in Ophthalmology [In Russian.] Medgiz, Moscow 1943.
2. Khitrov, F. M.: Plastic Repairment of Defects Localized on Face and Neck Using
3. Filatov's Flap [In Russian.] Meditsina, Moscow 1954.
3. Khitrov, F. M., Mamontov, G. P.: Advances in Plastic Surgery. [In Russian.], Moscow 1965.

Dr V. S. Bondar, Tselinograd Medical Institute, Street Mira 51-a, 473013 Tselinograd, USSR

Central Scientific Institute of Haematology and Blood Transfusion
of Ministry of Health of USSR, Moscow (USSR)
Clinic of the Surgical and Transfusion Treatment of Burns and Frostbites
Director Prof. R. I. Murazyan
Clinic of Plastic Surgery, Prague (Czechoslovakia)
Director Prof. M. Fára
Institute of Experimental Medicine of Czechoslovak Academy of Sciences, Prague
Director Prof. V. Kusák

STAPHYLOCCAL INFECTIONS AND THEIR TREATMENT IN BURNED PATIENTS*)

R. I. Murazyan, N. R. Pantchenkov, S. V. Smirnov, A. A. Yevteyev,
R. Königová, Z. Koníčková, L. Pávková, S. Svoboda

In most industrial countries, the lives of severely burned patients are endangered mainly by gram-negative bacteria and fungi nowadays. However, the most frequent bacteria isolated from the burned surfaces are staphylococcal pathogenic strains. They interfere with local healing, cause disintegration of autografts and of the newly formed epithelia. In addition cases of staphylococcal sepsis may still occur. The most important one is cannula sepsis, the treatment of which has become more and more difficult due to the increasing incidence of staphylococcal strains resistant to majority of antibiotics.

In 90—100 % of our patients admitted to the hospital, *Staphylococcus aureus* was isolated from the burned areas. Later on, *Bacillus pyocynaeus*, *Enterobacter*, *Enterococcus*, *Escherichia coli*, *Proteus* and more rarely some other microorganisms appeared. The isolated staphylococcal strains had following properties: yellow pigment was formed in 61 %, lecithinase was produced in 74 %, mannose was metabolized in 80.5 % and haemolytic activity was present in 84 %.

Almost all isolated staphylococcal strains were quantitatively resistant to Penicillin, Ristomycine, Streptomycine, Tetracycline, Oleandomycine, Levamycetine, Kanamycine and Monomycine. In 20 %, the staphylococcal strains were resistant to all these antibiotics simultaneously. They were sensitive to Garomycine (Gentamycine), Carbpenicillin, Cenorine, Lincomycine and Methi-

*) In this study, the results of the joined interinstitutional research programm on immunologic methods used against staphylococcal infections in patients suffering from burns are reported.

cilline. With the latter, the sensitivity reached 60—90 % (Tab. 1). High sensitivity to staphylococcal bacteriophage (72 %) and to staphylococcal phage lysate (100 %) was noted as well. When the same staphylococcal strains were repeatedly examined, the spectrum of susceptibility to antibiotics diminished in each consecutive isolation. However, the sensitivity to bacteriophage and to staphylococcal phage lysate remained sufficiently high.

Table 1, Susceptibility to antibiotics of microorganism isolated from burn wounds

Antibiotics	% of susceptible strains	
	USSR	Czechoslovakia
Penicillin	5,8	0,0
Ristomycine	7,5	—
Streptomycine	13,4	—
Tetracycline	14,8	0,0
Oleandomycine	16,0	—
Levomyectine	16,7	—
Erythromycine	16,7	20,0
Kanamycine	25,8	0,0
Monomycine	34,0	—
Garamycine	92,0	—
Carbpenicillin	87,6	40,0
Cenorin	76,1	80,0
Lincomycine	78,6	80,0
Vancomycine	—	95,0

Our data and the data published elsewhere show that the immune response of the organism directed against infection decreases already during the first 24 hours after the burn injury. Further decline depends on severity of the burn disease. The organism's defence is depressed in relation to the size and depth of the injury. A minor burn injury is followed by no substantial immunological disturbances, in some cases the immune response is even stimulated. The moderate or severe burn disease regularly causes depression of immunogenesis and secondary immune insufficiency results finally.

Based on the obtained data, a plan of active and passive anti-staphylococcal immunization of burned patients was suggested. It was the author's aim to enhance a specific anti-staphylococcal immunity as early as possible, as probability of a generalized infection increases simultaneously with progression of changes in the injured wound.

A shortened procedure of active immunization by a staphylococcal anatoxin proved to be the most effective treatment of minor burn injuries. The anatoxin was applied in doses 0,5 — 1.0 — 1.0, in 3 days intervals the first dosis being injected when the patients was admitted to the clinic. The shortened procedure



of active immunization was applied in 140 patients and complications caused by staphylococcal infections were prevented in 134 of them. The level of alpha-antistaphylolysin in serum rapidly increased. On the 18th—20th day after the beginning of the immunization, its content in serum was 14—20 AU/ml (a normal value in adults is less than 2 AU/ml or equal to it). No side effects were observed.

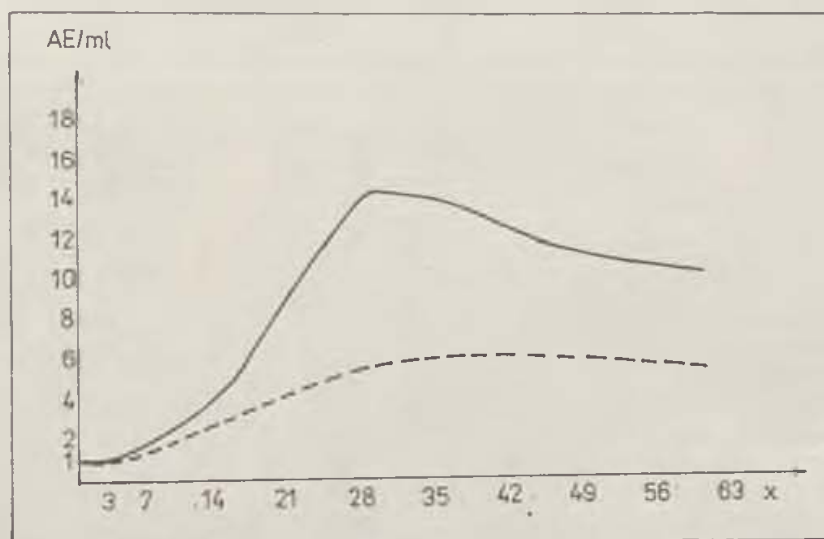


Diagramm 1. Increasing level of alpha-antistaphylolysin in patients affected with burns of medium severity. ordinate — AU/ml, abscissa — days, dotted line — only anatoxin, full line — antistaphylococcal plasma and anatoxin

However, the sufficiently high level of antistaphylococcal resistivity is reached not sooner as on the 10th—14th day after the beginning of active immunization. That means that the patient's organism remains "unprotected" in the acute phase of the burn disease. Providing the organism with the anti-staphylococcal protection during the first days following the burn injury can be achieved by application of antibodies contained in antistaphylococcal plasma or in an antistaphylococcal immunoglobulin serum fraction. This approach is highly important in patients with large and deep burns. Passive immunization achieved by the mentioned ont only way prevented the development of infectious complications caused by Staphylococci during the acute period of the burn disease, but also contributed to increased effectiveness of active immunization in later time periods (Diagram 1) by diminishing specific intoxication and sensibilization by Staphylococcal. The patients suffering from similarly serious burn injuries were divided into two groups. Comparison of patient who obtained transfusion of antistaphylococcal plasma with controls revealed the fact that active immunization lead to significantly increased level of alpha-antistaphylolysin; the complications caused by staphylococcal infections were less frequent in the course of the burn disease. Thus, the clinical and laboratory data confirmed the usefulness of the suggested programm of passive and active anti-staphylococcal immunization in patients affected with medium or severe forms of the burn disease.

Local and general applications of a staphylococcal lysate yielded good results as well. It was applied in 7 patients suffering from staphylococcal infections resistant to treatment by antibiotics. The local treatment prevented disintegration of autografts and of the newly formed epithelium. The general treatment enhanced production of antibodies by active immunization. Even the treatment of staphylococcal sepsis with disseminated abscesses was successful.

In conclusion, it should be stressed that purposeful application of immunotherapy in infectious complications caused by pathogenic strains of *Staphylococcus* improved healing of patients suffering from thermal burns. Local therapy utilizing specific antistaphylococcal preparations effectively cured the inflammatory process caused by *Staphylococci*. M. T.

The antistaphylococcal plasma seems to be one of the most effective means that can be used to suppress the developed infectious complication, including the staphylococcal sepsis. It was part the complex therapy of 34 patients. If the blood of culture was positive and the clinical features also suggested septicemia, of plasma were started immediately. The volume of the applied antistaphylococcal plasma depended on time, after which the infectious complications retreated. Usually, 3 to 5 applications of 200—250 ml of plasma were quite the transfusions sufficient. Best results were obtained, if antistaphylococcal plasma was applied as soon as possible in rather high quantities (not less than 250 ml) together with a massive specific treatment by antibiotics.

Bacteriophage can be utilized for local therapy of the burned patients, as *Staphylococci* proved to be highly susceptible to it. It was applied in 32 patients suffering from abundant and prolonged suppuration from the burned wounds, which had been resistant to usual methods of treatment. Favourable results were obtained in 29 patients. Volume of the suppurative exudate and contamination of the wounds by microorganisms decreased significantly. Epithelization of superficial burns was completed and the deep burns were prepared to skin autografting in shorter time periods. Development of staphylococcal complications could be prevented in majority of cases, if the staphylococcal bacteriophage was combined with complex treatment by antibiotics.

SUMMARY

An increased incidence of staphylococcal infections resistant to treatment by antibiotics was observed. For their treatment, the authors recommend to combine active and passive immunization against *Staphylococcus aureus*. Transfusion of hyperimmune plasma and local and/or general application of staphylococcal lysate proved to be effective means suppressing even spread infections, if combined with complex therapy.

RESUME

Staphylococcie des brûles et la lutte contre elle

Murazyan, R. I., Pantchenkov, N. R., Smirnov, S. V., Yevteyev, A. A.,
Königová, R., Koníčková, Z., Pávková, S. Svoboda, S.

Nous avons constaté l'augmentation significative de l'apparition des staphylococcies dont les instigateurs sont résistants à l'antibiothérapie.

Pour le traitement des brûlures, nous recommandons l'immunisation active contre «staphylococcus aureus» en combinaison avec l'immunisation passive. Au cas de la staphylococcie développée, on a obtenu de bons résultats en utilisant le plasma hyperimmunisé aussi que l'application locale ou centrale du lysat des staphylocoques.

ZUSAMMENFASSUNG

Staphylokokkeninfektionen bei Verbrannten und ihre Bekämpfung

Murazyan, R. I., Pantschenkow, N. R., Smirnow, S. V., Jewtejew, A. A.,
Königová, R., Koníčková, Z., Pávková, S. Svoboda, S.

Wir fanden ein markant erhöhtes Vorkommen von Staphylokokkeninfektionen, die auf die Antibiotikatherapie resistent sind. Wir empfehlen bei den Verbrannten, dass die aktive Immunisierung gegen den goldenen Staphylokokken mit der passiven kombiniert wird. In Fällen einer entwickelten Staphylokokkeninfektion bewährte sich als Ergänzung der komplexen Behandlung gleichfalls die lokale oder allgemeine Applikation des Staphylokokkenlysats.

RESUMEN

Estafilococias en los quemados y la lucha contra ellas

Murazyan, R. I., Pantchenkov, N. R., Smirnov, S. V., Yevteyev, A. A.,
Königová, R., Koníčková, Z., Pávková, S. Svoboda, S.

Detectamos una considerablemente levada existencia de estafilococias resistentes al tratamiento con antibióticos. Recomendamos que en los quemados la inmunización activa contra el estafilicoco de oro sea combinada con la pasiva. En casos de estafilococias desarrolladas dio buenos resultados, como complemento del tratamiento complejo, la utilización del plasma hiperimmune así como la aplicación global de lisatos de estafilicoco.

Dr. R. I. Murazyan, Central Institute of Haematology and Blood Transfusion,
Novozykovskii Street 4, Moscow, USSR

Gorkii Research Institute of Traumatology and Orthopaedics, Gorkii (USSR)
Director Prof. M. G. Grigoryev

PRIMARY LOCAL THERAPY OF BURNS (An early necrectomy and chemical necrolysis.)

M. G. Grigoryev, S. P. Pakhomov, G. I. Dmitriev, A. A. Tyukina,
L. N. Sokolov, E. R. Sovo

A treatment of thermal injuries will certainly remain one of the most important problems of surgery. High lethality is characteristic for deep burns affecting more than 40 % of the body surface. Therefore, search for new methods of medical rehabilitation and improvement of the existing ones is an urgent task.

An early excision is considered by many authors to be the best way of treatment of the deep burns (Janzekovic 1977, MacMillan 1978, Bižič and Zdravič 1978, Finley et al. 1978, Kuzin et al. 1979). It was reported by some surgeons that deep burns affecting even more than 60 % of the body surface could be successfully handled, if early necrectomy was performed. Excision of skin and of all subcutaneous connective tissue above fascia was recommended (Levine et al. 1978, Stern 1978). However, it was claimed by other authors (Beesinger et al. 1978, Jouglard et al. 1978) that early excision of the burned necrotic parts improved healing of the wounds, only if less than 15 % of the body surface had been burned. Till this time, the radical excision has not been sufficiently widely used. It has been due to great loss of blood, difficulties in handling of infections and in adequate feeding of the burned patients (Lloyd 1977). Following necrectomy, the uncovered wound is a widely opened gateway for entry of an infection and development of a septic shock. Therefore, it is advisable to know the bacteriological spectrum present on the burned surfaces before the necrectomy and below the hetero- and homografts (Koenigová and Koníčková 1978). In order to prevent septic complications, the early necrectomy should be performed in a controlled germ-free environment. During the last years. If the area of deep burns comprised less than 10 % of the body surface thus diminishing loss of blood (Fidler et al. 1978, Zelner et al. 1978).

*) Reported on Symposium on early treatment of burns, Prague, Czechoslovakia, May 19—20, 1980.

An enzymatic and chemical necrolysis is another way, how the necrotic tissue can be removed. Various aspects of the enzymatic necrolysis have been dealt with in papers of Hummel et al. (1974) and Tyukina (1973). It has been reported that salicylic acid (Sautter et al. 1958, Bovadjiev and Atanasov 1978) or benzoic acid (Tchervenkov and Vyglenova 1979) contained in a plaster or in an ointment may be used for early chemical necrectomy.

In the Gorkii Research Institute of Traumatology and Orthopaedics, 441 patients in the age of 3—102 years, who suffered from deep burns (IIIrd—IVth degree) affecting 1—60 % of the body surface, were followed. These patients were classified into three groups. The first group (101 patients) consisted of patients, by whom an early necrectomy and free skin plasty was performed. In the second group (248 patients), a necrolytic therapy was applied. The third (control) group contained 92 patients, by whom the skin plasty was applied on granulating wounds following a spontaneous detachment of the necrotic tissue scab.

The early necrectomy was done by 101 patients in the age from 3 to 77 years. If the area of deep burns comprised less than 10 % of the body surface and the scabs were dry, an excision was performed in one stage and was followed by a skin autoplasty. If the deep burns affected more than 10 % of the body surface, the necrectomy was carried out in two stages separated by a time period of 3—5 days. The total necrectomized area reached 20 % of the body surface by many patients. By 6 patients, who suffered from very large burns covering as much as 50—60 % of the body surface (the skin was injured in all its thickness on 30—40 %), the early necrectomy was performed on a limited area (less than 10 % of the body surface) and immediately was followed by skin autoplasty. Subsequently, the skin autografts were transferred onto wounds that had been prepared by consecutive necrectomies using scissors, when the wounds were redressed. However, all the 6 patients with deep burns covering more than 30 % of their body surface died due to complications that appeared later on (sepsis, pneumonia). They died longer time than 2 weeks after the operation.

In order to obtain a dry scab, bandages soaked in antiseptic solutions were applied on the wounds starting in the first days after the injury or an exposed way of treatment was chosen. The necrotic tissues were excised using an electrodermatome or a scalpel (on hands, in joint regions). In dependence on depth of the damage, all the tissues above connective and fat tissue layer, fascia or muscles were excised, using a scalpel. A haemostasis was secured by suturing the blood vessels, by a pressing bandage or by a bandage containing ϵ -aminocaproic acid that was applied for some time. If a sufficient haemostasis could not be achieved in the wound, a skin plasty was performed 1—2 days following the necrectomy. The wound was redressed 1—2 days after the skin plasty, in order to make sure that coagulated blood had not accumulated below the grafts. Its removal improved healing of the grafted skin, if accomplished in time.

The grafts 0.3—0.4 mm thick were utilized for the skin plasty. In some too weakened patients, the wounds could not be fully covered by continuous

grafts. Then, meshed grafts or complementary allografts were used. The meshed grafts also appeared to be quite efficient in cases of insufficient haemostasis. The bleeding was effectively prevented by application of meshed skin allografts that were replaced by skin autografts several days after the operation.

The grafts healed fully or almost fully in 85 patients, a partial healing (50—70 %) took place in 15 patients, the grafts became totally resolved in one patient. The meshed grafts were more successful due to their draining properties. The free skin grafts healed well on any support, however, a better attachment to muscles and fascia was noted. No differences in healing were observed in skin autografts applied on various regions of the body (trunk, extremities, breast etc.). Insufficient haemostasis, incomplete excision of necrotic tissues and infections were the main causes of failed healing of the grafts.

The excision of the necrotic tissues and the skin plasty were done under anaesthesia and the lost blood was adequately compensated. From the total number of 101 patients, 95 patients recovered and 6 patients died.

A necrolytic treatment was applied in 248 patients, 3 to 102 years old, in order to shorten the time period spent for preparation of the tissues before the skin plasties. A pepsin complex and an ointment containing necrolytic chemical substances (devised in our Institute, the author's certificate No. 439288) were utilized.

The necrolytic preparations were applied shortly (not more than 10 days) after the injury in 173 patients. The reason of a more delayed application in 75 patients, who attended our Clinic rather late, was a speeding up of a slow elimination of the necrotic tissues. The necrolytic therapy was mainly used in 15 to 50 years old patients (192 patients); 32 patients were older than 50 years and 24 patients were younger than 14 years.

The pepsin complex consists of pepsin, urea and organic acids (ascorbic and lactic ones); lanolin is a basic component of the ointment. The necrolytic chemical ointment contains salicylic acid (24 %) and lactic acid (12 %) dispersed in lanolin. Both preparations are active in acid environment, which is unfavourable for development of infections. The necrolytic chemical ointment and the pepsin complex were applied on dry necrotic scabs. The necrolytic chemical ointment induced elimination of the necrotic skin. The necrotic skin, as well as the deeper tissues (muscles, fascias, tendons) were rapidly removed by application of the pepsin complex. These necrolytic preparations could be combined. If the necrolytic chemical ointment was applied on the necrotic tissues for 24 hours, the wound became better demarcated. The necrolytic effect of the subsequent treatment by the pepsin complex was enhanced as well.

In one moment, not more than 8—10 % of the body surface could be treated by the necrolytic preparations. The greater necrotic areas should be treated by 2—3 separate doses. The tissues surrounding the selected areas were covered by Lassar's or zinc ointments. The layer of the necrolytic chemical ointment was covered just by an aseptic bandage. A bandage impermeable for water was applied, if the pepsin complex was used. The wounds were redressed every day. The necrotic tissues detached usually within 2—3 days. The first skin

plasty could be performed within 10—11 days, more often within 14—16 days following the burn injury. The transferred skin grafts were healed successfully.

The necrolytic therapy was used in 248 patients. From this total, 14 patients died: 5 patients during the first 2—3 weeks and 9 patients later on, although the skin recovered in 3 of them. The age of 11 died patients was 45—102 years, 3 patients were younger than 45 years. The main causes leading to death were large burn injuries that were complicated by sepsis (7 patients), pneumonia (5 patients), myocardial infarction (1 patient) and thrombosis (1 patient).

The time of treatment leading to recovery of 360 patients, who attended our Clinic early after the injury (i. e. within 10 days), is indicated in the table (Tab. 1).

The results of treatment of the patients classified into three groups were analyzed. If the skin plasty applied following early necrectomy or necrolytic therapy was successful, then progression of the burn disease was prevented and the wound were healed in the shortest time periods.

The early necrectomy and necrolytic therapy applied within 10 days after the burn injury enabled the significantly (2 times) quicker restitution of the damaged skin and the time spent in the hospital was 1½ times shorter, in comparison with the control group (see the Table 1).

Table 1, Time periods spent in hospital for treatment of the patients, when their burn wounds were prepared to skin plasties by different ways

Preparation of burns to skin autoplasty	Area of deep burns			
	1—10 % of body surface		more than 10 % of body surface	
	days per a patient (M ± m)	No. of patients	days per a patient (M ± m)	No. of patients
Early necrectomy	44,2 ± 5,3	81	99,3 ± 6,5	20
Chemical necrolysis	46,4 ± 3,2	104	81,2 ± 5,4	69
Controls	69,4 ± 8,1	66	127,6 ± 8,6	26

The more rapid recovery of the skin was followed by improved haematologic parameters (content of erythrocytes, haemoglobin) and by normalization of protein fraction levels in blood. Significantly less transfusions could be spent for maintenance of these parameters on higher levels. The volume of transfused blood decreased more than two-times in patients, in whom less than 10 % of the body surface was injured. In patients with larger burned areas, the volume of the transfused blood decreased 1½ times. Earlier restitution

of the skin cover was joined with also better functional and cosmetic results and an invalidity was less frequent.

Thus, it was documented that the early necrectomy and necrolytic therapy are quite efficient procedures preparing the burn wounds for application of free skin autografts. The skin cover was earlier restituted, haematologic parameters and protein content of blood were improved, the lower volumes of transfusion media were spent, the time periods of treatment were shortened and, consequently, the required expenditures were diminished, the invalidity was less frequent.

CONCLUSIONS

1. The early necrectomy can be successfully performed in patients with limited burned area (10—15 % of the body surface). In larger injuries, special conditions have to be provided for excision of the necrotic tissues (prevention and treatment of infections, adequate substitution of the lost blood, anaesthesiologic and reanimation care).

2. The necrolytic therapy (i. e. the enzymatic and chemical necrolysis) is recommended to be applied during the first 10 days after the injury in patients with limited burned area (10—15 % of the body surface) and also with larger burn injuries.

M. T.

SUMMARY

The number of 441 patients in the age from 3 to 102 years, who suffered from deep burn injuries affecting 1 to 60 % of the body surface, was followed. An early necrectomy was followed by free skin plasty in the first group (101 patients). A necrolytic therapy (an enzymatic and a chemical necrolysis) was applied in patients of the second group (248 patients). In the third, control group (92 patients), free skin grafts were applied on the granulating surface following spontaneous detachment of the necrotic tissue scab.

It is quite meaningful to prepare the burn wounds to autoplasty by the early necrectomy or by the necrolytic therapy. Application of these methods enables earlier restitution of the skin and shortening of time periods spent for treatment (1½ to 2 times), in comparison with the control group. The haematologic parameters and content of protein fractions in blood are normalized more rapidly, lower volume of transfusion media is spent, functional results are improved and invalidity is less frequent.

RESUME

La thérapie locale primaire des brûlures. (Nécrotomie immédiate et nécrolyse chimique)

Grigoryev, M. G., Pakhomov, S. P., Dmitriev, G. I., Tyukina, A. A.,
Sokolov, L. N., Sovo, E. R.

Nous avons traité 441 malades âgés de 3 jusqu'à 102 ans qui ont endurés de profondes brûlures sur 1—60 % de la surface corporelle. Tous les malades ont été divisé en 3 groupes. Dans le premier groupe (101 malades) on a exécuté la nécrotomie immédiate et la greffe libre. Dans le deuxième groupe (248 malades) on a choisi la

thérapie nécrolytique. Dans le troisième groupe (de contrôle — 92 malades) on a appliqué une greffe libre sur une surface de granulation bien préparée, après la disparition spontanée des escarres.

Selon nos résultats, nous recommandons la nécratomie avec la thérapie nécrolytique ce qui sert à une bonne préparation de la surface à greffer. Les avantages de ce procédé, en comparaison avec le groupe de contrôle, sont multiples: prise du greffon plus rapide, durée du traitement considérablement abrégé (0,5—2 fois), rétablissement rapide des paramètres hématologiques et rétablissement du contenu des fractions albumineuses au sang, diminution de la dépense en liquides sanguins. Les résultats fonctionnels s'améliorent et l'invalidité s'abaisse.

ZUSAMMENFASSUNG

Primäre lokale Therapie der Verbrennungen. (Frühzeitige Nekrektomie und chemische Nekrolyse)

Grigorijew, M. G., Pachomow, S. P., Dmitrijew, G. I., Tjukina, A. A., Sokolow, L. N., Sowow, E. R.

Wir behandelten 441 Kranke im Alter von 3 bis 102 Jahren, die tiefe Verbrennungen auf 1 bis 60 % der Körperoberfläche erlitten haben. In der ersten Gruppe (101 Patienten) wurde frühzeitige Nekrektomie und freie Hautplastik durchgeführt. In der zweiten Gruppe (248 Patienten) wurde nekrolytische Therapie benutzt. In der dritten (Kontroll-) Gruppe (92 Kranke) haben wir das freie Hauttransplantat auf die granulierende Wunde erst nach spontaner Trennung des Schorfes übertragen.

Wir empfehlen die Nekrektomie und nekrolytische Therapie als Vorbereitung der Brandwunden für die Autoplastik der Haut. Auf diese Weise kann man im Vergleich zu der Kontrollgruppe, eine frühere Heilung der Hautdecke erreichen und die Behandlungszeit verkürzen (1 ½ bis 2 mal). Schneller kommen zur Norm zurück auch die hämatologischen Parameter und der Gehalt an Eiweissfraktionen im Blut. Der Verbrauch von Transfusionslösungen sinkt. Die Funktionsergebnisse verbessern sich und die Invalidität sinkt.

RESUMEN

Terapia local primaria de las quemaduras. (Necrectomia temprana y necrolisis química)

Grigoriev, M. G., Pakhomov, S. P., Dmitriev, G. I., Tiukina, A. A., Sokolov, L. N., Sovo, E. R.

Sometimos al tratamiento a 441 enfermos con edades de 3 a 102 años quienes habían sufrido quemaduras profundas sobre un 1 a un 60 % de la superficie del cuerpo. En el primer grupo (101 pacientes) se ha hecho necrectomia temprana y plásticas libres de piel. En el segundo grupo (248 pacientes) se ha utilizado la terapia necrolítica. En el tercer grupo (de control) (92 enfermos) llevamos el trasplante libre de piel sobre la herida en estado de granulación sólo después de la separación espontánea de la costra.

Recomendamos utilizar la necrectomia y la terapia necrolítica como preparación de las heridas para la autoplástica de piel. Así puede conseguirse una cicatrización más rápida de la cubierta dérmica y el tiempo de tratamiento será más corto (1,5 o 2 veces) en comparación con el grupo de control. Vuelven a normalizarse más rápidamente también los parámetros hematológicos y el contenido de las fracciones albuminosas en la sangre. Se reduce la necesidad de soluciones de transfusión. Mejoran los resultados funcionales y baja la tasa de invalidez.

REFERENCES

1. **Königová, R., Koníčková, Z.:** Clinical Forms of Endotoxinaemia by Large Burns. *Acta Chir. plast.*, 20, 4: 219, 1978.
2. **Kuzin, M. I., Sologub, V. K., Dolgina, M. I., Borisov, B. G., Yakovlev, G. B., Grishina, I. A.:** Treatment of Burned Patients in a Controlled Germ-free Environment. In: *The Second All-Union Conference on „Deep and Large Burns“*, Moscow 1979, p. 108 [In Russian].
3. **Tchertchenkov, I., Vyblenova, E.:** Chemical Necrectomy by 40 % Benzoic Acid Ointment [In Russian.] *Acta Chir. plast.*, 21, 2: 110, 1979.
4. **Beesinger, D., Sato, R., Hunt, J., Baxter, C.:** Result of Early Excision on Morbidity and Mortality of Varying Sized Burns. Abstract Book 5th Intern. Congress on Burn Injuries, Stockholm, Sweden 1978.
5. **Bovadjiev, Hr., Atanasov, N.:** Operative Treatment of Extensive Burns in Childhood. Abstract Book 5th Intern. Congress on Burn Injuries. Stockholm, Sweden 1978.
6. **Borčič, A., Zdravič, F.:** Lessons Learnt from 2409 Burn Patients Operated by Early Excision. Abstract Book 5 th Intern. Congress on Burn Injuries, Stockholm, Sweden 1978.
7. **Fidler, J. P., Srivastava, R. K., MacMillan, B. C.:** Use of CO₂ Laser Excision in Burned Children. Abstract Book 5th Intern. Congress on Burn Injuries. Stockholm, Sweden 1978.
8. **Finley, R. K., Miller, S. F., Shumaker, S.:** Immediate Excision of Burn Wounds. *Am. Surg.*, 44, 7: 421, 1978.
9. **Janzekovic, Z.:** The Treatment of Burns, Excision of Burns. *Burns*, 4, 1: 67, 1977. [*Plast. reconstr. Surg.*, 63, 1: 141, 1979.]
10. **Levine, B. A., Sirinek, R. R., Pruitt, B. A.:** Wound Excision to Fascia in Burn Patient. *Arch. Surg.*, 113, 4: 403, 1978.

Further references are available by the author.

Dr. M. G. Grigoryev, Research Institute of Traumatology and Orthopaedics,
Zhdanov Street 18, 603155 Gorkii, USSR



A meeting with international participation is scheduled to be held at the Karl Marx University Leipzig on Nov. 5th and 6th 1982 to discuss the subject "Adhesives and Their Uses in Medicine". Part of the occasion will be an exchange of opinion on the use of all types of adhesives (fibrin adhesives, GRF adhesives, cyanoacrylates, etc.) with the largest possible number of participants hopefully taking part.

The following are the necessary facts and figures. Subject: **"Adhesives and Their Uses in Medicine"**. Interdisciplinary meeting and symposium with international participation at the Karl Marx University Leipzig, the German Democratic Republic.

Date: **November 5th and 6th, 1982**

Scientific supervisors: Senior Medical Counsel Prof. Dr. Dr. sc. med. W. Bethmann (Director of Clinic and Policlinic for Surgical Stomatology and Stomatological and Facial Surgery), Senior Medical Counsel Prof. Dr. sc. med. W. Kothe (Director — Surgical Department).

Contact the Symposium organizer: Dr. H. A. Gitt, Nürnberger Str. 57, 7010 Leipzig, GDR

CONTENTS

Appeal to the European Medical Profession	129
Bondar V. S.: Cheiloplasty of Acquired Open Defects	132
Filatov V. I., Voinova L. E.: Reconstructive Surgery in the Preprosthetic Period	140
Szabó K.: Relationships of Thermal Injuries and Medicine	155
Pondělíček I., Véle F., Königová R.: Neurological and Psychological Complications in the Burned	161
Kozlov V. A., Kamalov R. K., Tsimbalistov A. V.: Replantation of Articular Process of Mandibula [A Clinical and Experimental Study]	166
Bondar V. S.: Cavity Formation in Obliterated Orbita before Application of a Cosmetic Prosthesis	172
Murazyan R. I., Pantchenkov N. R., Smirnov S. V., Yevteyev A. A., Königová R., Ko- níčková Z., Pávková L., Svoboda S.: Staphylococcal Infections and Their Treat- ment in Burned Patients	180
Grigoryev M. G., Pakhomov S. P., Dmitriev G. I., Tyukina A. A., Sokolov L. N., Sova E. R.: Primary Local Therapy of Burns [An Early Necrectomy and Chemical Necrolysis]	185
News	153, 192

STOP FOR A MOMENT AND CONSIDER YOUR HEALTH



DAY AFTER DAY AND YEAR AFTER YEAR YOU ARE CONSTANTLY CHASING SOME AIM OR ANOTHER, YOU STRETCH THE MAINSPRING OF YOUR HEALTH TO THE VERY MAXIMUM. AND HOW LONG DO YOU THINK YOU CAN CONTINUE TO DO SO? REMEMBER THAT YOU HAVE ONLY ONE HEALTH AND FINALLY MAKE UP YOUR MIND TO GRANT IT, AT A VERY REASONABLE PRICE, WHAT IT DESERVES: COMPLEX TREATMENT AT ONE OF THE OLDEST AND THE MOST WIDELY RECOGNIZED SPAS IN EUROPE.

CZECHOSLOVAK SPAS — OASES OF HEALTH,
QUIET AND INSPIRATION

KARLOVY VARY — FRANTIŠKOVY LÁZNĚ — MARIÁNSKÉ LÁZNĚ — JACHYMOV —
TEPLICE V CECHÁCH — PODEBRADY — JANSKÉ LÁZNĚ — TŘEBŮŇ — JESENÍK
LUHAČOVICE — TEPLICE NAD BEČVOU



BALNEA PRAHA - REPRESENTATION OF CZECHOSLOVAK SPAS AND MINERAL SPRINGS
110 01 PRAHA 1, PARIŽSKÁ 11 - TELEX: 122 215 - CZECHOSLOVAKIA