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ACTA CHIRURGIAE PLASTICAE — 13, 4, 1971

Medical Faculty of Hygiene, Clinic of Plastic Surgery, Charles University,
Prague (Czechoslovakia)
Head Prof. H. Pešková, M. D., DrSc.

TISSUE REACTIONS AFTER SUBCUTANEOUS IMPLANTATION OF HYDRON SPONGE

J. ŠMAHEL, J. MOSEROVÁ, E. BĚHOUNKOVÁ

This experimental study is concerned with the histology of tissue reactions following implantation of porous hydrophilic gel, Hydron Sponge, into the subcutaneous tissue of young female pigs.

The Hydron Sponge has been used in clinical practice in various forms for several years, mainly as prosthetic material in tissue defects. The advantage of the Hydron as compared with other xenoplastic materials, is its inertness, the minimal tissue reaction it evokes following implantation and its hydrophilic properties (Barvič et al., 1967; Simpson, 1969). The material is very stable, depolymerisation occurs only after heating to 200 °C.

In plastic surgery, Hydron is being used mainly as prosthetic material in breast augmentation operations (Kliment et al., 1968). After long-term implantation of Hydron Sponge in this locality though, X-ray contrasting shadows were observed on the circumference of the implant. In some excised implants calcium incrustations of the outer layers of the implant were found. Similar incrustations were also found in ureter Hydron prostheses in experimental dogs (Kočvara et al., 1968). Winter and Simpson (1969) reported calcium depositions and bone formation in porous hydrophilic gel in experimental pigs.

In a preliminary experiment carried out in 1968, the authors encountered formation of bone tissue in Hydron Sponge implanted subcutaneously to young pigs 6 months following implantation (Moserová, 1969). This finding lead the authors to the decision to start a more detailed investigation of this occurence.

According to the suggestion of the Institute for Macromolecular Chemistry, three types of Hydron were used in the experiment (Wichterle and Štol, 1968). Methacrylic acid was incorporated into two modifications of Hydron with the supposition that this acid might influence the incorporation of calcium salts into the porous gel.

MATERIAL AND METHODS

Implants.

a) Hydron Sponge G 1: hydrophilic gel developed by Wichterle and Lím in 1955. The gel is a polymer of ethylene-glycol-monomethacrylate crosslinked by ethylene-glycol-dimethycrylate prepared with 0,25 water solution of amonium-persulphate as initiator. Size of pores 40—80 μ. Thickness of Hydron sheet 7 mm.

Fig. 1. Fragmentation of gel by fibrous strips. Hematoxylin-eosin, x 65.

b) Hydron Sponge G 2: the same hydrophilic gel with the addition of 1% methacrylic acid; thickness of Hydron sheet 6 mm.

c) Hydron Sponge G 3: the hydrophilic gel with the addition of 4% of methacrylic acid. Thickness of Hydron sheet 4 mm.

The Institute of Macromolecular Chemistry supplied Hydron Sponge sheets hydrated in 0,2% Septonex solution, sealed in sterile, polythene covers. For implantation, quadrangular pieces 2×4 cm were cut out of the sheets.

IMPLANTATION

The experiments were carried out on 14 young female pigs, weighing 25—30 kg. After the animals' back was shaved, four skin incisions were made under pentothal anaesthesia on the sides of the back. The two anterior in

cisions were started approximately 15 cm from the axillae, the two posterior incisions were localised approximately 20 cm from the loins. Through the incisions the skin muscle was reached; along the upper layer of the muscle a tunnel, approximately of 5 cm was made, parallel with the surface of the skin. The implants were inserted into these tunnels. The wound was closed by ordinary sutures in two layers. Implants of all three types of Hydron were placed in each experimental animal. Following the operation, animals ware allowed to move freely. The implanted material was excised after 1, 2, 4, 5, 6 ½ months, and in the case of G 3 also after 8 ½ months. For each term, 2—3 animals were used. In few cases inflammation of the wound occured postoperatively and the implanted material was eliminated. In several cases, after long term implantation, the implants could not be located.

HISTOLOGY

Biopsies taken after 1 and 2 months following implantation were excised from anaesthetized animals. At later terms implants were excised from exsanguinated animals in the slaughter house. In total, 29 samples of implanted Hydron were examined. Baker's solution was used for fixation. Biopsies obtained 1 and 2 months following implantation were treated without previous decalcification, biopsies from later terms were first decalcified by sodium formate and by formic acid. The material was embedded in paraffin in the usual manner and sections were cut 7—15 μ thick. The sections were stained by haematoxylin-eosin and haematoxylin-eosin-sofronin. The presence of calcium was determined by Kossa's method.

RESULTS

G 1

One month following implantation: the implanted material is surrounded by a thin fibrous capsule which is slightly thicker in the vicinity of muscle tissue. The number of fibrocytes, mainly on the inner side of the capsule, is increased. The capsule on the outer side is surrounded by loose connective tissue, in which numerous medium sized blood vessels, mainly veins, may be observed. In the capsule itself there are also numerous blood vessels; arround some of these there is a slight cellular reaction formed by lymphocytes, histiocytes and plasmatic cells. In some places, the capsule is thicker, collagen fibres are arranged less regularly and between them small islets of Hydron may be round. The implant stains faintly violet on its circumference. In the periphery of the implant thin fibrous tissue strips may be observed. In some places these strips are connected with the capsule, thus resembling septa. The fibrous tissue subdivides the Hydron into smaller units or islets; fibroblasts, histiocytes and some giant cells may be observed. In the pores of the Hydron there are mononuclear cells; towards the centre of the implant these cells are less numerous and are undergoing desintegration. Sections treated according to Kossa show calcium depositions in the Hydron pores in the outer part of the implant. There are no depositions in the centre. In the periphery calcium granules form

rosette-like patterns corresponding topographically with the Hydron units or islets subdivided by fibrous tissue strips. Towards the centre, calcium depositions are less marked and are dispersed.

Two months following implantation: the capsule does not differ morphologically from the capsule described above. The fine violet tinge is now apparent almost throughout the whole implant; on the periphery, the violet colouring is more marked. Fibrous tissue strips, subdividing the Hydron, are thicker and reach further towards the centre (Fig. 1). Numerous fibroblasts and small blood vessels may be observed between collagen fibres. In some places, fibrous tissue strips show hyaline degeneration. On the periphery of Hydron islets there are histiocytes and numerous giant multinuclear cells. The giant cells are mostly flat and they lie on the surface of the islets. Free cells are invading the pores. Calcium depositions show a similar distribution as described above but they are denser and reach further towards the centre of the implant. Occasionally, some dispersed depositions may be found in fibrous tissue undergoing hyaline degeneration. On the periphery, the depositions form gross granules and masses.

Four months following implantation, implants show violet colouring in the whole extent. In the pores there are numerous mononuclear cells, some of which are desintegrating. The peripheral part of the implant shows quite a varied picture. Homogenous, red-brown globules appear in the pores. The globules conglomerate and are surrounding small fragments of Hydron and free cells (Fig. 2). Map-like, granulated areas start appearing; between these areas there are residual Hydron islets surrounded by giant cells and histiocytes. In other places, uneven, trabecular formations may be observed, which contain small fragments of Hydron. The architecture of the trabecullae is not uniform (Fig. 3). In some places the architecture shows a fibrillar pattern

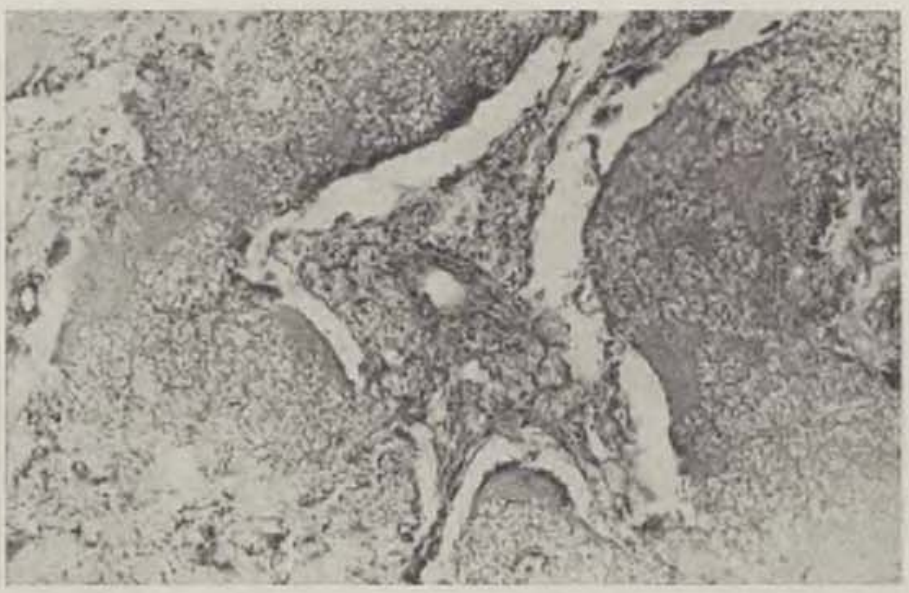

Fig. 2. Deposition of homogenous globules into Hydron pores. Confluence of globules. Hematoxylin-eosin-sofronin, x 170.

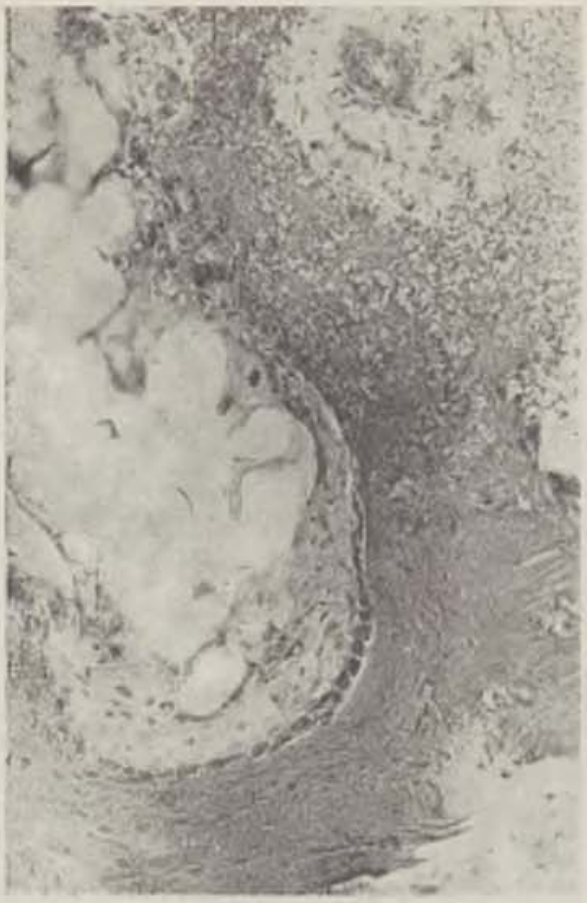

Fig. 3. Trabecular formations in the Hydron. Hematoxylin-eosin-sofronin, x 170. — Fig. 4. G 2, 2 months following implantation. Determination of calcium according to Kossa, in unstained section, x 65.

with shadowy remnants of nuclei. In other places mainly on the surface of the trabecular formations concentric lamellar bone structures may be observed. Between these, at regular intervals, there are oval osteocyte nuclei. On the outside of some bone lamellae rows of osteoblasts may be observed. Between the trabeculae there is highly vascularised, loose fibrous tissue with fat cells and giant cells. The giant cells are either free or placed in small excavations on the trabeculae. Depositions of homogenous masses occur also in the fibrous strips and the capsule in the vicinity of bone tissue formation. Frequently, confluence of trabeculae and fibrous tissue undergoing hyaline degeneration may be observed. On slides treated according to Kossa, at this stage, granular calcium depositions, correspond with the described globular deposits, while homogenous, massive calcium depositions correspond to the trabeculae (Fig. 4).

Five months following implantation: The implant is surrounded by a thicker capsule, formed by interwoven fibres. Violet colouring is discernible only on the periphery of the implant. In the peripheral and medial zone of the implant the fibrous strips are markedly thicker. Some of the septal vessels are surrounded by fine lympho-plasmocyte infiltrates. Small islets of Hydron are surrounded by numerous flat giant cells. Histiocytes are also

numerous and are invading the pores of the Hydron. Homogenous, red-brown deposits as well as bone lamellae with osteoblasts and multinucleous osteoclasts may be found only occasionally (Fig. 5).

Six and a half months following implantation: the fibrous capsule is thicker and highly vascularized. Inner layers of the capsule and some fibrous strips appear to be homogenous and stain in the same way as the trabecular formations. Throughout the whole implant the violet colouring is apparent while it is less intense in the centre. Free cells and detritus may be found in pores. In the periphery of the implant the periphery of the implant the finding does not differ from that of the specimens taken 4 months following implantation (Fig. 2, Fig. 3): numerous globular deposits inside Hydron pores, irregular trabecular formations with bone tissue.

In G 2 and G 3 basically the same histological processes occur. In the following paragraphs some special characteristics related to timing and morphology will be stressed.

Fig. 5. Bone trabeculae within the implant. Hematoxylin-eosin-sofronin, x 65.

G 2

One month following implantation calcium deposits are more dispersed and do not form rosette-like patterns. On the circumference the granules conglomerate into large groups. Two months following implantation formation of fibrous tissue strips is more advanced and incipient bone tissue formation is already apparent.

On sections treated according to Kossa granular calcium deposits are more massive. In areas corresponding to trabecular formations the deposits congregate into homogenous masses (Fig. 4). Similar findings were observed in G 1 four months after implantation. As compared to G 1, the building of bone tissue at later terms is more advanced; nevertheless, on each section, various stages of this process may be found.

Localization of calcium deposits in this type of Hydron is quite specific. Calcium granules accumulate on the periphery and in the centre of the implant while between these two zones an area without calcium incrustations may be observed (Fig. 6). Morphological processes show similar localization, while in the centre these processes are more intense. At later terms, as in G 2, bone

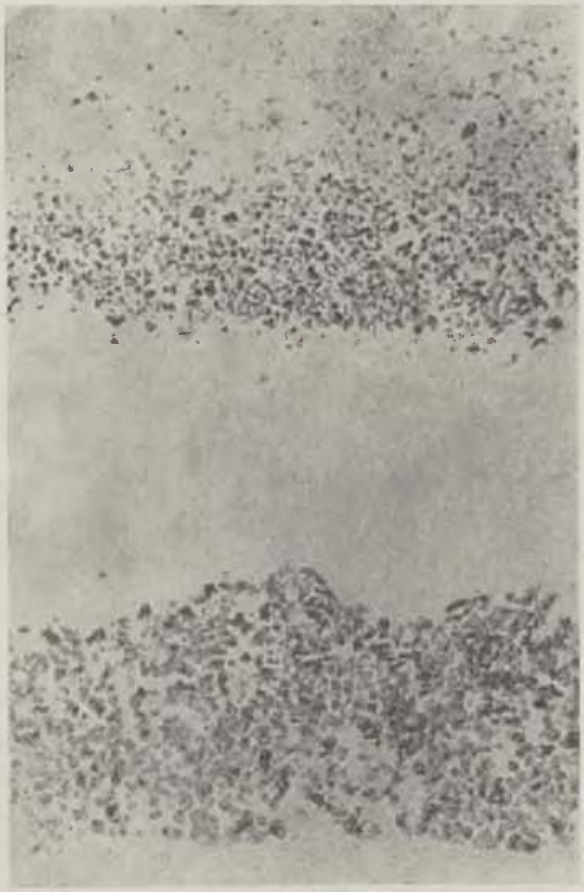

Fig. 6. G 3, 1 month following implantation. Determination of calcium according to Kossa, in unstained section, x 65.

formation is more advanced. Nevertheless, in G 3, there is one specific finding: formation of cartilage, starting at two months following implantation. At four months, several cartilage islets are formed in the vicinity of bone trabeculae. In some places, the cartilage is composed of chondrocytes separated by cartilage capsules only, in others the cartilage is clearly differentiated, with chondrocytes in isogenous groups and with a greater amount of ground substance. In larger cartilage islets characteristic ossification zones can be found (Fig. 7). G 3 is the only Hydron modification used from which a sample was taken at *8½ months following implantation.* In this specimen, the processes described above are more advanced though they have not reached a final stage.

DISCUSSION

In three types of Hydron Sponge, implanted subcutaneously basicaly the same histological processes occurred. The implants were covered by a fibrous capsule, from which fibrous strips invaded the Hydron and subdivided the sponge into smaller fragments surrounded by histiocytes and giant cells. Mononuclear cells migrated into the pores of the Hydron to a greater distance. Calcium incrustations were found to a corresponding extent.

Fig. 7. Hyaline cartilage with ossification zone in G 3 4 months following implantation. Hematoxylin-eosin-sofronin, x 65.

Between the 2nd and 4th month following implantation, when the ingrowth of fibrous tissue strips could be observed deeper in the implant, calcium was being deposited into the gel on a protein carrier, discernible by its staining reaction. The protein carrier was deposited into the pores in globular form (Wolf, 1966). A similar process occurred also in the connective tissue strips showing hyaline degeneration. The confluence of the globules lead to the formation of trabecular formations, in which at first some structures could be discerned: small gel fragments, free cells and both the fibrillar and cellular components of connective tissue strips. Later, by means of the activity of osteoblasts and osteoclasts, bone formation occurred. On each section mostly all of the processes described above could be observed. In none of the samples up to 6 months following implantation did the process reach a final stage.

The number of biopsies studied does not authorize conclusions as to the differences between the three types of gel used. It is not clear, whether these differences were caused by the content of methacrylic acid, the addition of which was expected to influence calcium deposition by alteration of chemical properties of the Hydron. Morphological methods point only to topographical differences. Nevertheless, some of these differences could also have been caused by variations in Hydron sheet thickness.

Our findings in G 2 and G1 basically correspond to the findings of Winter and Simpson (1969).

The results of the above experiment as well as clinical experiences seem to point to the fact, that Hydron Sponge in the form used nowadays does not have optimal properties for soft tissue substitution. It is to be expected though, that a change of physical properties of the Hydron Sponge (porosity, size, surface) might lend the desired qualities to the material. This problem is the subject of further study. Nevertheless, it is also worth consideration, if the tendency of Hydron Sponge in its present form to accept calcium depositions and heterotopical bone formation could not be exploited in the substitution of hard tissues.

SUMMARY

A histological examination of processes occuring in three types of porous hydrophilic gel, the Hydron Sponge, implanted subcutaneously to young female pigs was carried out. Connective tissue invaved the implants, simultaneously calcium incrustations and formation of bone tissue started appearing. In gel modification prepared with 4% addition of methacrylic acid, formation of cartilage occurred. Differences between processes observed in the three types of Hydron used were pointed out, though the relatively small number of samples examined does not authorize final conclusions as to these differences.

RÉSUMÉ

Les procès histologiques au cours d'implantation du gèle hydrophile spongieux

J. Šmahel, J. Moserová, E. Běhounková

Les auteurs ont fait les examents histologiques des proces au cours d'implantation de trois sortes de gèles spongieux dans l'espace sous-cutané du porc. Le tissu conjonctif se répandait dans les implants, la calcification et la formation du tissu osseux prenait place. Au cas de modification du gèle respectif à l'aide de solution de quatre pour cent d'acide métacrylique la formation du tissu cartillagineux trouva lieu. Les auteurs soulignent les différences des gèles respectifs, mais pourtant le nombre des examents ne forme pas encore une base fixe pour en tirer des conclusions.

ZUSAMMENFASSUNG

Histologische Prozesse bei der Implantation des porösen Hydrophilgels

J. Šmahel, J. Moserová, E. Běhounková

Die Autoren unternahmen histologische Untersuchung von Prozessen, die bei drei Arten poröser, in das Unterhautzellgewebe des Schweines implantierter Gele stattfinden. In die Transplantate wuchs das Bindegewebe ein, und es kam zur Verkalkung und Bildung des Knochengewebes. Bei der Gelmodifikation mit 4% Zusatz von Metacrylsäure erfolgte Knorpelbildung. Es wurde auf die Sonderheiten unter den einzelnen Gelen hingewiesen, die Zahl der Untersuchungen berechtigt jedoch in dieser Richtung zu keinen Schlüssen.

RESUMEN

Procesos histológicos en la implantación de la gelatina hidrofila porosa

J. Šmahel, J. Moserová, E. Běhounková

Se realizó el examen histológico de los procesos que pasan en tres tipos de gelatinas porosas implantadas por via subcutánea al cerdo. En los injertos penetraba el ligamento, se producía la calcinación y la formación del tejido huesoso. En la modificación de la gelatina con cuatro por ciento ingrediente del ácido metacrylico succedió la formación del cartílago. Se advirtió de las particularidades entre las gelatinas singulares, pero el número de los examenes no autoriza a las conclusiones en este sentido.

REFERENCES

1. **Barvič, M., Kliment, K., Zavadil, M.:** Biologic properties and possible uses of polymer-like sponges. J. Biomed. Mat. Res. 1 : 313,1969.
2. **Kliment, K., Štol, M., Fahoun, K., Stockar, B.:** Use of spongy hydron in plastic surgery. J. Biomed. Mat. Res. 2 : 237, 1968.
3. **Kočvara, S., Kliment, K., Kubát, J., Štol, M., Ott, Z., Dvořák, J.:** Long-term results with the gel-fabric prostheses of the ureter. J. Biomed. Mat. Res. 2 : 489, 1968.
4. **Moserová, J.:** Discussion at 1st Conference on hydrophilic gels in medicine, Prague 1969.
5. **Simpson, B. J.:** Hydron: A hydrophophilic polymer. Bio-Med. Engineer. 4 : 65, 1969.
6. **Wichterle, O., Štol, M.:** Personal communication, 1968.
7. **Winter, G. D., Simpson, B. J.:** Heterotopic bone formed in a synthetic sponge in the skin of young pigs. Nature 223 : 88, 1969.
8. **Wolf, J.:** Histologie, Praha 1966, SZN, P. 211—220.

Dr. J. Šmahel, Legerova 63, Praha 2, Czechoslovakia

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The First International Congress of **The Chapter of Aesthetic Platic Surgery**, of the International Confederation for Plastic and Reconstructive Surgery, will be held at the Hotel Nacional in Rio de Janeiro, Brazil, from February 6 — 11, 1972.

This Society cordially invites all plastic surgeons who are members of their established national plastic societies, recognized by the International Confederation of Plastic Surgery, to attend this Congress.

It should be noted that the Carnival in Rio will begin on February 12, 1972, the day after the meeting.

Registration for the meeting should be made with Dr. David Serson; Av. Higienopolis 462, Sao Paulo, Brasil.

The 12th Latin American Congress of Plastic Surgery and at the same time the 9th Brasilian Congress of Plastic Surgery will be held in Sao Paulo (Brasil), Hilton Hotel from January 30 to February 4, 1972.

For information write Dr. Ricardo Baroudi, Av. Barao de Itapura, 1111, 13100 — Campinas — SP — Brasil.

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RECONSTRUCTIVE OPERATIONS ON MANDIBLE IN CHILDREN

(clinico-experimental study)

A. A. KOLESOV, R. G. FEDOROVA, S. V. DYIAKOVA, Z. D. KOMNOVA, Y. P. YERADZE

Defects in bones of the face lead to disorders of vital functions and grossly change the appearance of the patient, which has an adverse effect on his general and mental condition. The anatomic and functional disorders become much worse with the growth and development of the child, and that is why repair of defects in facial bones and the mandible usually becomes measures of first-rate importance.

Mostly autologous bone is used as material for these operations, but much attention has been paid of late to conserved homologous bone. However, it has not been used very frequently in children, although good results, both functional and cosmetic, have been reported on (Plotnikov, 1967; Kolesov et al., 1968; Dyiakova et Yeradze, 1968, and others). Some authors (Imamaliev, 1964; Akopova, 1965; Stapane, 1965, Nadopta, 1966, and others), in experiments, studied the process of regeneration after surgical repair of various bone defects with conserved homologous grafts. However, their data are related to adults; up to date, special studies concerning regenerative osteogenesis in children are insufficient.

The aim of the present investigation was to ascertain the time it takes a bone graft to firmly unite with the recipient bony bed in adult and young animals, to give a comparative evaluation of these periods, and, on account of the data thus found by experiment, determine the earliest possible time when fixation of the mandible operated for defects of various aetiology can be discontinued in children.

The operations were carried out in a total of 32 rabbits, half of which of a weight between 2600 and 3000 g (i.e, adult rabbits aged between 6 and 12 months), the other half of a weight between 900 and 1000 g (i. e., young rabbits aged between 2 and 3 months (by the definition of Kovalevsky, 1958)). An artificial defect 2.0—2.5 by 0.5—1.0 cm was created in the lower margin of the mandible and bridged with a homologous bone graft. The graft consisted of part of the mandible of an adult rabbit, conserved by deep freezing according to the method developed and used at CITO (Central Institute of Traumatology and Orthopaedics). It was first modelled into proper shape, and then laid on the freshened up edges of the bone defect and fixed there at both ends with a steel wire of the trade mark 1X18H9T and a calibre of 0.2 cm. In all experiments, the graft was larger by 1.0—1.5 cm than the defect, a fact which made it lie firmly attached to its bony bed. The graft was considered to have been put properly into its place, when its edges were in close contact with those of the defect, and it could not be moved in its bed. After operation, the animals stayed under ordinary conditions.

Since interest was centred on the early period of osteogenesis, the animals were sacrificed 1, 2, 3, 4, 6 and 8 weeks after operation.

In order to evaluate the results, clinical, roentgenological and morphological methods were employed.

In the post-operative period, no complications were observed in any of the animals. After sacrifice, the mandible was exarticulated and removed together with the soft tissues, and the thus acquired specimen was first subjected to roentgenological and afterwards to morphological examination.

On the basis of the clinical, reontgenological and morphological data obtained, it was ascertained that complete union of the homologous-bone graft with its bony bed had taken place in young animals two to three (Fig. 1 and 2) and in adult animals four to six weeks (Fig. 3 and 4) after operation. Thus evidence was furnished by experiment that union of a homologous graft with its bed is effected earlier in the young than in adults.

The subjects of clinical investigation were 41 children of an age between 18 months and 16 years, in whom a total of 51 bone plasties were performed for defects in the mandible of various aetiology (see Tab. 1). With respect to the indication, the defect was bridged either immediately or in a second session. Primary bone plasty was performed 38 times in 31 children; in two out of 41 subjects, both primary and secondary plasty were carried out.

The dimensions of the anticipated defect were determined prior to operation on the basis of clinico-roentgenological examinations and trials on diagnostic models of the mandible. In the given subjects, these dimensions were from 0.5 cm to half the mandible.

Homologous bone, either frozen by the CITO method (used in 28 patients) or lyophilized (used in 23 patients), was used as biological material; in 34 patients, this was a mandibular graft whose shape fitted best the lost part to be replaced, and thus gave the best chance of a good union.

Table 1. Indications for Bone Plasty on Mandible in Children

Indication for bone plasty	Number of patients operated on
Post-operative defect after removal of:	
benign tumours	22
malignant tumours	2
Defects or deformation of mandible after inflammatory disorder or trauma	11
Congenitally underdeveloped mandible	2
Defect or pseudarthrosis after gun shot wound	4
Total	41

In most cases (39 patients), the graft was laid on the freshened up edges of the defect; in two patients, a combination was used, whereby one graft was laid on and another wedged into the gap of the defect. The grafts were fixed in place by stainless-steel wire (in 35 cases) or a polyamide thread (in 6 cases), with simple or cross stitches. External immobilization of the mandible was applied for the post-operative period in all patients.

Taking into account the dento-maxillary system in a growing organism, it is, in the authors' opinion, necessary, in children, to immobilize all fragments preserved with devices fixed to the teeth, and thus also to the jaws, during the postoperative period after bone plasty of the mandible.

Removal of these immobilizing devices is indicated by the complete healing of the soft-tissue wound and the presence of firm X-ray union of the transplant with its recipient bed. Thus in the above clinical series of subjects, immobilization of the jaws was discontinued 30 to 60 days after operation.

The results of the above experiments as well as the data of other authors convincingly demonstrate that solid union of bones is established much earlier than it is shown on X-ray, particularly in those cases in which the area of contact between the transplant and its bed was largest and the graft had been firmly fixed to it. It, therefore, may be assumed that the hitherto usual immobilization period of mandibular fragments is not an optimal one.

Good functional and cosmetic results after mandibular plasty were achieved in 34, satisfactory in three and poor in four subjects of the above series of children. Complications after the first plasty occurred in three children, and in one child even the out-come of a second plasty was not satisfactory. After a delayed bone plasty, elimination of the graft occurred in one patient in whom two operations had been performed.

The case histories referred to below are given as examples:

Patient M., a girl aged four, was admitted to the Clinic on 24 Jan., 1966, suffering from a tumour on the right side of the mandible. The parents gave

Seven months after operation, the X-ray of the mandible (Fig. 10) shows that the graft has maintained its position. Apart from invasion of bone tissue into the graft, intensive formation of young osteoid tissue around the implant has become apparent. The functional and cosmetic effect of the plasty is good.

After discharge from the Clinic, the children must be put under the dispensary care of a surgeon and orthodontist. This makes it possible to prevent deformation of the rows of teeth and, if necessary, to provide the patient with an artificial denture at a later stage after operation.

Based on the findings in this study, it may be stated that bone plasty may be indicated in children at any age. The introduction of reconstructive operations on the mandible in children, using homologous bone grafts, saves the patient from serious physical and mental sufferings.

SUMMARY

The methods of bridging mandibular defects of various aetiology in children with conserved bone grafts have been described. This bone material is of great advantage as compared to autologous bone, because it is possible to use it in the respective anatomical form and the required size. Experimental evidence has been furnished of the union between this graft and its recipient bony bed taking place earlier in young than in adult animals under the same conditions. Conserved bone grafts have been used in 41 patients in whom a total of 51 plastic operations have been performed on the mandible. The results achieved are considered good in 34, satisfactory in three and poor in four children. The necessity of dispensary care for such patients in the post-operative period has been pointed out.

RÉSUMÉ

Les opérations réconstructives de la mâchoire inférieure des enfants

A. A. Kolesov, R. G. Fedorova, S. V. Dyiakova, Z. D. Komnova, Y. P. Yeradze

Les méthodes de réparations des défauts de la mâchoire inférieure à l'étiologie différente chez des enfants à l'aide de l'os homogène ont été décrites. Ce matériel de transplantation est de préférence envers celui autologue par ce qu'il est capable de former minitieusement la forme anatomique respective de même que la grandeur exigée du transplant. Les expériments ont montré qu'une jonction osseuse de ce transplant avec sa base trouve place beaucoup plus tôt chez les individus jeunes que chez ceux âgés dans des conditions égales. Les transplants osseux ont été employés chez 41 des malades au cours de 51 dess opérations estétiques et réconstructives de la mâchoire inférieure. .Les résultats de ces opérations peuvent être confirmés come bons dans 34 des cas, comme assez bons dans 3 des cas et comme mauvais dans 4 des cas. Une nécessité du soin infini chez ces enfants dans la période postopératoire est soulignée.

A. A. Kolesov, R. G. Fedorova, S. V. Dyiakova, Z. D. Komnova, Y. P. Yeradze

RECONSTRUCTIVE OPERATIONS ON MANDIBLE IN CHILDREN

(clinico-experimental study)

Fig. 1

Fig. 2

Fig. 3

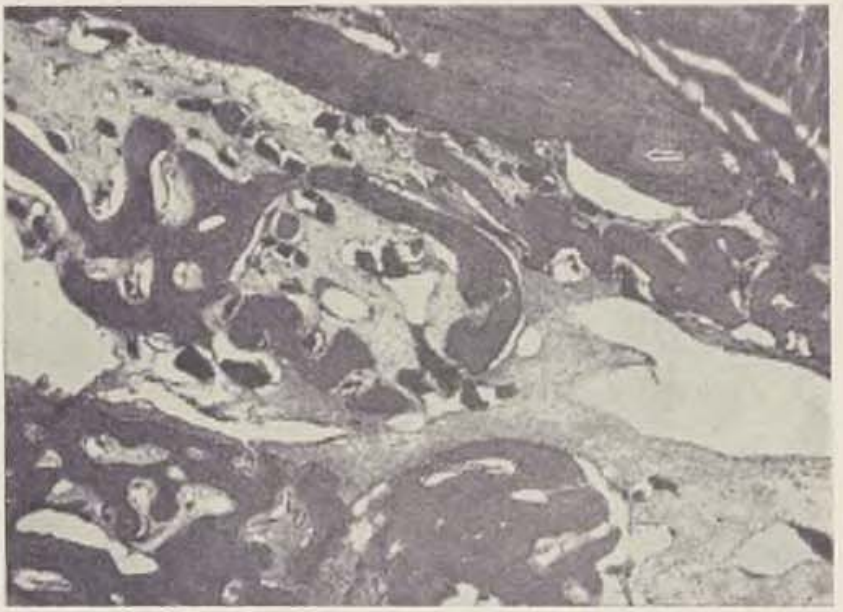

Fig. 4

Fig. 5

Fig. 6

Fig. 7

Fig. 8

Fig. 9

Fig. 10

ZUSAMMENFASSUNG

Wiederherstellungsoperation am Unterkiefer bei Kindern

A. A. Kolesov, R. G. Fedorova, S. V. Dyiakova, Z. D. Komnova, J. P. Jeradze

Die Autoren beschrieben Methoden zur Überbrückung von Unterkieferdefekten verschiedener Ätiologie bei Kindern mittels des konservierten homologen Knochens. Dieses Verpflanzungsmaterial hat gegenüber dem autologen Knochen einen grossen Vorteil darin, dass es ermöglicht, die entsprechende anatomische Form und richtige Transplantatgrösse zu gewinen. Es wurde im Versuch nachgewiesen, dass es zur Knochenverbindung eines derartigen Pfropfens mit seinem Bett bei jungen Tieren früher kommt, als bei erwachsenen Tieren, die unter gleichen Bedingungen gehalten wurden. Die Pfropfen des konservierten Knochens wurden bei 41 Kranken in insgesamt 51 plastischen Operationen am Unterkiefer benutzt. Die Ergebnisse dieser Operationen können in 34 Fällen als gut, in 3 Fällen als befriedigend und in 4 als schlecht angesehen werden. Es wurde auf die Notwendigkeit der Dispensierpflege bei diesen Kindern in der Nachoperationszeit hingewiesen.

RESUMEN

Operación de reconstrucción en la mandíbula inferior en los niños

A. A. Kolesov, R. G. Fedorova, S. V. Dyakova, Z. D. Komnova, J. P. Yeradze

Se describieron los métodos de echar un puente sobre los defectos en la mandíbula inferior de la etiología en los niños por medio del hueso homólogo conservado. Este material de injerto tiene una gran ventaja en comparación con un hueso autólogo en dar la posibilidad de ganar la forma anatómica competente y la dimensión justa del injerto. Se probó por un experimento, que ocurre un contacto huesoso de este injerto con su lecho más temprano en los jóvenes animales que en los adultos guardados en las mismas condiciones. Los injertos del hueso conservado se emplearon en 41 enfermos en 51 operaciones plásticas de la mandíbula inferior en total. Los resultados de estas operaciones se pueden tener por buenos en 34 casos, por satisfactorios en tres casos y por malos en cuatro casos. Se indicó la necesidad del cuidado de dispensario en estos niños en el período después de la operación.

REFERENCES

1. **Akopova, A. L.:** Results after Implantation of Homologous-Bone Grafts Conserved by Various Methods (experimental investigation), Sbornik nauchnikh trudov Yerevanskovo nauchno-issled. in-ta travmatologii i ortopedii (Collection of Scientific Papers of the Yerevan Scientific Research Institute of Traumatology and Orthopaedics), 8 : 89, Yerevan 1965.
2. **Dyiakova, S. V.; Yeradze, Y. P.:** Preparation of Children for Bone Plasty of Defects in Mandible, Materiali dokladov 7-i respublikanskoi konferentsii stomatologov i zubnikh vrachey Estonskoi SSR (Proceedings of VIIth Republican Conference of Stomatologists and Dental Surgeons of the Estonian Soviet Socialist Republic), Tartu 1968, p. 146.
3. **Imamaliev, A. S.:** Condyle Plasty Using Homologous-Bone Grafts, Moscow 1964.
4. **Kovalevsky, K. L.:** Laboratory Stock-Raising, Moscow 1958.

5. **Kolesov, A. A.; Imamaliev, A. S.; Dyiakova, S. V.:** On Surgical Reconstruction of Mandible in Children Using Homologous-Bone Grafts, Voprosi stomatologii detskovo vozrasta (Child Stomatology), Riga, 1968, p. 219.

6. **Nadopta, R. A.:** Roentgenological and Histological Characteristics of Homologous-Bone Graft Transformation in Connection with the Duration of its Storage, Ortop. travm. protez., 4 : 27, 1966.

7. **Plotnikov, N. A.:** Employment of Lyophilized Homologous-Bone Tissue in Reconstructive Facio-Maxillary Surgery, Leningrad 1967.

8. **Stapane, S. S.:** Experimental Study of Roentgenological and Morphological Changes in Mandibular Defects Bridged with Homologous Bone or Cartilage, Aktualnie voprosi normalnoi i patologicheskoi morfologii (Topical Problems of Normal and Pathological Morphology), Riga 1965, p. 261.

Prof. A. A. Kolesov, ul. Kalyayevskaya 18, Moscow, K-6, USSR

Fig. 1. Complete union of transplant with bony bed in young animal (3 weeks). — Fig. 2. Site of union of transplant with bony bed in young rabbit (3 weeks). Stained with haematoxylin-eosin. Magn. 10×8. — Fig. 3. Complete union of transplant with recipient bony bed in adult rabbit (4 weeks). — Fig. 4. Detail of union of homologous--bone graft with recipient bony bed in adult rabbit (6 weeks). Stained with haematoxylin-eosin. Magn. 10×4. — Fig. 5. X-ray of right side of mandible of patients M., girl aged 4, prior to operation. Gross deformation due to enlargement of bone and presence of a large number of cavities. Borderline between normal and pathological bone is sharp. — Fig. 6. X-ray some patients as in Fig. 5, 40 days after operation. Shape of mandible has been reconstructed. There is firm union between the transplant and its bony bed. — Fig. 7. X-ray of same patient as in Fig. 5 and 6, 58 days after operation. Structures of homologous-bone graft and recipient bony bed at the site of contact are the same. Borderline between transplant and mandibular fragments is disappearing. — Fig. 8. X-ray of left side of mandible in patient B., boy aged 12, prior to operation. Deformation due to enlargement of bone in anterior parts of mandibular body. The pathological focus has no sharp borderlines. Osteoporosis prevails and, in places, acquires lacunar character. — Fig. 9. X-ray of left side of mandible of same patient as in Fig. 8, 43 days after operation. Mandibular defect bridged with bone graft. Homologous-bone implant has completely preserved its shape and is in close contact with edges of the defect. — Fig. 10. X-ray of mandible of same patient as in Fig. 8 and 9, 7 months after operation. The implant has maintained its position. Intensive development of bone tissue invading and surrounding the implant.

Moscow Medical Institute of Stomatology, Moscow (U.S.S.R.)
Rector Doc. A. Z. Belo'usov
Department of Child Stomatology
Director Prof. A. A. Kolesov

CLINICO-ROENTGENOLOGICAL CHARACTERISTICS OF PATHOGENESIS OF MANDIBULAR-JOINT ANKYLOSIS

N. N. KASPAROVA

In recent years, large clinical and experimental experience has been gathered, which permits us to survey mandibularjoint ankylosis from new positions, and to elaborate a more complex method of its treatment. However, many authors explain the way ankylosis develops differently, and most clinicians speak of fibrous and osseal ankylosis of the mandibular joint as of separate forms of the disorder.

The present study is based on the results of a seven-year investigation of the clinical and roentgenological picture of mandibular-joint ankylosis in 45 patients (22 boys and 23 girls) of an age between 20 months and 20 years. With respect to the age, there were six between 1 and 3, 14 between 3 and 7, 18 between 12 and 16 and two older than 16. In 35 patients, ankylosis had developed unilaterally (in 18 on the right and in 17 on the left), and in 10 patients bilaterally.

In all patients, the onset of the disorder could be traced back to childhood, i. e., to the period of intensive growth of bones. Similar findings have been reported by Limberg (1950), Semenchenko (1951), Medvedev (1957), Schröder (1960), Cernea et al. (1962) and Ricketts (1966). These observations permit us to regard mandibular ankylosis as a children's disease.

According to the author's own experience, mandibular-joint ankylosis developed in most children as a consequence of purulent arthritis, except those cases in which it was a sequela of untreated or badly treated fracture of the mandibular neck healed by luxuriant callus (in 8 patients of the series). The basic cause of the disorder was traumatic inflammation of the joint due to injury at birth or an accident (fall) without fracture of the articular process (in 12 patients). Second as to the frequency of causes stands haematogenic osteomyelitis of the articular process (8 patients), and third, acute and chronic otitis media with spreading of the inflammatory process to the joint socket and the other parts of the joint (in 7 patients). There was no case in which ankylosis developed from odontogenic osteomyelitis. The latter, if it involves

the entire ramus of the mandible and its processes, in children, usually leads to sequestration of the articular process and the development of pseudarthrosis without limitation of joint movements. The cause of the disorder could not be disclosed in ten patients.

In the children investigated, the first marked sign of ankylosis was retardation of mandibular growth; not limitation of movements, as is believed by many authors. Signs of disturbance of normal mandibular growth could be noticed three to six months after the onset of the primary disorder in the joint, and were most conspicuous in unilateral affection. Asymmetry of the lower part of the face was usually first noted by strangers or relatives who had seldom seen the child. The parents notice the deformation later or occasionally in the reflexion of the child's face in a mirror, when its sides appear reversed as compared to what they usually look like. In bilateral joint affection, the changes in appearance remain unnoticed for a long time, and the parents usually bring the patient to hospital because of limitation of mandibular movements. Retardation of mandibular growth becomes ever more apparent with continued growth of the child. In unilateral affection, the articular process is either short or completely disintegrated, and the ramus and body of the mandible are smaller than those of the other side; diminution is more marked in the ramus than in the body, as anthropometrical measurements have shown.

Disturbance of joint function is noted either at the same time as that of mandibular growth, or later. The side movements are limited first; at a later period also the vertical and forward movements. At the early stages, stiffness of the joint does not interfere with eating or speaking, and this is why the disorder can remain unnoticed for a long time. Shortening of joint excursions develops slowly, over years, and in most children terminates in complete immobility of the mandible about five to seven years after the onset of the disorder.

Roentgenological examination of the mandible disclosed gross changes in bone independently of the degree of joint movement limitation. Most children of an age of six or seven could open their mouths 1—3 cm, and still in all, the articular process was badly deformed or completely disintegrated. In each case, the head and upper parts of the articular process were absent,

Fig. 1. Roentgenological forms of incomplete ankylosis of mandibular joint: a) Patient O., girl aged 2, ankylosis as sequela of haematogenic osteomyelitis. Duration of disorder 2 years. Distance of 1.3 cm between central incisors on opening the mouth. — b) Patient G., girl aged 5, ankylosis as sequela of haematogenic osteomyelitis. Duration of disorder 5 years. Distance of 2 cm between incisors on opening the mouth. — c) Patient G., girl aged 6. Cause of disorder could not be disclosed. First sign of mandibular-growth retardation at the age of 6 months. Amplitude of mandibular movements 0.9 cm. — d) Patient S., boy aged 13, ankylosis as sequela of chronic otitis media. Duration of disorder 9 years. Amplitude of mandibular movements 2 cm. — e) Patient M., boy aged 12, ankylosis as sequela of haematogenic osteomyelitis. Duration of disorder 12 years. Amplitude of mandibular movements 0.8 cm

Fig. 1a

Fig. 1b

Fig. 1c

Fig. 1d

Fig. 1e

and its base was thickened and irregular. In the lateral projection, or on pantograms, thin bony excrescences, originating from the edge of the mandibular notch and pointing upwards, are clearly visible. In children older than ten, compact sclerotic bone can be seen in the pathological focus, and the thin bony excrescences fuse with each other, forming a continuous bony mass between the mandibular ramus and the base of the skul. Irregular bone formations occupy joint socket, and envelop, like a cuff, the articular process. Joint movements are preserved to various degrees as long as the thin and irregular fissure of a false joint can be detected in the X-ray (Fig. 1 a-e).

It was impossible to determine a direct relationship between the duration of the disorder and the degree of mandibular-growth retardation or that of bone affection. Obviously the clinical severity of mandibular deformation and the time in which complete ankylosis develops, depend on the extent to which the epiphysial cartilage of the articular process has been involved by the pathological process. In two children of the same age, both suffering from mandibular ankylosis originating from an injury at birth, severity of the disorder was different. In the girl Y., aged two years and five months, with unilateral ankylosis of the mandibular joint, complete disintegration of the articular process, thickening of its base and considerable narrowing of the mandibular notch can be seen in the X-ray (Fig. 2c). The lower jaw could be moved almost to full range (the mouth opened to a width of 3 cm), but underdevelopment of one half of the mandible was very conspicuous. In the other child D., aged two years and seven months, with bilateral ankylosis of mandibular joints, the X-ray shows massive bone formations between the ramus and the base of skull, marked underdevelopment the ramus and the base of skull, marked underdevelopment of all parts of the mandible and its complete immobility (Fig. 2 a and b).

During operation, the condition of bone tissue in the region of the upper parts of the ramus was subjected to meticulous examination. It was found that the articular process had disintegrated and its base grossly thickened in all patients. From this base, bone growth started with single and thin bony excrescences pointing up- and inwards, and leading to the development of large bone processes on the medial surface of the ramus and the edge of the mandibular notch. The affected surface of the ramus is smooth and glossy in all areas. In patients at the age of puberty, i. e., at the period of intensive skeletal growht, irregular bone structures in the region of the affected articular process developed rapidly and reached their largest dimensions (Fig. 3 a—c). These observations permit to assume that the pathological transformation of bone in the region of the articular process continues for a long time in ankylosis of the mandibular joint, and that acceleration of pathological osteogenesis coincides with the period of age, in which growth of the facial skeleton is fastest in general.

The data from the literature, the author's own clinical and roentgenological observations in patients of various age and the study of bone changes in the

Fig. 2a

Fig. 2b

Fig. 2c

Fig. 2. Ankylosis of mandibular joint after injury at birth: a) and b) Patient D., girl aged 2 years and 7 months, c) Patient Y., girl aged 2 years and 5 months. Distance of 3 cm between central incisors on opening the mouth

articular process during surgical operations make it possible to form the following conception of the pathogenesis of mandibular-joint ankylosis.

Evidence has been furnished of the fact that, at the period of postnatal development of the facial skeleton, the mandibular head represents one of the main areas of growth, which subsequently ensures the trend of growth of the entire mandible (Rusakov, 1959; Krishtab, 1968; Vares, 1967; Sarnat, 1957; Torsten, 1964; Enlow, 1966). At this period, the immature elements of cartilaginous and bony tissue possess a high capacity for reactive hyperproduction of bone tissue. The processes of active transformation of cartilaginous and bone tissue in the region of the mandibular head, which are linked up with the growth of the entire mandible, could be traced up to the age of 20 and even 30 (Torsten, 1964; Moffetl, 1966)), but non-differentiated cellular ele-

ments of mesenchyma were found in the centre of the head in people of an age between 50 and 60 (Torsten, 1964).

The functional peculiarity of the temporo-mandibular joints. The full extent of movements in the healthy joint prevents the timely development of a defensive reaction, and thus leads to functional overloading of the affected joint. An inflammatory process or trauma cause disruption and necrosis of bone structures, disintegration of the mandibular head at an early stage of the disorder, when no clinical signs have as yet come into appearance. This process takes place under constant functional loading. The products of tissue decay, formed as a result of trauma or inflammation, as well as the constant irritation by movements, favour the development of excessive regeneration of

Fig. 3a

Fig. 3b

Fig. 3c

Fig. 3. Roentgenological forms of complete mandibular ankylosis: a) Patient F., boy aged 12, ankylosis after injury. Duration of disorder 9 years. — b) Patient K., girl aged 12, ankylosis as sequela of chronic otitis media and mastoiditis. Duration of disorder 10 years. — c) Patient T., girl aged 16. Cause of disorder could not be disclosed. Underdevelopment of mandible became apparent at the age of 3 months

bone tissue. The growth of the mandible, typical of the period of childhood and youth, is not interrupted. However, as a result of destruction of the epiphysial cartilage layers, normal growth of bone, which is conditioned by hereditary factors, becomes unbalanced; growth into length of the half of the mandible with the affected joint is retarded or ceases completely, while excessive irregular osteogenesis takes place in the region of the articular process. Pathological transformation of bone in the region of the articular process, which started at the very onset of the disorder (trauma, inflammation), continues for a very long time and only terminates in the development of mature and densely sclerotized bone after puberty. At the beginning of the disorder, therefore, the process is governed by the destructive changes in bone tissue of the mandibular head, developing under the influence of trauma or inflammation.

Preservation of movements in the affected joint is no evidence of the existence of a fibrous ankylosis. The degree to which movements are limited, depends on the area involved by pathological osteogenesis and on the extent to which the bony excrescences have reached the base of the skull. The present conception of the pathogenesis of fibrous ankylosis as of a junction between adjacent surfaces effected by fibrous links, cannot be applied to ankylosis of the mandibular joint, developing in a growing organism. In this, destruction of the joint surfaces takes place in children from the very beginning of the disorder, and active and irregular osteogenesis in the region of the disintegrated articular process governs the pathological event. Classification of fibrous ankylosis of the mandibular joint in children as an independent form of the disease does not correspond to the morphological picture of the complicated pathological process, and may lead to an erroneous plan of treatment (intraarticular injection of corticosteroids, prolonged physiotherapy, redressement forcé of the mandible, etc.), which can only impair the course of the disorder.

Preservation of movements in the joint affected by gross bone changes is evidence only of the pathological process having proceeded for a long time. The author distinguishes two stages of mandibular-joint ankylosis: The first is incomplete ankylosis, when opening of the mouth is possible to 0.5 cm or more, and the second is complete ankylosis.

The scientific definition of the disorder is the following: Mandibular-joint ankylosis should be considered a protracted pathological process in the joint, in which necrosis and active transformation of bone tissue take place under continuous functional loading, and lead to a disorder in mandibular growth and to disruption of joint functions.

Children with clinical signs of underdevelopment of the mandible and destruction of bone in the articular process should be subjected to surgical treatment independent of age or the range of movement still preserved in the affected joint. Observations in four children suffering from this disorder for several years without surgical treatment showed that deformation of the mandible increased with years and led to secondary deformation of the maxilla.

SUMMARY

A clinical and roentgenological study of 45 patients aged between 20 months and 20 years was carried out. The first sign of the disorder was retardation of mandibular growth. Disturbances of function of the affected joint become clinically apparent much later; in most patients complete ankylosis of the mandibular joint was established five to seven years after the onset of the disease. At the early stages of the disorder, irrespective of the preservation of joint movements, almost complete disintegration of the articular process and formation of a multitude of thin bony excrescences originating from the base of the articular process and pointing upwards, inwards and towards the mandibular notch, could be seen in the X-ray and during operation in all children. These observations justify the author to reject the classification of fibrous ankylosis as an independent form of the disease in children and young people. At this age, complete disintegration of joint surfaces takes place, and the epiphysial cartilage of the mandibular head is involved to an extent which leads to retardation of mandibular growth and to formation of irregular and luxuriant osteogenesis in the region of the articular process.

RÉSUMÉ

Une charactéristique clinico-radiologique de pathogenèse d'ankylose de l'articulation temporo-maxillaire

N. N. Kasparova

Les auteurs ont entrepris une complète examination clinicoradiologique chez 45 des malades à l'âge de 20 mois à 20 ans. Le premier signe de la maladie était celui de relentissement de la croissance de la mâchoir inférieure. La fonction endommagée de côté de l'articulation respective se manifestait cliniquement beaucoup plus tard. Chez la pluspart des malades il s'agissait de l'ankylose complète de l'articulation temporo-maxillaire dans la période de 5 à 7 ans dès le commencement de la maladie. Dans la période innitiale les rayons X et l'opération rélévèrent chez tous les enfants le processu articulaire à peu près completement dissolu et la formation de multiples minces lamelles osseuses apparut. Celles-ci sortaient de la base elle- même de l'articulation respective et se dirigeaient en haut, médialemet et directement dans l'incisure de la mâchoire. Ces données étaient indépendant de la possibilité de mouvement de l'articulation respective. Elles pressent l'auteur de refuser le terme "ankylose fibreuse" en tant qu'une forme extra de maladie des enfantes et des personnes jeunes. A cette âge une complète dissolution des articulations trouvent place, le cartillage épiphysaire de l'articulation est tellement endommagé, que la suite en est une retardation de la formation de la mâchoire inférieure et de même une formation irréguliaire et une ostéogénèse trop développée dans la région du processus articulaire.

ZUSAMMENFASSUNG

Klinisch-röntgenologische Charakteristik der Pathogenese der Mandibulargelenkankylose

N. N. Kasparova

Es wurde klinisch-röntgenologische Untersuchung bei 45 Kranken im Alter von 20 Monaten bis 20 Jahren unternommen. Das erste Zeichen des Defektes bildete die Wachstumverlangsamung des Unterkiefers. Die Funktionsbeeinträchtigung an der Seite des betroffenen Gelenks manifestierte sich klinisch viel später; bei meisten Kranken kam es zu vollständiger Ankylose des Mandibulargelenks ungefähr 5 bis 7 Jahre nach der Entstehung der Erkrankung. In ihren Frühstadien ist am Röntgenbild und bei der Operation bei allen Kindern festgestellt worden, dass der vordere Fortsatz fast vollkommen zerfallen ist und dass sich eine grosse Zahl dünner Knochenfortsätze gebildet hat, die aus der Base des Gelenkfortsatzes ausgingen und in der Richtung nach oben, medial und in die incisura mandibulae gerichtet waren. Diese Befunde waren vom Umfang der erhaltenen Beweglichkeit im Gelenk unabhängig. Diese Beobachtungen berechtigen die Autoren zur Ansicht, dass die Anerkennung der fibrösen Ankylose als einer besonderen Erkrankungsform bei Kindern und Jugendlichen abzulehnen ist. In diesem Alter kommt es zu vollständigem Zerfall der Gelenkflächen und der Epiphysenknorpel des Kopfes ist so geschädigt, dass es zur Wachstumverlangsamung des Unterkiefers und zu unregelmässiger und übermässiger Osteogenese des Gelenkfortsatzes kommt.

RESUMEN

Característica clínica-radiológica de la patogenesis de la anquilosis de la articulación mandibular

N. N. Kasparova

Se hizó el examen clínico y la radioscopia en 45 enfermos de la edad desde 20 meses hasta 20 años. El primer síntoma del defecto fue el retardamiento del crecimiento de la mandíbula inferior. La perturbación de la función en la parte de la articulación afectada se mostró clínicamente mucho más tarde; en la mayoría de los enfermos ocurrió la anquilosis total de la articulación mandibular aproximadamente cico hasta siete años después del principio de la enfermedad. En sus estadios tempranos se comprobó en el aparato de radioscopia y en la operación en todos los niños, que la estribación de la articulación había sido descompuesta casi completamente y que había sido formada una gran cantidad de las excrecencias huesosas delgadas, las que salen de la base de la estribación de la articulación y se dirigen hacia arriba, mediamente y en la incisura de la mandíbula. Estos diagnósticos fueron independientes en la extensión de la movilidad conservada en la articulación. Estas observaciones facultan a la autora para que rechace reconocer la anquilosis fibrosa como la forma especial de la enfermedad de los niños y de las personas jovenes. En esta edad sucede la descomposición completa de las superficies de la articulación y el cartílago de epifisis de la cabeza es perturbado hasta el punto de que suceda al retardamiento del crecimiento de la mandíbula inferior y a la osteogenesis irregular y excesiva en la zona de la estribación de la articulación.

REFERENCES

1. **Vares, E. Y.**: Rules of Bone Growth of Jaws and Their Significance for the Orthodontic Practice, Doc. Diss., 1967.
2. **Krishtab, S. I.**: On Pathogenesis and Diagnosis of Mandibular Deformations, Doc. Diss., 1968.
3. **Cernea, Crepy, Roux**: Actual. Odont. Stomatol., 1962, 58, Juin.
4. **Enlow, D.**: Amer. J. Orthodont., 52, 4 : 283, 1966.
5. **Moffetl, B.**: Amer. J. Orthodont., 52, 4 : 401, 1966.
6. **Ricketts, R.**: Amer. J. Orthodont., 52, 6 : 416, 1966.
7. **Forsten, O.**: Morphology, Growth and Matrix Formation in the Mandibular Joint of Guinea-Pig, Umea, 1964.

Doc. N. N. Kasparova, ul. Kalyayevskaya 18, Moscow K-6, USSR

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SUBMUCOUS CLEFT PALATES

M. FÁRA, J. HRIVNÁKOVÁ, E. SEDLÁČKOVÁ

The submucous cleft is anatomically — the lightest form of cleft palate. It causes nevertheless, imperfect palato-pharyngeal closure so that the thus afflicted person is forced to undergo sooner or later phoniatrical and surgical treatment.

DIAGNOSIS

In order to determine a submucous cleft, the palate must carry the following three symptoms: a) central dent in the palate plates, b) velar muscles not joined in the central line with intact mucous layer, c) parted uvula.

The diagnosis is mostly facilitated because of the strikingly thinner medial zone between more or less bulging muscles on both sides of the soft palate. In more serious cases, when the nasal and oral mucosa got into contact between the parted muscles, this zone is usually whitish or partly translucent. The dent in the palate plates may be of different length, sometimes the submucous cleft reaches into the foramen incisivum. The incisure is not too wide, its end is usually rather sharp whereas in open cleft palates the end may be rounded off.

If the vomiting reflex is induced, mere aspect sometimes suffices to diagnose the affect of the hard palate. The velar muscles bulge due to contraction, the central part in the soft and hard palate hightens and flattens. Palpation serves best however for making sure of the actual size of the cleft in the palate plates.

Cleft of the uvula is no reliable indicator of the submucous cleft, because we often find it even in the healthy population (more than $1 \cdot 100$) and — on the other hand — we may meet exceptionally with submucous cleft of the velar muscles and palate plates, without the uvula being parted.

An important symptom of submucous cleft is the speech disorder resulting from incomplete palato-pharyngeal closure as the consequence of short and insufficient palate.

DIFFERENTIAL DIAGNOSIS

The submucous cleft should not be confused with two pathologic conditions of the palate which also cause disorder of speech. One is the insufficient palate without cleft which is imperfect from the anatomical point (short), or from the functional point (disorder of inervation) and the other is the palate which is affected by cleft velum passing submucously forward to the palate plates.

In the first case a confusion may occur if an accidental cleft of the uvula is associated with the case. The parted velar muscles are absent however and instead of a dent in the posterior edge of the palate plates, we palpate an intact spina.

The second confusion is caused by doctors who are not aware that the essential point of the submucous cleft and its peculiarity in comparison with other types of cleft palates does not lie in the submucous cleft of the palate plates, but rather in the specific affect of the functional component of the palate, i.e. in the muscles which in the intact mucous covering did not join in the raphe palati.

INCIDENCE

The reports on the share of the submucous clefts in the total number of all cleft palates differ. The above mentioned unsatisfactory definition of the conception of submucous clefts increases the number of reported cases if submucous clefts of the hard palate with open cleft of the soft palate are included.

On the other hand, cases with smaller functional affect escape counting and thus the share of submucous clefts in the total number of cleft palates, decreases.

The reported share amounts to approx. 4% [for ex. Cricelair reports 4,3% in the number of 20 cases (3). Porterfield 3,16% of 18 cases (13), Rees 4,8% in 12 cases (14)].

HISTORY OF THE DIAGNOSIS AND THERAPY OF THE DEFECT

J. P. Roux (15) described in 1825 the cleft with parted uvula and thinned central part of velum. This is considered to be the oldest written proof of the existence of submucous cleft. In 1846 J. N. Demarquay (4) published an anatomic study of this defect. G. Passavant pointed to submucous cleft in two of his reports in 1862 (11) and in 1865 (12). B. v. Langenbeck (9) divided in 1864 submucous clefts into 3 groups according to their locality a) in the soft palate only, b) in the hard palate, c) in both simultaneously. Trélat (18) described in 1870 familial incidence of submucous cleft (father-son).

In 1910 A. B. Kelly (8) introduced the characterization as "submucous cleft palate" which became familiar and is used till the present. The founder of Phoniatrics in Czechoslovakia M. Seeman deserved eminently of the research in submucous clefts. His report of 1924 (16) ranges amongst the most important on this problem. Valuable reports dealing with this defect in later years, were contributed by A. Limberg (10), V. Veau (19), F. Burian (1) and J. Calnan (2).

With regards to the therapy it has been believed for a long time that by training the soft palate, sufficient rehabilitation of the muscles may be achieved to make palato-pharyngeal closure function satisfactorily without an operation being necessary.

In spite of this however, submucous clefts were already operated on in the 19th century and the history of their surgical therapy includes all known procedures used when operating on other clefts. Retroposition of

Fig. 1. Example of a typical submucous cleft reaching into the vault. Shape and localisation of excision for the histologic examination is marked by dotts.

the palate, push-back procedure with the application of skin graft, pharyngofixation with upper and lower flap and different types of pharyngoplastics, should be mentioned as the most satisfactory operations.

From the very outset there was much discussion on the necessity of excising the central mucosa zone between the parted muscles.

It is mostly agreed upon that pre- and postoperative therapy of speech, possibly massage of the palate, achieve the desired functional effect.

CLINIC MATERIAL

At the Clinic of Plastic Surgery in Prague, 83 patients were operated on for submucous cleft and this amounts to 2,9% of all 2,846 primarily operated on clefts of the palate and to 5,4% of 1,539 primarily operated on isolated

medial clefts of the palate. In 2 patients the submucous cleft was combined with incomplete cleft of the lip. 20 individuals manifested symptoms of "syndrome of development shortening of palate" (see chapter on "phoniatric findings").

In ¾ of the number of patients it was a wide parting of the velar muscles with typically translucent central zone, only in ¼ of cases the parting was not striking. Also in ¾ of the number of cases the entire uvula was cleft, whereas the remaining ¼ manifested cleft uvula only partially. The affect of the hard palate was rather variable. The minimal dent in the posterior margin of the palate plates was ascertained 5×, a dent of 5 mm 8×, 5—10 mm 17×, dent into the vault 21×, into foramen incisivum 14× (of these in 5 cases the vault disclosed congenital perforation of the mucous duplicature) and in 18 cases there are no records.

There were 36 male and 47 female patients. We recorded 8× familial incidence of cleft: brother-sister 2×, sister-sister 3×, mother-daughter 1×, patient-further relative 2×. In each case it was cleft of the palate (2× submucous- and 6× open palate), there was no case of cleft of the lip or both (cheilognatopalatoschisis).

The mean age of operated on patients was 9,89 years, or 16,2 years up to the year 1945 and 9,02 years in the past 25 years.

Associated defects occured in our patients 34× (Tab. 1).

We consider the congenital defect in the hard palate to be a purely specific manifestation of submucous cleft and not a further associated defect. We recorded it in 5 out of 83 patients, i.e. in 6,02%. In the most serious cases of submucous cleft we see the mechanism of the formation of this opening in pre-natal rupture of the connective tissue between the cleft palate plates. We never met with postnatal rupture of the mentioned un-

Table 1

Associated congenital defects

Deformation of auricles	9
Stenosis of both auditory meati	1
Atresia of the left nasal choana	1
Strabismus	2
Klippel-Feil	3
Treacher-Collins	1
Transversal cleft	1
Medial cleft	1
Mandibular cleft	1
Spraengel deformity of shoulder blades	1
Hypospadia	1
Syndactylia	1
Luxation of the hip joint	2
Haemangioma	1
Congenital vitium cordis	1
Epilepsy	1
Oligophrenia	6

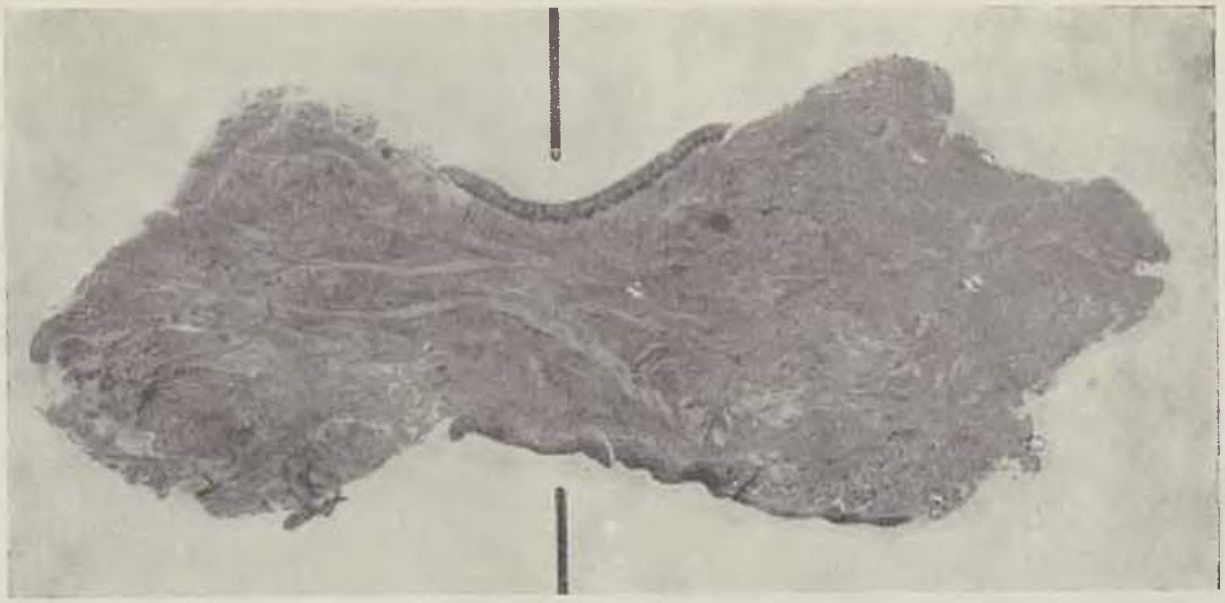


Fig. 2. Excision from the least serious submucous cleft. Although the medial zone is rather thin, part of the muscle fibers of both sides is interconnected.

resistant zone as described by Trélat (18) and Veau (19). We believe it possible that parents might overlook the opening in the hard palate when the child is born and when they discover it later they believe it had been acquired.

Reason for operation was always hyperrhinophonia from imperfect palato-pharyngeal closure. That is why patients with submucous cleft who did not manifest the functional sequels to the defect, were not operated on and the number of submucous clefts in our clinical material was descreased by these individuals in comparison to the actual incidence in the population. The share of submucous clefts without functional effect is however relatively small and according to our investigations it does not exceed 10% (5).

THERAPEUTIC PROCEDURE

Surgical therapy was in the predominant majority of our patients completed by phoniatric therapy which began in almost 30% of the cases already before the operation. We consider massage of the soft palate to be an inseparable component of the pre-operative and post-operative therapy.

The operation itself consisted apart from the suture of the muscles in the medial line in 81 cases i.e. practically always — in primary pharyngofixation (6). Pharyngeal upper-based flap was applied in 50 cases (of these 9× tubulated), in 31 cases the lower based flap was used.

Simultaneous retroposition was carried out 47× and — mainly in the first twenty years of clinical activity — it was 36× left out. In the last ten years we stressed especially the careful detachment of the muscle insertions from the posterior margin of the palate plates and their "end to end" suture in the central line (7).

In 3 patients with not too much parted muscles and well developed mucosa we modified the operation by not cutting the oral cover and operated on the soft palate from the nasal side. After elevating the muco-periosteum in form of one flap, we detached the muscle insertions at the posterior edge of the palate plates and pushed them back. Then we made ¾ cm incisions on both sides in the nasal mucosa in front of them i.e. approx. in half the length of the soft palate. We spread the incisions into the defect thus pushing the nasal side of velum somewhat backwards. Thus we secured better approach to the muscles which we sutured in the medial line. We pushed the upper based pharyngeal flap tubulated at the base along the nasal side into the mentioned defect and fixed it there with catgut. Finally we sutured both halves of uvula. The advantage of this procedure is that the oral cover of velum remains intact.

ANATOMIC FINDINGS

During the operation we studied the condition of the mucosa in the central zone of the palate, the arrangement of the muscles and bone changes in the cleft region. We found the mucosa to be of worst quality in cases in which the muscles of both sides were widely parted and if the oral and nasal cover were closely attached to each other. We carried out excision of this mucous duplicature. But in the majority of patients — though their muscles parted — a more or less thick interlayer of collagen tissue remained between both mucous layers. After discision in the central line it was sufficient to separate both layers thus exposing the muscles for the suture.

The arrangement of the muscles was in all heavier submucous clefts similar to open forms of palate clefts. The muscle bundles were folded for-

Fig. 3. Excision from the more serious form of submucous cleft. The central zone consists solely of dense collagenous connective tissue. The muscle fibers at the edges of the excision are transversally cut.

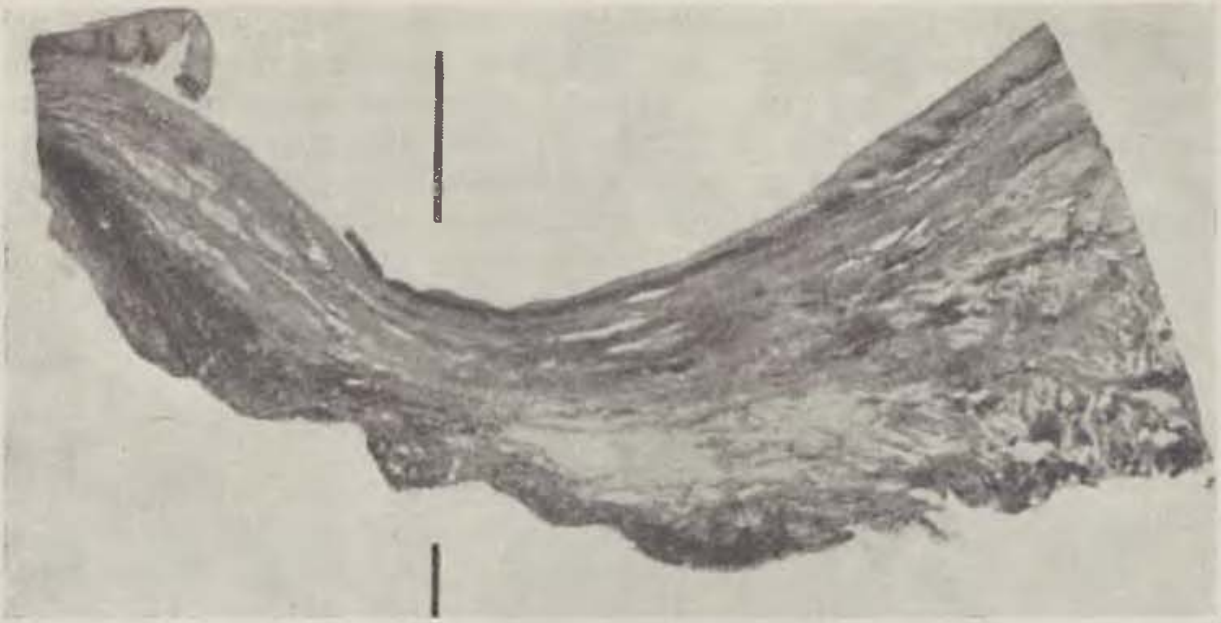


Fig. 4. Excision from the most serious form of submucous cleft. The central zone, only filled with collagenous connective tissue is rather wide and thin, above a striking reduction of the layers of oral epithelium.

ward and attached to the posterior margin of the palate plates. In the lightest cases this folding was only partial and furthermore some muscle fibers proceeded from the edges of both lateral muscle groups in direction of the medial line and even passed into fibers of the opposite side. Taking these variations in the condition of the velar muscles into consideration, we endeavoured to reconstruct the palatal muscle ring in the most natural shape possible.

HISTOLOGIC FINDINGS

Histologic examination was carried out in excisions transversally removed from half of the length of the soft palate. The excisions covered the entire medial zone with the nasal and oral mucosa and the muscle edges of both sides. We unfolded the formed defect in length and carried out longitudinal suture in the final phase of the operation without difficulties.

It appeared that there exist various forms of muscle effects in direct relation to the visible width of the cleft.

The least serious cases — but we met these cases only rarely — were those in which numerous muscle fibers of both sides of the velum in the medial line intermingled. In spite of this however the central zone was considerably thinned. The nasal and oral mucous membrane was normally formed.

The more serious cases were those, in which the muscles of both groups parted already considerably and their fibers proceeded parallel to the medial line. The central zone of excision consisted predominantly of dense collagenous connective tissue. The mucous membrane of both sides did not differ from standard to any significance.

In the most serious cases the muscles were widely apart and the muscle fibers ran parallel to the central line in the edges of the excision. The central zone without muscles was very wide, between the oral and nasal mucosa there was a not too thick layer of dense collagenous connective tissue and the arrangement was not uniform. Both mucous layers manifested a reduction of epithelial layers in lateromedial direction. The oral mucosa was far more significantly affected in this respect than the nasal mucosa. In the central line itself it was only formed by a few layers of strikingly flattened cells.

Fig. 5. Boy with the typical physiognomy of the syndrome of developmental shortening of palate.

POSTOPERATIVE COMPLICATIONS

In 12 cases, i.e. in 14,4% occured postoperative complications. In 6 cases the uvula parted, in 4 cases the pharyngeal flap was detached and in two cases there was perforation.

Only twice had pharyngofixation to be repeated. In the remaining 2 patients the palatopharyngeal closure was satisfactory even after the flap was detached and this was obviously due to the intact rest of the freed flap in form of a bulge on the posterior pharyngeal wall, which helped the closure.

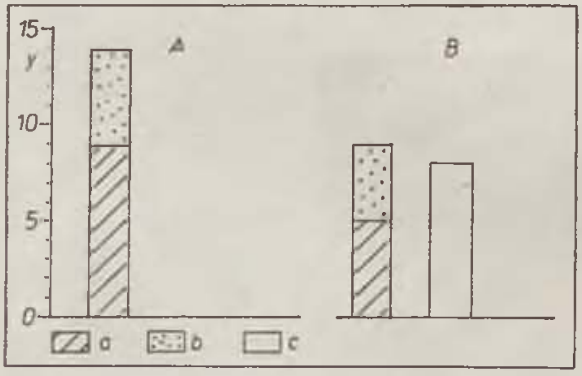
There was not a single case of postoperative bleeding from the palate or from a secondary defect, after elevating the pharyngeal flap (always carefully sutured with catgut).

Neither were there any more serious complications in connection with anaesthesia. 16 patients were operated on under local anaesthesia, 25 under ether insufflation narcosis with oxygen and 42 under endotracheal — mostly fluothane — narcosis. No patient deceased during operation or during hospitalisation, tracheotomy or massage of the heart was never required.

PHONIATRIC FINDINGS

Of the total number of 83 patients, phoniatric documentation (i.e. preoperative examination and assessment of speech at least one year after the operation) could be evaluated in 62 patients. In 12 individuals the speech before the operation was practically unintelligible, 37 individuals suffered of strong rhinophonia and in 13 individuals the speech disorder was of a slighter degree. The postoperative findings were as follows: strong rhinophonia in 12 cases, mild rhinophonia in 15 and normal resonance in 35 cases.

31 patients underwent p e r s o n a l c o n t r o l. It was evident already from the start the therapeutic results will be distorted by the fact that — in contrast to the normally speaking patients — the badly rehabilitated patients arrived with far greater readiness, because they accepted the invitation with the hope of obtaining further help.



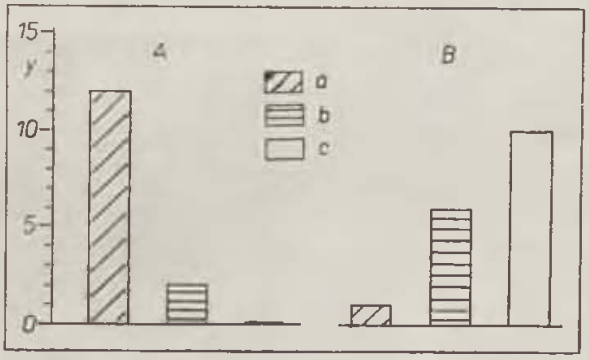


Fig. 6. Articulation in a group of patients examined by the authors. — Fig. 7. Resonance in a group of patients examined by the authors.

The speech was mainly evaluated by the symptoms which are connected with the function of the palatopharyngeal closure.

Disorder of a r t i c u l a t i o n due to insufficiency of the palatopharyngeal closure manifests in mild cases in weakened tension or incapability to form explosions of the sounds, in heavier cases by substitute articular mechanisms formed as disturbing glosopharyngeal sounds or pharyngeal explosions on the voice slit (palatolalia).

Incomplete palatopharyngeal closure affects basically also the sound of the voice, its r e s o n a n c e. The penetration of air into the nose gives the voice a bleating characteristic (hyperrhinophonia and palatophonia).

Naturally there may be disorders of pronounciation for other reasons than the mentioned characteristic changes, mainly it may be simple d y s l a l i a i.e. the incapability to form sounds correctly.

When assessing articulation we divided the patients into three groups. In the first group we classified persons with absolutely correct pronounciation, in the second group were persons with simple disorder when pronouncing sounds — without relation to the palatopharyngeal closure and in the third group were individuals in which disorders of pronounciation directly connected with palatopharyngeal insufficiency persist, i.e. persons with mild or strong symptoms of palatolalia.

We assessed the resonance of the voice subjectively by listening and we tested the penetration of air through the nasal passages by phonendoscope. We divided the patients into three groups according to the degree of hyperrhinophonia: 1. with normal resonance, 2. with mild hyperrhinophonia, 3. with severe hyperrhinophonia.

Already when we started the controls, it was evident that the complete clinical set falls into two groups which differ considerably from each other.

In group I we have the individuals in which submucous cleft is the main — and usually also the only — disorder in the otherwise healthy and physically and psychically adequately developed organism.

The results of surgical and phoniatric therapy are very satisfactory. When we evaluated the articulation, we ascertained simple disorders in pronounciation but not a single case with signs of palatolalia. Resonance was also normal in

Fig. 8. Condition of palate after incorrectly carried out operation of submucous cleft. The central velum zone was excised and the muscles were tangentially sutured. Substitute attachments of mm. palatopharyngei on the posterior margins of the palate plates were not detached and not transfered to the horizontal level so that they shorten the velum permanently and this may be clearly seen during the vomiting reflex.

this group with the exception of 2 patients in which mild hyperrhinophonia was ascertained.

In group II we differentiated patients with clear signs of so called syndrome of developmental shortening of the palate as described by one of the authors of this report [Sedláčková, 1955 (17)].

The main symptom of this syndrome is hyperrhinophonia and in more serious cases even palatolalia caused by shortened and insufficient velum with strikingly underdeveloped muscles.

Only a small number of these individuals manifests submucous cleft, but this group comprises of course only persons with submucous cleft besides the syndrome.

Some patients are characteristic by their special physiognomy due to wide root of the nose, narrow eye slits, narrowed opening into auditory meatus and the nose and namely by striking hypomimia. The upper lip is vertically shortened, the contures of the filtrum are not very expressive. The auricles are short and the lobules are backwards diagonally shaped and often attached or not very much developed.

Often different developmental anomalies are elsewhere on the body.

In the absolute majority of cases the intellect is decreased.

The hereditary character of the disease could be never ascertained.

It may be assumed that apart from the common base for mimical muscles and for the levator in the II. pharyngeal arch, the rest of the mesenchymal system is also disturbed in different ways. Preliminary EMG findings record chronic lesion of the peripheral neuron in the mimic muscles and in musculus levator veli palatini.

The results of therapy were of considerably worse effect in these persons and this may be attributed to deep and serious anatomic and functional changes in the soft palate.

The diagrams demonstrate the numerical results in both groups.

It has been already mentioned that in group I consisting of 14 patients there was not a single case of palatolalia. In 6 patients there were disorders in the pronounciation of sounds, dyslalia not connected with the function of the palatopharyngeal closure. This is the reason why we record these cases in column I. jointly with normally speaking persons. On the other hand only 5 persons of the 17 in group II achieved normal articulation, 4 manifested disorders in pronounciation and in 7 persons persisted significant palatolalia even after the operation and after long lasting pre- and postoperative phoniatric therapy.

Examinations of the vocal resonance demonstrate similar results. In group I the resonance was normal 12× with two cases of slight persistance of rhinolalia. In group II only one person achieved however perfect resonance, of the remaining 16 there were 6 patients with slight and 10 with heavy resonantial disorder. In both groups the differences in results of statistical calculation by Fischer's test are highly significant. The probability of incidental

grouping amounts to only 0,00308 for articulation and even only 0,000757 for resonance.

DISCUSSION

We consider the operation of submucous cleft to be only justified if the disorder of speech can not be rectified by conservative methods. Experience taught us that even in heavier forms of this defect with striking partition of muscles, the child might — though this happens only in rare cases — learn to speak without any signs of rhinophonia, but the operation appears to be superfluous. In most cases different compensating mechanisms aid this achievment (mechanisms of shape: for ex. hypertrophic nasal conchi, or functional mechanisms: for ex. hyperfunction of pharyngeal constrictors).

For this reason we do not consider surgery to be opportune before the child has started to speak and we prefer still more to wait and find out whether phoniatric therapy was unsuccessful.

The degree of speech disorder or the insufficiency of the palatopharyngeal closure were in the majority of patients directly related to anatomic insufficiency of the palate. The wider the cleft in the posterior region of the hard palate was, the greater the parting of the velar muscles and the substituting attachments of these muscles on the palate plates were functionally less valuable. Hypoplasia of the muscles increased in proportion and velum as such was shortened.

We consider extensive retroposition of the velar muscles with detachment of the substituting insertions in front and their suture in the medial line, to be an essential component of the surgical procedure. If the palate is simply sutured this is an unphysiological procedure because it does not change the cleft arrangement of the muscles, they are sutured side to side in the medial line and their function remains permanently unnatural. If the speech in thus operated on patients improves, it is apparently due to satisfactory pharyngofixation.

All the 83 patients manifested medial cleft palate with vomer in the central line. This is an important statement because it classifies thus the submucous cleft as the sole manifestation of genetic group II in which cleft lip is a purely accidental phenomenon.

Every fourth patient with submucous cleft was afflicted with the syndrome of developmental shortening of the palate. The results of the therapy were far inferior in this case to the effect achieved in the other operated on patients. We consider early recognition of persons afflicted with this syndrome, amongst patients undergoing our treatment for submucous cleft of extreme importance for the decisions in respect of prognosis and plan of surgico-phoniatric treatment.

SUMMARY

The authors carried out analysis in 83 patients operated on at the Clinic of Plastic Surgery in Prague for submucous cleft. They consider retroposition of the palate with physiologic reconstruction of the muscle ring and with pharyngofixation by means of upper based flap to be the optimal surgical

approach. They stress the importance of pre- and postoperative phoniatric therapy.

It is important to differentiate patients with syndrome of developmental shortening of the palate from patients with simple submucous cleft. Prognosis of the therapeutic results in the former cases is unfavourable, but it is most favourable in the latter cases.

RÉSUMÉ

Les fentes du palais sous-mucotiques

M. Fára, J. Hrivnáková, E. Sedláčková

Les auteurs ont subi à analyse 83 des malades, opérés à la clinique de la chirurgie plastique ă Prague faute de la fente sous-mucotique. Comme intervention chirurgicale la meilleure les auteurs proposent la retroposition du palais et la reconstruction physiologique de l'anneau musculaire accompagné par la fixation pharyngéale par le lambeau à la base craniale. Ils soulignent la nécessité de la thérapie phoniatrique pré- et postopératoire.

Il est très important de différer les malades au syndrome d'accourcissement du palais développé au cours de la vie intrautérine de ceux de la simple fente sous-mucotique. Le prognosis des résultats postopératoires chez le premier groupe étant peu favorable, tandis que chez le deuxième groupe au contraire très favorable.

ZUSAMMENFASSUNG

Submuköse Gaumenspalten

M. Fára, J. Hrivnáková, E. Sedláčková

Die Autoren unternahmen die Analyse von 83 Patienten, die an der Klinik für plastische Chirurgie in Prag wegen submuköser Spalte operiert wurden. Als optimales chirurgisches Verfahren betrachten sie die Retroposition des Gaumens mit physiologischer Wiederherstellung des Muskelringes und mit der Fixierung des Pharynx durch einen Lappen mit oberem Stiel. Hervorgehoben wird die Bedeutung der prä- und postoperativen phoniatrischen Behandlung.

Wichtig ist es zu unterscheiden, ob es sich um Kranke handelt, die mit dem Syndrom einer Entwicklungsverkürzung des weichen Gaumens handelt, oder um Kranke mit einfacher submuköser Spalte. Die Prognose der therapeutischen Ergebnisse bei den ersten ist ungünstig, bei den letzteren dagegen sehr günstig.

RESUMEN

Grietas submucosas del paladar

M. Fára, J. Hrivnáková, E. Sedláčková

Los autores practicaron el anälisis de 83 pacientes operados en la Clínica de Anaplastia en Praga para la grieta submucosa. La retroposición del paladar con la reconstrucción fisiológica del anillo muscular y con la faringofijación por el lóbulo con el pecíolo superior consideran como el proceso quirúrgico óptimo. Acentuan la importancia de la terapia foniatrica antes de la operación y después de ella.

Es importante diferenciar los pacientes afectados con el síndrome del acortamiento de desarrollo del paladar blando y los pacientes con la grieta submucosa simple. El pronóstico de los resultados terapéuticos es desfavorable en los primeros, en tanto que en los segundos es muy próspero.

REFERENCES

1. **Burian, F.:** Chirurgie rozštěpů. (Surgery of clefts.) Praha SZdN, 1954.
2. **Calnan, J.:** Submucous cleft palate. Brit. J. plast. Surg., 6 : 264, 1953—4.
3. **Cricelair, G. F., Striker, P., Cosman, B.:** The surgical treatment of submucous cleft palate. Plast. reconstr. Surg., 45 : 58, 1970.
4. **Demarquay, J. N.:** Tissue fibrineux remplaçant au voile du palais et à la voute palatine les muscles palatins. Bull. Soc. anat., 21 : 11,1846.
5. **Fára, M. Hrivnáková, J.:** Význam vyhledávání rozštěpových mikroforem a stigmat. (The importance of search for microforms and stigmas of clefts.) Sborník LFH, Praha 1968.
6. **Fára, M., Sedláčková, E., Klásková, O., Hrivnáková, J., Chmelová, A., Šupáček, I.:** Primary pharyngofixation in cleft palate repair. Plast. reconstr. Surg., 45 : 449, 1970.
7. **Fára, M., Dvořák, J.:** Abnormal anatomy of the muscles of palatopharyngeal closure in cleft palates. Plast. reconstr. Surg., 46 : 488, 1970.
8. **Kelly, A. B.:** Congenital insufficienty of the palate. J. Laryng. 25 : 281, 1910.
9. **Langenbeck, B., von:** Weitere Erfahrungen im Gebiete der Uranoplastik mittels Ablösung des mucosperiostalen Gaumenüberzuges. Arch. klin. Chir., 5 : 7, 1864.
10. **Limberg, A.:** Neue Wege in der radikalen Uranoplastik bei angeborenen Spaltendeformationen: Osteotomia interlaminaris und pterygomaxillaris, resectio marginis foraminis palatini und neue Plättchennaht. Fissura ossea occulta und ihre Behandlung. Zbl. Chir., 54 : 1745, 1927.
11. **Passavant, G.:** Zweiter Artikel über die Operation der angeborenen Spalten des harten Gaumens und der damit komplizierten Hasenscharten. Arch. Heilk., 3 : 305, 1862.
12. **Passavant, G.:** Über die Beseitigung der näselnden Sprache bei angeborenen Spalten des harten und weichen Gaumens. Arch. klin. Chir., 6 : 333, 1865.
13. **Porterfield, H. W., Trabue, J. C.:** Submucous cleft palate. Plast. reconstr. Surg., 35 :45, 1965.
14. **Rees, T. D., Wood-Smith, D., Swinyard, Ch. A., Converse, J. M.:** Electromyographic evaluation of submucous cleft palate. Plast. reconstr. Surg., 40 : 592, 1967.
15. **Roux, J. P.:** Mémoire sur la staphylorrhaphie, ou suture du voile du palais. Paris, J. S. Chaudé, 1825.
16. **Seemann, M.:** Contribution à la pathogénie et la symptomatogie de la fissure sousmuqueuse du palais osseux. Arch. int. faryng., 3 : 388, 1924.
17. **Sedláčková, E.:** Insuficience patrohltanového závěru jako vývojová porucha. (Insufficiency of the palatopharyngeal closure as a developmental disorder.) Čas. Lék. čes., 94 : 1304, 1955.
18. **Trélat:** cit. Veau, V. (19).
19. **Veau, V.:** Division Palatine. Paris, Masson & Cie 1931.

Doc. Dr. M. Fára, DrSc., Šrobárova 50, Praha 10, Czechoslovakia

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Medical Institute, Novosibirsk (USSR)
Ophthalmological Department, Director Doc. L. I. Tomilova

SOME PLASTIC OPERATIONS IN OPHTHALMOLOGY WITH USE OF STERILIZED HOMOLOGOUS TISSUES

L. I. TOMILOVA, S. P. CZECHOVA

Plastic surgery has greatly profited by the progress in tissue conservation and transplantation. In recent years, homologous tissues have been used increasingly even in opthhalmic surgery; previously only autologous tissue was used in operations on eyelids, such as fascia lata for the repair of ptosis of the upper or paralytic ectropion of the lower eyelid, cartilage or fat for the construction of supporting and mobile socket after enucleation of the eye ball, etc. With the employment of autologous tissue, the patient is subjected to additional trauma, the operation is protracted, and material is not always available in sufficient amount.

When using conserved homologous tissue, the additional operation for taking the graft, which is fraught with various complications, can be avoided. Homologous tissue, unlike heterologous tissue or alloplastic material, is biologically and physically related to the recipient's tissues, does not become infected so easily as other material, and has, therefore, found wide employment in ophthalmology (Billet, 1968; Bodian, 1968).

In the ophthalmological practice, homologous cartilage which has been used most frequently for implantation into the conjunctival sac in order to construct a supporting and mobile socket after enucleation of the eye ball as well as for the repair of various cosmetic defects which become apparent when fitting the orbit with an eye prosthesis (Sverdlov, 1941; Tomashevskaya, 1956; Zaykova, 1961; Starodubtseva, 1961; Bakin, 1962; Koganova, 1965; Griaznova, 1968; Savushkina, 1969). Other homologous tissues have been used but rarely in plastic operations on the eyelids. Kolen (1965) and Falls et al. (1967) reported on the employment of homologous fascia for the repair of upper-lid ptosis, and Fankhauser (1966) and Bodian (1968) on the use of homologous sclera for the same purpose.

For the surgical treatment of upper-lid ptosis, lower-lid ectropion and for the construction of a supporting and mobile socket after enucleation of the eye ball, the authors themselves have used homologous fascia, dura mater and cartilage, sterilized by chemical means. These grafts were prepared in the Laboratories of Tissue Conservation and Transplantation (Director: V. I. Sa-

velyev, DrSc.) of the Novosibirsk Scientific Research Institute of Traumatology and Orthopaedics, after having been taken from dead donors of an age between 18 and 45 under non-sterile conditions but by observation of all principles laid down for the taking of biological donor material. The tissues were lifted four to twelve hours after death. The grafts were then mechanically cleansed and sterilized in a 1% solution of β-propiolactone and ethylene oxide, which safely ensures sterility of the tissues and does not cause any morphological changes in them. (The chemical formula of ethylene oxide is $(CH_2)_2O$ and that of β-propiolactone $\overset{CH_2}{C} - \overset{CH_2}{CO}$). From an organizational and technical point of view, this method is simplest and most economical, because lifting tissue grafts without having to maintain aseptic conditions simplifies the procurement of biological material for clinical purposes, favourably increases the number of sources thus meeting the requirements of departments for biological material, and permits, if necessary, to prepare these tissues on the spot.

The aim of the investigation reported on below was to try out sterilized homologous tissue grafts, such as fascia, dura mater or cartilage, for clinical purposes, because these tissues had not been used before in ophthalmology.

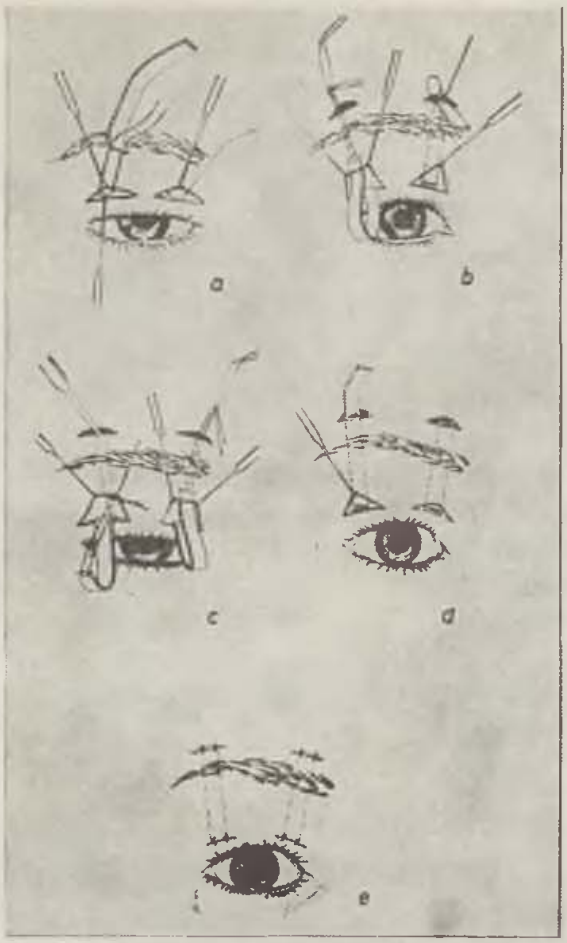
Among operations carried out on the eye and its auxiliary organs, those on the eyelids occupy one of the first places not only because of their frequency but also because of their significance. Even small changes in the configuration of eyelids may have an adverse effect upon the condition of the eye and its function, not to speak of their cosmetic effect. In a number of professions, such as car driver, plane pilot, artist, etc., plastic repair of cosmetic defects are required from an occupational point of view.

The authors' research material consisted of 175 operations in which sterilized homologous fascia, dura mater or cartilage were used; 50 of them were carried out for ptosis of the upper eyelid, 25 for ectropion of the lower eyelid, 86 for the construction of a supporting and mobile socket after enucleation of the eye ball and 14 for the repair of the upper eyelid in anophthalmos. In plastic operation on the eyelid, homologous fascia was used 37 times and dura mater 38 times.

For ptosis of the upper eyelid, a total of 38 patients were operated on; in twelve of these, ptosis was bilateral. Twenty nine patients had congenital ptosis, in six ptosis was of traumatic origin, and three patients suffered from paralytic ptosis. Most of these patients (23) were aged between 10 and 20, in whom repair of the cosmetic defect was, of course, most important. In many patients, ptosis is accompanied by other congenital anomalies or acquired disorders, the latter most frequently of traumatic origin.

When chosing the type of operation, function of the levator palpebrae was taken into account in the first place. In most patients, this muscle was weak or completely absent, and this was the reason why transposition of part of the frontalis proved to be the method of choice in these cases.

The authors have elaborated two methods for the surgical treatment of congenital, paralytic and post-traumatic ptosis of the upper eyelid, which are



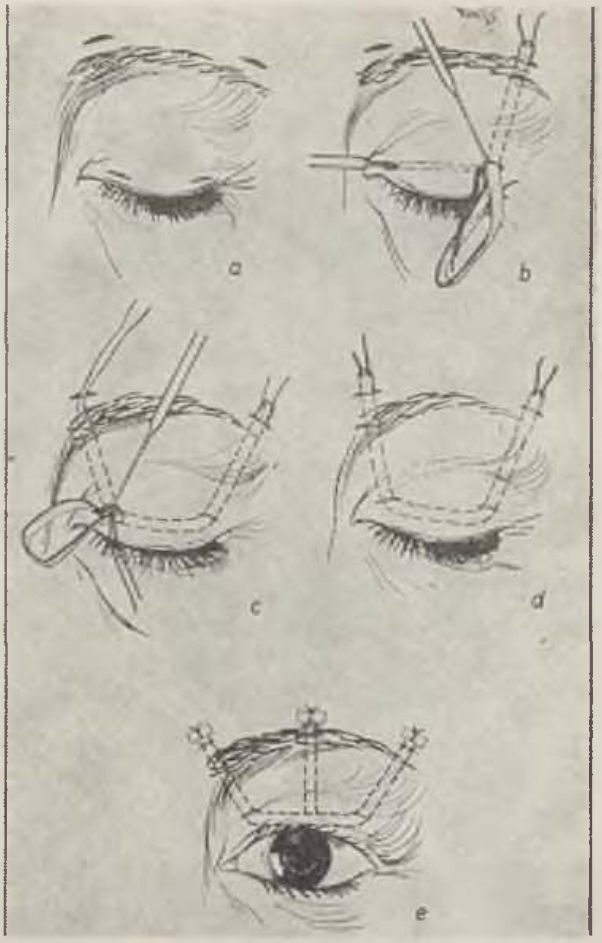


Fig. 1. First method of surgical treatment of upper-lid ptosis. — Fig. 2. Second method of surgical treatment of upper-lid ptosis.

based on utilizing the elevating power of the frontalis by using homologous fascia or dura mater for fixation of the muscle flap. These tissues are firm, elastic, not prone to distension and do not evoke any reaction in the surrounding tissues.

By the first method, a total of 23 operations for ptosis of the upper eyelid were performed.

The surgical procedure was as follows: Under local infiltration anaesthesia with a 2% novocain solution injected into the upper eyelid and above the eye brow, two incisions down to the tarsal cartilage were made 3 mm away from and parallel to the eye lash margin, each 1 cm in length, one in the medial and the other in the lateral third of the upper lid. About 1 cm above the eye brow and symmetrically with the incisions on the eyelid, another two incisions through skin and soft tissue were made, each 1.5 cm in length. Then two strips, each 0.5 cm wide and 5.0 cm long, were cut from a piece of homologous fascia or dura mater, which had been placed in a penicillin solution (200,000 units per 10 ml saline) for 20 minutes before. Now the skin bridges between each upper and lower incision were tunnelled with an instrument specially

designed by the authors for the purpose, and the strip grafts threaded through the tunnels. Their lower ends were sutured to the tarsal cartilage by physiological matress stitches. By pulling at the upper ends of these strips, the upper eyelid could be lifted to the required level and its position fixed there by suturing the upper ends of the grafts to the frontalis muscle; the superfluous upper parts of the grafts were cut off eventually (Fig. 1).

The second method was based on the procedure recommended by Bodian and modified by the authors. A total of 27 operations were performed in this way.

The surgical procedure was as follows: Under the same anaesthesia as in method 1, the two incisions in the upper eyelid, each 3 mm long, were made only 2 mm away from the ciliary margin and only 5 mm away from the medial or lateral palpebral commissure respectively. About 2 mm above the eye brow and exactly above the medial and lateral palpebral commissures, another two skin incisions were made, each 1 cm in length. In this instance, therefore, the incisions on the lid and above the brow were not symmetrical as in method 1. As in method 1, the homologous fascia or dura mater was first placed into penicillin for 20 minutes, and a strip, 3 mm wide and 5—6 cm long, cut out of it. A kapron thread was laid at either end of the strip graft, a tunnel burrowed with a special instrument from the temporal incision above

Fig. 3. Congenital upper-lid ptosis of left eye. Patient Ch. prior to operation. — Fig. 4. Patient Ch. after operation.

the eye brow to the temporal incision on the eyelid, and one end of the strip graft threaded through it. Another tunnel was the burrowed from the temporal incision on the lid to the nasal incision on the lid with an instrument made of a spatula, and the same end of the strip graft threaded through it. Finally a third tunnel was made from the nasal incision on the lid to the nasal incision above the brow and the end of the strip graft also threaded through it. By pulling both ends of the strip graft upwards, the upper eyelid could be

Fig. 5. Scar ectropion of lower lid of right eye. Patient G. prior to operation.

lifted up to the required level. The two threads at either end of the strip graft were then tied over little rolls of gauze, and the skin wound above the brow sutured with two horse-hair stitches each. In some cases, it was necessary to introduce and additional strip of tissue through incisions placed exactly in the middle between the first incisions on the lid and brow, in order to achieve a better cosmetic result. The lower end of this strip graft (which was made 3 mm wide and 2.5 cm long) was fixed to the tarsal cartilage with a physiological matress stitch, the upper end was held in place by a thread being tied over a gauze roll (Fig. 2).

In all patients, the post-operative period was uneventful. No inflammatory or allergic reaction could be observed in the tissues surrounding the grafts.

The clinical experience with these methods permits to recommend them for the surgical treatment of ptosis, of course, provided a special approach is chosen for each individual case.

In most patients operated on for ptosis of the upper eyelid, good cosmetic and functional results have been achieved (Fig. 3 and 4).

A total of 24 patients was operated on for ectropion of the lower eyelid; in one patient, ectropion was bilateral. In eleven patients, ectropion was due to scarring, four suffered from paralytic, another four from senile ectropion, and in five patients the disorder developed in connection with the abscence

of the eye ball. In all patients operated on, grafts of homologous fascia or dura mater, sterilized by chemical means, were used.

The surgical procedure was as follows. Under local infiltration anaesthesia with 2% novocain injected in the regions of the lateral and medial palpebral commissure and the width of the lower eyelid, a vertical skin incision was made at the lateral orbital margin, 1.5 cm in length. For the better exposure of the medial commissure, a tongue-shaped incision was made near the medial corner and above the medial commissure with its base facing upwards. These

Fig. 6. Patient G. after operation.

two incisions were joined by a tunnel burrowed between the orbicularis oculi and the inferior palpebral fascia, using a knife specially constructed for the purpose, and a strip graft, 3 mm wide and 5—6 cm long, was threaded through it and fixed by physiological suture to the periosteum of the lateral orbital margin and to the medial palpebral ligament, using an Oma needle. The eyelid was then reduced to about 1.0—1.5 mm above normal level, and the superfluous ends of the graft cut off. The skin wounds were sutured with horse-hair stitches.

The post-operative period was uneventful in all patients.

In 20 patients, the results of the operation were good both from the cosmetic and functional point of view (Fig. 5 and 6); only in three cases did hypocorrection of the lower eyelid result from it not making proper contact with the eye ball, and in one case a lateral shift of the caruncle was observed.

At the ophthalmological department of the Novosibirsk Medical Institute, homologous cartilage has been employed in 100 patients; in 86 for the construction of a supporting and mobile socket and in 14 for the repair of an upper lid retracted into the orbit as a result of enucleation of the eye ball. Most of the patients were of a fairly young age; 69 out of 86 up to 40. This fact alone made the possibility of wearing a cosmetic eye prosthesis most important to them.

Enucleation of the eye was carried out in the usual manner, and the cartilage graft was prepared by the following method: The tissue specimen was removed from the phial and placed into the penicillin-saline solution (the same as in the other methods described above) for minutes, and then stripped of its perichondrium and tailored with a scalpel. For implantation, a one-piece cartilage graft of oval shape, 16 and 18 mm in diameters and 0.8—1.0 mm in thickness, was placed under the recti oculi, whereby the superior and inferior rectus and the medial and lateral rectus were joined over it by catgut sutures. This provided good fixation of the implant. Tenon's capsule was sutured with catgut and the conjunctiva with interrupted silk stitches. After wound toilet, a pressure bandage was applied. There were no complications during operation.

In the post-operative period, moderate swelling of eyelids and conjunctiva was observed, which usually subsided after three to four days. In no case did inflammatory or allergic reactions develop in the tissues. In one case, however, dehiscence of wound edges and exposure of the cartilage implant occurred, which was probably due to the considerable haemorrhage during operation. Secondary suture of the wound was, therefore, carried out, after which the implant did not become exposed any more.

The results of operation were analyzed in these patients with respect to the shape of the eye socket and the position and mobility of the eye prosthesis. Early and late (up to 6 years) check-up showed that homologous cartilage, sterilized by chemical means and used for implantation into Tenon's capsule after enucleation of the eye ball or for the repair of a retracted upper lid in anophthalmus, preserved its shape and size, did not become absorbed, gave a spacious and mobile eye socket, and with a good artificial eye ensured a stable cosmetic effect.

Homologous tissues, such as fascia, dura mater or cartilage, sterilized by chemical means, therefore, represent a good material for plastic operations, which may be used on a wide scale. They can also be recommended for such operations in ophthalmology.

REFERENCES

1. **Griaznova, I. I.:** Loyphilized Tissues for Construction of a Supporting and Mobile Socket after Enucleation of the Eye. Sbornik Krioterapie v Oftalmologii, p. 132, Krasnoyarsk, 1968.
2. **Koganova, E. A.:** Transplantation of Cartilage after Enucleation of the Eye. Sbornik Vop. Oftal., p. 86, Novosibirsk, 1965.
3. **Kolen, A. A.:** Some Cases of Original Plastic Operations in the Region of the Eye. Sbornik Vop. Oftal., p. 42, Novosibirsk, 1965.
4. **Savelyev, V. I.:** Methodical Principles of Large-Scale Preparation of Tissues for Transplantation Using Chemical Agents for Sterilization. Methodical discourse, Novosibirsk, 1968.
5. **Savushkina, N. M.:** Construction of Mobile Socket after Enucleation of the Eye Using Rib Cartilage Conserved at Low Temperatures. Vop. Travm. Org. Zrenia, p. 120, Kuibyshev, 1969.
6. **Sverdlov, D. G.:** A New Method of Socket Construction after Enucleation of the Eye Based on Implantation of

Cadaver Cartilage into Tenon's Capsule. Vestnik Oftal., 19, 5—6 : 45, 1941.
7. **Billet, E.**: Bovine Fascia Lata in Ptosis Surgery. Amer. J. Ophthal., 65, 4 : 561, 1968.
8. **Bodian, M.**: Repair of Ptosis Using Human Sclera. Amer. J. Ophthal., 65, 3 : 352, 1968.
9. **Falls, H. F.; Sloan, D. B.; Bryson, J. M.**: Clinical Use of Cobalt-Irradiated Fascia Lata. Amer. J. Ophthal., 64, 3 : 426, 1967.
10. **Fankhauser, F.**: Die Verwendung von konservierter Sklera in der Augenchirurgie. Arch. klin. exp. Ophthal., 170, 3 : 235, 1966.

S. P. Czechova, Lenina 18, flat 105, Novosibirsk-4, USSR

Second International Congress on Cleft Palate

Copenhagen, 26—31st August 1973

At the closing of the First International Congress on Cleft Palate in Houston 1969, sponsored by the American Cleft Palate Association, it was decided to arrange a Second International Congress on Cleft Palate in Scandinavia 1973, sponsored jointly by the Scandinavian Association of Plastic Surgeons, the Scandinavian Orthodontic Society, and the Scandinavian Collaboration Board for Speech Pathology.

Place and time for the Congress have now been fixed to Copenhagen, last week of August 1973. The topics of the Congress will cover all aspects of cleft lip and palate, treatment as well as research in etiology, genetics etc. It is the intention of the Scandinavian Organizing Commitee to include a session on other congenital craniofacial anomalies in the scientific program.

For further information, contact DIS Congress Service, 36 Skindergade, 1159 Copenhagen K, Denmark, or write the General Secretary, Dr. P. Fogh-Andersen, Diakonissestiftelsens Hospital, 2000 Copenhagen F, Denmark.

Under the suspicies of Transplantation Society will commemorate the oldest European Tissue Bank in Hradec Králové (ČSSR) her 20 years of activity by organizing the Symposium **"Preservation of Cells, Tissues and Organs"** from September 4—6, 1972. The programme will include the papers concerning the freezing of cells and tissues, organs perfuzion, freeze-drying and all problems connected with securing, preparation, examination, preservation, dispatching of cells, tissues and organs and organization of tissue banks.

Dead line for the registration of papers and films with short summary is up to April, 1, 1972 and to the registration of the participation to May 30, 1972 on the following adress: Tkáňová ústředna Fakultní nemocnice KÚNZ Hradec Králové, ČSSR, where also all informations will be given.

Charles University, Faculty of Medicine, Clinic of Orthopaedics,
Hradec Králové (Czechoslovakia)
Deputy Head Ass. Prof. J. Emr, M. D., CSc.

TRANSPLANTATION OF HOMOGENOUS JOINTS

Treatment of homogenous osteocartilaginous graft by partial replacement for autogenous cancellous bone and impregnation with autogenous marrow

O. FIALA, V. HEROUT

The homogenous osteocartilaginous graft is treated with the purpose of decreasing its antigenic properties, maintaining the biologic activity of both components — bone and cartilage.

Of the various methods attempting to achieve this purpose the composition of homogenous and autogenous tissue has afforded good results. Three modifications of the preparation proved expedient. One was the partial drilling-off of the homogenous cancellous bone and its replacement by the same autogenous tissue (Fiala, Herout 1965). The second modification was the washing of the cancellous bone with saline solution, subsequently impregnating the medullary spaces with autogenous red marrow according to Burwell (Fiala, Bartoš in print). Finally there was the washing of the cancellous bone with saline solution, irradiation and impregnation by autogenous red marrow (Fiala, Herout, in print). The first method of treatment disclosed good condition of the bone and cartilage component of the graft in the near vicinity of the autogenous spongiosa. The other homogenous tissue was not affected by the autogenous spongiosa and for this reason its remodelling proceeded as in non-treated graft. The second method of treatment appeared to be of greater advantage than the former, because the remodelling of the bone trabeculae was continuous in the whole graft. In places however where the spongiosa layer in the graft was higher, the reconstruction was defective and this led to certain deformation of the joint surface and thus also to damage of the articular cartilage. The third method did not differ considerably from the second method.

For this reason we believed to achieve better results of transplantation if we connect the first two methods of treatment by partially replacing the homogenous cancellous bone for autogenous tissue and by washing the remaining homogenous cancellous bone and impregnating it with autogenous marrow.

Technical cooperation R. Rohoznická

METHODS

In 12 adult mongrel dogs — mean weight 14 kg — we transferred the whole knee-joint. We left the crucial and lateral ligaments, the menisci and only a small posterior part of the joint capsule on the graft. On both parts of the graft (femoral and tibial) the bone part was cut off so as to form two vertically facing surfaces. This secured good attachment of the graft to the bed and the possibility of firm fixation. The height of the cancellous bone

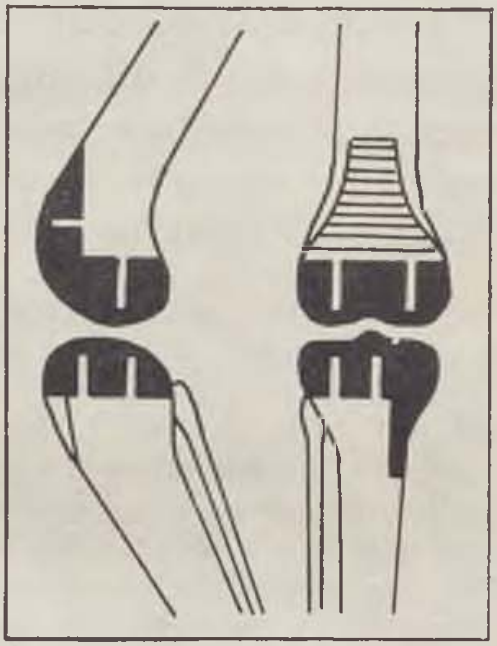


Fig. 1. Sketch depicting the shape and drilling off of the grafts.

left on the femoral part of the graft was 8—10 mm on the side turned to the patella and 12 mm in the area of the condyles. Height of the spongiosa on the tibial part was 6—8 mm. In the places where the bone was highest 4—6 holes of 2—3 mm diameter were drilled in the femoral part and 4 holes in the tibial part. The articular cartilage remained intact. Then the cancellous bone was washed with saline solution and the thus processed graft was preserved for 7—14 days in liquid paraffin at +4 ^{0}C. Before the operation the entire graft was first washed, its cancellous bone again washed with saline solution and the graft was left for 1 hour in a solution of antibiotics. After opening the knee-joint of the experimental animal, a bed was formed for the graft by excision of the articular surfaces of femur and tibia. Columns of 2—3 mm diameter were formed from the cut off femoral cancellous bone and they were pressed into the drilled holes in the graft. The homogenous cancellous bone of the graft was impregnated with the bone marrow removed from the femur. The graft was fixed to the bed with wire loops. The joint was immobilized for 14 days in a plaster cast (Fig. 1). After removal of the plaster the animals were clinically and roentgenologically studied and after killing,

histotopograms as well as normal histological specimens were produced from the knee-joints.

In order to approach in our studies the reports which had been already published and which purported the evaluation of the results of treated homogenous osteocartilagenous graft, where only the anterior part of the distal femoral joint surfaces was transplanted, we directed our attention mainly to the results of remodelling the bone component and to the condition of the cartilaginous component in the femoral part of the graft.

RESULTS

We studied the animals after removing the plaster cast during 36 months after grafting; we killed 11 dogs at intervals from 3 to 36 months, one dog is still remaining in the experiment.

Macroscopic findings:

From this point of view we classified the results as successful (6 animals) and unsuccessful (5 animals) transplantations. Each damage of the femoral part of the graft was counted as an unsuccessful grafting. If the graft was deformed, the deformity only affected the weight bearing condylar joint sur-

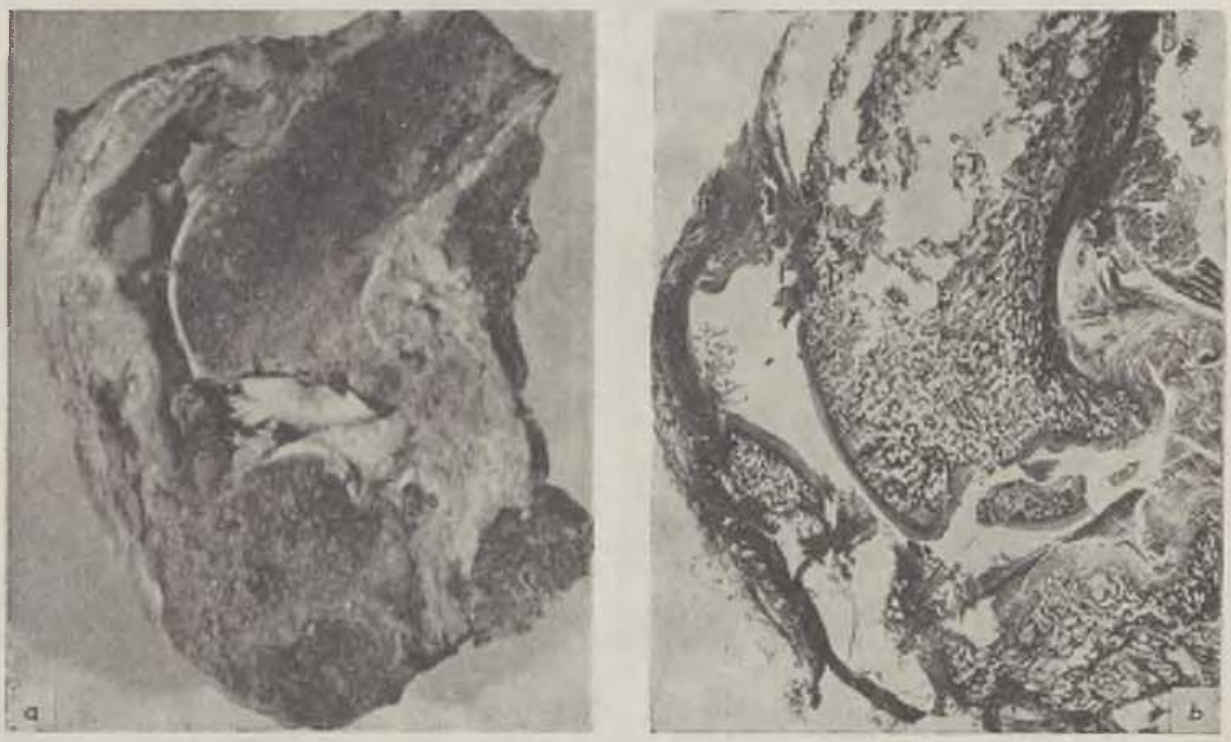


Fig. 2. Dog 5/64. Knee joint 6 months after transplantation. On the left, incision through knee joint in sagital level (a), on the right, histotopogram (b). This figure demonstrates clearly the undamaged anterior femoral part and the separated condylar part. The histotopogram demonstrates the good bone structure and the intact cartilage of the anterior part of the graft. The weight bearing part has been separated. The remaining part of the graft turned to the free part is covered by connective tissue (stained in modification according to Goldner, ×3).

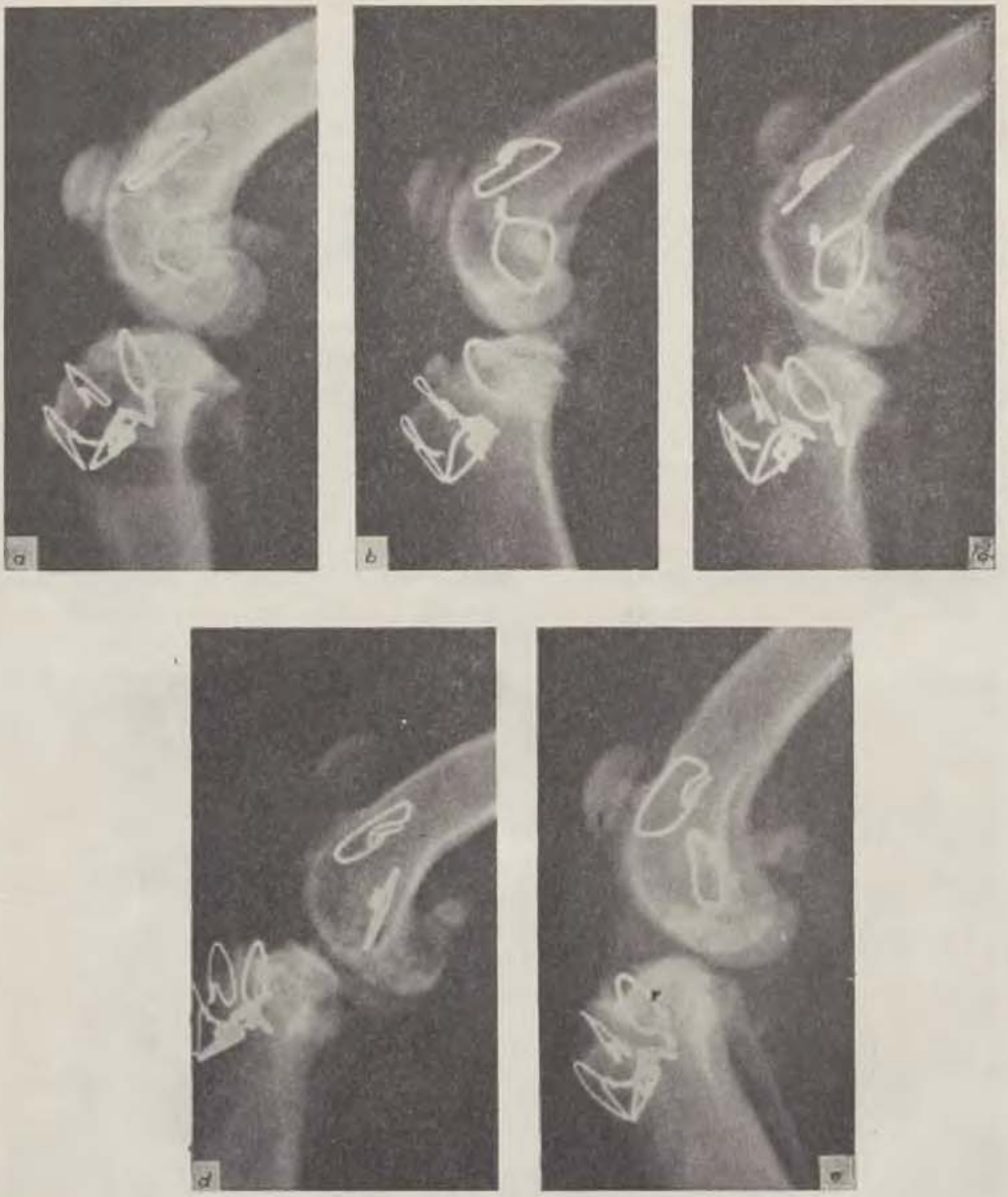


Fig. 3. Dog C/64. Side x-ray view after transplantation of the knee joint. — a) well adapted graft immediately after transplantation, b) after 2 months an evident transparence may be observed in the front part of the femoral graft, c) after 4 months the transparence is greater and reaches in front as far as below the articular cartilage, d) after 6 months the difference in the structure of the bed and the graft disappears and only the condensation of the distal condylar part is apparent, e) after 10 months remains the condensation of the distal condylar part (×2).

face. The patellofemoral unloaded part remained undamaged. The joint cartilage of the unloaded part of the graft was usually at all time intervals more or less smooth and shiny. The cartilage of the weight bearing joint surface usually lost its smoothness and shine and became uneven in places, wherever the original curvature of the joint surface was deformed, this surface was covered by rigid whitish tissue (Fig. 2).

Roentgenologic findings:

Six weeks after the grafting, the line of transparence denoting the area of junction of the graft to the bed was not visible any more. At the end of the second or in the beginning of the third month a diffuse transparence appeared at the base of the graft first in the front part of the femur and later it spread even to the condylar part. In the 6th month after transplantation, the difference in transparence between the front part of the femur and the bed was not visible any more; the condensation of the subchondral bone in the

Fig. 4 a) Dog 1/64. Histotopogram of knee joint 5 months after transplantation. The femoral graft maintained its original shape. Tiny connective tissue focus in cancellous bone of the non-weight bearing front part in the area of the wire loop. Several fibrous tissue foci in cancellous bone on the transition of the anterior and intercondyle distal part. The articular cartilage is of adequate height (stained in modification according to Goldner, ×3). — b) Dog 4/64. Histotopogram of the knee joint 36 months after transplantation. Light flattening of condyle, small fibrous tissue focus in cancellous bone of posterior condylar part. Front cartilage of the non-weight bearing part is of adequate height, the cartilage of the weight-bearing condylar part is considerably lower (stained in modification according to Goldner, ×3).

condylar part was however still distinguishable. 10 months after transplantation the front part of the graft did not differ in transparence from the bed, in the condylar part however places of condensation still remained. After 18 months the structure of the bed and the graft were homogenous, only in the condylar part were tiny transparencies possibly light subchondral sclerosis (Fig. 3).

If partial disturbance of the weight bearing joint surface occured, this kind of damage was mostly ascertained in form of a deformation of the joint surface of one condyle.

When the experimental animal was studied for a longer period, arthrotic changes of the grafted joint formed and they manifested mainly in form of osteophytes and narrowing of the articular space. There were no arthrotic changes in the patellofemoral joints. If the weight bearing joint surface of one condyle was deformed, the degenerative changes commenced earlier and their progress was more considerable.

Studies of the histotopograms and microscopic findings:

In all animals which were killed, we ascertained from the fifth month after grafting, a terminated remodelling of the whole bone part of the femoral graft. The unburdened part of the graft was very well reconstructed, in the weight bearing part we saw at some places tiny islands of fibrous tissue; the junction of both parts with the bed was perfect and without any visible transition. On the deformed joints we found either flattened condyles or a defect.

The cartilage of the graft articulating with patella remained adequately high even in animals studied for more than a year. The cartilage covering the weight bearing part of the joint decreased and towards the first year after grafting it was usually much lower (Fig. 4).

Remodelling of the bone part of the graft agreed with the roentgenologic findings. Towards the end of the second and beginning of the third month the junction of the graft with the bed could not be distinguished any more. Towards the end of the third month after grafting, the anterior non-weight bearing part of the graft was practically reconstructed. Only the most superficial layers under the cartilage were either regions of the terminating reconstruction or single islets of fibrous tissue where the bone trabeculae were resorbed. The reconstruction of the subchondral layer of bone tissue was still proceeding on the weight-bearing condylar part of the graft. In this region we found greater islets of fibrous tissue. If the islets joined and a continuous stripe of connective tissue was formed, part of the bone could become separated or damaged so that the condyle flattened. At the end of the fifth month after grafting the remodelling — even on the condyle part — was practically finished. We found islets of fibrous tissue only in the subchondral layers and signs of reconstruction only in places of damaged articular cartilage (Fig. 4).

Not a single experimental animal manifested damage of the articular cartilage of the non-weight bearing part of the graft. Even up to 3 years

after grafting it remained adequately high. The basal layer of the cartilage manifested sufficient cellularity, the superficial layer was not so rich on cells and also the colouring to acid mucopolysaccharides was less intensive in this layer. The zone of calcified cartilage clearly showed string demarcation, the structure of subchondral bone was undisturbed, the medullary spaces were predominantly filled up with fat marrow (Fig. 5). In the articular

Fig. 5. Dog 4/64. Cartilage of the anterior non-weight bearing part of the femoral graft 36 months after transplantation. The basal layers are sufficiently cellular, there is a precise demarcation between the cartilage and the bone, the subchondral medullary spaces contain fat marrow (stained by haem. eos. ×150).

cartilage of the weight-bearing part, degeneration occured later in its entire thickness and it was replaced for connective tissue or fibrocartilage. In this region the tidemark was also disappearing. The subchondral bone lost its architecture, it became denser and the medullary spaces disappeared or became smaller (Fig. 6).

DISCUSSION

The treatment of the homogenous osteocartilaginous graft by drilling off parts of the homogenous cancellous bone and replacing it for the same autogenous tissue, carries two kinds of danger which must be evaded. Firstly the weight-bearing ability of the graft decreases by the drilling off and this leads to the seperation of a part as well as to the desintegration of the entire

graft. For this reason it is necessary to choose the suitable diameter of the drilled holes and their correct number. Furthermore it must be carefully considered which part of the graft will be weight-bearing and which part will not. After previous experiments with transplantation of the knee joint (Fiala, Herout 1967) we ascertained that 4—6 holes of 2—3 diameter may be drilled into the femoral part of the graft in an animal of 14 kg weight without causing

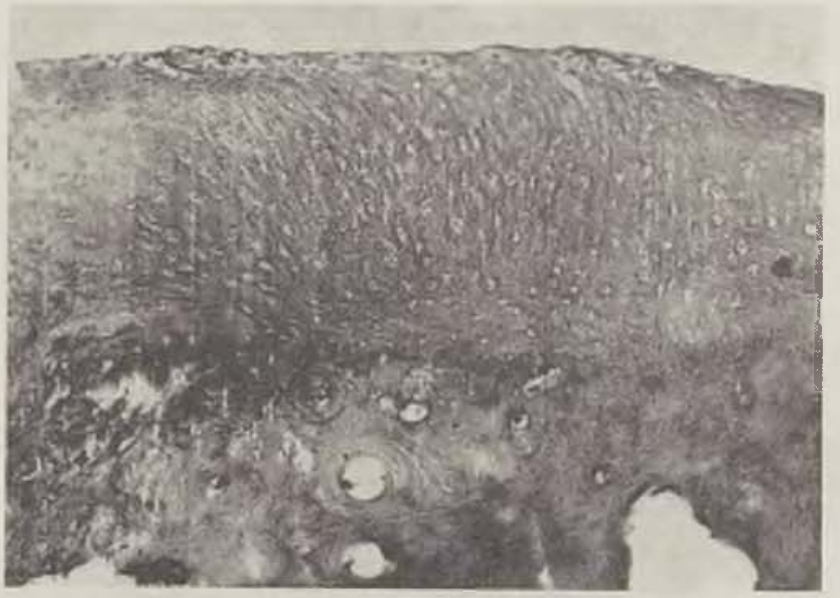


Fig. 6. Dog 4/64. Cartilage of the weight-bearing condylar part of the femoral graft 36 months after transplantation. The original hyaline cartilage is replaced for fibrocartilage and connective tissue, in places the demarcation between the cartilage and the bone is indistinct, coarse subchondral bone trabeculae (stained by haem. eos. ×150).

deformation of the graft due to decreased weight-bearing ability. We were able, of course, to weaken the non-weight bearing part more than the weight-bearing part. The second danger of the method by which the autogenous cancellous bone is treated, is the wrong orientation of the bone trabeculae. If we excise the column with the trabeculae orientated across the longitudinal axis of the bone, we slow down considerably the penetration of the granulation tissue from the bed into the subchondral part of the graft. String (1957) when evaluating bone grafting pointed out this fact. We also learned of this in our previous experiments (Fiala, Herout 1965).

When we considered the different methods of preparing osteocartilaginous grafts, we grafted the anterior non-weight bearing joint part of the distal end of the femur (Fiala, Bartoš 1967, Bartoš, Fiala 1968, Fiala, Herout 1965), but in the experiments evaluated in the reports we grafted the entire knee joint and studied the condition and reconstruction of the complete femoral part. The experiments disclosed that the weight-bearing plays a very important role in joint grafting. We found that after treatment with autogenous cancellous bone and autogenous marrow, the bone component of the non-weight bearing part of the graft is very well remodelled und furthermore that the

transplanted cartilage is of very good condition in this region. The reconstruction of the weight bearing part of the graft was however not always perfect so that in 5 of 12 animals, part of the joint area was separated or damaged. The cartilage of the graft also degenerated when burdened and was replaced for connective tissue and fibrocartilage. Doubtlessly the weight-bearing and pressure hinder the reconstruction of autogenous bone tissue. This is known from the clinical practice when M. Perthes is treated. In the degeneration of the hyaline cartilage of the weight bearing part of the graft, pressure is of unfavourable effect inasmuch as the transplanted homogenous cartilage is not of sufficient value as to resist the permanent pressure due to weight-bearing, whereas the same autogenous tissue would be able to resist. From this point of view it is possible to consider the comparatively early start of arthrotic changes of the transplanted homogenous joint.

In conclusion it could be stated that the treatment of the osteocartilaginous homograft replacing the drilled off part of the homogenous cancellous bone for equal autogenous tissue and impregnation of the remaining washed part with autogenous marrow is the most advantageous method for a massive joint graft. After this treatment the homogenous graft approaches most by its properties the autogenous graft.

SUMMARY

The authors transplanted the whole knee joint in 12 dogs. The homogenous graft was prepared by washing, partial drilling off of the cancellous bone, replacement for equal autogenous tissue and impregnation with autogenous marrow. In 7 animals the grafting was successful, in 5 the weight-bearing condylar part of femur was deformed. The non-weight bearing patellofemoral part remained undamaged in all animals. The macroscopic, roentgenologic and microscopic results are evaluated. When comparing this type of preparation of the homogenous graft with other modifications, this preparation was found to be of advantage for a massive graft in form of epiphysis. The reconstruction of the bone component approaches very much the reconstruction of the autogenous bone, the articular cartilage remains viable, but the weight bearing worsens the course of reconstruction and induces degenerative changes on the cartilage.

RÉSUMÉ

La transplantation des joints homogènes. — V. La préparation du transplant ostéocartillagineux par le remplacement de la spongiose autogène et par l'imprégnement a l'aide de la moelle autogène

O. Fiala, V. Herout

Les auteurs ont entrepris chez douze chiens la transplantation du genou entier. Le transplant homogène a été préparé par le lavage, par l'abraison partiale de la spongiose. Celle-ci a été remplacée par le même tissu autogène et par l'imprégnement de la moelle autogène. Chez sept des chiens la transplantation était de succes, cinq d'eux ont montré une déformation de la partie condylique du fémur en question trop

accablée. La partie fémororotulienne étant moins en charge est restée intacte chez tous les chiens. Le travail résume les résultats microscopiques, macroscopiques et ceux des rayons X. En comparant les résultats de ce mode de préparation du transplant homogène avec d'autres modifications, les auteurs ont trouvé que cette préparation est idéale pour les transplants massifs tels que les joints respectifs. La transformation de la partie osseuse et bien ressemblable à celle de l'os autogène, le cartillage du joint garde sa vitalité. Pourtant la charge rend le proces de la transformation bien difficile et cause des changements dégénératifs du cartillage respectif.

ZUSAMMENFASSUNG

Die Transplantation homogener Gelenke. — V. Bereitung des homogenen osteokartilaginösen Pfropfens durch partialen Ersatz mit autogener Spongiosa und Impregnation mit autogenem Mark

O. Fiala, V. Herout

Die Autoren übertrugen bei 12 Hunden das ganze Kniegelenk. Behandelt wurde das homogene Transplantat durch Durchspülung, partielle Abbohrung der Spongiosa, Ersatz mit identischem autogenem Gewebe und durch Imprägnation mit autogenem Mark. Bei 7 Tieren war die Übertragung erfolgreich, bei 5 bildete sich eine Deformation des belasteten Condylusteiles des Oberschenkels. Der unbelastete patellofemorale Teil blieb bei allen Tieren unversehrt. Gewertet werden die makroskopischen, röntgenologischen sowie mikroskopischen Ergebnisse. Bei der Gegenüberstelung dieses Verfahrens zur Bereitung des homogenen Spanes mit anderen Modifikationen ist festgestellt worden, dass diese Vorbereitung für einen massiven Span in der Form des Gelenkes zweckmassig ist. Der Umbau der Knochenkomponente nähert sich sehr dem Umbau des autogenen Knochens, der Gelenkknorpel bleibt lebensfähig, die Belastung verschlechtert jedoch den Umbauverlauf und bewirkt degenerative Veränderungen am Knorpel.

RESUMEN

Transplantación de las articulaciones homogéneas. — V. Preparación del injerto homogéneo osteocartilaginoso por la sustitución parcial con la espongiositis autogéna y por la impregnación con la médula autógena

O. Fiala, V. Herout

Los autores trasladaron en 12 perros toda la articulación de rodilla. El injerto homogéneo fue preparado por la irrigación, por la desperforación parcial de la espongiositis, por la sustitución con igual tejido autógeno y por la impregnación con la médula autógena. En 7 animales fue el traslado lleno de éxito, en 5 apareció la deformación de la parte condilar del fémur. La parte patelofemoral no cargada restó en todos los animales intacta. Se estiman los resultados macroscópicos, radiológicos y microscópicos. En comparación de este tipo de la preparación del injerto homogéneo con otras modificaciones se encontró que esta preparación estaba para el injerto robusto en forma del extremo de articulación. La reconstrucción del componente huesoso se aproxima mucho a la reconstrucción del hueso autógeno, el cartílago de articulación resta vital, pero la carga empeora el transcurso de la reconstrucción y ocasiona los cambios de degeneración en el cartílago.

REFERENCES

1. **Bartoš, F., Fiala, O.:** Die Behandlung des homogenen osteokartilaginosen Transplantates. Die Perforation des Spanes. Sb. věd. prací LFKU Hradec Králové, 11 : 187, 1968.
2. **Burwell, R. G.:** Studies in the Transplantation of Bone. J. Bone Jt. Surg., 48-B: 532, 1966.
3. **Boyne, P. J.:** Autogenous Cancellous Bone and Marrow Transplants. Clin. Orthop., 73 : 199, 1970.
4. **Fiala, O., Herout, V.:** Vliv spojení autogenního a homogenního osteokartilaginózního štěpu na jeho vaskularizaci a přestavbu. (The effect of the junction of autogenous and homogenous osteocartilaginous graft upon its vascularisation and reconstruction) (In Czech.) Acta Chir. orthop. Traum. čech., 32 : 409, 1965.
5. **Fiala, O., Bartoš, F.:** Regeneration of Deep Defect in Autogenous Osteocartilaginous Graft. Plast. Reconst. Surg., 40 : 277, 1967.
6. **Fiala, O., Herout, V.:** Transplantation von homologen Kniegelenken im Tierversuch. Beitr. Orthop., 14 : 638, 1967.
7. **Janeček, M., Kosinka, E., Horn, V:** Einheilung der grossen homoplastischen Knochentransplantate. Beitr. Orthop. 14 : 586, 1967.
8. **Kyselka, R., Beck, O.:** Tierexperimentelle Erfahrungen über die Transplantation von homoplastischen Halbgelenken. Z. Orthop., 102 : 189, 1966.
9. **Stringa, G.:** Studies of the Vascularisation of Bone Grafts. J. Bone Jt. Surg., 39-B: 395, 1957.
10. **Volkov, M. V., Imamaliev, A. S.:** Greffe homologue de l'articulation du genou. Revue Chir. orthop., 55 : 3, 1969.

Doc. Dr. O. Fiala, Ortoped. klinika, Hradec Králové, Czechoslovakia

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The International Association for Maxillo-Facial-Surgery will hold its 1st World-Congress in Dresden from the 8th—12th May 1972. The association purposes to unite all collegues who are working in the field of jaw and face-surgery (for example jaw-surgeons, plastic-surgeons, nose-ear-throat-surgeons, neuro-surgeons and so on).

Members of the presidium are: President: Prim. Dr. H. G. Bruck, Wienna; secretary-general: OMR Prof. Dr. Dr. W. Bethmann, Thallwitz; vice-presidents: Prof. Dr. L. Bornstein, Iowa-City; Prof. Dr. H. Brückner, Rostock; Prof. Dr. H. Z. Konuralp, Istanbul; Prof. Dr. L. Lebourg, Paris; Prof. Dr. V. Popescu, Bukarest; Prof. Dr. Fr. Urban, Praha; treasurer: MR Dr. Dr. H.-J. Hochstein, Thallwitz.

Main subjects of the 1st world-congress are:

1) newer methods in the treatment of facetumors,

2) unspecific inflammations, proceeding from the skull,

3) orthopaedic operations on the skull of the face.

Notification for participation as well as for lectures, reports and films are requested to be sent to: OMR Prof. Dr. Dr. W. Bethmann, 7251 Thallwitz/DDR, Schlossklinik. Notifications for membership of the association may be directed to Prof. Bethmann, Thallwitz too.

Charles University, Medical Faculty of Hygiene, Prague (Czechoslovakia)
Clinic of Plastic Surgery
Head Prof. H. Pešková, M.D., DrSc.

RHINOPHYMA EXPERIENCES WITH 81 OPERATED PATIENTS

M. FARA

Nine years ago we carried out a rather detailed study of rhinophyma in 65 patients, operated on at the Clinic of Plastic Surgery in Prague (1). At that time much had already been written on this disease, opinion differed however considerably on aethiology, pathogenesis and method of treatment. By the end of 1970 the number of our patients had risen to 81 and information required for assessment of this disease from different aspects had been simultaneously augmented and specified. As there still exist numerous points at issue — in these problems of rhinophyma — we believe that this fact justifies our brief mentioning of the most important findings at which we arrived by studying our broader clinical material.

According to the clinical and histological picture of the disease we distinguish 2 types of rhinophyma: g l a n d u l a r (58 patients) (Fig. 1a, b, c, d) and f i b r o t i c (23 patients) (Fig. 2a, b). The fibrotic type never achieved such bizarre shapes and dimensions as we observed in the gladular type.

It is often stressed in literature that w o m e n are rarely a f f l i c t e d with rhinophyma. Sometimes it is even considered to be quite a rarity in women. With us however the rate of women to men was 15 : 66, i.e. approx. 1 : 4.

According to the data from case history and local findings there exists however a connection between rhinophyma and a c n e r o s a c e a, although this is expressly disputed by some research workers. The greated part of our patients had been suffering of rosacea since adolescence and after several years rhynophymatose growth clearly developed from it. The first signs of rosacea appeared in women often immediately in puberty, in men between the age of 22 and 60. In the time of operation twenty seven patients still manifested acne rosacea on the cheeks, some even elsewhere on the face. We believe the more intensive treatment of this disease by dermatologists to be at present of considerable influence upon the decrease of rhinophyma incidence.

We endeavoured to ascertain as reliably as possible the effect of a l c o h o l: more than half of the patients questioned, drank alcohol in various amounts. Neither this fact however, nor their being partial to strongly spiced food (18,44%), black coffee (9,22%), smoking (27,66%) and the sub-

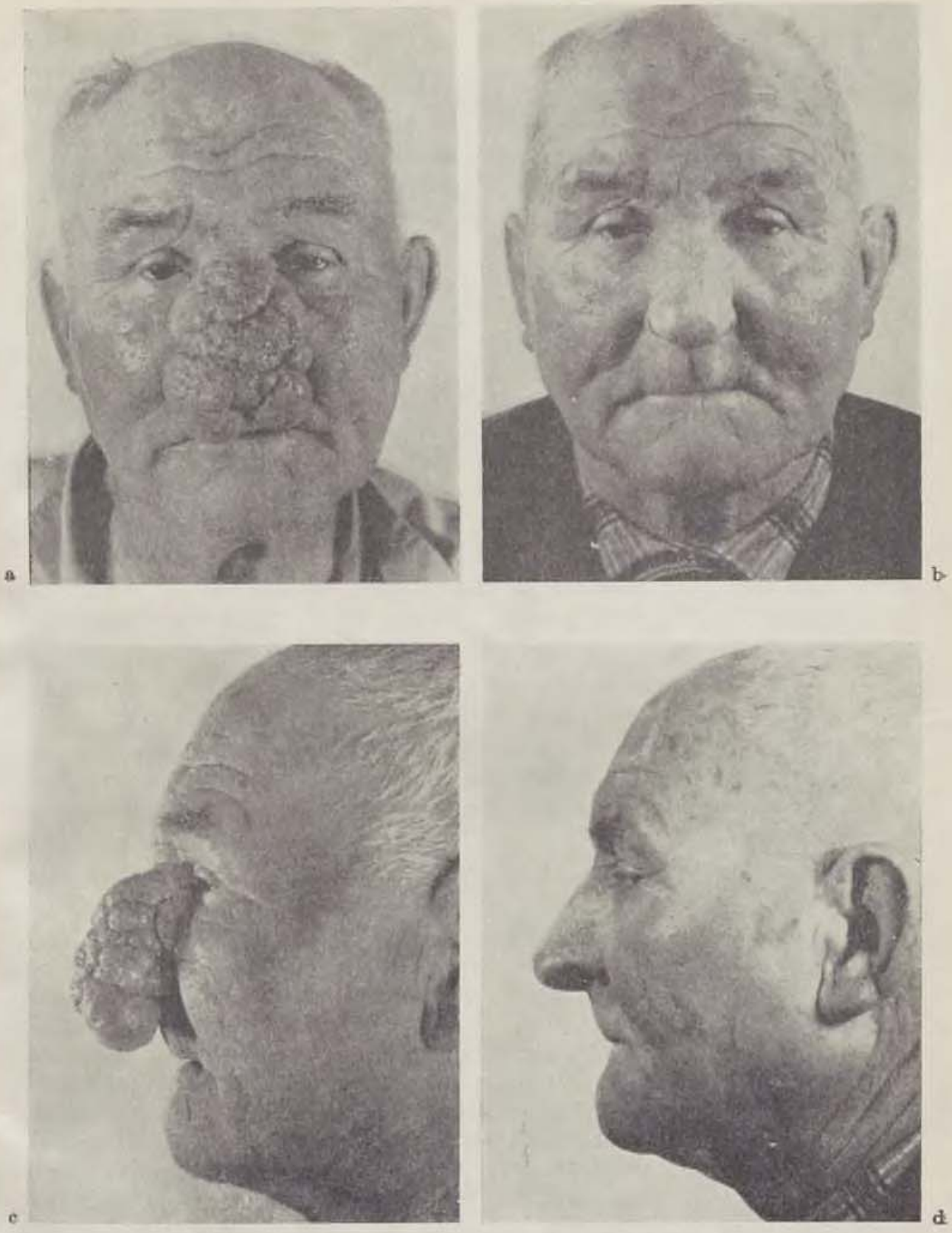


Fig. 1a, b, c, d. Patient V. J., case history No. 51352. Glandular, heavily lobulated rhinophyma was removed by electrical knife and the defect was left to spontaneous epithelisation

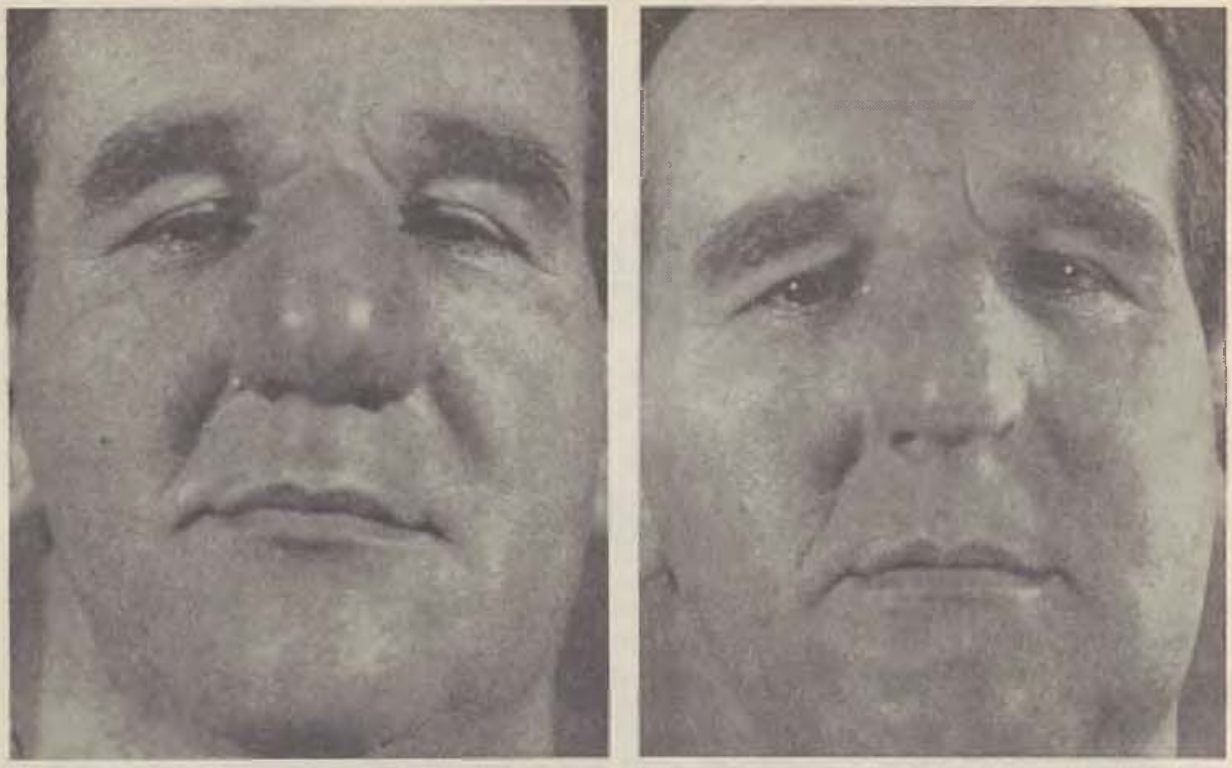


Fig. 2a, b. Patient F. D., case history No. 33449. Fibrotic, absolutely smooth rhinophyma was removed by electrical knife and the defect was left to spontaneous epithelisation

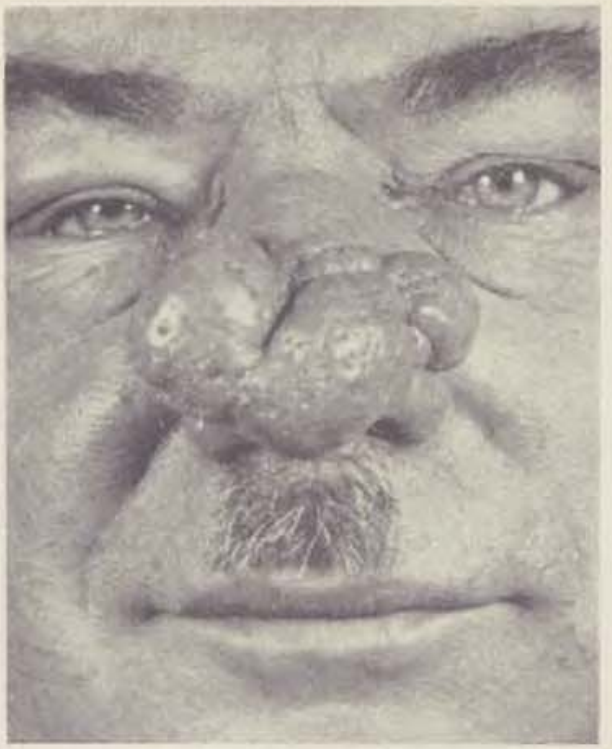
sequent possible disturbances of the digestive tract could be considered by us as proved factors in the aethiology of rhinophyma.

No familiar incidence was recorded, only 10% of our patients stated that their father or mother had a rosy nose, perhaps rosacea. One patient has an adult son with strongly developed rosacea with initial manifestations of plastic growth.

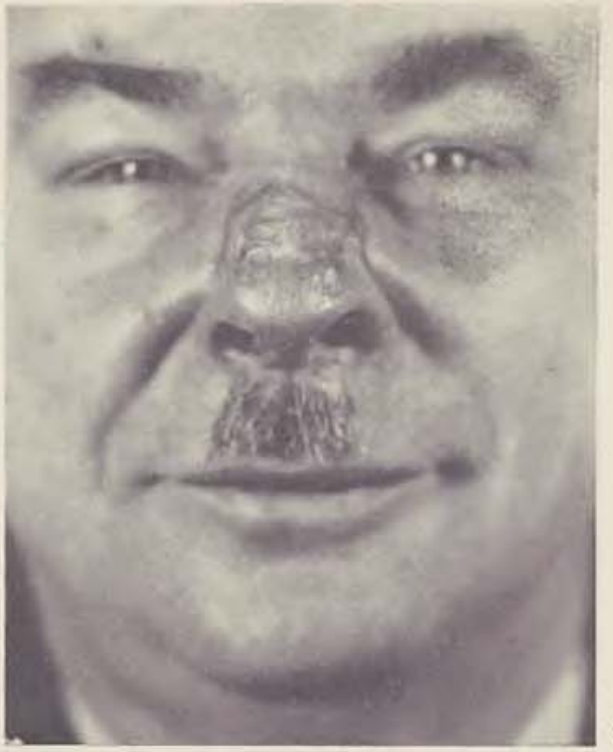
We do not take the sceptical view of those surgeons who maintain that no method of therapy of rhinophyma affords a perfect result and that the surgeon must be satisfied with compromise results.

In 75 of our patients the operation was carried out by flat cutting off of rhinophymatose mass, in 6 little developed cases, removal of smaller lobules by excision and suture of the wound was sufficient. The scalpel was used 27 times, the electrical knife 54 times. L3× the decorticated nose was primarily covered by a thick and 9× by a thin dermoepidermal graft, 5× additional graft was carried out where spontaneous epithelisation ceased and the granulation areas survived. Practically all grafts took completely. Reoccurrances of rhinophyma — not too extensive — appeared in 3 cases after 4,8 and 18 years, i.e. in 3,7% of all operated cases. Epithelial cysts formed under one graft and had to be removed.

The result of the primary operation was very good (traces of the former disease or surgery were almost undistinguishable) in 45 patients, good (altogether fine scars, shape of the nose almost natural) in 33 patients, bad



a



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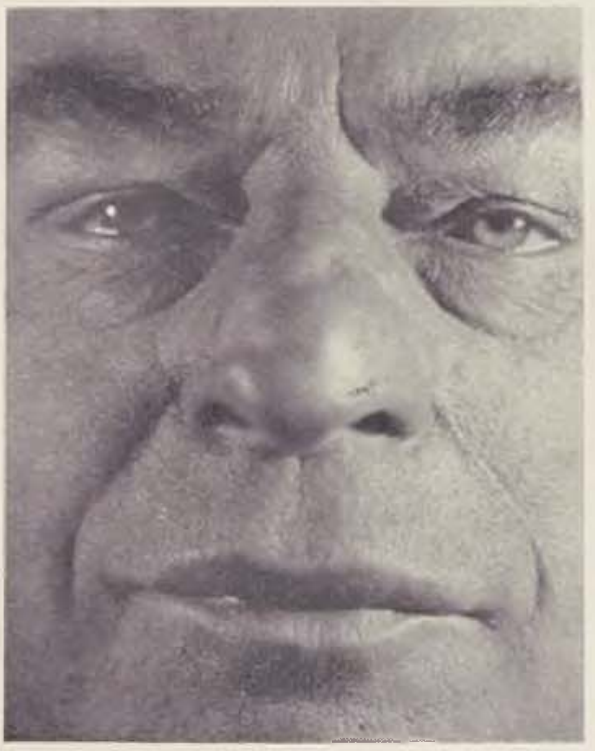
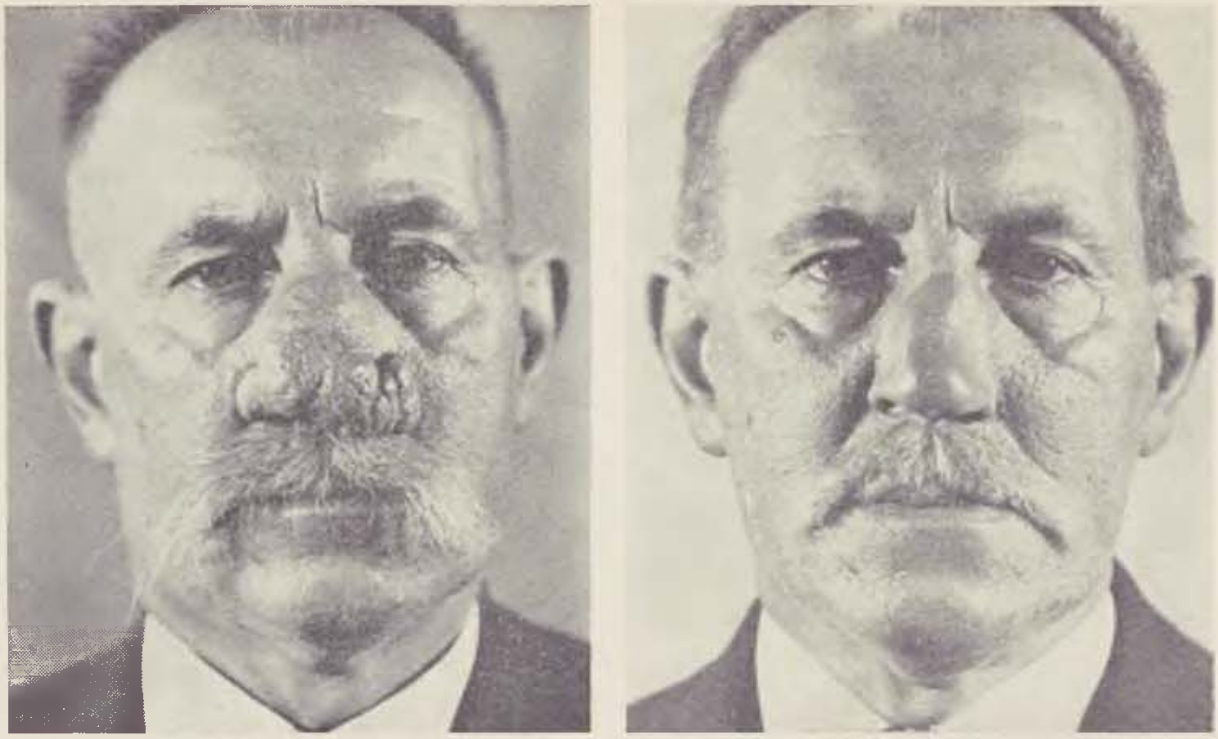


b

Fig. 3a, b, c. Patient A. H., case history No. 2727. Glandular medium sized rhinophyma was removed by scalpel and the defect left to spontaneous epithelisation. The operated region scarred hypertrophically and for this reason the scarred area was secondarily excised and the defect was covered by pedicle flaps cut out in the nasolabial grooves and turned over the dorsum nasi facing each other

(rough scar deforming the nose by the retraction) in 3 patients. But in all these three patients the condition was additionally corrected in a quite satisfactory way. In two cases the excision and dermabrasion of the scars was sufficient. In the third case the entire decorticated area became keloidally hypertrophied. It had to be completely removed and the defect was covered by pedicle flaps cut out in the nasolabial grooves and turned over the dorsum nasi facing each other (Fig. 3a, b, c).



a b

Fig. 4a, b. Patient V. H., case history No. 6689. The glandular rhinophyma was removed by scalpel and the formed defect was covered by dermoepidermal graft. Take within 12 days. The graft is of permanently different appearence

Histology disclosed only one malignant growth in the cut off rhinophymatose mass — carcinoma basocellulare.

The period between operation and take was shortest in mere excision with suture (5—6 days), in grafts it amounted to approx. 10 days, spontaneous epithelisation of the decorticated nose took 12—25 days.

The original subjective and objective complaints resulting namely from the weight and pressure of the hypertrophied tissue and associated inflammatory reactions, ceased in all patients. In 62,07% of cases there appeared after the operation for a brief period (half a year at the longest) increased sensitivity of the epithelialised nose towards cold air, sometimes also towards warm air. The grafted dorsum nasi was in some cases insensitive to touch for quite some time.

Practically all operations (79 out of 81) were carried out under local anaesthesia with 1% Procain with adrenalin or octapressin. The patients endured the operation under this anaesthesia very well and injected mentioned solution influenced bleeding favourably. For this reason we consider general anaesthesia in patients with rhinophyma to be an unnecessary burden to them as well as to the operating team.

To the question of selecting the suitable operational procedure it may be said that it proved statisfactory with us to cut off the rhinophymatose mass by electrical knife, maintaining the remnants of selvaceous glands at the base. Rapid spontaneous epithelisation is caused by them. The thus treated nose

looked more natural than the nose which we covered by skin grafts after decortication. Grafts on the nose maintained in their majority a more or less different appearance (fig. 4a, b).

During the operation a specially careful procedure must be taken on the nasal wings, where the hypertrophied tissue usually grows firmly to the nasal alar cartillages and the cartillage can be easily denudated or even damaged. For this reason we work in this region with the finger slipped into the nostril, leaving a narrow skin rim around the circumference of the nostril in order to prevent scaring and subsequent disfiguring of the nasal apertures.

If spontaneous epithelisation does not terminate within 3 weeks, it means that not enough epithelial elements were left during operation on the base of the decorticated areas and that a secondary grafting is necessary.

In the treatment of rhinophyma we consider it absolutely essential to look out for a malignant degeneration although it occured only rarely in our clinical material (1,2%). For this reason we are having in each patient the removed tissue from several localisations histologically examined.

SUMMARY

At the Clinic of Plastic Surgery in Prague, results in the surgical treatment of rhinophyma in patients in which the decorticated areas were left to spontaneous epithelisation — setting out from maintained bases of sebaceous glands — are better than in patients in which primary graft was carried out. The share of reccurrances and the necessity of secondary corrections is minimal, the appearance of the operated nose is satisfactory.

Fig. 5. Before the operation, a rim of undamaged skin cover is left around the circumference of the nasal apertures in order to prevent disfigurement due to scarring. The surgeon works with the finger slipped into the nostril

RÉSUMÉ

Rhinophyma. Les expériences obtenus avec 81 des malades opérés

M. Fára

La clinique de la chirurgie plastique à Prague a trouvé au cours du soin des malades souffrant de rhinophyma qu'on peut obtenir des résultats beaucoup plus favorables dans les interventions chirurgicales de rhinophyma en laissant guérir par l'épithélisation spontannée les surfaces décortiquées. Cette épithélisation sortant des bases conservées des glandes graisseuses donne des résultats plus favorables que la transplantation précoce. Le pourcentage des récidives et le besoin de correction secondaires est minimal et l'apparance du nez respectif est bonne.

ZUSAMMENFASSUNG

Rhinophyma. Erfahrungen mit 81 operierten Patienten

M. Fára

An der Klinik der plastischen Chirurgie in Prag werden bei der chirurgischen Behandlung der Rhinophyma bessere Ergebnisse bei Kranken gewonnen, bei dennen sich die entrindeten Flächen durch spontane, aus den erhaltenen Basen der Talgdrüsen herausgehende Epithelbildung heilen lassen, als in Fällen, in welchen primäre Transplantation durchgeführt wurde. Der Prozentsatz der Rezidiven und das Bedürfniss sekundärer Korrektionen sind minimal und das Aussehen der operierten Nase ist befriedigend.

RESUMEN

Rhinophyma. Experiencias con 81 pacientes operados

M. Fára

En la clínica de anaplastia en Praga consigen mejores resultados en el tratamiento quirúrgico de rhinophyma en los pacientes, donde las superficies privadas de la corteza pueden curarse por la epitelización espontánea, la que sale de las bases bien conservadas de las glándulas sebáceas, que en aquel lugar donde se trasplantó primariamente. El tanto por ciento de las recidivas y la necesidad de las correcciones secundarias es mínima y la apariencia de la nariz operada es satisfactoria.

REFERENCES

1. **Fára, M.:** Rhinophyma. Acta Chir. orthop. Traum. čech., 29 : 523, 1962.

Ass. Prof. M. Fára, M.D., DrSc., Praha 10, Šrobárova 50, Czechoslovakia

Czechoslovak Society for Plastic & Reconstructive Surgery

At its recent meeting, the Society elected as a new President S. Demjén, M.D. Secretary of the Society is F. Maris, M.D. Address: Dept. of Plastic Surgery, Partizánska 2, Bratislava, Czechoslovakia.

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