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ON THE DIAGNOSIS AND TREATMENT OF ANTERIOR ENCEPHALOCELE

Review of 20 cases

W. PORADOWSKA, S. RESZKE, M. JAWORSKA, K. ŁODZIŃSKI

Fronto-nasal area is a known site of congenital abnormalities which occur early in morphogenesis. They originate from the primary disturbance in the closure of anterior neuropore on the level corresponding to the bony structures of the fronto-nasal process and to sphenoido-ethmoidal components of the base of the skull.

Intracranial elements derived from the more than one germinal layer (neuroectodermal, mesodermal, ectodermal) protrude through the bony defect or fissure. The herniated mass may retain its connection or be completely detached from the central nervous system.

Herniation of neuroectodermal tissues appears with the relatively highest frequency. They are represented by meningoencephalocele as well as by other tumors composed of neural or neuro-fibrous tissues, single or sometimes double and even symmetrical.

Large tumors interfere in conspicuous way with development of the face and may produce extreme degree of hypertelorism, bifid nose, hypoplasia of nasal cavities and median cleft lip (6). Smaller tumors are not associated with any major developmental disorders, nevertheless mild hypertelorism and facial asymmetry or some minor local deformities are generally observed (2, 7, 10) (Fig. 1, 2).

Surgical treatment is difficult. Apart of the tumor itself, complex anatomy of facial and cranial structures as well as associated anomalies or secondary developmental disorders present serious problem even for a skilled and experienced surgeon.

It is helpful to classify the tumors of neurogenic origin according to their location — external or internal (1, 8, 9).

External tumors penetrate outside through the defect of the cranial valut in the region of the foramen cecum: 1. between the nasal process of the frontal bone and nasal bones (frontonasal or glabellar), 2. between

frontal and ethmoid bones (naso-ethmoidal), 3. between the median wall of the orbit (composed by frontal, lacrimal and ethmoid bones) and the lower orbital margin of the maxillary process (naso-orbital).

Internal tumors also herniate through the similar cranial defects but their final location is in the one of the facial cavities. They may subsequently pass through: 1. ethmoid or sphenoid bones to the nasopharynx, 2. the upper

Fig. 1. Fronto-nasal encephalocele with gross deformation of the right upper portion of the face

orbital fissure to the posterior orbital cavity or to maxillary sinus, 3. the lower orbital fissure to maxillary sinus, sometimes to the mouth cavity (3, 4, 5).

External tumors are noticed at birth. They are usually covered with normal or thinned skin, in some cases merely by epithelium. Vascular lesions (telangiectasia) appear occasionally on the top. They are not distinctly demarcated and the surrounding tissues, especially the eyelids, may be permanently oedematous. They are generally of solid consistency though the protruding mass may be fluctuant, pulsating and increasing in size when the child cries or on compression on the external cervical veins. The may be tender on palpation (Fig. 3).

Internally located tumors are usually detected when the child is examined because of some respiratory disorders or when his oral cavity is inspected for the presence of cleft palate and other congenital anomalies. Lesions of this

type are particularly vulnerable. Covered with thin mucous membrane, they may be easily damaged by mechanical injury with subsequent development of fistula, cerebro-spinal fluid drainage and meningitis.

Diagnostic studies require close cooperation of specialists in pediatric neurology, ophthalmology, laryngology and radiology. Cerebral heterotopic tumors should be differentiated with dermoid cysts, glioma, vascular tumors,

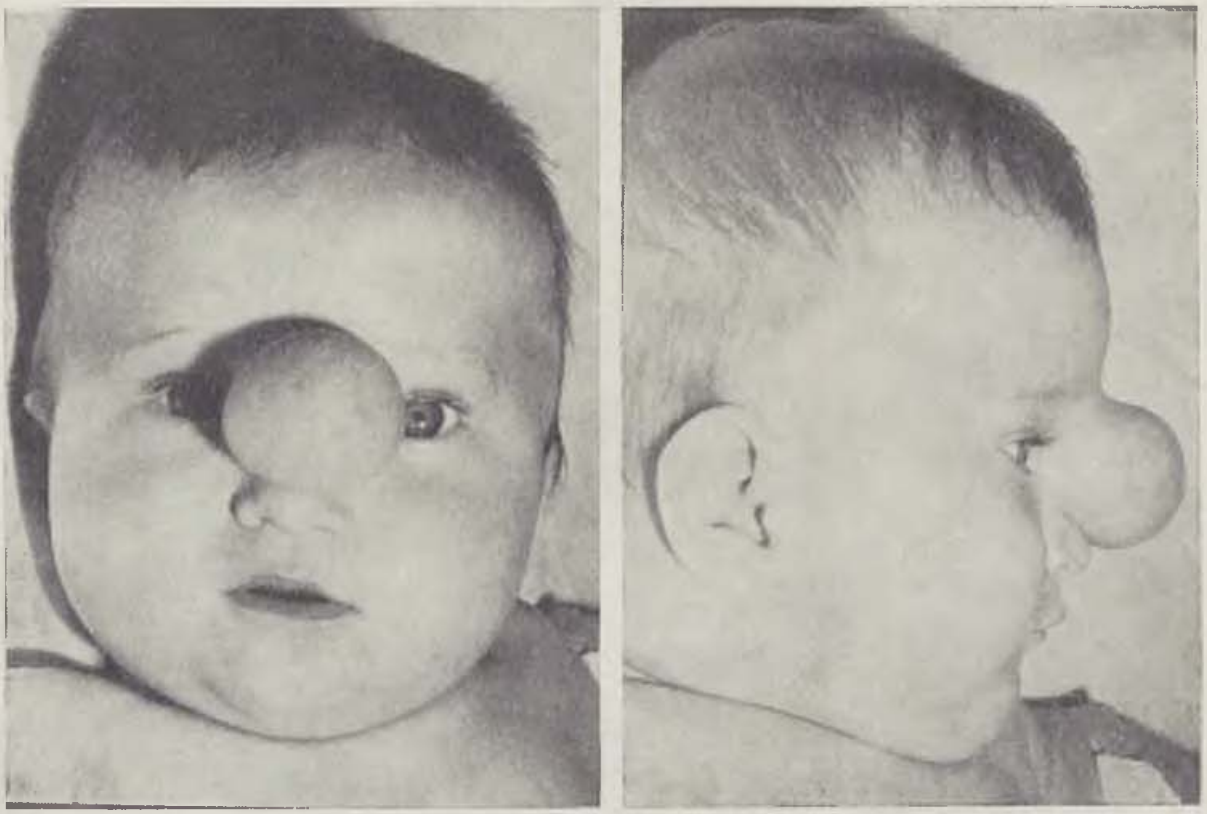

Fig. 2 a, b. Naso-ethmoid encephalocele covered with normal skin

neurofibroma and those located internally with nasal or pharingeal polypes, though the presence of a tumor at birth or shortly afterwards virtually rules out certain lesions that occur later in life.

Needle aspiration of the tumor in order to obtain material for histologic examination is not recommended because of imminent risk of meningitis.

MATERIAL AND RESULTS

In the years 1954—1971 20 children aged no more than 3 years, 10 girls and 10 boys were admitted for surgical treatment. Fronto-nasal protrusion had been noticed at birth in 17 cases, in two of them clinical signs suggested the presence of an additional tumor in the nasal cavity. Two of the 3 remaining patients had facial asymmetry and a naso-pharyngeal tumor was suspected. The last child in this series was admitted with diagnosis of a tumor in the upper pharyngeal area.

Clinical picture was variable according to the size and type of tumor as well as to the extent of involvement with surrounding structures. In each of our patients, however, clinical examination strongly suggested the diagnosis of encephalocele.

In 7 cases of external lesions, the overlying skin was found intact, in other 8 — abnormal and atrophic on the top. In 2 further children, the

Fig. 3. Fronto nasal tumor covered with thin, translucent epithelium

protruding mass was covered with bluish-gray epithelium. Internal tumors were all covered with mucosa.

Apart of hypertelorism present in 11 children, one had syndactyly, one median cleft lip and complete cleft of secondary palate.

DIAGNOSTIC INVESTIGATIONS

13 children were examined by neurologist prior to surgery. Mild psychomotor retardation was found in 4 of them, microcephalia in one.

Ophtalmologic examination (13 children) revealed convergent strabismus of one eye in 3, lateral displacement of the ocular globe in one, retinal hypoplasia in 2, hypoplasia of lacrimal ducts in one patient.

Laryngologic examination (14 children) demonstrated the presence of a tumor in the left nasal cavity in 4. In one, the tumor was associated with complete cleft of secondary palate.

Fig. 4 a, b. Bilateral naso-ethmoid encephalocele, microcephaly

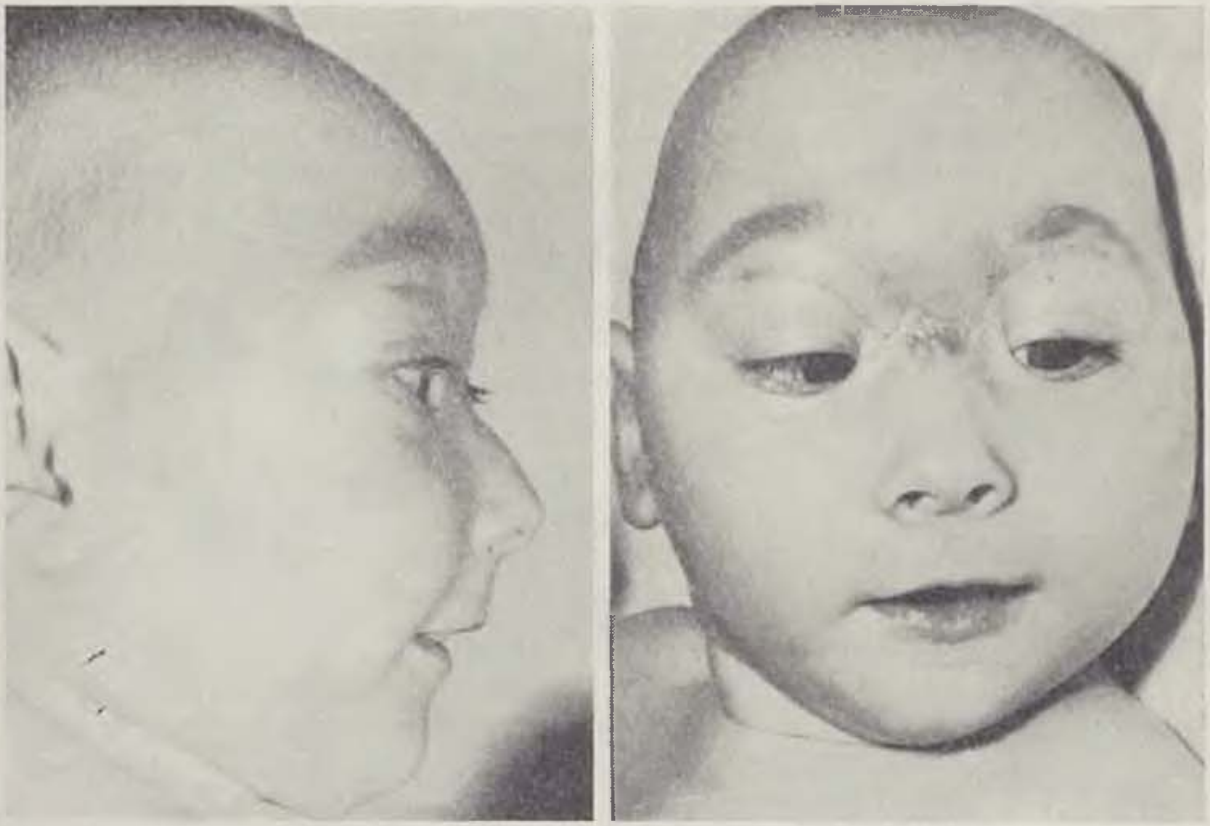

Fig. 4 c, d. Postoperative appearance

Roentgenograms (all children) showed bony defects in 11, in 9 of them confirmed by surgical exposure. In 2 others operation was not performed. In the remaining 9 patients, radiologic examination as well as tomography performed in one of them failed to demonstrate a bony defect which was identified at operation in all these cases.

In one child, a defect was diagnosed with Rhese technique. Pneumoventriculography was performed in 3 cases: in two of them, the air was found to penetrate into the tumor, in one to the mass of soft tissues. Arteriography of cerebral vessels (2 children) showed vascularization of the tumor. Pneumotomography was not performed.

In one child, roentgenogram demonstrated gross dilatation of the left nasal cavity and partial translocation of ethmoid bone into the orbit due to the large tumor in the nose.

SURGICAL PROCEDURE

In all resection of the lesion was accomplished by external approach.

Incision was throughly shaped to obtain the best cosmetic effect. The tumor was gradually separated out of the adjacent tissues and its pedicle exposed. The dural sac was found only in 7 cases. In 8, the tumor was covered with thin mebrane resembling the pia-arachnoid. In a couple of children, there was no demonstrable connection of the herniated mass to the intracranial contents.

The dura, if present, was opened, the neural tissue removed with electric knife and the bleeding controlled. In the next step, the dura was closed with continuous or interrupted sutures with the use of atraumatic silk 5—0, Tightness of closure was tested by compression of the anterior fontanelle. The pedicle of the tumor was ligated with silk whenever it appeared to consist of fibrous tissue.

The bony defect was covered with autogenous fascial or osseous graft, the wound closed in layers and the skin sutured with silk. In some cases, the wound had to be closed with sliding cutaneous flap, sometimes with the free graft of full thickness. Subcutaneous catheter was left for 24 hours (Fig. 4, 5, 6).

ANALYSIS OF MATERIAL

On the basis of diagnostic and surgical findings our material was reviewed with particular reference to the location of tumors.

Unilateral fronto-nasal tumors:

— 2 children had median defect of the nasal process of the frontal bone (region of glabella), tumors were located above the nasal bones;

— 4 children had lateral defect on the left side of the nasal process. 2 of them had one portion of the tumor located externally and another inside the left nasal cavity. It was found that the tumor had been initially

Fig. 5 a. Child with encephalocele located in the left nasal cavity, b. Tumor exposed during operation

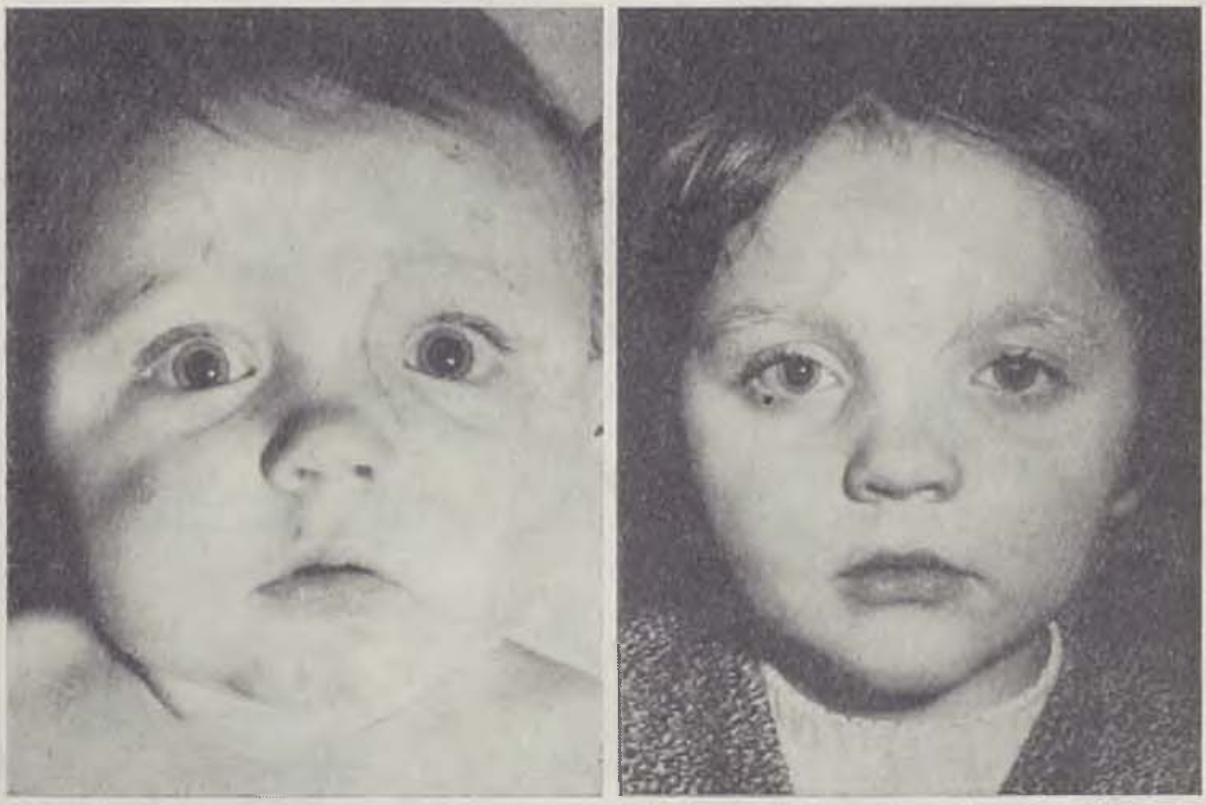

Fig. 5 c. Surgical scar following operation, d. Distant effect

Fig. 6 a. Fronto-nasal encephalocele, b. Satisfactory cosmetic effect of operation

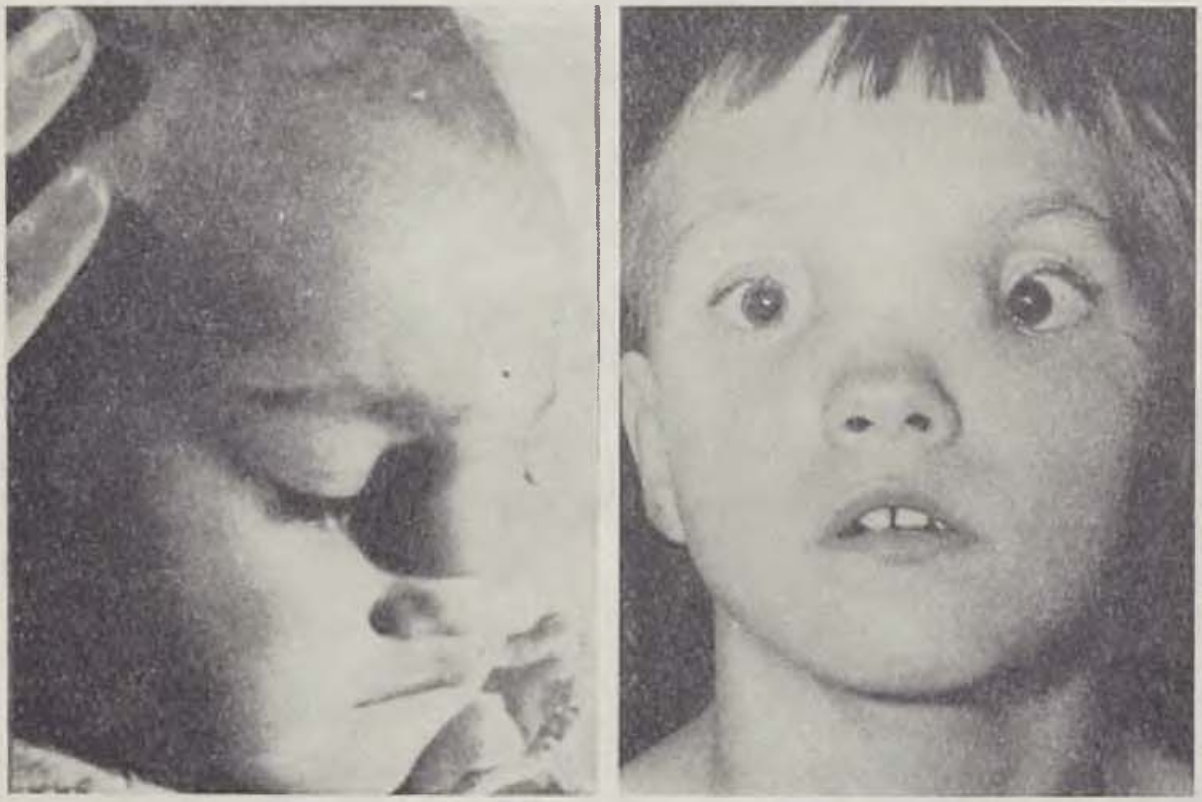

Fig. 7a, b. Facial appearance before and after operation of bilateral fronto-nasal encephalocele. Correction of Hypertelorism is indicated

located in the left nasal cavity but along with growth its distal, narrowed portion penetrated outside through the defect in the left nasal bone;

— 1 child had external tumor with the defect of the nasal process on the right side.

Bilateral fronto-nasal tumors:

— 2 children. The tumors were situated above the nasal bones. Unilateral fronto-naso-ethmoid tumors:

— 4 children. All on the left side.

Bilateral fronto-naso-ethmoid tumors:

— 4 children.

Internal location of the tumors:

— 2 children. In one, the tumor was located in the left nasal cavity with pedicle passing through the region of the foramen cecum. .In the second case, the tumor had penetrated through the ethmoid-sphenoid bones and was situated in the upper pharynx.

POSTOPERATIVE RESULTS

Postoperative care depended on the individual needs of each patient, all children, however, were given antibiotics for about 10 days following surgery.

Healing of the surgical wounds was uneventful in 14 cases, in 2 others was complicated by infection with subsequent dehiscence.

Pathologic examination of the surgically removed tumors was performed in 16 cases. Meningo-encephalocele was diagnosed in 14, glioma in 2.

3 children died of meningitis following surgery of the big external tumors.

DISCUSSION

The tumors of the anterior pole of the skull, especially those located in the fronto-nasal area, should be always suspected to be of neurogenic origin if present since birth.

Clinical diagnosis of encephalocele is based on characteristic facial asymmetry, hypertelorism, deviated ocular globe, nasal deformities and on the nature of herniated mass.

The tumors partially connected with intracranial contents have the pedicle formed by the dura. Completely detached tumors are rather solid, well demarcated, deprived of the dura and are likely to be covered with a thin membrane resembling pia-arachnoid.

Analysis of our material shows that: 1. external tumors of neurogenic origin most often penetrate outside the skull through the region of foramen cecum and are present in the glabellar and nasal area, 2. internal tumors usually herniate through the cribriform plate and are located in the left nasal cavity, 3. both types of tumors may occur in the same patient.

Extracranial approach enabled amputation of the lesion irrespectively of its type, location and size. With the use of this technique and with the nasal bones pushed upwards, we could expose the herniated mass and localize its passage through the bony defect, next, we could perform excision of the tumor and dissection of the dura out of the edges of the osseous defect, especially in absence of a pedicle. It also permitted to secure tight closure of the dura and to cover the defect with autogenous graft.

In 3 cases, however, the closure was not tight enough to prevent formation of fistula and its infection with resultant meningitis and fatal out-come. This illustrates that in certain cases it is necessary to secure the optimal tightness of the dural sutures by simultaneous anterior craniotomy with fascial cover of the dura from inside of the skull cavity.

The choice of surgical approach is actually a matter of dispute (4). In our experience, anterior craniotomy should be indicated in children with extreme degree of hypertelorism (paramedial interorbital distance of more than 30 mm), with excessive overgrowth of the ethmoid and anomalous sphenoid bones that require correction.

As far as prognosis is concerned, it should be emphasized that apart of few minor disorders, all surviving children are neurologically normal and their good future development can be anticipated.

In a number of children, cosmetic deformities will require reconstructive surgery, especially narrowing of the interorbital distance in case of extreme hypertelorism.

SUMMARY

20 children with anterior meningoencephalocele were reviewed in respect to the site of the lesion, diagnostic investigations and surgical technique.

The lesions were located externally in 17 cases, in two of them there was additional tumor in the nasal cavity. Out of the remaining 3 patients, in two a single tumor was situated in the nasal cavity, in one in the upper pharynx.

In most cases, external lesions were located in the glabellar area and their pedicles were found to pass through the area of foramen caecum. Internal tumors were situated in the left nasal cavity and their pedicles passed through sphenoid bones.

Clinical diagnosis was based on the combined studies of several pediatric specialists. 17 children were qualified to surgery. Extracranial exploration was performed with tight closure of the dura and of overlying tissues. Pathologic examination confirmed clinical diagnosis of meningoencephalocele except two cases in which the tumors were found to be composed only of glial tissues.

3 children died of meningitis as a result of leakage and infection following operation. Simultaneous frontal craniotomy is then advisable whenever tight closure of the dura cannot be realized by external approach.

RÉSUMÉ

A propos de la diagnose et du traitement de l'encéphalocèle antérieure Résumé de 20 cas

Poradowska W., Reszke S., Javorska M., Lodziński K.

On a présenté le résumé des cas de la meningoencéphalocèle antérieure chez 20 enfants avec la localisation de la place atteinte, les examens diagnostiques et la technique chirurgicale.

Chez 17 malades, il s'agissait d'une localisation extérieure de la lésion pendant que chez 2 de ceux-ci il y avait encore une tumeur accessoire dans la fosse nasale. Deux enfants de 3 restants malades avaient seulement une tumeur dans la fosse nasale et 1 enfant avait la tumeur dans la partie supérieure du pharynx.

Les tumeurs extérieures ont été localisées dans la plupart des cas dans la région glabérale et les pédicules de celles-ci traversaient la région de foramen caecum. Les tumeurs internes ont été situées dans la fosse nasale gauche et leurs pédicules traversaient l'os sphenoïde.

La diagnose clinique s'est appuyée sur l'examen contemporaine des sujets atteints fait par plusieurs spécialistes pour enfants. Dans 17 cas, on a recommandé le traitement chirurgical. L'examen extracranial a été fait avant de fermer par l'opération dura mater et les tissus situés en haut. L'examen pathologique a confirmé le diagnostics clinique de la meningoencéphalocèle sauf deux cas où les tumeurs consistaient en tissu glial seulement.

3 enfants sont morts de l'encéphalite en conséquence d'une infiltration et d'une infection postopératoire. La craniotomie frontale simultanée est convenable en cas, si la fermeture étroite de dura mater ne peut être réalisée de l'extérieur.

ZUSAMMENFASSUNG

Über die Diagnose und Behandlung der vorderen Enzephalozele. Eine Übersicht von 20 Fällen

Poradowska W., Reszke S., Javorska M., Lodziński K.

Eine Übersicht der Fälle der vorderen Enzephalomeningozele bei 20 Kindern mit Angabe der Lokalisierung, der diagnostischen Untersuchungen und der chirurgischen Technik wurde vorgelegt.

Bei 17 Kranken handelte es sich um äussere Lokalisierung der Läsion, wobei bei zwei Kranken unter denselben noch eine Nebengeschwulst in der Nasenhöhle festgestellt wurde. Unter den drei übrigen Kranken hatten zwei Kinder bloss eine Geschwulst in der Nasenhöhle und ein Kind hatte eine Geschwulst in der oberen Partie des Rachens.

Die äusseren Geschwülste lokalisierten sich in der Mehrzahl in der Glabellargegend und ihre Stiele liefen durch die Gegend des foramen caecum. Die inneren Geschwülste waren in der linken Nasenhöhle lokalisiert und ihre Stiele liefen durch das Keilbein.

Die klinische Diagnose beruhte auf gleichzeitiger Untersuchung der Betroffenen durch mehrere Kinderspezialisten. In 17 Fällen wurde chirurgische Behandlung empfohlen. Extrakraniale Untersuchung erfolgte vor der operativen Schliessung der harten Hirnhaut und der oberhalb liegenden Gewebe. Die pathologische Untersuchung bestätigte den klinischen Befund der Enzephalomeningozele bis auf zwei Fälle, in welchen die Geschwülste bloss aus Gliageweben zusammengesetzt waren.

Drei Kinder starben an Hirnentzündung infolge von Durchsickerung und postoperativer Infektion. Simultane frontale Kraniotomie eignet sich nur in denjenigen Fallen, in welchen die Schliessung der harten Hirnhaut aus äusserer Annäherung nicht ausgeführt werden kann.

RESUMEN

Sobre el diagnóstico y tratamiento de la encefalocele anterior. Cuadro sinóptico de 20 casos

Poradowska W., Reszke S., Javorska M., Lodziński K.

Ha sido presentada una sinópsis sobre unos casos de la meningo-encefalocele anterior en 20 niños e indicada la localización de la afectación y técnica quirúrgica.

En 17 enfermos se trató de una localización externa de la lesión, de lo que en 2 de ellos hubo además un tumor en la fosa nasal. De los 3 enfermos restantes 2 niños tuvieron solamente un tumor en la fosa nasal y un niño tuvo un tumor en la parte superior de la faringe.

Los tumores externos fueron localizados en la región glabelar en la mayoría de los casos y sus pedículos pasaban por el área del agujero ciego posterior (foramen caecum). Los tumores internos fueron colocados en la fosa nasal izquierda y sus pedículos pasaban por el hueso esgenoídeo.

La diagnosis clínica fue basada en el reconocimiento contemporáneo de los afectados por unos cuantos especialistas pediátras. Un tratamiento quirúrgico fue recomendado en 17 casos. El reconocimiento extracraniano fue llevado a cabo antes del cierre operativo de la duramadre y de los tejidos superpuestos. El reconocimiento patológico confirmó el diagnóstico clínico de una meningo-encefalocele excepto dos casos, donde los tumores consistían solamente de tejidos gliales.

3 niños murieron de la inflamación del cérebro en consecuencia de una infiltración e infección postoperativa. La craniotomia frontal simultánea conviene en los casos donde una clausura estrecha de la duramadre no se puede realizar de por fuera.

REFERENCES

1. **Birnbaum, L. M., Owsley, J. Q.:** Frontonasal tumors of neurogenic origin. Plast. reconstr. Surg., 39 : 462, 1968.

2. **Duhamel, B., Haegel, P., Pages, R.:** Morphogenèse pathologique «Des monstruosités aux malformations». Paris, Masson et Cie 1966.

3. **Esila, R., Torma, T., Vannas, S.:** Unilateral orbital anterior hydrencephalocele and bilateral atresia of the lacrimal passages. Acta ophthal. (Kbh.), 45 : 350, 1967.

4. **Farhat, S. M., Hudson, J. S.:** Extracerebral brain heterotopia. J. Neurosurg., 30 : 190, 1969.

5. **Giroud, A., Martinet, M., Deluchat, C.:** Meningoceles et encephalomeningoceles intra-nasaux. Ann. Oto-laryng. (Paris), 83 : 833, 1966.

6. **Jaworska, M., Łodziński, K.:** Śródnosowe umiejscowienie przepukliny oponowo-mózgowej. Pol. Tyg. lek., 23 : 235, 1968.

7. **Jaworska, M., Poradowska, W., Hilgier, A.:** Hiperteloryzm. Pediat. pol., 155 : 641, 1970.

8. **Suwanwela, Ch., Hongsaprabhas, Ch.:** Fronto-ethmoidal encephalomeningocele. J. Neurosurg., 2 : 172, 1966.

9. **Tessier, P., Guiot, G., Rougerie, L.:** Hypertelorism: cranionaso-orbito-facial and subethmoid osteotomy. Panminerva med., 2 : 102, 1969.

10. **Zarem, H. A., Gray, G. F. Jr, Morehead, D., Edgerton, M. T.:** Heterotopic brain in the nasopharynx and soft palate. Report of two cases. Surgery, 61 : 483, 1967.

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DYNAMICS OF REPARATIVE REGENERATION AFTER LENGTHENING BY THE METHOD OF DISTRACTION EPIPHYSEOLYSIS

B. M. EYDELSHTEYN, N. F. UDALOVA, G. F. BOCHKAREV

A number of interesting experimental investigations have dealt with the possibility of lengthening a limb by mechanical acting upon the growth zone without operation (Ilizarov et Soybelman, 1969; Chirkova, 1968; Ring, 1958; Marsch et al., 1961; Harscha, 1962; Hert et Liskova, 1964).

After Ilizarov had recommended his method of bloodless lengthening of a limb by distraction epiphyseolysis in 1965, papers appeared in the literature (Ilizarov et Soybelman, 1969) about clinical application of this method (Zavyalov et Plaksin, 1968 and 1969; Ilizarov et Soybelman, 1969; Eydelshteyn, 1971). These papers only deal with the description of the method used and the immediate clinical results.

The aim of the present investigation was a clinical and roentgenological study of the features of reparative regeneration of bone in the gap developing during and after distraction on the metaphyseal part of the tibia.

Observations on 33 patients in whom bloodless lengthening of the leg was carried out by distraction of the distal growth zone of the tibia, were the material for the study. Indication for lengthening was a short limb due to poliomyelitis in all cases.

There were two patients of ages from 9 to 10 years, twelve patients from 11 to 12 years, 17 patients from 13 to 15 years, two patients aged 16.

The shortening of the limb in these patients amounted to 4—8 cm. Correction of the shortening was carried out with due regard to the extent of paresis of the limb muscles. In deep paresis of the proximal part of the limb, lengthening was carried out to 1.5—2 cm short of the existing shortening.

The method of applying the device was as follows: Two wires were introduced into the distal epiphysis of the tibia in two directions, crossing each other, and one of them also penetrating the distal epiphysis of the fibula. Another two wires were introduced into the proximal metaphysis of the tibia. After anchoring the wires in the fixing rings, the device was assembled with extension screws. In order to achieve additional stability and to prevent de-

formation in the ankle joint a fifth wire was introduced into the calcaneum in a frontal plane, which was anchored in a horse shoe-shaped plate which was firmly anchored to the distal ring of the distraction device by short extension screws. In the presence of horse-foot deformity or its lateral deviations a wire was introduced into heads of metatarsal bones an anchored in a horse shoe-shaped plate, the latter was anchored to the proximal ring of the distraction device. During lengthening, the deformation of the foot was also corrected (Fig. 1). One or two days after application of the distraction device,

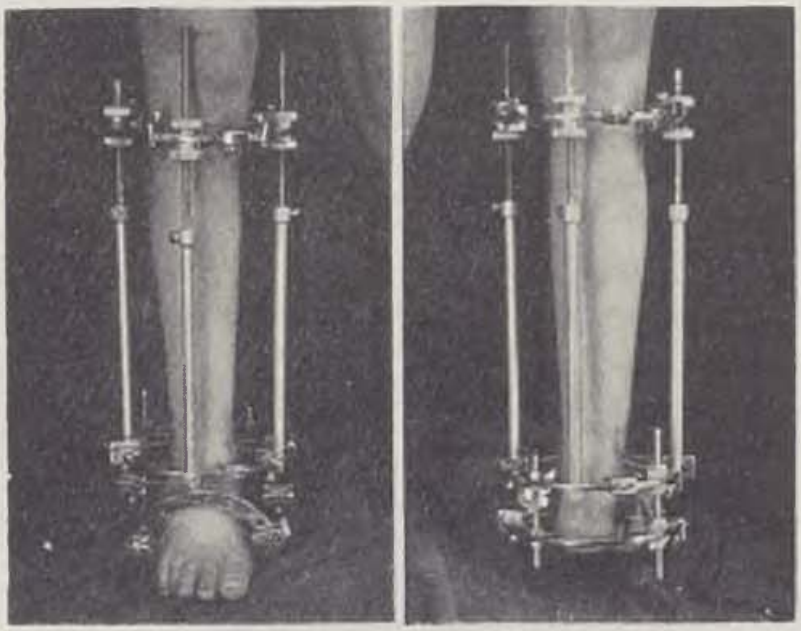

Fig. 1. View of patient with distraction device fixed (anterior, posterior view)

gradual distraction was started by turning the distal screws for ¼ of their circumference 4 to 6 times per day, which corresponded to 1—1.5 mm.

Separation within the epiphyseal zone was registered seven to ten days after distraction had started. Generally duration of this treatment depended on the rate of shortening, but the average period was 1.5—2 months.

The observations made during this investigation showed that in most cases (26 patients) separation took place in the region of the metaphysis, bone fragments were visible in the X-ray. In seven patients, separation took place at the level of the growth cartilage with preservation of a zone of preparatory calcifications. In the following, the reparative process did not show any differences in dependence on the level of the gap. Six phases of reparative regeneration during distraction could be distinguished:

In the first two weeks, the gap between the epiphysis and metaphysis did not show any bone structure. The first radiological signs of the reparative process (first phase of reparation) were registered three to four weeks after distraction had started. A fine inhomogeneous shadow appears in the distraction gap consisting of separate calcifications near the ends of the distracted bones.

In half the number of patients, a transverse band of sclerosis, probably a conditionally preserved zone of preparatory calcification, appeared in the proximal part of the gap on the metaphyseal ends of the crural bones.

The following, second phase of the reparative process (six to eight weeks after the start of distraction) is characterized by longitudinal striation of the callus; a shadow of cortical bands appears, which are linked to each other having a prominent "swollen" shape. The transverse band of the marginal sclerosis is more conspicuous when seen against the background of osteo-

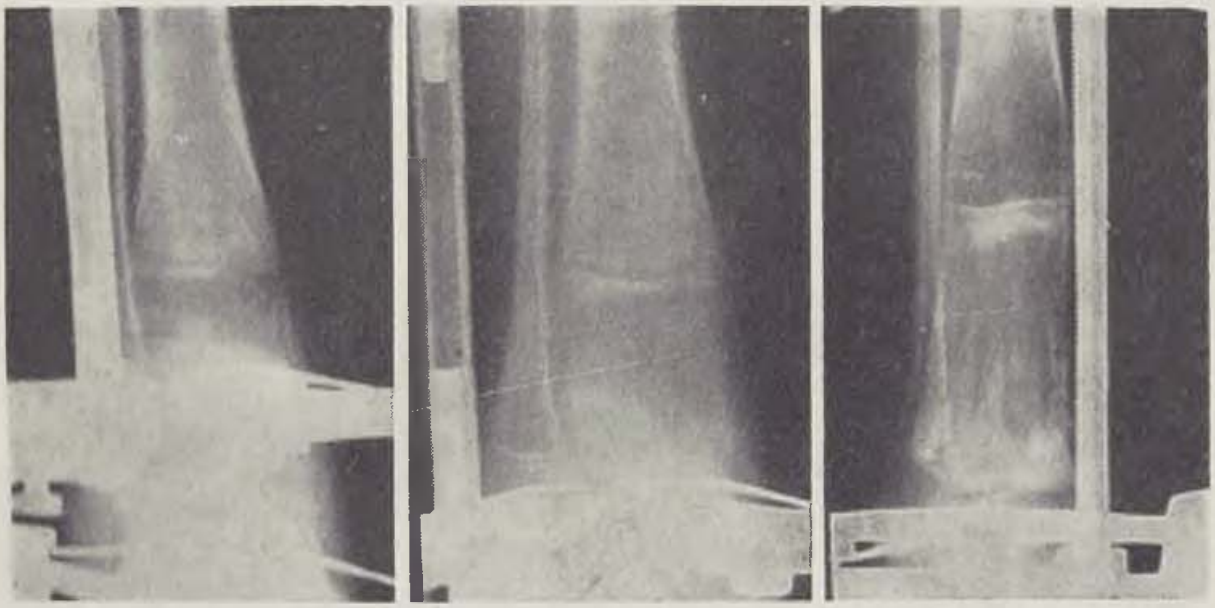

Fig. 2. Second phase of reparation: Striated structure of callus. — Fig. 3. Third phase of reparation: Structure of callus is homogeneous. Thin cortical bands linking with each other can be traced. — Fig. 4. Fourth phase of reparation: Irregular sclerosis of callus structure

porosis at the bone ends (Fig. 2). By the time (1.5—2 months), shortening is levelled in most of cases and distraction is discontinued.

The third phase (10—12 weeks) is characterized by the callus becoming compact. Its structure grows more homogeneous and the thin cortical bands, though linked to each other, can easily be traced. At this time, osteoporosis still remains noticeable in the centre of the callus and in the region of the metaphysis in some cases. The band of marginal sclerosis becomes displaced to the side of the diaphysis (Fig. 3).

In the fourth phase (16—20 weeks), the callus acquires the structure of sclerosed cancellous bone with thin cortical bands swollen from inside (Fig. 4).

The fifth phase (30—40 weeks) is characterized by an increase in sclerosis and a marginal zone at the ends of the bones. The cortical bands grow thicker. The transverse band near the end of the metaphysis becomes less conspicuous (Fig. 5).

The final, sixth phase of regeneration starts after one year. The callus is completely transformed. The marrow cavity develops, the structure of the

callus completely fuses with that of the metaphysis, but in some cases it remains relatively sclerosed in comparison with the osteoporotic ends of the bones. The growth zones at the distal ends of the crural bones are well outlined and their widths are the same as those on the other limb (Fig. 6).

After more than one year the newly formed metaphyseal part of the crural bones shows no more phases. The callus has now a homogeneous structure, and its borders disappear in the X-ray, the growth zone occupies the entire width of the bone (Fig. 7). The result of distraction epiphyseolysis was 4 cm

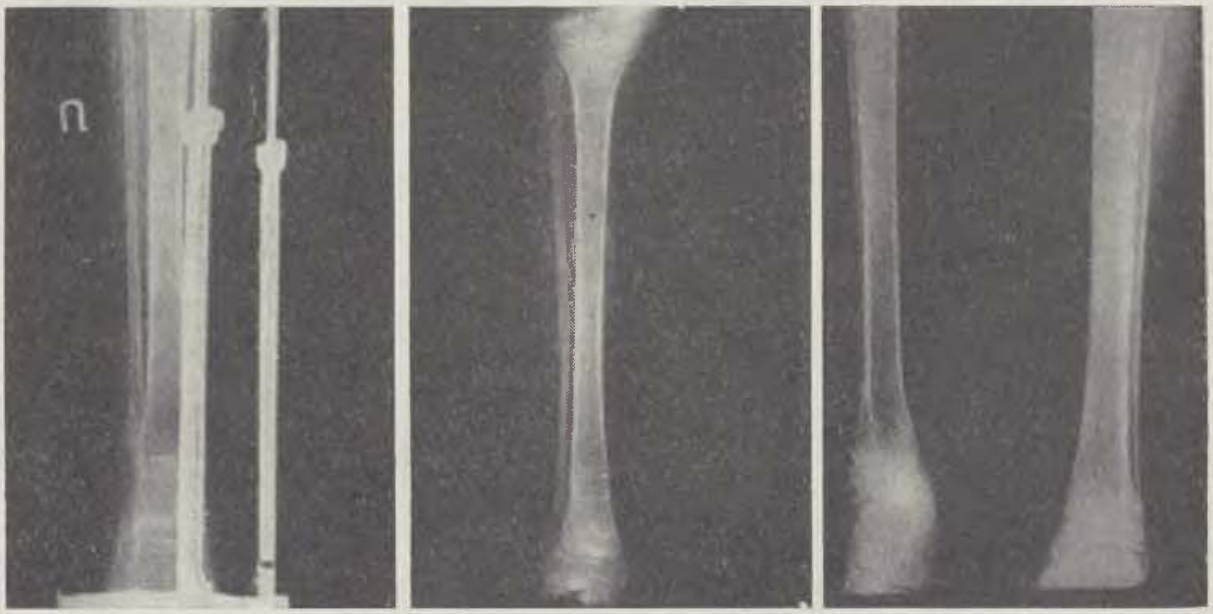

Fig. 5. Fifth phase of reparation: Thickening of cortical bands over the entire callus. — Fig. 6. Sixth phase of reparation: Full restoration of structure in callus; formation of marrow cavity. — Fig. 7. Result of lengthening checked up two and a half years after start of treatment: Callus has normal bone structure, growth zone has been preserved

lengthening in 16 patients, 5 cm in seven patients, 6 cm in seven patients and 7 cm in three patients.

Check-up of late results after five years bears witness that the trauma suffered by the growth cartilage at the distal epiphysis due to distraction, had no influence on further growth. In the subjects of this investigation in whom distraction at the level of the growth zone had been effected, no retardation of growth was ever registered. In none of the 13 patients at an age of 16 did obliteration of the growth zone take place. In another 18 patients, obliteration of the growth zone started at the usual age and took the same course as that on the other limb. Only in two patients, premature obliteration of the growth zone was observed.

Meticulous study of the radiological dynamics in the reparative process of regeneration as it takes place in the distraction gap and determination of its marked phases permits laying down the time of immobilisation in the dis-

traction device, the time of its removal and the time of weight bearing for the lengthened limb. In dependence on the rate of shortening, distraction continues to full levelling for 8—10 weeks, which corresponds to the first or second phase of the reparative process.

Immobilization of the limb in the distraction device should continue up to the start of the second phase of reparation, which corresponds to 16—20 weeks after the start of distraction. Weight bearing on the lengthened limb can be permitted after the period of completion of the sixth phase of regeneration which begins one year after the start of distraction.

The clinical and roentgenological investigation of the reparative process in the distraction gap and the analysis of late results of distraction epiphyseolysis permit us to ascribe good efficacy to this method and recommend it for use in children of an age between 12 and 15. B. K.

SUMMARY

In the present communication, the dynamics of reparative regeneration of bone at the level of the gap developing in bloodless lengthening of the leg by distraction epiphyseolysis, have been described.

Its features consist of well determined phases of the process of transformation of structure in the newly formed bone, which continue for one year. Observations made after one year have shown that no more changes take place in the callus.

The results of distraction epiphyseolysis have been checked up in 33 patients, aged between nine and 16 years. In all patients complete levelling of the shortened limb has been achieved. Distraction, though acting upon the growth zone, had no influence upon the further growth of the limb.

RÉSUMÉ

Dynamique réparatrice de la régénération osseuse après un allongement par la méthode de l'épiphyseolyse de distension

Eydelchteyn B. M., Udalova N. F., Botchkarev G. F.

On a décrit la dynamique de la régénération réparatrice dans l'espace se formant pendant l'allongement non sanglant de la tibia par l'épiphyseolyse de distension.

Les phénomènes particuliers tirent son origine du processus expressivement détaillé en phases qui s'effectue pendant la transformation de l'os nouveau créé et se passe dans l'espace d'une année. Après une année il n'y a plus de modifications dans le tissu régénéré.

Les résultats de l'épiphyseolyse de distension ont été constatés sur 33 malades de 9 à 16 ans. Chez tous ces malades, le raccourcissement de l'extrémité en question a été totalement compensé. La distension au niveau de la zone de croissance n'a pas exercé aucune influence sur l'accroissement suivant de l'os.

ZUSAMMENFASSUNG

Die Dynamik der reparativen Knochenregeneration nach Verlängerung mittels der Methode der Distraktionsepiphyseolyse

Eidelstein B. M., Udalova N. F., Botschkarew G. F.

Die Autoren beschrieben die Dynamik der reparativen Knochenregeneration in der Spalte, die sich bei der unblutigen, durch Distraktionsepiphyseolyse vermittelten Unterschenkelverlängerung bildet.

Die Eigentümlichkeiten bestehen in dem ausgeprägten Phasencharakter des Transformationsvorganges des neugebildeten Knochens, der ein Jahr dauert. Nach einem Jahr kommen in dem Regenerat keine Veränderungen mehr vor.

Ergebnisse der Distraktionsepiphyseolyse wurden bei 33 Kranken im Alter von 9 bis 16 Jahren ermittelt. Bei allen diesen Patienten wurde vollkommene Ausgleichung der verkürzten Gliedmasse erzielt. Die Distraktion auf der Ebene der Wachstumzone hatte keinen Einfluss auf das weitere Wachstum des Knochens.

RESUMEN

Dinámica de la regeneración reparativa del hueso después de una distensión por el método de epifiseolisis distensiva

Eidelstein B. M., Udalova N. F., Bochcarev G. F.

Fue descrita la dinámica de la regeneración reparativa del hueso en el espacio que se forma al ser distendida la tibia de forma no sangrienta por la epifiseolisis distensiva.

Las peculiaridades se basan en la marcada división en fases del proceso de la transformación del hueso nuevamente formado, el cual tiene lugar en el transcurso de un año. Pasado este tiempo no aparecen cambios en el regenerado.

Los resultados de la epifiseolisis distensiva fueron constatados en 33 pacientes en la edad de 9 a 16 años. En todos aquellos pacientes fue conseguida recuperación total del anterior acortamiento de la extremidad. El alargamiento en el nivel de la zona del crecimiento no ejercía ninguna influencia en el crecimiento posterior del hueso.

REFERENCES

1. **Ilizarov, G. A., Soybelman, L. M.:** Some Clinical and Experimental Data on the Bloodless Lengthening of Lower Limbs., Exp. Khir. Anestez. 4 : 27, 1969.

2. **Zavyalov, P. V., Plaksin, I. P.:** Distraction Epiphyseolysis for Lengthening of Limbs in Children. Khirurgia, 7 : 121, 1968.

3. **Eydelshteyn, B. M.:** On the Characteristics of the Force of Distraction in Bloodless Lengthening of the Leg with the Device of Ilizarov. Compression-Distraction Osteosynthesis. Vopr. sust. Pat., Sverdlovsk, V 11, 1971.

4. **Harscha, N.:** Distracting Effects Placed Across the Epiphysis of Long Bones. J.A.M.A., 179, 10 : 776, 1962.

5. **Hert, J., Liškova, M.:** The Growth of Bone After Experimental Overloading or Unloading of the Epiphyseal Cartilages. Čs. Morfol., 12, 1 : 104, 1964.

6. **Marsch, H., Adas, E., Laroia, K.:** An Experimental Attempt to Stimulate Growth by a Distracting Force Across the Lower Femoral Epiphysis. Am. Surg., 27 : 615, 1961.

7. **Ring, A.:** Experimental Bone Lengthening by Epiphyseal Distraction. Brit. Surg., 46, 196 : 169, 1958.

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COMPARATIVE EVALUATION OF TRANSPLANTATION OF HETEROLOGOUS CARTILAGE STORED FROZEN AND IN 70° ALCOHOL

Experimental-clinical investigation

V. I. PANKIN, A. M. CHIRKOVA

So far chiefly cartilage of human cadavers has been used in plastic surgery, its preparation, however, is not always possible and meets with particular difficulties. This is why great importance is ascribed to utilizing animal cartilage whose preparation is available in unlimited quantities and its conservation quite simple thanks to the progress in conservation methods.

The data published in the literature about the fate of cartilage in heterologous transplantation both in experiments and patients are still controversal (Klen, 1962; Krüger, 1964; Gibson, 1965; Burian, 1967; Kluzák, 1967; Klen et Nožička, 1969; Ilyin, 1970, and Terminasova, 1970).

The absence of an unanimous opinion about the possibility of utilizing heterologous cartilage for supporting and contour plasty has provoked the authors of this communication to carry out the following investigation. They studied the fate of heterologous cartilage conserved by freezing or in 70° alcohol, in transplantation experiments, and analysed the late clinical results of heterologous-cartilage employment, conserved in the above way.

Heterologous cartilage of calf whose age did not exceed one year was used both in experiments and on patients.

Freezing and ethyl alcohol were chosen as means of conservation, because they were the simplest ones and readily available (Krüger, 1964; Kovalenko et Yemelyanov, 1966).

The experimental investigation was carried out on rabbits to which one to four pieces of cartilage, measuring 1.5×1 cm, were implanted. Most of the transplants were covered with perichondrium, because the pieces were cut through the entire thickness of a rib. Two series of experiments were set up.

In series 1, 30 rabbits had a total of 74 pieces of cartilage, conserved by freezing, implanted, while in series 2, 25 rabbits were implanted with 61 pieces of cartilage, conserved in 70^0 alcohol. In all of these experiments, the wounds healed by first intension.

In nine of the experimental animal, it was found on palpation that some or all transplants had disintegrated. In the series 1 experiments, four rabbits showed absorption of seven out of eight cartilage pieces. In series 2, five rabbits had seven out of eleven transplants absorbed. Thus of a total of 135 transplanted pieces of heterologous cartilage, 14 (seven in each series) had undergone absorption. Two to five months after transplantation, the grafts which had undergone absorption had grown smaller and after six to twelve months they could not be found any more.

The rabbits were sacrificed at various intervals after operation (four days to three years). The transplants including the surrounding tissues were fixed in 10% formalin. After dehydration, the cartilage pieces were embedded in celloidin. The sections were stained with haematoxylin-eosin and according to van Gieson.

Histological examination showed that the structure of cartilage had been preserved from four days to one month after operation. In the central parts of the transplants, death of chondrocytes and basophilia of the matrix was ascertained. The peripheral parts of cartilage were stained either oxyphilic or slightly basophilic. In some cases, young chondrocytes lying underneath the necrotic perichondrium, had preserved their pyknotic nuclei. Around the transplants, richly vascularized granulation tissue had developed, which was infiltrated by a large number of leucocytes. At the same time, no absorption of cartilage was observed.

Later (2, 4, 6 or 9 months), degenerative changes had increased in the transplants: The nuclei of chondrocytes did not stain at all, in some cases basophilia of the central parts of the transplanted pieces had increased. In some grafts, conserved in 70^0 alcohol, parts of the cartilagionous matrix showed fraying. In both series of experiments, a connective-tissue capsule had developed around the transplants, which became fibrous with time. There were foci of lymphoid infiltration in the capsules (Fig. 1). The pieces of cartilage, on parts without perichondrium, had undergone absorption. The thus formed shallow erosions as well as the empty vascular canals on the surface of cartilage, were filled with connective tissue. Deep infiltration of vessels and connective tissue had not taken place. Where the perichondrium had been preserved between the cartilage and the surrounding tissue, the latter united with the perichondrium by spreading between the collagenous fibres of the perichondrium. At these sites, no absorption of cartilage and its replacement by connective tissue took place (Fig. 2).

In the period from one to three years, homogenization and fraying of the cartilaginous matrix took place in some cases in which grafts conserved in alcohol had been used. Calcium salt deposits were found in lacunae and the matrix of some transplants, no matter how they had been conserved. They

had the form of granules of various sizes, which in parts had fused into a compact mass, staining basophilic. In the fibrous capsule, surrounding the grafts, shallow perivascular foci of lymphoid infiltration had been preserved. The superficial parts of transplants, without perichondrium, had undergone absorption to various degrees and replacement by young connective tissue (Fig. 3). Capillaries and connective-tissue bands had grown into the superficial canals and cracks in the cartilage. The surface of transplants where the perichondrium had been preserved had not undergone absorption and showed their original contours.

Histological examination has thus shown that heterologous cartilage conserved by freezing or 70^0 alcohol is sufficiently resistent to absorption when implanted into soft tissue. Superficial absorption of cartilage and replacement by connective tissue was observed only in parts which had no perichondrium. In those parts of the transplant where the perichondrium had been preserved, the latter rapidly united with the surrounding connective tissue and absorption of cartilage did not take place.

In order to find out what kind of changes occur in cartillage due to the mode of conservation, histological examination of the cartilage pieces after different periods of conservation by freezing or 70^0 alcohol was carried out.

The results of these examinations showed that after a fortnight or one month of storage, the cartilage had preserved a structure similar to that of normal cartilage. With lengthening of storage time, after five to 18 months, signs of degeneration could be observed in the cartilage: disintegration of cells, pyknosis and weak staining of nuclei of the preserved chondrocytes, and increased basophilia of the cartilaginous matrix. In some parts of cartilage conserved in alcohol, apart from the changes referred to above, fraying of the cartilaginous matrix had taken place.

Thus the higher degree of degeneration as observed in the transplants of series 2 may be explained as a consequence of alcohol conservation. However, apart from this, no other difference in the degree of absorption has been found between transplants conserved by freezing or 70^0 alcohol.

The good results of the above experimental investigation made it possible to utilize animal cartilage in patients for reconstructive operations in the face on a wide scale. From 1953 till 1970 conserved heterologous cartilage was used in 168 patients during a total of 188 operations for various disorders and acquired defects and deformations of the face. Eighty five patients had defects or marked cicatrization of the tegumental tissues at the sites of planned transplantation of cartilage. In all cases chondroplasty was only possible after repair of the defect in soft tissues.

Calf rib cartilage was used in the form of large tissue blocks or slices of various thickness, or diced with the scalpel or chondrotome.

The observations showed that all patients tolerated implantation of heterologous cartilage well.

Postoperative complications, such as suppuration or dehiscence of wounds with removal of the implant were met with in five patients (3 %).

Table. Late Results of Transplantation of Heterologous Cartilage in Patients

Method of conservation	Number of cartilage grafts	Result		
		good	satisfactory	poor
Freezing	47	31	9	7
70° alcohol	43	54	4	15
Total	120	85	13	22

Late results were appraised by the following scheme: Good results: The cartilage had been preserved without change in its dimensions, and the deformation had remained repaired. Satisfactory results: The cartilage graft had been preserved in parts and partly absorbed, but the deformation remained repaired. Poor results: The cartilage had been completely absorbed and the deformation looked as prior to operation. Late results one to two years or even later after operation were checked up in 110 patients who had undergone a total of 120 operations (Table).

The results permit one to state that there is no difference whatsoever in the clinical employment of cartilage grafts frozen or conserved in alcohol. Neither has there any dependence of final results on the site of implantation been detected.

When analysing the late results with regard to the dimensions of the grafts, a better resistence to absorption was shown by large pieces or thick slices of cartilage as compared to small pieces and diced cartilage, no matter what method of conservation had been used. Eight of the 74 grafts modelled into large blocks underwent absorption. The remaining 66 grafts had preserved their dimensions and had not irritated the surrounding tissues during a period from one to ten years. From the 46 small or diced cartilage grafts, good results were only achieved in 19, satisfactory in 13 and poor results in 14 cases. At the same time, clinical observations showed that employment of thin slices of heterologous cartilage of the same quality as that referred to above, is justified. In 13 cases thin slices were used for the repair of residual depressions at the site of a defect covered by transfer of local tissues, pedicle skin grafts, or tubed pedicle grafts according to Filatov. Absorption of cartilage as observed clinically did not impair the cosmetic result of the operation, which may be explained by the formation of a strong connective-tissue capsule, compensating for the defect, although the cartilage graft had been absorbed or removed later.

Histological examination of eight pieces of heterologous cartilage excised on the occasion of corrective operations, has shown that the grafts, enveloped in connective-tissue capsules, had preserved their contours up to ten years after operation (Fig. 4).

Cracks and ossifications in the cartilage proved factors facilitating absorption. This, therefore, necessitates histological examination of the prepared cartilage prior to transplantation.

Thus the above experimental and clinical findings permit us to consider employment of conservation methods leading to degenerative changes in the cartilage not to impair the resistence of such grafts to absorption. This justifies one to recommend heterologous cartilage, conserved by freezing and 70^0 alcohol, as plastic material of full value. B. K.

SUMMARY

Both in experiments and on patients, calf rib cartilage, conserved by deep freezing and in 70^0 alcohol, was used for transplantation. Two series of experiments on 55 rabbits with intervals of observation ranging from four days to three years were carried out. The results of morphological examination have shown that the grafts, after implantation into soft tissues, are sufficiently resistent to absorption. Superficial absorption and replacement by connective tissue was observed in parts of the grafts which had no perichondrium. Perichondrium prevents absorption of cartilage.

Conserved heterologous cartilage was transplanted to 168 patients during a total of 188 operations carried out for various defects and deformations in the face. The late results were checked up after one to ten years in 110 patients. Good results were found in 78, satisfactory in 13 and poor in 19 patients. It has been established that the results of chondroplasty are independent of the mode of conservation and the site of implantation. Large-size implants show a better resistence to absorption than diced cartilage. Cracks and foci of ossification in the cartilage facilitate absorption.

The good results in employment of conserved heterologous cartilage on patients and in experiments permit one to recomend it for reconstructive operations in the face as plastic material of full value.

RÉSUMÉ

Evaluation comparative des résultats de la transplantation du cartilage hétérogène conservé à l'aide de congélation et en 70^0 d'alcool

Pankin V. I., Tchirkova A. M.

Dans l'expérience aussi bien que dans la clinique, on a utilisé le cartilage costal du veau conservé par une congélation profonde et en 70^0 d'alcool. On a établi deux séries d'expériences sur 55 lapins qui étaient puis observés dans l'espace de 4 jours à 3 ans. Les résultats de l'examination morphologique ont montré que les greffes implantées dans un tissu mou présentaient une haute capacité de résistence contre la résorption. La résorption superficiele du cartilage et la compensation de son tissu par le tissu conjonctif étaient observées dans les régions où le cartilage a été privé de périchondre. La conservation du périchondre empêche la résorption du cartilage.

Le cartilage hétérologue conservé a été implanté à 168 malades au cours de 188 opérations indiquées à cause de différents défauts et déformations de la face. Les résultats ultérieurs ont été constatés chez 110 malades après un à 10 ans révolus

de l'opération. Le résultat était bon chez 78 patients, satisfaisant chez 13, mauvais chez 19. On a décidé que le résultat d'une chondroplastique était indépendant de la manière de conservation du cartilage aussi bien que de la région de l'implantation. L'expérience a démontré que les greffes solides possédaient une plus grande capacité de la résistence qu'un cartilage broyé. Les fissures et l'ossification locale rendent la greffe disposée à la résorption.

Les résultats positifs obtenus pendant l'utilisation du cartilage hétérologue conservé dans la clinique aussi bien que dans l'expérience permettent de le recommander comme un matériel plastique de grande valeur pour les interventions de reconstruction de la face.

ZUSAMMENFASSUNG

Vergleichende Auswertung der Transplantationsergebnisse des durch Tiefkühlung und im 70⁰ Alkohol konservierten Heteroknorpels

Pankin V. I., Tschirkowa A. M.

Im Versuch als auch in der Klinik wurde vom Kalbsrippenknorpel Gebrauch gemacht, der durch Tiefkühlung und im 70⁰ Alkohol konserviert war. Es wurden zwei Versuchsserien zu je 55 Kaninchen zusammengestellt, die dann in der Zeitspanne von 4 Tagen bis 3 Jahren beobachtet wurden. Die Ergebnisse der morphologischen Untersuchung haben gezeigt, dass die in weiches Gewebe eingesetzten Transplantate gegenüber Resorption höchst resistent sind. Oberflächliche Resorption des Knorpels und Ersetzung seines Gewebes durch das Bindegewebe wurde in Gegenden beobachtet, in denen der Knorpel vom Perichondrium frei war. Die Erhaltung des Perichondriums verhütet die Knorpelresorption.

Den konservierten heterologen Knorpel implantierten die Autoren 168 Kranken in 188 Operationen, die wegen verschiedener Defekte und Deformationen im Gesicht indiziert waren. Die Spätergebnisse nach einem bis 10 Jahren nach Operation wurden bei 110 Kranken ermittelt. Gute Ergebnisse wurden bei 78 Kranken erzielt, befriedigende bei 13 und schlechte bei 19. Es wurde ermittelt, dass das Ergebnis der Chondroplastik weder von der Methode der Knorpelkonservierung noch von der Implantationsstelle abhängig ist. Es hat sich herausgestellt, dass dicke Transplantate gegenüber Resorption widerstandsfähiger sind als der zerkleinerte Knorpel. Risse und lokale Ossifikationen machen das Transplantat zur Resorption geneigt.

Die sowohl in der Klinik als auch im Versuch gewonnenen positiven Ergebnisse mit dem Einsatz des konservierten heterologen Knorpels erlauben es, denselben als vollwertiges plastisches Material für Wiederherstellungsoperationen im Gesicht zu empfehlen.

RESUMEN

Evaluación comparativa de los resultados del transplante del heterocartílago conservado por congelación y en alcohol de 70⁰

Pankin V. I., Chircova A. M.

El cartílago costal de ternera conservado por congelación profunda y en alcohol de 70⁰ fue empleado tanto en el experimento como en la clínica. Fueron establecidas dos series de experimentos en 55 conejos que después fueron observados durante un período de 4 días a 3 años. Los resultados de los exámenes morfológicos han mostrado que los injertos implantados en los tejidos blandos tenían gran resis-

tencia contra la reabsorción. La reabsorción superficial del cartílago y el reemplazo del tejido de la misma por el tejido conectivo fueron observados en las regiones donde el cartílago fue desprovisto del pericondrio. La conservación del pericondrio precede a la reabsorción del cartílago.

El cartílago heterólogo conservado fue implantado a 168 enfermos en 188 operaciones indicadas por varios defectos y deformaciones en la cara. Los resultados posteriores después de haber pasado un año hasta 10 años después de la operación fueron constatados en 110 pacientes. Un buen resultado se obtuvo en 78 pacientes, un resultado satisfactorio en 13, un mal resultado en 19. Fue constatado que el resultado de la condroplástica no dependía del modo de la conservación del cartílago ni siquiera del lugar de la implantación. Se mostró que los injertos fuertes tenían mayor resistencia contra la reabsorción que el cartílago pulverizado. Las fisuras y osificaciones locales hacen el injerto propenso a la reabsorción.

Los resultados positivos en el empleo del cartílago heterólogo conservado realizados tanto en la clínica como en el experimento permiten recomendarlo como material plástico de gran valor en las operaciones reconstructivas en la cara.

REFERENCES

1. **Burian, F.**: Atlas of Plastic Surgery. Prague, Government Publishing House of Medical Literature; Moscow, Medgiz 1967.

2. **Ilyin, V. A.**: Repair of Mandibular Defects with Conserved Heterologous Osseo-Cartilaginous Transplants (filings). Experimental investigation. Stomatologia, 2 : 54, 1970.

3. **Klen, R.**: Preparation and Conservation of Tissues. Prague, Government Publishing House of Medical Literature 1962.

4. **Klen, R.: Nožička, Z.**: Transformation of Heterologous Cartilage Graft from Adult Donor, Old by Measure and Biologically. Ortop. Travm., 4 : 46, 1969.

5. **Kovalenko, P. P.: Yemeylyanov, V. A.**: Conservation and Transplantation of Cartilage. Experimental-clinical investigation. Moscov, Meditsina 1966.

6. **Ter-Minasova, N. N.**: Influence of Cortisone and of Some Methods of Conservation on Implanted Heterologous Cartilage. Ortop. Travm., 5 : 53, 1970.

7. **Gibson, T.**: Cartilage Grafts. Brit. med. Bull., 21, 2 :153, 1965.

8. **Kluzák, R.**: Acta Chir. plast., 3 : 230, 1967.

9. **Krüger, E.**: Die Knorpeltransplatation. Experimentelle Grundlagen und klinische Anwendung in der Kiefer- und Gesichtschirurgie. München Carl Hanger Verlag, 1964.

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VALUES OF LA_{50} IN PATIENTS WITH BURNS OF VARIOUS AGE GROUPS

S. HÁJEK

The expression LA_{50} (lethal area 50) denotes, in accordance with Rödling (2), the extent of thermic second- and third-degree damage of the body surface, which is lethal to 50 % of patients. Essentially, this is an analogous expression to LD_{50} (lethal dose 50) which is currently used in experimental toxicology and determines the quantity of a substance after whose administration 50 % of the experimental animals die.

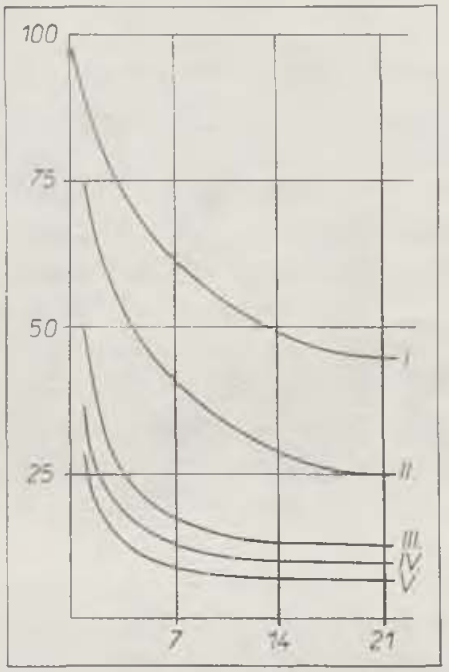
The values LA_{50} are of practical significance. They permit one to appraise the severity of the injury in the individual patient and thus make a quite exact prognosis of the sickness possible: If the percentage of thermic damage is larger than LA_{50}, a lethal outcome is more likely than in 50 % and vice versa; the probability increases or decreases with the increase or decrease in the difference between the two values. Furthermore, the suitability and intensity of medical care rendered to the patient after admission to hospital may be appraised on hand of the values LA_{50}; or by comparison of two or more burns units, it can be judged which of them is more efficient on hand of the values LA_{50}. In this way, two methods of treatment at the same unit may be compared and appraised on hand of LA_{50} and thus decided whether or not introduction of a new method or drug has led to improvement of the treatment of burns sickness; the higher the values LA_{50} for a certain age group, the better the medical care and vice versa.

The author analysed a series of 113 patients, aged between 15 and 90, who prior to death were treated at the Burns Unit in Prague and in whom the post mortem was carried out at the Institute. Their care consisted in intensive antishock treatment, aimed administration of antibiotics, local treatment of the burned skin, care of the upper airways, which was possibly augmented by administration of other appropriate drugs, in short the care which in its extent corresponded to the modern conception of treatment in burns sickness.

Because, as is well known, the chance of survival decreases with the age over 50 in an otherwise equal extent of the burned surface, the author divided the entire series into five age groups (disregarding sex differences): 15 to 50

(44), 51 to 60 (19), 61 to 70 (17), 71 to 80 (29), and 81 to 90 (24). In all patients not only the age and extent of burns, but also the survival time were registered. The extent of burns was expressed in per cent of body surface, disregarding the location of the injury.

The results thus obtained may be found in the graph on whose abscissa the time of death and on the ordinate the area of surface with second- and third-degree burns have been entered in per cent; the curves in the graph connect the same age groups.



Time of death is registered on the abscissa, the extent of thermic damage in per cent of area with second- and third-degree burns on the ordinate. The curves connect the same age groups. — I = 15—50 (n = 44), LA_{50} = 45 %; II = 51—60 (n = 19), LA_{50} = 25 %; III = 61—70 (n = 17), LA_{50} = 13 %; IV = 71—80 (n = 29), LA_{50} = 10 %; V = 81—90 (n = 24), LA_{50} = 7 %

Let us take the course of curve 15—50 as example of the actual determination of LA_{50}, at the same time being aware that an analogous procedure must be valid for the curves of the other age groups. The survival curve of the 15—50 group first runs as an exponential which changes into a straight line parallel to the abscissa after the 20th day, and corresponds to the equation y = 45. Up to the 20th day, it is possible to deduce from it the mean survival time of 45 % to 100 % burns. After the 20th day, however, the curve completely loses its function, because it does not give any information about, for example, whether a patient with 45 % of body surface burned is likely to die 20 or 20 + n days after the accident; the value "n" may then be substituted by any number. While the curve or straight line y = 45 has lost its significance in the sense of a horizontal, it has gained significance as a vertical. As a matter of fact, it still represents the average (now unchangeable)

Table

Age in years	LA (in per cent)		
	Bull-Fisher	Rodling	Hájek
15—50	44	40.1	45
51—60	24	—	25
61—70	15	—	13
71—80	9	—	10
81—90	5	—	7

Values of LA_{50} in various age groups. Comparison of the author's own results with those of Bull et Fisher (1) and Rödling (2)

of the values lying above or below it. The values above the straight line represent the higher percentage, those below the line the lower percentage of burns. Keeping in mind that the chance of death increases with the percentage of burns and vice versa, the original scale of burns percentage, as registered on the ordinate, may be substituted by another scale, expressing the chance of death; the value of the straight line $y = 45$ then represents the constant value of death probability, the so-called certain value of LA. Providing the values of deaths are arranged around the straight line so that there is an equilibrium between them and the number of equally burned patients who have survived the injury, the straight line then represents the true value of LA_{50}.

In order to verify that the determination of LA corresponds to the true value LA_{50}, i.e. of 50 % mortality, the results of this investigation were compared with those of Rödling (2) who calculated LA_{50} from 359 patients with thermic injuries for the age groups 0 to 15, 15 to 50 and 50 years and compared his results with those of Bull et Fisher (1) who did not determine LA_{50}, but analysed a series of 2807 patients and determined the death probability in dependence on the age and extent of burns. In the present investigation, the latter author's paper was used for comparison of the per cent values of burned area where in view of the age group there was a 50 % chance of death (which essentially is LA_{50}). The results of the comparison are registered in the table.

As can be seen from the table, there is complete agreement between the results, which confirms the correctness of the above assumption. At the same time, the sharp drop in LA_{50} values with the increase in age over 50 is evident; this is in full agreement with reality; prognosis of burns sickness becomes significantly worse with the increase in age, elderly people are threatened on their lives even with a smaller area of burn. B. K.

SUMMARY

LA_{50} was determined by an analysis of a series of 113 deaths from thermic injury, i.e. the extent of second- and third-degree burns leading to death in 50 % of cases. It was found that LA_{50} was 45 % of body surface for the age

group 15 to 50, 25 % for the group 51—60, 13 % for 61—70, 10 % for 71—80, and 7 % for 81—90. These values may be used for making the prognosis for a certain patient and for appraising the standard of medical care.

RÉSUMÉ

Valeurs LA_{50} chez les brûlés dans de différents groupes d'âge

Hájek S.

Suivant l'analyse d'un ensemble de 133 décédés en conséquence d'un traumatisme thermique a été établi LA_{50}, c'est-à-dire l'étendu de la brûlure du II^{e} et III^{e} degré où meurent 50 % des atteints. On a constaté que chez les sujets de 15 à 50 ans LA_{50} présente 45 %, de 51 à 60 ans 25 %, de 61 à 70 ans 13 %, de 71 à 80 ans 10 % et de 81 à 90 ans 7 % de la surface du corps. Il est possible d'utiliser les valeurs citées pour établir une prognose plus précise du sujet atteint de même que pour apprécier le niveau des soins médicaux.

ZUSAMMENFASSUNG

Werte für LA_{50} bei Verbrannten in verschiedenen Altersgruppen

Hájek S.

An Hand der Analyse einer Aufstellung von 133 Individuen, die an Folgen eines thermischen Unfalls gestorben sind, wurde LA_{50} bestimmt, d. h. der Umfang der Verbrennung des II. und III. Grades, bei welchem 50 % der Verbrannten sterben. Es wurde ermittelt, dass bei den 15—50-jährigen LA_{50} 45 % beträgt, bei 51—60-jährigen 25 %, bei 61—70-jährigen 13 %, bei 71—80-jährigen 10 % und bei 80—90-jährigen 7 % der Körperoberfläche. Die angeführten Werte können zur genaueren Bestimmung der Prognose der Verbrannten und zur Beurteilung des Niveaus der Heilpflege benutzt werden.

RESUMEN

Los valores LA_{50} en los quemados en varios grupos de edad

Hájek S.

A base del análisis de un conjunto de 133 muertos en consecuencia de un trauma térmico fue determinado el LA_{50}, es decir la extensión de quemaduras del II^{do} y III^{er} grado, en que mueren 50 % de afectados. Fue constatado que en las personas de 15—50 años LA_{50} hace 45 %, en las de 51—60 años 25 %, en las de 61—70 años 13 %, en las de 71—80 años 10 % y en las de 81—90 años 7 % de la superficie del cuerpo. Los valores mencionados pueden ser empleados para la determinación más precisa de la diagnosis del afectado y para la apreciación del nivel del tratamiento.

REFERENCES

1. **Buil, J. P., Fisher, A. J.**: A Study of Mortality in Burns Units, a Revised Estimate, Ann. Surg., 139; 269, 1954.

2. **Rödling, H.**: Objektive Erfolgsbeurteilung der Behandlung thermischer Schädigungen, Zbl. Chir. 95; 1313, 1970.

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PLASMA RENIN LIKE ACTIVITY (RLA) AND ANGIOTENSIN II LEVELS AFTER MAJOR BURNS

A Preliminary Report

R. DOLEČEK, M. ZÁVADA, M. ADÁMKOVÁ, K. LEIKEP

The release of renin by the juxtaglomerular cells is based either on a haemodynamic or humoral signal, but probably not a direct neurogenic one (Forsham, 1968). Many, if not all, of the stimuli for renin release are mediated by a common pathway which may involve alpha- and beta-adrenergic receptors. Such receptors are probably renal in origin, not dependent on renal nerves, since human transplanted kidneys show a normal renin response to stimuli which provoke renin release (Winer et al., 1969). All major burns are followed by a hypovolemia, vasoconstriction, in vitally important organs (including kidneys), centralization of circulation, and sequestration of venous blood. All the above are stimuli which tend to enhance the renin release.

When reliable methods for RLA and angiotensin II determination became available to us, we started to study the response of the renin-angiotensin system to major burns and to correlate it with other symptoms and signs and laboratory findings of an adequate fluid therapy, and electrolyte and fluid balance. We already reported about increased aldosteron levels in urine after burn (Doleček et al., 1964; 1969). Lowrey and Feller reported recently about hypertension in burned children (1971). Our preliminary results about RLA and angiotensin II levels after burns are included in this short communication.

METHODS

All blood samples of the burned patients were drawn between 07—08 a.m., into chilled tubes. All patients were recumbent, after an overnight bed rest. The RLA was measured by the method of Haber et al. (1969), angiotensin II by the method of Gocke et al. (1969), with the use of kits from SORIN, Saluggia, Italy. RLA and angiotensin II values were determined in some patients both after an overnight bed rest and after 20 min. walking. In the patients BO, SB, LA (see the table) this test was carried out on the very day when they started to walk again.

Our normal results from unburned controls (n=10) are for RLA (recumbent/upright, ± SD) : 1,5 ± 0,8/1,9 ± 1,1 ng/ml/hr, and for Angiotensin II 153,2±55,5/168,0±52,1 pg/ml. The burn index (1) represents

a point system for evaluation of the severity of burn: each per cent of third degree burn represent 1 point, each per cent of second degree burn ½ point. of second degree burn ½ point.

RESULTS

The results are included in the table.

Table. Renin Like Activity (RLA) in ng/hr and Angiotensin II (ANGIO II) in pg/ml values in plasma after major burns

Name, age, sex, extent and degree of burns	Weeks after burn							
	I	II	III	IV	V+VI	VII + VIII	IX–	
D. Z., 22, m 76%, mainly III°, 63 p.*	22,3	9,6	32,0	14,5	Died			RLA
	315	530	505	480				ANGIO II
M. M., 38, m 70%, II–III° 52 p.	19,6	–	3,8	–	3,0			RLA
	270		235		125			ANGIO II
N. A., 32, f 68%, II–III° 53 p.	13,0							RLA
	340							ANGIO II
B. O., 49, f 35%, III° 35 p.	–	–	–	–	5,8/8,8 **)	–	1,1/1,4	RLA
					650/605		185/250	ANGIO II
Ř. M., 22, m 53%, II–III° 33 p.	6,3	8,1	4,7	1,2	–	0,6/0,9	0,2/0,9	RLA
	415	660	290	355		285/400	120/125	ANGIO II
K. A., 53, m 25%, III° 25 p.	–	–	–	2,5	1,9	2,1	2,8/2,0	RLA
				375	65	472	170/145	ANGIO II
R. G., 32, m 30%, mainly III°, 25 p.	–	–	–	–	–	0,7/1,0	–	RLA
						225/350		ANGIO II
S. B., 32, m 28%, mainly III°, 24 p.	–	–	–	2,7/4,7				RLA
				400/370				ANGIO II
L. A., 42, f. 55%, II–III° 37 p.	–	–	1,9/7,0					RLA
			470/420					ANGIO II
Z. L., 13, m 30%, mainly II°, 18 p.	2,1 3,6	2,1 1,1						RLA
	235 230	450 340						ANGIO II

*) points (see text), **) recumbent/20 min. upright

DISCUSSION

The main findings of our preliminary report are:

1. After major burns, high or even very high RLA and angiotensin II levels in plasma were found, the highest levels were in the first postburn weeks

2. These high levels persisted for many days and even weeks. They decreased gradually with the improved patient's condition

3. The high RLA and angiotensin II levels lasting for weeks after burns indicate the persistance of major derangements (fluids, electrolytes, kidney function, etc.). Prolonged high levels are probably an unfavorable sign.

SUMMARY

In 10 burned subjects (with a burn index of 18 to 63 points), high or even very high renin like activity (RLA) and angiotensin II levels in plasma were found. The maximal RLA value was 32,0 ng/ml/hr, the maximal angiotensin II value was 660 pg/ml. The high RLA and angiotensin II levels persisted in severly burned patients for may days, even weeks.

RÉSUMÉ

Valeurs de la rénine et de l'angiotensine II dans la plasma en cas de brûlures considérables

Doleček R., Závada M., Adámková M., Leikep K.

Chez 10 brûlés (avec un index de brûlure de 18—63 points) on a trouvé de hautes ou même considérablement hautes valeurs de renin like activity (RLA) et de l'angiotensine II dans le plasma. La plus haute valeur RLA relevée chez un brûlé était 32,0 ng/ml par heure, la plus haute valeur de l'angiotensine II 600 pg/ml. De hauts niveaux de RLA et de l'angiotensine II survivaient chez les personnes grièvement brûlées pendant beacoup de jours ou bien de semaines.

ZUSAMMENFASSUNG

Die Werte für Renin und Angiotensin II im Plasma bei grösseren Verbrennungen

Doleček R., Závada M., Adámková M., Leikep K.

Bei 10 Verbrannten (mit einem Verbrennungsindex von 18 bis 63 Punkten) wurden hohe bis sehr hohe Werte für die renin like activity (RLA) und Angiotensin II im Plasma gefunden. Der höchste gefundene Wert für RLA beim Verbrannten betrug 32,0 ng/ml/St., der höchste Wert für Angiotensin II war 660 pg/ml. Die hohen Spiegel für RLA und Angiotensin II blieben bei den schwer Verbrannten mehrere Tage bis Wochen lang erhalten.

RESUMEN

Los valores de la renina y de la angiotensina II en le plasma en los casos de quemaduras considerables

Doleček R., Závada M., Adámková M., Leikep K.

En 10 quemados (con el índice de quemadura de 18 a 62 puntos) fueron encontrados valores elevados hasta muy elevados de la acción de la renina — „renin

like activitiy" (RLA) y de la angiotensina II en el plasma. El valor más elevado averiguado de la RLA en un quemado fue de 32,0 ng/ml por hora, el valor más elevado de la angiotensina II 660 pg/ml. Los niveles elevados de la RLA y de la angiotensina II perduraban en los gravemente quemados durante muchos días inclusive muchas semans.

REFERENCES

1. **Artz, C. P., Moncrief, J. A.**: The Treatment of Burns. 2nd. Ed., Philadelphia, Saunders 1969, p. 93.

2. **Doleček, R., Endryáš, L., Kalina, J., Klabusay, L., Tichý, A.**: Metabolic Response of the Burned Organism. Praha, SZdN 1964.

3. **Doleček, R., Endryáš, L., Kalina, J., Klabusay, L., Tichý, A.**: Metabolic Response of the Burned Organism. C. Thomas, Springfield, Ill., 1969.

4. **Forsham, P. H. in**: Textbook of Endocrinology (Ed. by R. H. Williams), 4th Ed. Philadelphia, Saunders Co, 1968, pp. 295—7.

5. **Gocke, D. J., J. Gerten, L. M. Sherwood, J. H. Laragh**: Physiological and pathological variations of plasma angiotensin II in man. Correlation with renin activity and sodium balance. Suppl. I to Circulation Research, Vols. XXIV, XXV, May 1969.

6. **Haber, E., Koerner, T., Page, L. B., Kliman, B., Purnode, A.**: Application of a radioimmunoassay for angiotensin I to the physiologic measurements of plasma renin activity in normal human subjects. J. clin. Endocr. 29, 10 : 1349, 1969.

7. **Lowrey, G. H., Feller, I.**: Hypertension in children with burns. in: Research in Burns. Ed. by **P. Matter, Barclay, T. L., Koníčková, Z.**, Bern, Hans Huber 1971.

8. **Winer, N., Chokshi, D. S., Yoon, M. S., Freedman, A. D.**: Adrenergic receptor mediation of renin secretion. J. clin. Endocr. 29, 9 : 1168, 1969.

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METHODIC EXPERIENCE WITH DETERMINATION OF ENDOTOXIN IN THE SERUM

Z. KONÍČKOVÁ, V. MATĚJÍČEK, R. VRABEC

The role of endotoxin in the pathogenesis of bacterial shock and shock conditions in general have been recently widely discussed; opinions still differ considerably. The reason is that endotoxin can be assumed in a patient only on basis of indirect haemodynamic and biochemical parameters which are sometimes very difficult to determine. These parameters are mostly obtained in animal experiments, so that their value can not always be compared to values obtained in a patient.

It should be possible apparently to define the role of endotoxin in shock by direct determination of endotoxin in the circulation of the patient, currently carried out and evaluated in relation to other parameters and to general condition of the patient. But there we meet with considerable methodical difficulties.

The "Limulus test" by Levin (1) has been a great discovery in this respect in recent years, but for the time being it is unavailable for us. In our experiments we applied another method, in which relatively high sensitivity is afforded. We used Pieroni's method (2) which is based on the principle of potentiation of the effect of endotoxin by Actinomycin D.

METHODS

1) Preliminary experiments: in groups of ten conventional albinotic female mice strain H, weight 20—22 g, endotoxin E. Coli (Sevak) was injected. Amounts from 500 μg to 0,0001 μg, simultaneously with Actinomycin D of the firm Serva Heidelberg at amounts of 12,5 and 25 μg, were applied intraperitoneally. In the control groups were administered: a) endotoxin only, b) Actinomycin only, c) endotoxin + 0,5 ml normal human serum, d) Actinomycin + 0,5 ml normal human serum and finally, e) a mixture of endotoxin, Actinomycin and normal human serum.

2) Observations: sterile blood samples from burned patients, were taken. The serum was filtered on millipore filters following centrifugation. Five samples were divided after centrifugation into two parts, of which one was filtered and the other not. After brief storage at —30 °C, 0,5 ml of the serum were injected into 20 conventional albiotic female mice together with 12,5 μg Actinomycin D. Each serum sample was administered to 2—8 mice, in average to 4 mice according to the amount of serum at our disposal.

1. In the preliminary experiments results in which we verified the sensitivity of the methods, we ascertained that Actinomycin D of the firm Serva may be toxic for mice weighing 20 gramme at a dose of 25 μg: in our experiments 3 out of 10 experimental animals died within 48 hours after intraperitoneal injection of 25 μg Actinomycin D. A dose of 12,5 μg Actinomycin was tolerated in all cases and for this reason we used this dose in the actual tests.

12,5 μg Actinomycin applied to mice simultaneously with endotoxin increased the sensitivity of mice to endotoxin, considerably. Whereas LD 50 for endotoxin E. coli (Sevak), amounted to approx. 500 μg, in our experiments at simultaneous administration of 12,5 μg Actinomycin D, already 1 μg of endotoxin established a hundred percent lethal dose. LD 50 corresponded approximately to a value of 0,1 μg of endotoxin. The increase of sensitivity to endotoxin was in our experiments markedly lower that the sensitivity increase reported by Peroni.

The addition of normal human serum immediately prior to injection, did not change the effect of endotoxin, nor of Actinomycin, nor of a combination of endotoxin and Actinomycin.

Tab. 1. Potentiation of the endotoxin effect by Actinomycin D, in animal experiment

AM D	25 μg	12,5 μg	—	—	12,5 μg	12,5 μg	12,5 μg
LPS*	—	—	10 μg	1 μg	1 μg	0,1 μg	0,01 μg
D/T	3/10	0/10	0/10	0/10	10/10	5/10	3/10

AM D = amount of applied Actinomycin D
LPS = amount of applied endotoxin
D/T = deaths of animals in relation to the total number of animals in the group

2. We examined in the actual studies the serum of 18 burned patients, mostly already in the early toxaemia stage. The serum of 4 patients was repeatedly examined. A positive result, i.e. death of the experimental animals, was recorded with the serum of 5 patients. In two of these cases, the patients had been transported in shock for a rather long distance, in a third patient the shock has been — for unknown reasons — unproportionally grave, considering the nature and relatively small extent of the burns. This was the only

patient of the entire group, in which no gram-negative microbial strains were ascertained on the wound areas. The serum of the fourth patient, which yielded positive reaction to endotoxin, was the serum of a female patient with developing sepsis, who died briefly afterwards (after exitus, pseudomonas aerug. was found in the spleen). The last sera giving a positive reaction were from a patient 5 weeks after grave complicated burn injury with massive colibacillary infection of the wound areas.

Haemocultures were negative in all the cases. Filtration of the serum on millipore filters did not influence the results: the sample which passed through the filter had the same effect as the same serum which was not filtered.

DISCUSSION

The above results correspond basically with our presumptions. Unfortunately amongst the remaining 13 patients whose serum had been examined, there were at least 2—3 patients whose condition resembled the condition of the 5 patients mentioned above, yet in spite of this, the test with Actinomycin D was negative. MacGill (3) made similar experiences in examination of cases of gram-negative infection, using an intradermal test. Several explanations of this fact may be considered. Firstly, the result of the reaction may be influenced by the actual condition of the patient at the moment of blood collection, for ex. RES condition, prior medication, etc. The individual differences in sensitivity to endotoxin, which are evident in the results of experiments with human volunteers (4), shall also have to be taken into consideration. Finally there remains the question of the specifity of the method applied and its sensitivity, which seems to be insufficient for our purposes. The results of the experiments disclosed that the Pieroni's method does not prove safely endotoxin amounts of less than 1 μg/1 ml blood. Furthermore, there are certain differences in the effectiveness of the individual doses of Actinomycin D. A further disadvantage of the method by Pieroni in clinical practice, is the relatively long duration of the test, which does not afford the possibility of instant application of the results in the therapeutical plan. Most of the other methods have similar shortcomings.

The classical method of endotoxin determination by studying the pyretic reactions in rabbit, used for drug testing, is not suitable for biologic materials, because the results may be distorted by the effect of other pyrogens. The testing of endotoxin in chick embryos is technically very demanding and not very sensitive (5). In cooperation with doctor Jelínek of the Department of Teratology at the Laboratory of Plastic Surgery, Czechoslovak Academy of Sciences, we attempted to achieve greater sensitivity of the method, by using younger embryos, but the results were not satisfactory. The sensitivity of the method did not improve even with the use of 4 days old embryos in which we ascertained some endotoxin sensitivity (contrary to literary data), because of low volume tolerance of the embryos. The results of our experiments in which we combined the application of endotoxin and normal human sera, were furthermore distorted by the teratogenic effect of human sera.

The so called Limulus test appears to be at present the most sensitive and promising method, as it even affords quantitative evaluation. It is based on gelification of the lysate of Limulus polyphemus amoebocytes, in the presence of endotoxin (1). According to literary data and to our recent experiences, the method is very sensitive: by its means it is possible to prove up to 0,0001, μg endotoxin in 1 ml blood (1, 6, 7, 8).

Because Limulus is quite unavailable in this country, this sera arthropoda is to be found only at certain localities for example on the coast of New England, the Gulf of Mexico etc.; we attempted to substitute its amoebocytes by those of some other species. The results of preliminary experiments with the haemolymph of the cockroach were negative; the only promising results for the time being were obtained with the use of the scorpion haemolymph.

H. S.

SUMMARY

The endeavour of early diagnosis of gram-negative sepsis and endotoxin shock led the authors to seek other more available methods than the Limulus test. The classical methods of endotoxin determination can mostly not be used for biologic materials and the authors selected therefore the method by Pieroni, based on the principle of potentiation of the effect of endotoxin by Actinomycin D. After testing the methods experimentally, the sera of 18 severely burned patients, were examined. Positive results were obtained with the sera of 5 patients in the stage of toxaemia, mostly with massive gram-negative wound contamination. The authors believe that the reason for the negative results in some cases of developing gram-negative sepsis, is insufficient sensitivity of the method, which does not detect less than 1 μg in 1 ml blood. The results tend to prove that the Limulus test continues to remain at present the only sufficiently sensitive method.

RÉSUMÉ

Expériences méthodiques avec le détermination de l'endotoxine dans le serum

Koníčková Z., Matějíček V., Vrabec R.

En désirant déterminer une diagnose opportune de la septicémie gramnegative et du choc d'endotoxine les auteurs cherchaient, à cause que Limulus était inaccessible, d'autres méthodes plus accessibles. Les méthodes classiques pour la détermination de l'endotoxine ne peuvent être utilisées pour la plupart en cas de matériel biologique. C'est pourquoi les auteurs ont choisi la méthode de Pieroni consistant en principe de la potentiation de l'effet de l'endotoxine par Aktinomycin D. Après avoir explore la méthodique dans l'experience, on a examiné à l'aide de cette méthode le sérum de 18 patients grièvement brûlés. Le résultat positif a été constaté chez 5 malades en stade d'une toxémie, pour la plupart s'il s'agissait d'une massive contamination gramnegative des surfaces blessées. Les auteurs trouvent la cause des résultats negatifs de certains cas de la septicémie gramnegative en stade de développement dans la méthode insuffisamment sensible par laquelle on ne peut pas jusqu'ici sûrement démontrer une quantité plus basse de 1 μg dans 1 ml de sang. Les résultats prouvent que c'est le Limulus-test qui reste seule méthode suffisamment sensitive à présent même que désormais.

ZUSAMMENFASSUNG

Methodische Erfahrungen mit der Endotoxinbestimmung in Serum

Koníčková Z., Matějíček V., Vrabec R.

Die Bemühung um frühzeitige Diagnose der gramnegativen Sepsis und des Endotoxinschocks führte die Autoren auf Grund der Unerreichbarkeit von Limulus zur Suche nach anderen, eher erreichbaren Methoden. Die klassischen Methoden zur Endotoxinbestimmung können in der Mehrzahl wegen des biologischen Materials nicht benutzt werden, deshalb wählten die Autoren die Methode von Pieroni, die auf dem Prinzip der Potenzierung der Endotoxinwirkung durch Actinomycin D beruht. Nach dem Erproben dieser Methode im Versuch wurde mittels dieser Methode das Serum von 18 schwer verbrannten Kranken untersucht. Positives Ergebnis wurde bei fünf Kranken im Toxämiestadium gewonnen, meist bei massiver gramnegativer Kontamination der Wundflachen. Die Ursache der negativen Ergebnisse der sich in einigen Fällen entwickelnden gramnegativen Sepsis sehen die Autoren in der unausreichenden Empfindlichkeit der Methode, mit der bisher nicht weniger als 1 μg in 1 ml Blut mit Sicherheit nachgewiesen werden kann. Die Ergebnisse deuten darauf hin, dass der Limulus-Test in der Gegenwart als die einzige genügend empfidliche Methode bleibt.

RESUMEN

Experiencias metódicas con la determinación de la endotoxina en el suero

Koníčková Z., Matějíček V., Vrabec R.

El empeño por conseguir una diágnosis temprana de la sepsicemia gramnegativa y del shock por endotoxina condujo a los autores a buscar métodos nuevos más asequibles, debido a la dificultad en la obtención de Limulo. Los métodos clásicos para la determinación de la endotoxina no pueden ser empleados para el material biológico en la mayoría de los casos, por eso los autores escogieron el método de Pieroni, que se basa en el principio de que se le da mayor potencia al efecto de la endotoxina por Actinomicina D. Después de ser probados los métodos experimentalmente fue examinado el suero de 18 enfermos con quemaduras graves por éste método. Un resultado positivo fue constatado en 5 pacientes en el estado de toxemia, en la mayoría de los casos en una septicemia gramnegativa amplia de las áreas de las heridas. Los autores opinan que la causa de los resultados negativos en algunos casos con septicemia gramnegativa incipiente consiste en la falta de sensibilidad del método empleado, ya que hasta el presente no puede ser determinado nada menos que 1 μg en 1 ml de sangre. Los resultados prueban que hasta el presente, el único método suficientemente sensible es la prueba del Limulo.

REFERENCES

1. **Levin, J., Tomasulo, P. A., Oser, R. S.:** Detection of endotoxin in human blood and demonstration of an inhibitor. J. Lab. clin. Med., 75 : 903, 1970.

2. **Pieroni, R. E., Broderick, E. J., Bundeally, A., Levine, L.:** A simple method for the quantitation of submicrogram amounts of bacterial endotoxins. Proc. Exp. Biol. Med., 133 : 790, 1970.

3. **MacGill, M. W., Porter, P. J., Kass, E. H.:** The use of a bioassay for endotoxin in clinical infections. J. infect. Dis., 121 : 103, 1970.

4. **Ollodart, R. M., Hawthorne, T. S.,**

Attar, S.: Studies of experimental endotoxemia in man. Amer. J. Surg., 113 : 599, 1967.

5. **Smith, R. T., Thomas, L.:** The lethal effect of endotoxin on the chick embryo. J. exp. Med., 104 : 217, 1956.

6. **Levin, J., Poor, T. E., Zauber, N. P., Oser, R. S.:** Detection of endotoxin in the blcod of patients with sepsis due to gram-negative bacteria. New Engl. J. Med., 283 : 1313, 1970.

7. **Cuveas, P., Fine, J.:** Demonstration of lethal endotoxemia in experimental occlusion of the superior mesentric artery. Surg. Gynec. Obstet., 133 : 81, 1971.

8. **Reinhold, R. B.:** Quantitative in vitro measurement of endotoxin in plasma. Rev. Surg., 27 : 450, 1970.

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PLASTY OF BREAST IN SCAR DEFORMATION AND DEFECTS AFTER DEEP BURNS

M. V. MUKHIN

A large number of papers have been published about corrective operations of the breast in macromastia, ptosis and micromastia, and the methods of breast reconstruction after radical mastectomy for cancer have been elaborated (Rees, 1961; Cholnoky, 1966; Fernander, 1970).

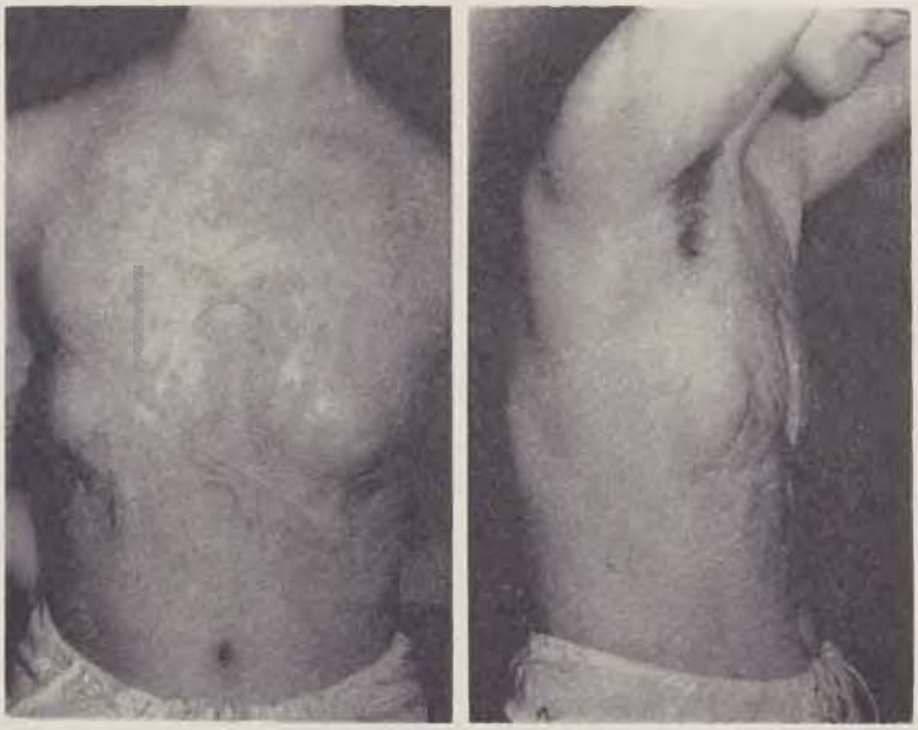

Fig. 1. Patient N. prior to operation

No description of repair and reconstruction of the breast after deep burns has been found in the literature.

The author had two patients, young women, who had suffered deep burns of the lactiferous glands in childhood, as a result of which the glands had

been partially destroyed and the breasts deformed. Both women were very much conscious of their deformity and called at the Department asking for repair of dimensions and shape of their breasts. In one of them, only one breast had suffered from the burns, and in her a plasty using a skin-and-fat flap, formed on the lateral aspect of the thorax extending to the anterior aspect of the abdomen, was performed. In the other patient, both breasts had been injured by burns, as well as the entire skin between the breasts on the anterior aspect of the thorax and the abdomen down to the umbilicus. This

Fig. 2. Patient N: On the right lateral aspect of thorax and abdomen, a big skin-and-fat flap has been formed. — Fig. 3. Patient N: Right breast mobilized and replaced to its proper position. Wound covered with skin-and-fat flap. Donor site closed by mobilization of wound edges

patient required a large amount of plastic material. Therefore a many-stage plasty using two Filatov flaps, formed at the lateral aspects of the thorax and a large skin-and-fat flap on the abdomen, was performed.

Here a short case history of both these patients:

1. Patient N., a woman aged 24: At the age of ten, she had suffered deep burns from flames on the anterior aspect of the thorax. The treatment of the burns had been carried out without employing skin transplantation. The right breast in particular became deformed as a result of long cicatrization. At the time the patient had reached the age of puberty, deformation of her right breast started to cause her severe mental suffering. In February, 1959, she called at the Department asking for repair of the deformity.

On admission, her general condition was good, there was no deviation from the norm in the findings of blood or urine. There were deep, insuf-

ficiently mobile scars on the anterior aspect of the thorax, and the right breast was deformed; the medial half and the lower pole were atrophic. The glandular tissue was replaced by deep scars. The areola was missing, but part of the nipple had been preserved. The right was much smaller than the left breast which, itself, was also slightly deformed, but most of the glandular tissue, the areola and the nipple were intact (Fig. 1a). There were no scars on the right lateral aspect of the thorax, the skin had a thick layer of subcutaneous fat and was well mobile (Fig. 1b). It was, therefore, decided to

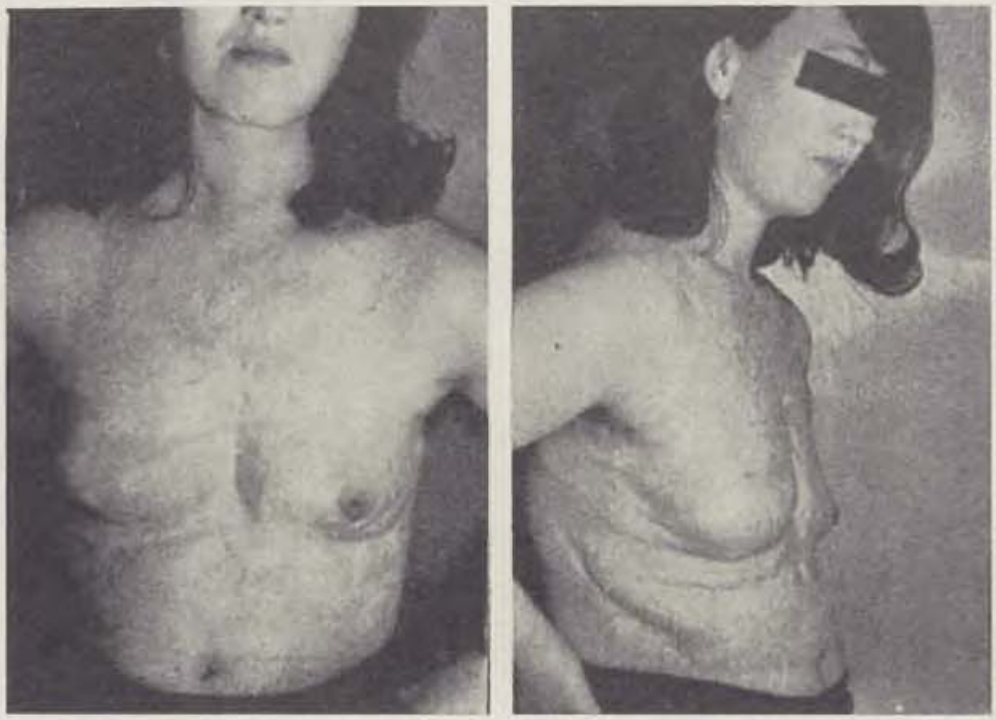

Fig. 4. Patient N: 12 years after operation. Right breast has normal shape and size. On left side of trunk, retracted scar at donor site can be seen. The patient does not mind this scar

reconstruct the deformed breast by using a large skin-and-fat flap from the right aspect of the thorax, because it seemed impossible to repair the deformity by transposition of opposing triangular flaps of local tissue which showed deep scars at the lower pole and on the medial aspect of the breast.

In February and March of the same year, under local anaesthesia, a skin-and-fat flap was formed on the right lateral aspect of the thorax, extending towards the median line of the abdomen, in three stages with an eight-day interval between each of them. The length of the flap was 28 cm, its width at the base 10 cm, and at the top 8 cm (Fig. 2). In March, 1959, under ether-plus-oxygen endotracheal anaesthesia, reconstruction of the breast was performed. A median incision was made through the scars which held the remnants of the gland and the lower pole of the breast in a displaced position, the scars were excised and the breast was then mobilized from the medial

side and shifted upwards. Thus a wound 8—10 cm in width opened. After ligation of bleeding blood vessels, the flap on the thorax was mobilized and its top transposed upwards and towards the midline. It covered the wound completely and without tension. It was, therefore, sutured to the wound edges. Rubber drains were introduced between the sutures. The donor site was sutured after mobilization and approximation of the wound edges. The post-operative period was uneventful. The drains were removed on the third day (Fig. 3). Ten days after operation, the patient was discharged.

Fig. 5. Patient R: Deformation by scarring of both breasts

She was checked up twelve years later (Jan., 1971). She was satisfied with the result of the operation. The reconstructed breast had grown considerably larger so that it was even somewhat larger than the left breast. The transplanted skin-and-fat flap had made up for the missing part of the breast (Figs. 4a and b).

2. Patient R., a woman aged 22: At the age of six, she had suffered burns from flames of the face and the anterior aspect of the thorax, which had been treated with vaseline gauze bandages. After healing, massive scars developed on the anterior aspect of the thorax, which led to deformation of the breasts. In Sept., 1962, she was admitted to the Department, asking for repair of the scar deformity in the face and breasts. Her general condition was good, and blood and urine normal. There were massive scars on the anterior aspect of the thorax, involving even the median parts and adherent to the sternum and xyphoid process. The scars had spread onto the abdomen down to the umbilicus. The medial sections of the breasts were replaced by scar tissue and drawn towards the midline. The areolae and nipples were

intact (Fig. 5). It was necessary to remove all scars from the sternum and xyphoid process, mobilize the remaining mammary tissue and reconstruct the medial parts of breasts lost by the burns. This required a large amount of tissue. It was, therefore, decided to form two big Filatov flaps on the lateral aspects of the thorax and transfer a large skin-and-fat flap from the anterior aspect of the abdomen below the umbilicus.

In Oct., 1962, under local anaesthesia, two big Filatov flaps, 18—20 cm long, were formed on both sides of the thorax, each starting from the pos-

Fig. 6. Patient R: Skin-and-fat flap formed on abdomen between umbilicus and mons pubis and between the two pedicles of tubed flaps. Donor site covered with free split skin grafts. Flap returned to donor site. — Fig. 7. Patient R. Excision of scars in regions of xyphoid process and epigastrium, scars also removed from breasts and mammae shifted laterally. Wound covered with skin-and-fat flap from abdomen. Donor site covered with two free split skin grafts

terior axillary line and proceeding in an oblique direction onto the anterior aspect of the abdomen down to below the umbilicus. Three weeks later, a large skin-and-fat flap was formed between the medial pedicles of the two tubed flaps on the anterior aspect of the abdomen between the umbilicus and the mons pubis. This flap was mobilized from its attachment to the fascia in two stages, and the donor site immediately covered with free split skin grafts, taken from the left thigh. The mobilized skin-and-fat flap was then replaced and fixed to the wound edges with a few stitches (Fig. 6). Ten days later, under ether-plus-oxygen endotracheal anaesthesia, the scars were excised from the regions of the sternum, the xyphoid process and the lower poles of the breasts, the breasts shifted laterally into their normal positions,

the skin-and-fat flap lifted from the donor site, and together with the tubed flaps transplanted onto the wound on the thorax. The free skin grafts had well taken to the donor site on the abdomen by that time (Fig. 7). Two weeks later, the lateral pedicles of the tubed flaps were transferred to the lateral parts of the breasts (Fig. 8). After another three weeks, the medial pedicles of the tubed flaps were separated from the skin-and-fat flap, the scars on the breasts were also removed, the tubed flaps split longitudinally and spread forming two skin-and-fat flaps which were implanted into the wounds on the

Fig. 8. Patient R: Lateral pedicles of tubed flaps transferred and taken to lateral parts of breasts. — Fig. 9. Patient R: Final result. Scar in midline replaced by skin-and-fat flap. Breasts freed from scars and in normal positions. Wounds at lower poles of breasts covered with spread tubed flaps, which made it possible to reconstruct breasts of normal shape and size

medial sides of the breasts (Fig. 9). In this position, the flaps were capable to maintain the breasts in normal positions, filling the gaps left after removal of tissue. All operations were well tolerated by the patient; the postoperative periods were uneventful.

In this way, the scars in the region of the sternum and xyphoid process were removed, and breasts of normal dimensions, shape and position were reconstructed.

B. K.

SUMMARY

The method of repair of a deformation and of filling a tissue defect in the breasts, which had developed in two young women after deep burns, has been described. In one patient, a woman aged 24, the deformity had involved

the right breast only. Here plasty employing a skin-and-fat flap on one pedicle, formed at the right lateral aspect of the thorax, was performed. Thus it was possible to give the breast a good shape and proper dimensions. Check-up after twelve years showed that the breast had grown in size. In the other patient, a woman aged 22, both breasts were involved. A many-stage and combined plasty using two tubed Filatov flaps, formed on the lateral aspects of the thorax, together with a skin-and-fat flap from the abdomen, was performed. The wound on the abdomen was covered at the time of flap formation with free split skin grafts taken from the left thigh. The result of the plasty was good.

RÉSUMÉ

Plastique des seins en cas de déformations par cicatres et de défauts après les brûlures profondes

Mouckin M. V.

On a décrit la réparation d'une déformation des seins existant après les brûlures profondes chez deux malades. Chez une malade de 24 ans c'était seulement le sein droit qui a été atteint. Chez celle-ci on a fait une plastique à l'aide d'un lambeau cutané-graisseux avec un pédicule sur le côté droit de la poitrine. Ainsi on a réussi à façonner le sein d'une forme et des dimensiones convénables. La malade était controlée pendant 12 ans après l'opération et pendant ce temps là le sein s'est augmenté. Chez l'autre malade c'étaient les deux seins qui ont été atteints. Dans ce cas, on a fait en plusieurs étapes une plastique combinée en utilisant deux lambeaux de Filatov façonnés sur les côtés latéraux du tronc en combinaison avec un lambeau cutané-graisseux pris de l'abdomen. Pendant le temps de la formation du lambeau cutané-graisseux la plaie sur l'abdomen était couverte par les greffes cutanées de Thiersch prises de la cuisse gauche. Le résultat de la plastique est satisfaisant.

ZUSAMMENFASSUNG

Brustplastik bei Narbendeformationen und Defekten nach tiefen Verbrennungen

Muchin M. V.

Der Autor beschrieb die Methode der Korrekturoperation bei Brustdeformation, die bei zwei Kranken nach Tiefverbrennungen entstanden sind. Bei der einen, einer 24 Jahre alten Kranken handelte es sich bloss um die rechte Brust, die verletzt war. Bei ihr wurde die Plastik mit einem Hautfettlappen an der rechten Brustkorbseite durchgeführt. Es konnte auf diese Weise eine Brust mit guter Form und Grösse gestaltet werden. Die Kranke wurde 12 Jahre nach der Operation kontroliert und es hat sich herausgestellt, dass sich die Brust inzwischen vergrössert hat. Bei der zweiten, einer 22 Jahre alten Patientin waren beide Brüste verletzt. Hier benutzte man eine Mehretappen- und Kombinationsplastik unter Anwendung von zwei Filatowschen Lappen, die an der lateralen Seite des Rumpfes in Kombination mit einem Hautfettlappen vom Bauch geformt wurden. Die Wunde im Bauch wurde in der Zeit der Hautfettlappenformung mit Thierschen Hautlappen vom linken Schenkel gedeckt. Das Ergebnis der Plastik ist gut.

RESUMEN

La plastia de las mamas en deformaciones por cicatrices y en defectos después de quemaduras profundas

Mujin M. V.

Fue descrita la metodología de la reparación de las deformaciones de las mamas originadas en dos pacientes después de quemaduras profundas. En una enferma, de 24 años, solo la mama derecha fue afectada. A la paciente se le hizo la plastia por un lóbulo cutáneo-adiposo con un pedículo en la parte derecha del pecho. Se consiguió así formar la mama a una forma y dimensiones buenas. La paciente fue controlada 12 años después de la operación y se mostró que mientras tanto la mama había aumentado. En la otra paciente, de 22 años, las dos mamas fueron afectadas. En este caso fue hecha una plastia de muchas etapas y combinada con la aplicación de dos lóbulos de Filatov formados en las partes laterales del tronco en combinación con un lóbulo cutáneo-adiposo tomado del abdomen. Durante la formación del lóbulo cutáneo-adiposo la llaga en el abdomen fue cubierta con injertos de Thiersch de la piel del muslo izquierdo. El resultado de la plastia fue satisfactorio.

REFERENCES

1. **Fernander, J. C.**: Mammary Reconstruction Immediately Following Mastectomy. Plast. reconstr. Surg., 45, 5 : 515, 1970.

2. **Rees, T. D.**: Radiation Necrosis of Chest Wall. Plast. reconstr. Surg., 28, 1 : 67, 1961.

3. **de Cholnoky, T.**: Breast Reconstruction after Radical Mastectomy. Plast. reconstr. Surg., 38, 6 : 577, 1966.

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HUMAN TAIL

M. FÁRA, J. ŠMAHEL

The protrusion in the caudal region, reminding by its localization and appearence of animal tail (Menschenschwanz, l'appendice caudal) ranks amongst rare defects. Although it does not interfere functionally or cosmetically, its removal is always insisted upon, because it is rather embarassing for the afflicted person or the parents, due to its similarity with the animal organ.

The strangeness of the finding, the resemblance with fauns and satyrs of the Greek mythology and the superstition of "the evil eye of some animal" caused this defect, to become the object of interest of the public and doctors.

We find reports in medical and anthropologic literature on the incidence of this anomaly in more than a hundred cases. The oldest reports were rather legends and only in the last hundred years were the cases sufficiently clinically and morphologically described.

The most comprehensive publication concerning this theme is probably the anthropologically orientated study by Bartels (1884). Older literatury data are also mentioned in the paper by Hennig and Rauber (1886) and in the paper by Harrison (1901). The human tail has been the object of the Thesis of the Russian author Piatnitski (1893). Tab. 1 surveys the most recent reports and findings.

CLASSIFICATION

The traditional and most frequent division of human tails into the individual types, originates from Bartels (1884). He ascertained amongst the cases published till then, 5 types of defect:

1. of real animal tail type, containing additional vertebrae (echte Tier-Schwänze),

2. stumpy types of conical shape, very much resembling the caudal termination of the embryo, they contain no differentiated bone, but their substrate ossifies sometimes (Stummelschwänze),

3. types formed only by soft tissue, with distally aimed apex, the bottom area completely grown together with the coccygeal region (angewachsene Schwänze),

4. long, thin, without any bone contents, sometimes with a twisted end — as the pig tail (Schweineschwanzform),

5. stumps of conical shape as ad 2), containing however, several clearly differentiated and ossified vertebral bodies (Stummelschwänze mit knöchernem Inhalt).

Virchow (1884), believed that 3 findings should be distinguished:

1. cauda perfecta, with multiplied vertebrae,

2. cauda imperfecta, soft tail without vertebrae,

3. different skin-stumps, resembling a tail.

DIAGNOSIS AND DIFFERENTIAL DIAGNOSIS

The prominence present since birth, should be located in the sacrococcygeal region, it should be prolonged into cylindrical or conical shape and should have the appearance of a continued vertebral column.

It is essential to distinguish in differential diagnostics various formations in the lumbar region: sacral teratoma, sacrococcygeal glioma and tumours. It is necessary furthermore, to exclude mere hairiness which is accompanying cleft of the spine regularly and which is usually called "Faun's tail" and is frequently included in this category in literature, without there being any justification for it.

CASE

Patient B. B., case history 80895, a little girl, quite healthy otherwise, from a family in which neither congenital defects nor any serious diseases, occur. Pregnancy and birth were quite normal.

The deformation was already present when the child was born.

The first examination was carried out at the age of 8. The tail was 3 cm long and of 8 mm diameter. It probably did not grow in proportion with the rest of the body, because it seemed larger to the mother after birth than later.

It was situated in the sacrococcygeal region, which was slightly above the surroundings. The tail was covered by a fine, somewhat shrunk, skin and its apex was caved in. This depression did not pass, however, into a fistule. On palpation the formation was soft, flexible and no firm resistance could be felt (Fig. 1).

X-ray examination proved spina bifida L V.

The tail was removed together with part of hypertrophic subcutis, by plain excision in endotracheal anaesthesia. The somewhat more considerable bleeding was stopped by several catgut sutures. No connection with the deep structures even via connective tissue, was ascertained.

HISTOLOGIC FINDING

The tail is formed at its apex by skin duplicature (Fig. 2), in direction to the base appears the subcutaneous layer containing fatty tissue (Fig. 3). The arrangement of the fatty tissue at the base of the extremity, is lobular. The skin surface is very uneven, with numerous folds and even crypts. The epidermis is of varying thickness, with well differentiated layers and penetrates by its papillae into the corium layer (Fig. 4).

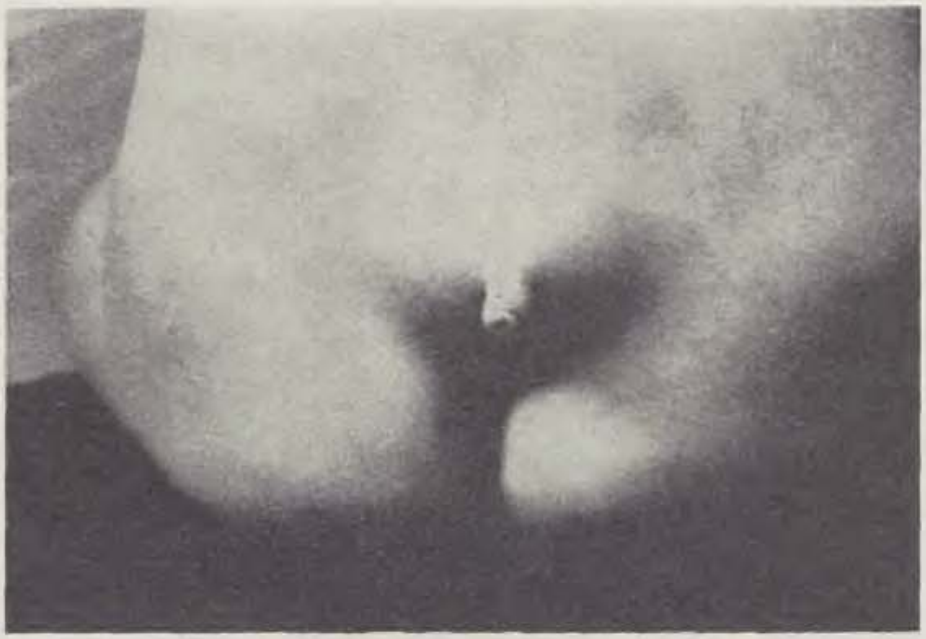

Fig. 1. Human tail — sitting patient — view from the back

The following layers are differentiated in the corium: the superficial stratum papillare sending out numerous papillae to the epidermis — and the deeper stratum reticulare. The reticular layer with coarser collagen bundles, is especially broad at the apex of the protrusion. The skin adnexes ascertained in the tail protrusion, were small hair follicles with sebaceous glands (Fig. 2, 3, 4) and eccrine- and apocrine sweat glands (Fig. 5, 6).

Smaller veins and nerves were ascertained in all specimens. No muscle fibres were ascertained in the protrusion. The surrounding skin, excised when removing the protrusion, was of the same character but no apocrine glands were found.

Foci with very numerous veins of different calibre, were present in the fatty tissue at the base of the protrusion (Fig. 7) and under the skin around it. The veins grew together at some places and their wall was differentiated. Their lumina contained free erythrocytes or haemolysed blood. Both findings were concluded by the diagnosis of arterio-venose haemangioma.

DISCUSSION

The human tail was ascertained in both sexes with about the same frequency and irrespective of race. The human tail described in our report belongs, similarly to most of the cases demonstrated on tab. 1, to group 4

Tab. 1. Survey of histologic findings in human tail.

	Number	Sex	Length in cm	Cover by normal skin	Hair follicles	Sebaceous glands	Eccrine sweat glands	Apocrine sweat glands	Fatty tissue	Significant participation of connective tissue	Skeletal muscles	Nerves	Vascular and other finding
Virchow 1880	1	♂	7,5	+	+	?	?	?	+	+	?	?	Thick-walled arteries with very numerous branches, growing in brush form in some places
Schaeffer 1890	2	♂	4 1,1	+	+	+	+	?	+	+	–	–	Numerous vessels in the first case. In the centre a stronger stripe, imposing as a thick--walled artery with organized thromb. Few vessels in the second case
Harrison 1901	1	♂	7	+	+	+	+	?	+	+	+	+	The vessels are numerous, but they show no peculiarities
Schwarz 1912	1	♂	5,5	+	+	?	?	?	+	–	?	?	A strong artery went through the centre of the processus
Rostock 1927	1	♀	?	+	+	+	+	?	+	+	?	+	Under the skin a formation composed of arteries veins and nerves. Endothelial cells accumulated in the vicinity. Perivascular lymphendothelium
Jorns 1955	1	♀	5,5	+	+	+	+	?	+	–	–	–	A distinct vascular bundle went through the centre of the processus
Parsons 1960	1	♀	4	+	+	+	+	?	+	–	–	+	Numerous vessels. Capillary haemangioma at the base of the processus
Lundberg & Parsons 1962	1	♀	2	+	+	+	+	?	+	–	+	+	Numerous vessels. Juvenile haemangioendothelium at the base of the processus
Giroud et al. 1966	1	♂	5	+	+	+	+	?	+	+	+	+	A strong nervo-vascular bundle at the attachment of the processus
Schierhorn 1968	2	♂	?	+	+	+	?	+	?	–	+	+	The processus was adherent and contained tail intestine and numerous vessels
Fára & Šmahel 1970	1	♀	3	+	+	+	+	+	+	+	–	+	Arteriovenose haemangiomas at the base and at the attachment of the processus

Symbols: + = ascertained, – = not ascertained, ? = not stated

according to Bartels (1884), or amongst cauda imperfecta according to Virchow (1884). The soft tail of several centimeters length, seems to be the most frequent form of this congenital defect. It is possible to argue with this conclusion, however, by claiming that this variety is the most striking and causes therefore the afflicted person most often to visit the doctor.

No satisfactory explanation of the forming of this anomaly has been submitted, however, so far and the effect of the possible causes is usually placed into the period of early stages of embryonic development.

The human embryo has at a length of 14 mm a clearly developed tail protrusion. Later there occurs secondary, hereditary conditioned, disappearance of this formation. The genetic factors, inducing development of the tail, may predominate in exceptional cases over the factors causing its disappearance. According to the mutual relation of both opposing factors, the persisting tail protrusion is sometimes only formed by the skin and subcutis, sometimes it may contain muscles and bony tissue. The development of the rudimentary tail, need not be combined with anomalous development of the coccyx.

We consider the incidence of haemangioma in the human tail and also in the vicinity of its base, to be a special finding departing from the above embryogenetic consideration. Hypertrophy up to malformation of the vascular system in the human tail, has been ascertained by other authors too (Tab. 1) and this tends to prove that it is not an incidental finding. The reason for the growth excess of the vessels in the human tail, is not clear. Possibly the endothelium does not submit to the general developmental inhibition of the respective region and continues to grow correlatively under the influence of growth stimuli of the organism. We are able to report from our own research a similar malformation of the vessels in a formation otherwise hypoplastic and excluded from the unit of shape and function in the central part of the lip (prolabium) in newborns with bilateral cleft (Fára-Šmahel, 1967).

H. S.

SUMMARY

The case of human tail (Menschenschwanz, l'appendice caudal) in an 8 years old little girl, is reported. It was composed of skin with adnexes and of a subcutaneous layer with fatty tissue. The finding of haemangiomas corresponding to similar findings by other authors, points to frequent malformation of the vascular system in the human tail.

RÉSUMÉ

Appendice caudal chez l'homme

Fára M., Šmahel J.

On décrit le cas d'un appendice caudal (human tail, Menschenschwanz) chez une fille de 8 ans. Celui-ci a été formé de la peau avec des annexes et de la couche souscutanée avec le tissu graisseux. Le constatation de la présence des hémangiomes corresponde avec des constatations d'autres auteurs et elle renvoie à la malformation très fréquente du système vasculaire dans l'appendice caudal.

ZUSAMMENFASSUNG

Der Menschenschwanz

Fára M., Šmahel J.

Es wurde ein Fall von Menschenschwanz (human tail, l'appendice caudale) bei einem achtjährigen Mädchen beschrieben. Der Auswuchs bestand aus der Haut mit Adnexen und aus subkutaner Schicht mit Fettgewebe. Der Befund von Hämangiomen, der mit ähnlichen Befunden anderer Autoren korrespondiert, weist auf die häufige Malformation des Gefäßsystems im Menschenschwanz hin.

RESUMEN

Apéndice caudal en el hombre

Fára M., Šmahel J.

Fue descrito un caso de un apéndice caudal (human tail, Menschenschwanz, l'appendice caudale) en una niña de 8 años. Estaba compuesto de la piel con los anexos y de la capa subcutánea con tejido adiposo. El hallazgo de hemangiomas, que corresponde con hallazgos semejantes de otros autores, muestra una malformación frecuente del sistema vascular en el apéndice caudal.

REFERENCES

1. **Fára, M., Šmahel, J.**: Postoperative follow-up of restitution procedures in the orbicularis oris muscle after operation for complete bilateral cleft of the lip. Plast. reconstr. Surg., 40 : 13, 1967.

2. **Giroud, A., Salet, J., Pernet-Robert, J.**: L'appendice caudal du nouveau-né. Arch. franc. Pédiat., 23 : 603, 1966.

3. **Jorns, G.**: Über die Schwanzbildung beim Menschen. Zbl. allg. path. Anat., 93 : 259, 1955.

4. **Lundberg, G. D., Parsons, R. W.**: A case of a human tail. Amer. J. Dis. Child., 104 : 72, 1962.

5. **Parsons, R. W.**: Human tails. Plast. reconstr. Surg., 25 : 618, 1960.

6. **Rostock, P.**: Beitrag zur Kasuistik des geschwänzten Menschen. Bruns' Beitr. klin. Chir., 138 : 657, 1927.

7. **Schierhorn, H.**: Über die Textur der persistierenden Rumpfschwanzknospe beim Menschen. Z. mikr.-anat. Forsch., 79 : 244, 1968.

8. **Schwarz, G.**: Beitrag zur Kenntnis des geschwänzten Menschen. Münch. med. Wchschr., 59 : 928, 1912.

Further references at the authors.

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SINGLE-STAGE CORRECTION OF CHORDEE AND URETHRAL PLASTY IN PENILE FORMS OF HYPOSPADIAS

G. A. PODLUZHNIY

The surgical treatment of urethral anomalies has remained one of the complicated and difficult chapters of reconstructive urology (Savchenko, 1962; Kolevatykh, 1969).

Disregarding the various methods of surgical treatment of hypospadias recommended hitherto, most urologists use skin of the penis, prepuce and scrotum as plastic material (Kulakov, 1962; Doletskiy et Korolkova, 1964; Duplay, 1880; Kronacher, 1896; Meyer, 1940; Browne, 1949). This treatment usually requires several stages, which considerably complicates surgical treatment, favours development of inflammatory processes in the urogenital organs, prolongs the stay of patients in hospital, and causes mental trauma to the patients. Therefore, diminishing the number of stages and shortening the intervals between them has become an intimate desire of all surgeons engaged in the treatment of these disorders (Savchenko, 1960).

The method of surgical treatment, as recommended by the author of this communication, is aimed at shortening the time of treatment of penile forms of hypospadias. He provides correction of chordee together with construction of the pars spongiosa urethrea from the tissues of the prepuce in a single stage.

The correction is effected by incisions encircling the glans penis at a distance of 0.5 cm from the coronary groove and one vertical incision on the ventral aspect of the penis down to the distal orifice of the urethra (Fig. 1). The urethra is dissected free and the scar tissue in the region of the cavernous bodies is meticulously excised. Instead of a vertical incision, Meyer separates the two leaves of the prepuce from a lateral incision running 0.5 cm from the edge, so as to be able to construct the lacking distal part of the urethra from the inner leaf (Fig. 2). In order to transfer the glans and the skin of the prepuce together with the constructed distal section of the urethra to the ventral aspect of the penis, an opening is made in the proximal part of the outer leaf of the prepuce, corresponding in dimensions to the thickness of the penis (Fig. 3). Through this opening, the glans penis is brought out onto the dorsal side, and the constructed urethral part, together with the outer leaf of the prepuce onto the ventral side. The edges of this opening are then sutured to the rest of the prepuce and the edges of the coronary groove. Here,

too, and exactly in the midline, the external opening of the constructed urethral part is fixed by sutures (Fig. 4). Then the proximal end of the constructed urethral part is joined to the distal end of the natural urethra (Fig. 5). Two rubber drains are laid to both sides of this connection, whose ends are brought out through additional incisions on the scrotum. The operation is

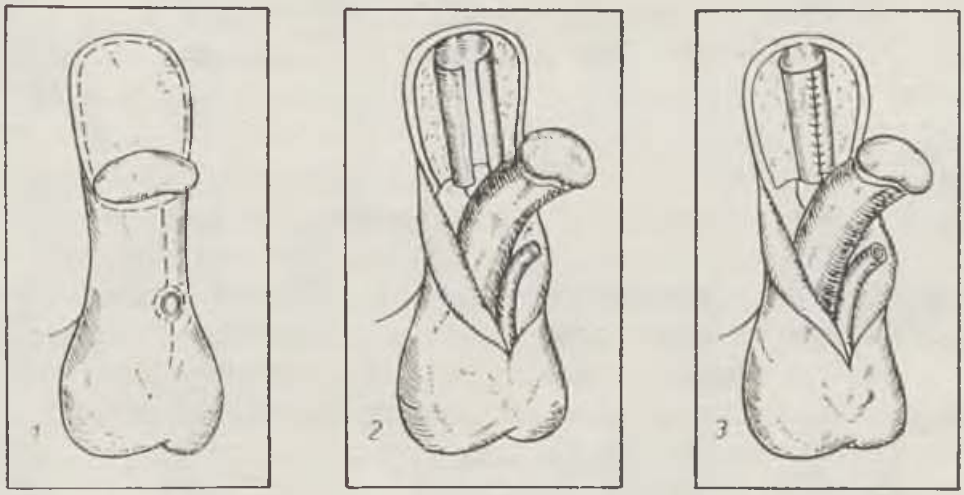

Fig. 1. Diagram of incisions for correction of chordee and formation of graft from inner leaf of prepuce. — Fig. 2. Completion of chordee correction, beginning formation of urethra from inner leaf of prepuce. — Fig. 3. Lacking part of urethra constructed and prepared for transplantation onto ventral aspect of penis

concluded by the skin sutures and fixation of the penis in hypercorrection to the skin of the mons pubis. Drainage of urine is ensured by cystotomy (Fig. 6).

The above surgical method may be employed in penile forms of hypospadias, where due to considerable chordee the orifice of the urethra is situated not lower than between the glans and the base of penis. The chief

Fig. 4. Constructed lacking part of urethra from skin leaf of prepuce and transposed to ventral aspect. Its distal end fixed to coronary groove. — Fig. 5. Anastomosing proximal end of constructed part of urethra to former orifice on natural urethra. — Fig. 6. Appearance of penis at the end of operation and after completion of skin sutures

condition for carrying out this operation is the presence of a well developed prepuce on the dorsal aspect of the penis.

In this way and under general anaesthesia, 13 patients with penile hypospadias, aged six to twelve years, were operated on. During the first 3—4 days after operation, moderate oedema developed around the wounds, which was evidence of circulatory transformation in the transposed skin flaps. The constructed part of the urethra then acquired a pink colouring and was covered with smegma in the first two or three months, which showed that the physiological properties of the inner leaf of prepuce had been preserved under the new conditions and that the transplant has remained viable.

In spite of the transplant having taken well, in seven out of the 13 patients, urethral fistulae developed at the site of anastomosis between the constructed and natural urethra. In four of these patients, this was due to suppuration at the site of anastomosis, because of insufficient passage of urine through the bladder drain and leaking of urine into the wound. In three patients, the fistulae developed due to the crossing of deep and superficial sutures at the site of anastomosis and to long errections during the postoperative period.

The above cases also furnished evidence that, apart from the factors referred to above, one of the main causes of the development of fistulae was the quality of suture material. Thus in six out of the seven patients who developed fistulae, ordinary thin catgut (No 00—000) was used, which, according to Savchenko (1962), Goodhope (1945) and Funfack et Bauer (1953), is apt to provoke considerable tissue reaction, such as oedema wich leads to tension in the sutures. In seven patients where thinner thread made of rat tail tendons had been used, a noticeable tissue reaction around the sutures was not observed, and healing proceeded in most patients (six) by first intention.

In three patients, the urethral fistulae were temporary, and closed spontaneously by the 12 th to 15 th day after operation. In another four patients, the fistulae closed after having been sutured once or twice according to the method of Kholtsov (1927), Duplay (1880) of Borchers' (1939). The patients who did not develop any complications stayed in hospital for 16 days on the average. Those who developed fistulae had to stay in hospital up to 43 days on the average.

The above clinical observation furnished evidence that the method of single-stage correction of chordee and urethral plasty in penile hypospadias favourably differs from the earlier methods not only by the fact that it can be completed in a single stage, but also that it considerably shortens the entire treatment. An advantage of the method is that the inner leaf of the prepuce is used for reconstruction of the urethra, because its structure and capacity for adapting itself to the influence of urine are similar to those of the mucous lining of the urethra.

Development of fistulae at the site of anastomosis is not connected with the surgical procedure as such, but may be explained by errors in surgical technique and the employment of unsuitable suture material (catgut).

SUMMARY

In order to shorten the time of treatment of penile forms of hypospadias, the author recommends an operation which permits combining correction of chordee with construction of the lacking part of the urethra from the inner leaf of the prepuce.

A total of 13 patients, aged between six and twelve years, were operated on by this method. The transplants took well in all cases. In seven out of the 13 patients, urethral fistulae developed, whose causes are believed by the author to be errors in surgical technique and the employment of unsuitable suture material. The above method permitted to shorten hospitalization time to 16 days on an average. In those cases, where urethral fistulae had developed, the patients remained bedridden for 43 days on an average.

RÉSUMÉ

Correction du pénis et la plastique de l'urèthre faite à la fois en cas de formes de l'hypospadias de pénis

Podlujnyi G. A.

Pour réduire le temps du traitement des formes de l'hypospadias de pénis, l'auteur propose une opération qui permet de combiner la correxion du pénis avec la formation de la partie absente de l'urèthre formée de la feuille intérieure du prépuce.

On a utilisé cette méthode pour opérer 13 enfants de 6 à 12 ans. Dans tous les cas le transplant a bien adhéré. Chez 7 de ces 13 malades des fistules d'urèthre se sont formées; leurs causes consistent selon l'auteur en fautes de la plastique opératoire et en défauts du matérial à coudre. Cette méthode permet de réduire le séjour du malade à l'hôpital à 16 jours. En cas de présence des fistules les séjour moyen au lit du malade s'est prolongé à 43 jours.

ZUSAMMENFASSUNG

Einmalige Korrektur des Penis und Plastik der Urethra bei penalen Hypospadieformen

Podluzhnyi G. A.

Um die Behandlungsdauer bei penalen Hypospadieformen zu verkürzern, empfiehlt der Autor eine Operation, die es möglich macht, die Peniskorrektur mit der Bildung des fehlenden Abteils der Urethra aus dem inneren Blatt der Vorhaut zu kombinieren.

Mittels dieser Methode wurden 13 Kinder im Alter von 6 bis 12 Jahren operiert. Das Anheilen des Transplantates war in allen Fällen gut. In 7 Fällen von den 13 Kranken entstanden Harnröhrenfisteln, deren Ursache der Autor in Fehlern der Operationstechnik und in den Mängeln des Nähmaterials sieht. Diese Methode macht es möglich, den Krankenhausaufenthalt des Kranken auf 16 Tage zu verkürzen. Wenn Fisteln entstehen, verlängert sich der durchschnittliche Aufenthalt des Kranken im Bett auf 43 Tage.

RESUMEN

La correción del pene y la plastía de la uretra efectuadas a la vez en los casos de hipospadías con alcance al pene

Podluznii G. A.

Con el fin de acortar la duración del tratamiento de la hipospadía con alcance al pene el autor propone una operación que permite combinar la corrección del pene con la formación del segmento deficiente de la uretra hecha con la hoja interior del prepucio.

13 niños en la edad de 6 12 años fueron operados por este método. El transplantado adhirió bien en todos los casos. En 7 de los 13 pacientes se formaron fístulas de uretra, cuya causa, al juicio del autor, son errores en la técnica operatoria y la imperfección del material de coser. Este método permite acortar la estancia del paciente en el hospital a 16 días. En caso de formarse las fístulas la estancia del enfermo en la cama se prolongó a 43 días.

REFERENCES

1. **Doletskiy, S. Y., Korolkova, I. A.**: Hypospadias in Children. Urologia, 3 : 6, 1964.

2. **Ziyauddinov, K. G.**: Construction of Urethra from a Flap of Prepuce in Hypospadias. Med. Zh. Uzbekistana, 10 : 75, 1966.

3. **Kolevatykh, V. P.**: Surgical Treatment of Urethral Anomalies in Children. Kuybyshev, 1969.

4. **Kulakov, G. P.**: On the Treatment of Hypospadias. Proceedings of Republican Conference of Urologists of the Ukrainian Soviet Socialist Republic, Kiev 1962, p. 118.

5. **Savchenko, N. Y.**: Experience with the Treatment of Hypospadias. Proceedings of Scientific Conference of Belorussian Government Post-Graduate Medical School, Minsk, 1960.

6. **Savchenko, N. Y.**: Hypospadias and its Treatment. Minsk, 1962.

7. **Kholtsov, B. N.**: Special Urology. Leningrad, 1927 : 322.

8. **Borchers, E.**: Epidermis-Harnröhrenplastik bei schweren Hypospadieformen. Derm. Chir., 11, 20 : 713, 1939.

9. **Browne, D. B.**: An Operation for Hypospadias. Proc. roy. Soc. Med., 42, 7 : 466, 1949.

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THE OLDEST PRESENTATION OF CLEFT LIP IN CZECHOSLOVAKIA

J. ČERVENÝ

A rather interesting wood-carving by an unknown artist, is deposited at the Spiš Museum in Levoča. It presents a twin monster of a female child, with clearly marked bilateral cleft of lip and jaw.

The town of Levoča is world renowned by its artistic monuments. The famous master in wood-carving Pavel of Levoča worked there early in the 16th century. He created the late gothic wing altar for the parish-church of St. Jacob in Levoča, the largest of its kind in Europe. After the death of master Pavel (in 1542 at the latest) the tradition of artistic wood carving did not become extinct in the town. It is to the disciples and followers of Pavel, that we owe the masterpiece of wood-carving of the child monster, which presents cleft lip and jaw for the first time. We even know the exact time of its creation.

According to Hain's chronicle, a child was born in Levoča on 19. 7. 1554, with two heads but one body only. The child was stillborn, the father was Ondrej Szutor and the mother Margit, née Öbelsová. In connection with the birth, a prophesy was made which the writer of the chronicle also recorded that "Levoča shall have two mayors — two heads of the town". The prophesy was actually fulfilled, because there were two mayors at the head of the town of Levoča in one year — Kletschko and Windeck. Both entries prove that the birth of the deformed child had raised extraordinary attention in the medieval town and this explains also, why the unknown wood-carver had recorded its exact appearance for the future. Due to the entry in Hain's chronicle, we are able to state the date of the origin exactly between the 19th—21st of July 1554.

The statue was carved by a masterful hand from one piece of linden-wood, the size is 28×17 cm, the anatomic proportions are perfect and the pathologic-anatomic deviations are expressively recorded. It is evident from the photograph that it is a monosymmetrical form of ischiopagus, with the lower extremities on one side fusing into one (ischiopagus tripus) and the external

genital on that side missing. The trunks of both individual parts are lying in one axis, with the heads at the opposite ends. There is one common pelvis, the lower extremities and genital (female) are only formed on one side. There is one common anal opening. The right hand of one part has only a thumb and three fingers.

Fig. 1. The Levoča ischiopagus tripus — total view

On both heads is a perfect demonstration of bilateral cleft of lip and jaw with prominent incisive bone, flattened tip of the nose and typical deformation of the apex cartillage.

The wood-carving in Levoča is a rare, realistic presentation of malformation of the foetus in medieval European pictorial art and for the time being, the oldest known work of this type on the territory of Czechoslovakia.

H. S.

Fig. 2. Front view of the head — Fig. 3. Head from profile view

SUMMARY

A wooden statue of a twin child monster — ischiopagus tripus, with a realistic presentation of bilateral cleft of lip and jaw, with the exact date of its creation, is deposited in the Spiš Museum in Levoča. The statue was created in 1554 by an unknown wood carver, apparently a disciple of master Pavel of Levoča. It is the oldest of its kind in Czechoslovakia.

RÉSUMÉ

La plus ancienne image de la fente de lèvre en Tchécoslovaquie

Červený J.

Dans le musée de Spiš à Levoča se trouve une statuette de bois représentant un monstre binaire de l'enfant — ischiopagus tripus avec la fente bilateraire de la lèvre et du maxillaire présentée avec un réalisme absolu et précisement datée. Elle a été créée en 1554 par un sculpteur en bois inconnu qui était peut être le disciple du maître Pavel de Levoča. C'est la plus ancienne découverte unique en son genre en Tchécoslovaquie.

ZUSAMMENFASSUNG

Älteste Abbildung der Lippenspalte in der Tschechoslowakei

Červený J.

Im Zipser Museum in Levoča befindet sich eine kleine Holzstatue einer Kinderdoppelbildung — ischiopagus tripus — mit realistischer Darstellung de Lippen- und Kieferspalte mit genauer Datierung. Gebildet wurde die Statue im Jahre 1554 von einem unbekannten Holzschnitzer, anscheinend einem Schüler des Meisters Pavel von Levoča. Der Fund ist der älteste dieser Art in der Tschechoslowakei.

RESUMEN

La representación más antigua de la fisura del labio en Checoslovaquia

Červený J.

En el museo de Spiš en Levoča está colocada una estatuita de madera que representa un monstruo binario de niño — ischiopagus tripus, con figuración realista de la fisura bilateral del labio y del maxilar, con fecha precisa. La estatuita fue hecha en el año 1554 por un tallista desconocido probablemente por un discípulo del maestre Pablo de Levoča. El hallazgo es el más antiguo de la especie en Checoslovaquia.

REFERENCES

Hain, C.: Zipserische oder Leütschaverische Chronica, ed. Levoča 1910.
Homolka, J. et al.: Majster Pavol z Levoče, Bratislava 1961.

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Acknowledgement: I should like to thank the employees at the Spiš Museum in Levoča for the kindness of affording me the possibility of elaborating their exhibit.

NEWS

Section of Plastic Surgery in USSR

In Nov., 1961, a Section of Plastic Surgery was organized at the Pirogov Surgical Society in Leningrad, USSR, Prof. T. Y. Aryev, V. G. Vaynshteyn, V. I. Golovin, A. V. Vorontsov, A. A. Limberg, A. A. Kyandsky, M. V. Mukhin (as chairman) and Y. B. Chuprina (as secretary) were nominated as members of its Executive Committee.

The first session of the Section convened on Jan. 9th, 1962. Afterwards the Section convened regularly every month except in the holiday months of July and August. During ten years, a total of 100 sessions were held with 113 lectures and 293 demonstrations of patients. In these lectures and demonstrations, plastic operations of the most variform localizations were dealt with.

At the 101st session (Jan. 11th. 1972), regular elections of the Executive Committee were held, which led to its being composed of Profs. B. D. Kabakov (as chairman), L. F. Volkov, M. V. Mukhin (vice-chairman), L. R. Balon, G. V. Golovin, V. A. Dunaevsky, A. A. Limberg, V. I. Petrov, A. T. Titova and S. S. Tkachenko, Dr. Med. Sc. as members, A. V. Klemenko (as referendary) and A. G. Mamonov, Dr. Med. Sc. (as secretary).

The proceedings of the Section's sessions were regularly published in the journal "Vestnik Khirurgii imeni I. I. Grekova". Prof. M. V. Mukhin

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The Czechoslovakian Society of Plastic Surgery and the Slovakian Society of Plastic Surgery, organised at the occasion of the twentieth anniversary of the foundation of Plastic Surgery in Košice and the twentyfifth anniversary of the foundation of the Faculty of Medicine in Košice, on April 6th 1973 in Štrbské Pleso an All-state Symposium of Plastic Surgery.

The Department of Plastic Surgery in Košice was entrusted with the chief organisation and selected a very suitable and interesting theme: "Research and Plastic Therapy of Malignant Skin Tumours". The departmental group organized the special as well as the social, part of the Symposium, very well indeed.

More than 100 participants met at the Symposium — they were specialists from several branches, predominantly plastic surgeons, oncologists, radiologists, dermatologists, otorhinolaryngologists and specialists from other related branches.

The chairman of the Slovakian Society of Plastic Surgery, Prof. Š. E. Demjén, M.D., opened the Symposium and greeted simultaneously the celebrating Department. After him, the vice-dean Doc. Kohút, M.D., CSc., welcomed the Group of the Department of Plastic Surgery in Košice, on behalf of the Faculty of Medicine, P. J. Šafařík University, Košice. He evaluated the work of the Group at the Department carried out

in the past and still carry out at present, he evaluated its political profile and the possibilities of further improvement in the branch. He stressed the work of the Head of the Department of Plastic Surgery in Košice Doc. A. Kipikaša, M.D., CSc., who by his untiring work and organisational abilities, also established conditions affording the Department of Plastic Surgery in Košice the possibilities of universal development.

In the introduction to the Symposium, a welcoming speech to the participants of the Symposium, was delivered by Doc. A. Kipikaša, M.D., CSc., at the same time informing briefly on the 20 years history of Plastic Surgery in Košice.

Further speeches were held by Prof. V. Karfík, M.D., DrSc., Prof. V. Kubáček, M.D., CSc., wishing the Group of the celebrating Department much health and success in the further work.

The press and the radio also expressed their interest in the work of the Group of the Department of Plastic Surgery in Košice.

Some very valuable and even outstanding sectures were delivered in the further course of the Symposium, in its special part, in the beautiful environment of the giant Slovakian mountains.

The first half of the special part was dedicated to malignant skin tumours in the wider sense of its meaning, the second half was concerned with problems of melanoblastomas. Altogether 19 lectures were delivered, after which a very rich and fruitful discussion ensued, with very valuable contributions.

Prof. V. Kubáček, M.D. CSc., evaluating the Symposium in conclusion, expressed his pleasure about the manifold participation of the specialists, who were solving this nasty and often insiduous disease, from many aspects. The specialists agreed upon the fact that the therapy of skin tumours requires mutual information by related branches and that the correct conclusions and the correct procedures can be decided on basis of these informations.

The Symposium afforded the participants not only ample about the clinic of malignant skin tumours and about the different possibilities of their therapy, but also pointed out correct procedures by team work in research and therapy of malignant skin tumours.

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V. I. Pankin, A. M. Chirkova

COMPARATIVE EVALUATION OF TRANSPLANTATION OF HETEROLOGOUS CARTILAGE STORED FROZEN AND IN 70° ALCOHOL

Experimental-clinical investigation

Fig. 1. Cartilage conserved in alcohol four months after implantation. A connective-tissue capsule has developed around the graft with a lymphoid infiltrated. Microphoto, magn. 40× — Fig. 2. Transplant of heterologous cartilage, conserved in alcohol, with preserved perichondrium. Eight-and-a-half months after operation. No absorption of cartilage has taken place. Microphoto, magn. 40×

Fig. 3. Invasion of connective tissue into superficial parts of transplant without perichondrium. Graft was conserved by freezing. Two years after transplantation. Microphoto, magn. 100× — Fig. 4. Rib cartilage of calf, conserved in alcohol, ten years after transplantation into orbital defect in a patient. Cartilage removed during corrective operation without its capsule. Chondrocytes dead, but general structure of cartilage has been preserved. Microphoto, magn. 40×

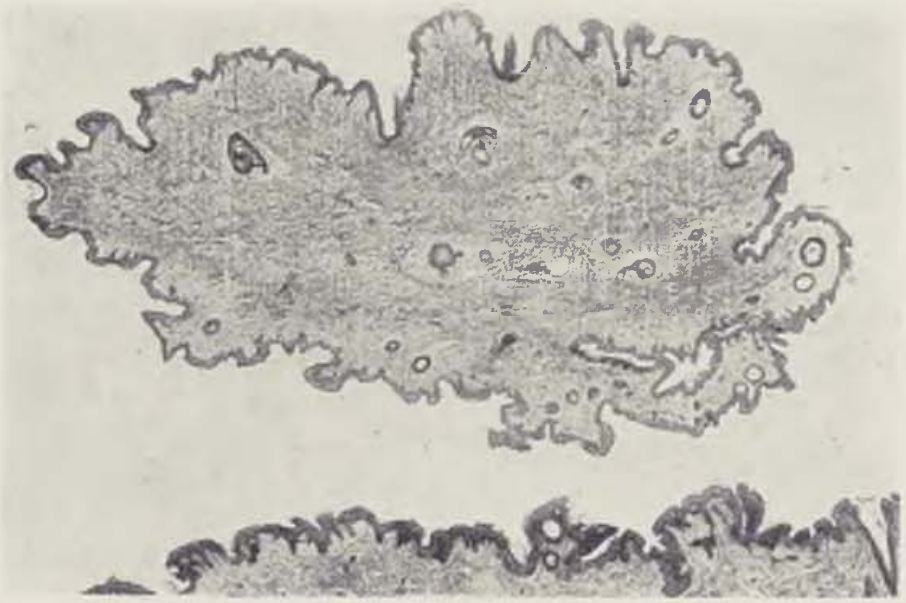

Fig. 2

Fig. 2—8. Histologic finding in the individual parts of the removed human tail

Fig. 3

Fig. 4

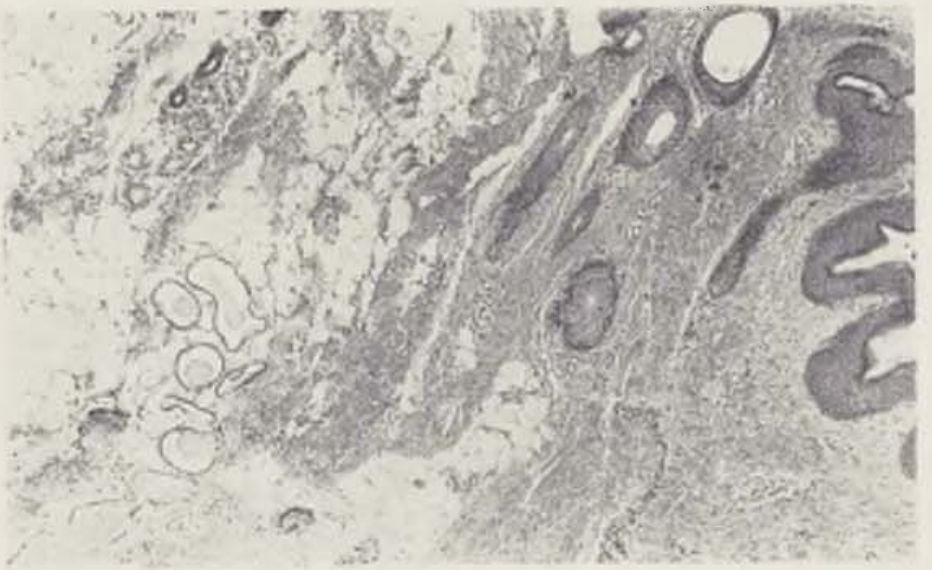

Fig. 5

Fig. 6

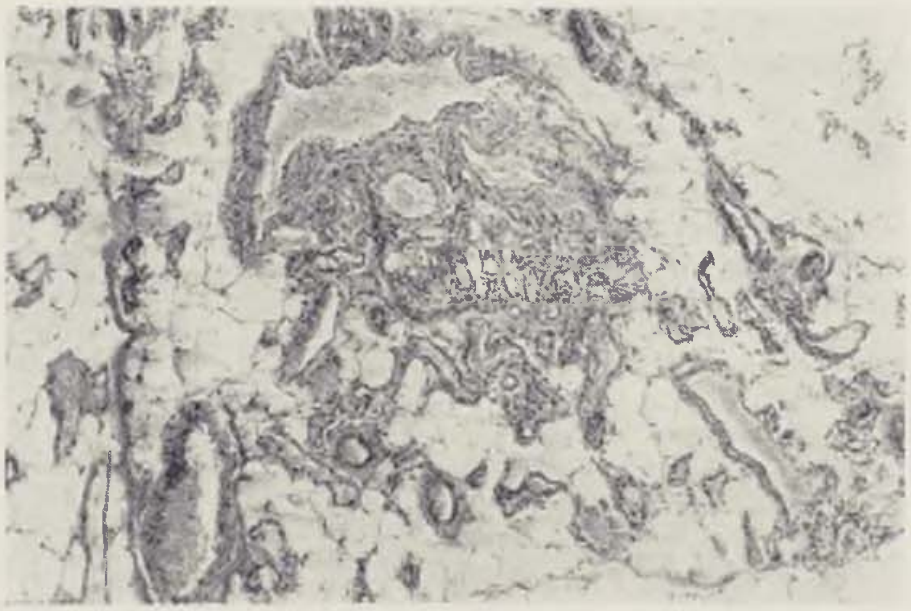

Fig. 7

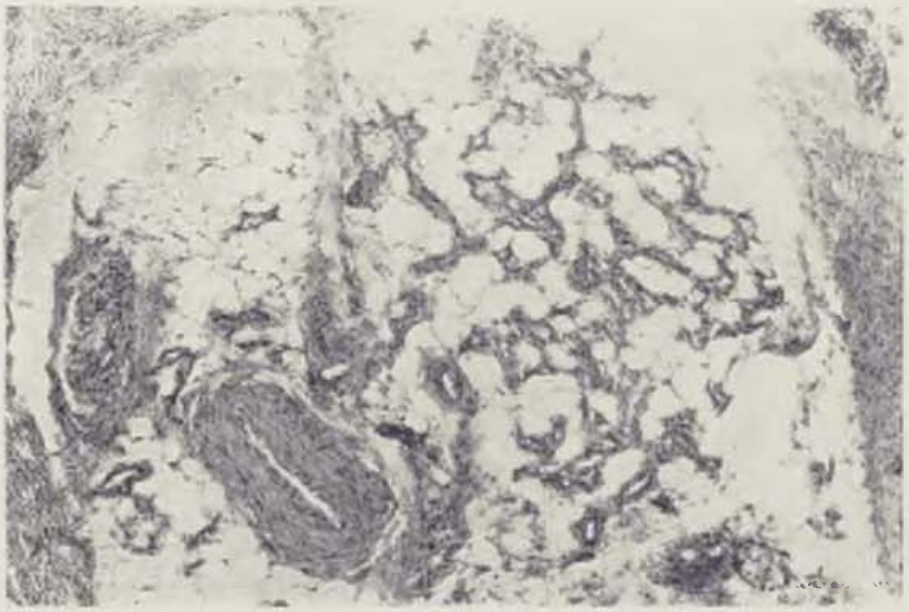

Fig. 8