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JAN EVANGELISTA PURKYNĚ — THE SCIENTIST AND HUMANIST

E. DUNGELOVÁ, L. BAŘINKA

"The physician's task is not merely to restore life or to preserve it for a brief period of time but also to protect it from damage and to bring it to consummate perfection and beauty. Medicine will not become fully ac-

Jan Evangelista Purkyně

1787 1987

complished in all its parts until — so long as this is possible given so great a variability and adverse effect of external forces — it has come to teach how to strengthen the fragility of the human organism, how to protect against damage and prevent diseases, until it has learnt to meet those tasks so as to

make sure that human life, once it has been well conceived, should in all its periods, with each individual in the proper confines well adapted to society and to himslef, be blissfully and wonderfully prolonged until the natural end".

This is how, 164 years ago, Jan Evangelista Purkyně, a naturalist and physiologist of world renown, whose bicentenary will be commemorated on December 18, 1987, formulated with admirable foresight his programme of preventive medicine.

At a time far from idyllic for the Czech nation, a time marked by police terror, physical poverty of the poorest classes, and by a moral breakdown of the bourgeois society, Purkyně devoted all his life and work to scientific progress to advance the Czech national spirit and the human community in general.

He spent his early childhood at Libochovice, in the unmolested atmosphere of the well-to-do family of his father, the administrator of the Dietrichstein estate. Sure, his father's sudden death did mean the advent of worries for the family, but luckily the family's friends helped to place the boy in the Piarist monastery at Mikulov where he was able to complete his grammar-school education and to become a novice of the Piarist order in 1804. In the following year, he left for the town of Litomyšl to complete his education with a two-year Piarist course of "philosophy" a kind of college education preparatory for higher university learning.

This was an important milestone in young Purkyně's early career, a period when he began to realize not only his talent but also his determination to pursue the road of free learning instead of the prescribed forms of thought.

In keeping with his changing world outlook, he decided to discontinue his membership of the Piarist order and, after a few years of work as a tutor of Baron Hildprant's son, he enrolled as a student of natural sciences at the medical faculty in Prague. In the first few years he spent most of his time studying anatomy and physiology, though he never neglected any of the theoretical sciences. In 1818, he defended his doctoral dissertation "Contributions to learning about vision from the subjective aspect" to reach his degree of doctor of medicine and to take up the post of assistant and prosector of anatomy and physiology in Prague.

Purkyně's particular emphasis on empirical learning, well noticeable in his dissertation, was stimulated by his excellently developed capability for self-observation. Many experiments of this kind made him realize that by observing one's own sensations one could immediately learn to know some of the details of the sense organs make-up and function otherwise detectable only through meticulous anatomical research.

As a young qualified doctor, he showed keen interest in physiology, studying the phenomena of vertigo and in 1820 publishing his first observations of the effect of drugs. His pharmacological studies of emetine, belladona, digitalis, opium, camphor and other substances yielded a wealth of new knowledge even though now they are valued mainly for their contribution to the study of sub-

jective states. However, he was the first to describe and present evidence of the fact that one drug may influence the effect of another.

In 1822, Purkyně was appointed to the chair of physiology and pathology at the University of Wroclaw, and the following year, having defended his habilitation thesis, he qualified as university professor.

He started his career there by continuing his research of subjective visual phenomena which he summed up in Part II of his "Contributions to learning about vision from the subjective aspect". This study contains, among other things, descriptions of what are known as galvanic phosphenes, definitions of the range of the field of vision for different colours, the discovery of the colour blindness of the peripheral parts of the retina, a description of changes in the relative brightness of colour patches in dim light — now referred to as Purkyně's phenomenon — and accurate observations of pseudoimages.

Soon afterwards, he turned his interest on to new subjects. His study of the bird egg resulted in the discovery of the embryo and in an account of the development of the egg membranes, later on highly valued in embryology.

In 1828—1830, he studied in detail the structure of plants to identify some of the basic types of cells with evidence of these being characteristic of the genus and species. His main contribution to the cell theory in the plant kingdom lay in his discovery of the cell as the basic element of the structure and differentiation of each individual. His study was an act of pioneering in that he combined physiology with comparative morphology. In appreciation of this, the French Academy awarded him the Prix Montyon.

The late 1820s and the early 1830s were for Purkyně an exceptionally fruitful period enrichted, moreover, by his deeply affectionate family life. Soon, however, this family harmony was to be broken by a series of severe losses. During a mere three years both his daughters died, then his mother and then his wife, too, the most tragic blow of all. He drew comfort from his two young sons, Emanuel, a future botanicist, and Karel, who later grew to become a well-known artist, and then, of course, intensive scientific work which helped him see through the period of great grief.

With his students to help him, he continued his microscopic research which he had started in 1832 when he acquired a large achromatic microscope regarded then as one of the best. He studied the structure of bone, cartilage, tooth, mucous membrane, the heart, vessels, nerves and other tissues. His salient discoveries of the time included the results of his microscopic study of the structure of the nervous system. Examining diverse parts of the brain and the spinal cord, the grey matter, he found granular nucleated formations, the nerve cells, discovered previously in the nerve nodes of invertebrates and in the spinal ganglia of birds. He described and made drawings of several types; one of them, the large cells of the cerebellar cortex, have since been known as Purkinje's cells. He also contributed greatly to our knowledge of the other element of the nervous tissue, nerve fibres. His microscopic discoveries boosted the development of modern microscopy.

At the 1837 Prague Congress of natural scientists and physicians, he formulated, ahead of Schwann, the main ideas of the cell theory.

R. Heidenhain rightly described Purkyně's institute at Wroclaw as the "cradle of histology".

In the 1830s, at the height of his fame as scientist, Purkyně spare no effort to make physiology, already an independent science, become independent of anatomy also in terms of organization. In 1831, he submitted his first proposal for the establishment of an institute of physiology but eight years were to elapse yet before he saw the idea materialize, on a very modest scale, too.

In the 1840s, Purkyně's career took a conspicuous turn when he came to realize the need for creating in the Czech lands conditions conducive to the development of a sound base for science. He resumed his keen interest in problems of education and in making scientific knowledge available to the lay public. Back in 1821, in co-operation with Jan Presl and Josef Jungmann, he co-founded the first Czech scientific journal "Krok".

On his return to Prague where he was appointed professor of physiology at the Prague medical faculty, he launched his own natural science journal "Živa", and, in 1862, the "Journal of Czech Physicians" which has been appearing since. He was elected the first chairman of the Society of Czech Physicians and he began to develop his second institute of physiology, this time in Prague.

At an age when people as a rule seek tranquility and solitude he grouped around himself young co-workers and through his own example and effort he gave a powerful impulse to the development of Czech natural sciences. He strove to have Czech introduced at the medical faculty as a language of instruction equal to German, to restore the Czech national university. He came forward with a bold conception of a Czech Academy, the supreme national scientific institution, the concentrate the mainstream of research work.

He became one of the leading personalities of the Czech national revival movement, an individuality whose creative efforts stimulated the emergence of new talent to ensure the future of Czech science.

He died on July 28, 1869, and his funeral became a dignified demonstration of Czech nationhood.

J. E. Purkyně occupies a place of extraordinary importance in the history of 19th century European science. Not only for his brilliant scientific discoveries but also because he realize far more acutely than many of his contemporaries the social responsibility of scientists. He gave deep thought to how best science, medicine and technology should serve man's material and spiritual advancement.

Purkyně was a philosophical idealist. However, throughout his life there were two concepts struggling in him — the spontaneously materialistic outlook arising from his work as an experimental scientist, and the idealistic one arising from his religious education and enhanced by his studies of German idealistic philosophy.

He lived a full life of his time. All his work radiates optimism stemming from his certitude about the need for forging ahead, about the need for progress.

In that sense, he set an impelling example for all of us to follow.

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TREATMENT OF CHILDREN WITH DYSPLASTIC DEFORMITIES OF THE LIMBS

A. A. KORZH, N. S. BONDARENKO, S. D. SHEVCHENKO, A. K. POPSUYSHAPKA

Deformities of the limbs of various origin in children are encountered quite frequently, but the well-known methods of their correction do not always ensure good results (M. A. Berglezov and L. I. Samoylova, 1976; Halski and Woyko, 1978). Of particular scientific and practical interest are deformities of the limbs based on dysplastic affections of the bones where disturbances of growth and development of the skeleton are especially manifest (M. V. Volkov, 1983; Marafioti and Westin, 1977; Spranger et al., 1974). The main object of the treatment is to influence not only the focus of affection to achieve anatomical and functional restoration of the respective segment, but also to create conditions for subsequent normal growth of the limb. In connection with the introduction of the compression-distraction method of treatment into broad clinical practice, this subject has become still more topical at present (V. L. Andrianov and V. A. Morgun, 1976; M. V. Volkov and V. A. Morgun, 1982; M. V. Volkov, 1983; G. A. Ilizarov et al., 1975).

While exhibiting unquestionable advantages over other methods correcting deformities and levelling the length of the limbs, the compression-distraction method also promoted additional tasks requiring accumulation of knowledge and experience to bring into line the possibilities of the compression-distraction apparatuses and the ability of growing children's bones affected with dysplastic processes to regeneration depending on the localization and variety of dysplasia, the character of operative intervention, the peculiarities of managing the postoperative period, etc. There is need for further detailed investigation of problems, such as the suitable age of the children for starting correction of the deformities and elongation of the limbs, the admissible extent of elongation in connection with the impaired ability of the bone affected with dysplasia to the processes of regeneration, the rates of distraction and the terms of fixation, the preferable time for starting the locomotor function and supporting weight, the difference in the processes of reparatory regeneration in dependence on the variety of dysplasia, the level of osteotomy with regard to the pathological focus, etc.

It has not been the object of the present work to answer all the questions mentioned; we only present some results of treatment of deformities of the limbs in individual varieties of dysplastic disorders of the bones in children.

Experience gained in the pediatric department of our institute shows that deformities of the limbs caused by widespread and localized displastic processes take rather an important place in children's orthopedic pathology. In the last 10 year, for example, a total of 123 patients (3.4 %) with deformities of the limbs were under our observation. Their etiology was as follows: Blant's disease — 51 patients; Madelung's disease — 11; imperfect bone formation — 18; fibrous dysplasia — 16; exostotic chondrodysplasia 13; achondroplasia — 6; Ol'e's disease — 8. Taking into account the involvement of several segments and repeated operations in the children, a total of 169 surgical interventions were carried out. The treatment of deformities in this category of patients is characterized by a certain complexity connected with trophic disorders of tissues, weakened mechanical properties of the bones, and the extensiveness of the pathological processes (Keyl, 1971; Spranger et al., 1974).

In patients with localized forms of dysplasia and essentially real possibility of simultaneous elimination of the deformity and liquidation of the pathological process, the treatment can be radical. In widespread forms of disease, where it is impossible to free the patients completely from their multiple pathological foci, measures are taken, limited to as much as the restoration of the axis and levelling of the length of the individual segments or of the whole limb.

Among the localized epiphyseal dysplastic disorders, the Erlacher-Blant diseases and Madelung's deformity were encountered most frequently. To eliminate the deformity in the Erlacher-Blant disease, we performed incomplete transversal osteotomy of the proximal tibial metaphysis below the epiphyseal cartilage with subsequent correction of all the components of distortion using the Ilizarov or Kaliberz apparatuses. On the basis of a comparative analysis of results of treatment of this pathological condition with the aid of one-time corrective osteotomy and subsequent immobilization of the limb with plaster bandage, and the method using compression-distraction apparatuses we prefer, like many other authors, the compression-distraction method of treatment (V. L. Andrianov nad V. A. Morgun, 1976; M. V. Volkov and V. A. Morgun, 1982; M. V. Volkov, 1983; G. A. Ilizarov et al., 1982). This intervention was indicated when the deformity exceeded 25—30°. The advantages of the compression-distraction method in this deformity are obvious. Firstly, incomplete cortical osteotomy in the metaphyseal zone near the epiphysis does not require wide baring of the metaepiphysis of the tibia as it is the case in complete circular osteotomy increasing the traumatic effect of the intervention. Secondly, the treatment using the distraction method offers the possibility of gradual and complete correction of all the components of the deformity with the implementation of regular clinical and X-ray controls at all stages of the therapeutical process. Correction of a multilateral periarthric deformity using a one-time intervention conceals the danger of incomplete correction. Thirdly, along with the elimination of the angular deformity during distraction, stability of the knee

joint is normalized thanks to restoration of the region of the medial tibial condyle. Redundant pathological mobility in the knee joint is preserved after one-time corrective osteotomy even following successful operations; this is not observed in patients treated by the compression-distraction method.

Lately, surgical intervention in bilateral dysplasia has been performed simultaneously in both extremities in order to shorten the period of treatment. We have used this strategy successfully in 5 children; starting from the 3rd—4th week, the could walk with the apparatuses on both legs. This permitted considerable shortening of the period of treatment and precluded overloading of one of the limbs which may occur when dysplasia is removed in stages, first in the one extremity and then in the other. The good results obtained in all children suffering from the Erlacher-Blant disease confirm the high effectiveness of the compression-distraction method in treating the mentioned condition, which has solved many problems encountered on the way to complete anatomical and functional restoration of the extremities, both in the early and late periods of observation.

Madelung's deformity is treated byl low metaphyseal osteotomy of the radius with its subsequent elongation and correction of the deformity of the forearm. Attention should be paid to the level of osteotomy which should approach the top of the deformity as much as possible. In the proximal section of the forearm, both bones are fixed by needles, in the distal section, they are just inserted into the epimetaphysis of the radius. It is more safe to fix each of the bones by separate needles at different levels. It is advisable to introduce the needles, fit the apparatus and accomplish distraction in supine position of the forearm to ensure straightening of the interoseous membranes, which is an important element preventing limitation of the functions of pronation and supination. In all cases, the hand was fixed by 2 crossed needles inserted from the side of the metacarpal bones II and V. Hereby the deformity was removed and the length of the radius was restored, the dislocation or subluxation of the ulnar head disappeared. However, in children the operation should be performed in adolescence to prevent relapse of the deformity. Excellent and good immediate and late results of treatment were obtained in all patients, undoubtedly surpassing those obtained after corrective osteotomy of the radius alone without its elongation, and all the more so as compared with the always undesirable resection of the head of the radius (Nielsen, 1977).

The second largest group consisted of 18 children aged 9—16 with imperfect bone formation. Surgical treatment was considered indicated in cases where, apart from distortion of the lower limbs, the children were able, though not for a very long time, to stand and walk. The basic principle of treatment of these patients was the restoration of correct axis of the lower limbs and gradual, dosed involvement of the improved extremity in functional load. All deformities of one or both limbs were corrected simultaneously.

As a rule, we performed corrective osteotomy with intramedullar fixation and alloplasty using long corticospongy grafts covering bone sections at all

levels. In cases of clearly expressed deformities of many years' standing it was necessary to resect a certain portion of bone as emergency measure to achieve complete correction of the segment where the soft tissues were shortened on the concave side of the extremity. A month after operation, the patients were made to stand on crutches in plaster bandage and the load was gradually increased. Common periods of fixation with change of plaster bandage were 3—5 months. Positive results were obtained in 15 out of 18 patients operated. Partial relapses of deformity and delayed processes of consolidation were observed in 3 patients.

In 16 patients with polyaxial or monoaxial forms of fibrous dysplasia, deformities of the thigh and the crus predominated. In connection with expressed arched deformities, multiple pathological fractures and, in some cases, the presence of Looser's transformation zones at the top of the deformity, we performed segmental osteotomy with correction of the axis of the segment and fixation of the fragments using bone allotransplants in combination with ceramic or metal cores. In 2 patients, segmental corrective osteotomy was performed simultaneously in the region of the thigh and the crus, in the remaining patients on one these segments. The external fixation was ensured by plaster bandage for a period of 3—5 months until transformation of the transplant and its merging with the maternal fragments was accomplished. After plaster immobilization, orthopedic apparatuses were prescribed until complete transformation of the structure of the bony tissue, restoration of continuity of the cortical layer and the bone-marrow canals was obtained. In 2 patients, simultaneous removal of deformity and elongation of the involved crus by 7 cm was performed with the aid of Ilizarov's apparatus.

In 6 patients with achondroplasia, bilateral varus deformity of the lower limbs was corrected simultaneously with their elongation. These patients exhibited a typical clinical picture of the disorder. Their age was from 7 to 15 years. A total of 17 operations were performed on 12 segments using Ilizarov's apparatus. The experience of treating these patients has demonstrated that it is advisable, by means of incomplete osteotomy of the thigh and the crus, sometimes at several levels, with subsequent application of compression-distraction apparatuses to correct all the limb at a time, with gradual improvement and elongation of each of the segments. For the period of distraction, the knee joint was fixed by means of bars to prevent its overstraining, but subsequently, we switched the apparatus at this level to a hinged juncture permitting movement in the knee joint. In all the children, elongation of the lower limbs ranging between 10 and 15 cm was achieved with simultaneous correction of the varus deformity. The periods of formation of the distraction regenerate did not differ from those in children with normal structure of the bones and lasted 3—5 months in all.

In 8 patients with deformities on the basis of dyschondroplasia of the type of Ol'e's disease, we performed simultaneous elongation and correction of deformity of the thigh and the crus on 8 segments. The elongation of the thigh and the crus was accomplished by means of Ilizarov's apparatus at the expense

of foci of cartilaginous dysplasia after their preliminary resection. Simultaneously, we removed a varus deformity in the lower third of the thigh and a valgus deformity in the upper third of the crus. The total elongation of both the thigh and the crus was 14 and 15 cm, in 2 other patients it was 8—10 cm only concerning the crus. In 3 patients aged 13—16, the results of treatment were positive. In one girl aged 7, a large regenerate was obtained, consisting of pathological cartilaginous tissue which was subsequently distorted in spite of prolonged fixation in the apparatus. During further growth of the patient, the shortening became manifest again in view of the predominant growth of the other, healthy limb.

In 13 children with multiple localization of exostotic chondrodysplasia, correction and elongation of one shortened ulnar bone was performed to remove displacement of the hand and luxation of the head of the radius. When treating distortion of the hand on the basis of exostotic chondrodysplasia with shortening of the affected ulna, corrective osteotomy with subsequent elongation was carried out. The radius was brought down until it was set. This led to the correction of the deformity, levelling of the length of the forearms and improvement of the function of the cubital joint by removing the luxation of the head of the radius. When this intervention is carried out at an early age (up to 6—7 years) the possibility of relapse of deformities is not excluded.

It can thus be concluded that in cases of localized Erlacher-Blant's and Madelung's epiphyseal displasia, correction of the axis and restoration of the length of the tibia and the radius enhance further anatomical and functional development of the extremities since after periarthric osteotomy, unlike distraction epiphyseolysis, the growth zones are preserved and continue their active functioning. The processes of bone transformation and the periods of forming distraction regenerates in these deformities do not substantially differ from those in correcting and elongating bones in patients not suffering from dysplastic processes. The treatment of a limb deformity connected with the spread of dysplastic disorders of the skeleton is distinguished by the fact that in systemic affections, such as fibrous dysplasia and Ol'e's disease, the process of correcting the deformity in itself does not show any direct pathogenetic effect on subsequent development of the limb since the pathological focus continues existing and can progress after completion of the patient's growth (Keyl, 1971). In all the varieties of diaphyseal, physeal and epiphyseal cartilaginous dysplasia: achondroplasia, Ol'e's disease, exostotic dyschondroplasia as well as in Erlacher-Blant's and Madelung's deformities, we performed corrective osteotomy and applied distraction apparatuses. In imperfect bone formation and fibrous dysplasia, we performed plastic operations of the bones using plaster immobilization, except for 2 patients in whom levelling of the length of the limbs with the aid of Ilizarov's apparatus was necessary along with the correction of deformities.

The observations demonstrate that the bony tissue in systemic dysplastic affections is capable of regeneration though it does not produce more mature cellular elements at the stages of correction and distraction. However, the le-

velling of the limb and normalization of its length are accompanied by a positive clinical effect and approach the functional activity of the limb to conditions enhancing transformation of the morphological structure of the pathologically changed portion of the bone. According to results reported by V. L. Andrianov and V. A. Morgun (1976), the pathological cartilaginous tissue in Ol'e's disease under the effect of tension was also rebuilt, ossified and transformed, its separate foci were wrapped up in the regenerate. These processes continued for at least a year and were frequently concluded by formation of sufficiently solid bone. In this connection, on the basis of our experience, the correction of deformities and levelling of the length of the limbs in imperfect bone formation, cartilaginous and fibrous dysplasia, should be considered fully justified regardless of the deep disturbances of growth and development of the skeleton. As the mentioned authors point out, the patient sufferring from the respective condition frequently requires many-stage treatment. It is often necessary both to operate on different segments of the limb and to repeat the intervention on a segment operated on earlier. This would be connected not only with a residual non-compensated shortening of the affected limb, but also with prolonged retardation of its growth. When choosing indications for the correction of limbs in systemic affections of the skeleton in children, even the slightest possibilities of correcting deformities should be utilized; it is advisable to stimulate the processes of regeneration using plastic bone surgery.

SUMMARY

The authors report their experience with the treatment of 123 patients with dysplastic affections of the bones due to Blant's disease (51 patients), Madelung's deformity (11), imperfect bone formation (18), fibrous dysplasia (16), exostotic dysplasia (13), achondroplasia (6), and Ol'e's disease (8 patients). A total of 169 operations were performed. In order to correct deformities and level the length of the limbs in all the varieties of diaphyseal, physeal and epiphyseal chondrodysplasia, corrective osteotomy with the aid of compression-distraction apparatuses according to Ilizarov or Kaliberz was carried out. In imperfect bone formation and fibrous dysplasia, plastic operations of the bones with plaster immobilization were used more frequently than compression-distraction apparatuses. Clinical, X-ray and pathomorphological observations have shown that the bony tissue in systemic dysplastic disorders at the stages of correction and distraction is capable of regeneration despite the fact that it does not produce more mature cell elements. Levelling and normalization of the length of the limbs, approaching their functional activity to conditions enhancing transformation and ossification of pathological foci, leads to good clinical results.

RESUME

Traitement d'enfants atteints de difformités dysplastiques des membres

Korzh, A. A., Bondarenko, N. S., Chevtchenko, S. D., Popsuychapka, A. K.

Les auteurs énoncent leurs expériences du traitement de 123 malades atteints de lésions dysplastiques des os, dues à maladie de Blant (51 malades), à maladie Madelung (11 malades), à formation imparfaite des os (18), dysplasie fibreuse (16), dysplasie exostosante (13), achondroplasie (6) et maladies d'Ol (8 malades). Totalement, on a exécuté 169 opérations. Ayat pour but la réparation de difformité et une égalisation de longuer des membres de tous les types de chondrodysplasie- diaphysaire, physaire, épiphysaire-, nous avons exécuté une ostéotomie de correction, en utilisant des appareils à compression-distraction selon Ilizaroff ou Kaliberz. Dans les cas de formation imparfaite des os ou de dysplasie fibreuse, nous avons plus fréquemment effectué les opérations plastiques sur les os avec immobilisation plâtrée aux appareils à compression-distraction. Des observations cliniques, radiologiques et pathomorphologiques témoignent une faculté de régénération des tissus osseux chez des lésions dysplastiques, au stade de correction ou de distraction, bien que ces tissus forment de élements cellulaires moins mûrs. L'égalisation et la normalisation de longueur des membres mènent aux résultats cliniques positifs, puisqu'elles rendent aux membres une fonction adéquate aux conditions favorisantes la transformation et l'ossification des sieges pathologiques.

ZUSAMMENFASSUNG

Die Behandlung von Kindern mit dysplastischen Deformierungen der Gliedmassen

Korzh, A. A., Bondarenko, N. S., Schevtschenko, S. D., Popsujschapka, A. K.

Die Autoren beschreiben ihre Erfahrungen bei der Behandlung von 123 Patienten mit dysplastischen Deformationen der Knochen infolge der Bland'schen Krankheit (51 Patienten), der Madelung'schen Krankheit (11 Patienten), einer unvollkommenen Ausbildung der Knochen (18 Patienten), fibröser Dysplasie (16 Patienten), exostoser Dysplasie (13 Patienten), Achondroplasie (6 Patienten) und der Ole'schen Krankheit (8 Patienten) Insgesamt wurden 169 Operationen ausgeführt. Zwecks Besserung der Deformation und Ausgleichung der Länge der Gliedmassen bei allen Typen der diaphysalen, physalen und epiphysalen Chondrodysplasie haben wir eine korrektive Osteotomie unter Anwendung kompressiv-distraktiver Apparate nach Illizarav oder Kaliberza vorgenommen. Bei einer unvollkommenen Knochenbildung sowie bei fibrösser Dysplasie haben wir häufiger als kompressiv-distraktive Apparate eine plastische Knochenoperation und Gipsverbandimmobilisierung angewendet. Klinische, röntgenologische und pathomorphologische Beobachtungen haben gezeigt. dass das Knochengewebe bei einem dysplastischen Betroffensein des Systems im Stadium der Korrektion und Distraktion sehr wohl einer Regeneration fähig ist, auch wenn sich keine reiferen Zellenelemente bilden. Der Ausgleich und die Normalisierung der Länge der Gliedmassen führt dadurch zu einem positiven klinischen Ergebnis, dass sich ihr Funktion den Bedingungen nähert, die eine Transformation und Ossifikation der pathologischen Lager unterstützen.

RESUMEN

Trataminto de niños con deformaciones displásticas de extremidades

Korzh, A. A., Bondarenko, N. S., Schevchenko, S. D., Popsuychapka, A. K.

Los autores aquí mencionan sus experiencias por el tratamiento de 123 enfermos con las afectaciones displásticas de huesos en base de la enfermedad de Blant (51 enfermos), enfermedad de Madelung (11 enfermos), de la formación imperfecta de huesos (18), de displasia fibrosa (16), de displasia exostosa (13), de acondroplasia (6) y de la enfermedad de Ole (8 enfermos). En total realizaron 169 operaciones. Con fin de la corrección de la deformación y equilibración de la longitud de las extremidades en todos tipos de la condrodisplasia diafisal, fisal y epifisal efectuamos la osteotomía correctiva usando a los aparatos compresivo-prolongados según Ilizarov o Kaliberz. En casos de la formación imperfecta de hueso y de displasia fibrosa en vez de los aparatos compresivo-prolongados más amenuda empleaban las operaciones plásticas de huesos y la inmovilización de yeso. Las observaciones clínicas, radiológicas y patomorfológicas muestran, que el tejido de hueso en casos de las afectaciones de sistema en el estadio de la correción y la prolongación está capaz para regeneración, aunque no crea a los elementos celulares más madurados. La equilibración a la normalización de la longitud de las extremidades nos conduce a un positivo resultado clínico por aquel obstáculo, que su función aproxima a las condiciones, las que apoyan la transformación y la osificación de focos patológicos.

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MICROSURGICAL TECHNIQUE USED IN THE FORMATION OF A STUMP CAPABLE OF BEARING WEIGHT, AND APPLICATION OF PROSTHESES

A. N. KEYER, K. K SHCHERBINA

Amputation is a mutilating operation, and so a thoughtful approach to the removal of the limb is receiving the greatest consideration and support.

Syme (1842) worked out in detail the technique of leg amputation using a flap of the calcaneal region of the sole and was the first to perform this operation on a patient. Plastic bone amputation of the leg according to Pirogov formed the basis for a fundamentally new trend in plastic surgery of the bone and the doctrine about creating stumps of the lower limbs capable of bearing weight. During the last 130 years, the operation according to Pirogov demonstrated its vitality and there was no need to defend it.

Using the skin of the plantar surface of the foot is an important feature of both operations, so it is necessary to dwell upon this original construction. Of particular signicifance is the structure of the subcutaneous elastic adipose tissue, resistant to friction and pressure. Tietze (1921) discovered, in the subcutaneous adipose tissue of the skin on the plantar surface, elastic fibrous partitions forming compartments filled with fat. Each fatty compartment is completely isolated from the others. At the top, the fibro-vascular bundles are attached to the heel bone and the plantar aponeurosis and, at the bottom, to the skin proper.

Large part of the partitions is V-shaped, being attached with the open end to the heel bone and the fibrous aponeurosis while the other part of the fibres proceeds in spiral and oblique directions, strengthening the former. Kuhns (1949) noticed that the semiliquid fat in the compartmens is under pressure and, when load is put on, acts as hydrostatic buffer; he demonstrated that the compartments change their form, not however volume, under the effect of pressure, but that both their form and size return to the initial when the load is removed. The above mentioned arrangement was also observed by the above mentioned authors in the skin of the plantar surface of a human embryo.

The investigations of A. V. Rozhkov (1964) have shown that here are no substantial differences in the structure of the skin of the plantar surface of the foot in its calcaneal and medial sections.

The examinations of the skin of the plantar surface carried out by the present authors jointly with Prof. N. M. Anichkov (Leningrad Sanitary-Hygienic Medical Institute) on 38 preparations also confirmed the absence of fundamental differences in the structure of the skin not only of the posterior and medial, but also the anterior part of the sole.

Our investigations thus fully agree with the conclusions of the mentioned authors.

The experience with replantation after the loss of lower limbs, gathered in the years 1960—70, demonstrated the expediency of replantation of large segments of the lost lower extremity and proposed, as its alternative, considerate operations during which, instead of the whole extremity removed, most frequently a flap from the plantar surface of the foot is replanted with the purpose of preserving the length of the separated limb and of creating a sensitive stump, capable of bearing weight (A. N. Keyer et al., 1983; J. B. Jupiter et al., 1982).

Further development of N. I. Pirogov's idea is the method of amputation using microvascular technique proposed by A. N. Keyer et al. (1983) in cases of loss and crushing of the lower limbs with complete interruption of the neurovascular connections. The core of the method lies in the excision of a calcaneoplantar flap from the separated part of the lower limb using a circular section right below the ankles. An artery, two veins, and a nerve are separated from the posterior tibial neurovascular bundle and are anastomosed with vessels and nerves of the stump of the lower extremity. The stump prepared in such a way exhibits a considerable degree of terminal weight-bearing capacity owing to the calcaneoplantar skin, this permitting rehabilitation of the patients with the use of prostheses of lightened constructions, improvement of the conditions of locomotion and reduction of disability. A shortcoming of the method described is increased hazard of venous thrombosis of the calcaneoplantar flap due to unbalanced return of venous blood from the transplant through the concomitant veins of the posterior tibial artery. Clinical observation is reported.

In the man patient M., aged 52, admitted to the clinical department of our institute (RIPAL) for late consequences of an open bone fracture of the leg (crus) with deen trophic changes and pseudoarthrosis in the lower third, amputation of the left crus in the upper third with autotransplantation of the calcaneoplantar flap to the end of the stump using the above mentioned method was carried out on May 30, 1984. We succeeded in isolating the nerve up to the level of the amputation and microanastomoses were performed between the posterior tibial artery of the flap and the same artery of the stump and between the paired veins of the flap and the same vein of the stump by means of a V-shaped microanastomosis under a surgical microscope, using a 8-0 nylon thread. The heel bone was fixed to the section of the tibia using Ilizarov's apparatus.

Good arterial blood supply to the transplant was observed in the postoperative period but partial necrosis occurred as a result of venous thrombosis and 50% of the flap were lost. After removal of the heel bone, the defect in the soft tissues at the end of the stump was covered with the remaining portion of the plantar flap. At present, 16 months after operation, the patient walks with the aid of a prosthesis of the leg (crus) supported on the end of the stump. Sensitivity of the flap has not been restored to full extent in spite of the fact that the integrity of the nerve has not been impaired.

The relative failure in this case induced us to ensure balanced blood supply to the transplanted complex of tissues by using a large subcutaneous vein rather than the deep veins entering the posterior tibial neurovascular bundle. A new tongue-shaped incision with its top 5—7 cm above the medial ankle was proposed, designed to incorporate the subcutaneous vein into the flap in order to ensure venous return (Fig. 1). The observation is presented.

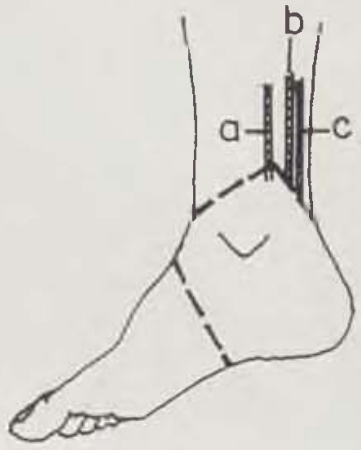


Fig. 1. Sketch of the incision on the foot and the crus. a — v. saphena magna, b — a. tibialis posterior, c — v. tibialis

In the man-patient D., aged 31, admitted to the department for chondrosarcoma of the proximal metepiphysis of the left tibia (Fig. 2), amputation of the left thigh between its medial and lower third with autotransplantation of the calcaneoplantar flap to the end of the stump was performed on June 20, 1984. Using the above mentioned incision, the calcaneoplantar flap with the posterior tibial neurovascular bundle, a large subcutaneous vein and the peroneal nerve was isolated from the foot and the leg. The vessels and nerves were laid bare to the medial third of the crus and resected. After amputation of the thigh, the flap was fixed to the section of the femur by means of 3 needles, after which microanastomoses were performed between the subcutaneous vein of the flap and the subcutaneous vein of the stump of the thigh, and between the posterior tibial artery of the flap and a branch of the deep femoral artery using a surgical microscope and 10—0 nylon thread. The pero-

neal nerve was sutured with the anterior femoral cutaneous nerve, the tibial nerve with the tibial portion of the ischiadic nerve in the stump using a 8—0 nylon thread (Fig. 3). The heel bone was fixed to the section of the femur by

Fig. 2. Patient D. X-ray picture of the left knee joint

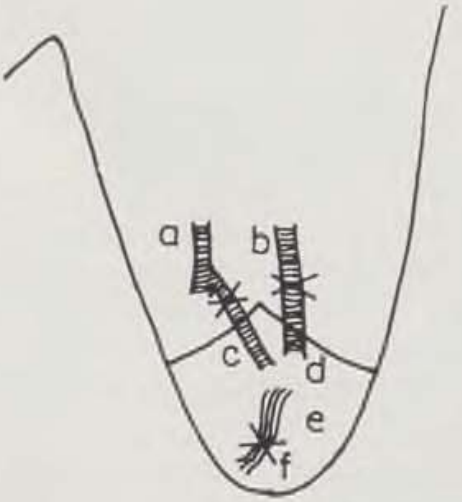


Fig. 3. Sketch of creating a stump of the thigh capable of bearing weight. a — a. femoralis, b — v. femoralis, c — a. tibialis posterior, d — v. saphena magna

means of Ilizarov's apparatus (Figs. 4 and 5). A stable, balanced blood flow was established in the transplanted complex of tissues on the operation table.

Fig. 4. Patient D. Stump of the thigh after application of Ilizarov's apparatus

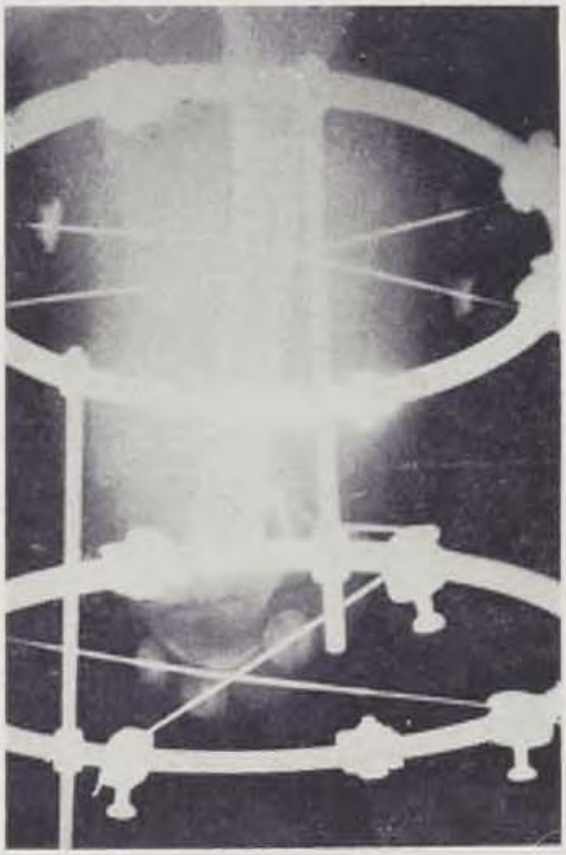


Fig. 5. The same observation. Stump of the thigh after application of Ilizarov's apparauts (X-ray picture)

Antibiotics, low-molecular dextrans, anticoagulants and spasmolytics were used in the postoperative period. The flap healed in completely. Two months later, after the onset of consolidation, Ilizarov's apparatus was removed (Fig. 6). At

Fig. 6. The same observation. General appearance of the formed stump of the thigh

Fig. 7. Patient A. X-ray picture of the right thigh

present, 14 months postoperatively, the patient walks on a leg prosthesis supported on the end of the stump. Supporting capacity of the end of the stump in the prosthesis is 56%. Restoration of all types of sensitivity of the flap has started.

In the man-patient A., aged 19, admitted to the department for osteosarcoma of the right femur (Fig. 7), amputation of the right thigh between the upper and medial third with autotransplantation of the calcaneoplatnar flap to the end of the stump was performed on December 20, 1984, using an analogous operative technique. Complete adaptation of the flap was observed (Fig. 8).

Fig. 8. The same observation. General appearance of the formed stump of the thigh

At present, the patient walks on a leg prosthesis supporting itself on the end of the stump (Fig. 9). Supporting capacity of the stump in the prosthesis is 44%.

In the woman-patient G., aged 28, amputation of the right thigh in the medial third with autotransplantation of the calcaneoplantar flap to the end of the stump and microanastomosis of the arteries, veins and nerves was performed for chondrosarcoma of the right tibia on January 16, 1985 in the cli-

nical department of RIPAL. In this case too, stable, balanced blood flow was established in the transplanted complex of tissues already on the operation table, resulting in complete adaptation of the graft. Unfortunately, the patient died of multiple metastases in the lungs 2 weeks after operation.

Fig. 9. The same observation. The patient with the prosthesis of the leg

In the late seventies of the 19th century, the Vladimirov-Mikulich operation was proposed for incurable conditions of the heel bone and the ankle bone. Its essential feature is that instead of removing the leg between the ankle and the knee, only the posterior part of the foot and the lower ends of the crural bones are removed while the toes, the metatarsus and partly the tarsus are preserved. Their prepared sections are joint to those of the crural bones and, after consolidation, the patient can walk supporting himself on the heads of the metatarsal bones while the toes remain in full extension. Time has shown good late results of this operation (I.Ya, Shternberg, 1939; O. A. Bukhtiarov, 1968). Realizing the indispensability of plantar surface skin for the creation of a stump of the lower extremity capable of bearing weight inspired us to apply the skin of the plantar surface of the anterior part of the foot using microvascular technique in cases where it was impossible to use other parts of the plantar surface of the foot. Observation is presented.

Man-patient G., aged 26, was admitted to the clinical department of RIPAL for trophic ulcer of the calcaneal portion of the plantar surface of the foot and osteomyelitis of the left heel bone. According to the patient's history, in 1980 a defect of the posterior part of the plantar surface of the foot, due to electrotrauma, was covered with a skin-muscle flap from the latissimus dorsi muscle using microvascular technique. However, 8 months after operation, trophic ulcer of the flap with osteomyelitis of the left heel bone developed, conditioning indication to amputation which was actually carried out on April 9, 1985.

The left crus was removed at the level between the medial and lower third and autotransplantation of a skin flap from the plantar surface of the anterior part of the foot to the end of the stump was attempted. After removal of the skin, the plantar artery of the foot and a subcutaneous vein were isolated at the back of the foot. The vessels were laid bare to the level of the talocrural joint and then resected since further mobilization from the scars was not possible. Metatarsal bones I—V were enucleated using the blunt method. After amputation of the crus, the flap was attached to the section of the stump by widely spaced sutures. Microanastomoses between the plantar artery of the foot in the flap and the posterior tibial artery of the stump as also between the subcutaneous vein in the flap and the subcutaneous vein in the stump by widely spaced sutures. Microanastomoses between the plantar thread. However, in spite of permeability of the anastomoses, satisfactory blood supply was observed only near the vascular pedicle of the flap while it was completely absent in the distal, plantar portion of the flap. This was obviously connected with the impairment of the deep plantar branch suffered during enucleation of the metatarsal bones, since the vessel is responsible for blood supply to the plantar portion of the flap from the plantar artery of the foot. The flap was therefore resected and the section of the stump covered with local tissues. The failure of the attempt at autotransplantation of a skin flap from the plantar surface of the anterior part of the foot demonstrates the inadmissibility of enucleating the metatarsal bones by the described technique of operation as it leads to impairment of blood supply to the flap.

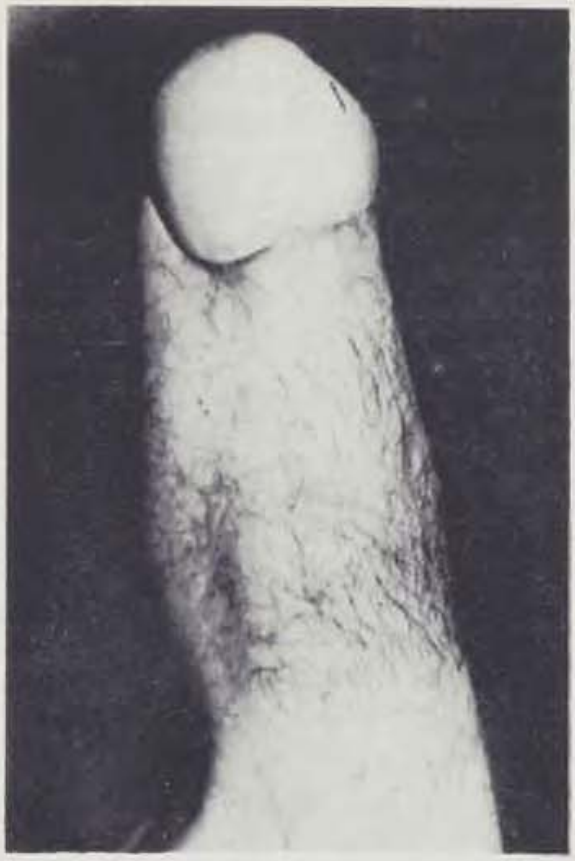
In the male-patient Sh., aged 36, admitted to the clinical department of RIPAL with late sequels of open comminuted fracture of the left crural bones (Fig. 10), we performed (May 15, 1985) amputation of the crus with autotransplantation of a skin flap of the plantar surface of the calcaneal portion of the foot to the end of the stump with microanastomoses of the arteries, veins and nerves. The amputation was indicated by deep trophic changes in the bony substance and the soft tissues, and by reduced and defective functions of the distal parts of the left lower limb. A preliminary angiographic examination revealed impairment of the integrity of all the 3 main crural arteries. The technique of the operation was as follows. Using an incision proposed by us on the foot and the crus, a plantar skin flap of the calcaneal portion of the foot was obtained including the posterior tibial neurovascular bundle and a large subcutaneous vein. After amputation of the crus and fixation of the skin flap to the

section by means of widely spaced sutures, we performed minianastomoses between the posterior tibial artery of the flap and the same artery of the stump, the large subcutaneous vein of the flap and the same vein of the stump using a surgical microscope and a 10—0 nylon thread. The peroneal nerve was su-

F g. 10. Patient Sh. Late sequels of open fracture of the left crural bones

tured to the subcutaneous nerve with an 8—0 nylon thread. Stable, well-balanced blood flow in the transplanted complex of tissues was obtained on the operation table, ensuring complete adaptation of the flap (Fig. 11). The patient was provided with a leg prosthesis supported on the end of the stump (Fig. 12).

In this way, microsurgical technique discovers new possibilities in the formation of a stump of the lower limb capable of bearing weight. Good results of operative treatment nad application of prostheses in 6 patients after amputation with autotransplantation of the skin of the plantar surface of the foot to the end of the stump using microsurgical technique testify to this effect. Adaptation of the transplant and formation of a stump capable of bearing weight was obtained in 5 patients.



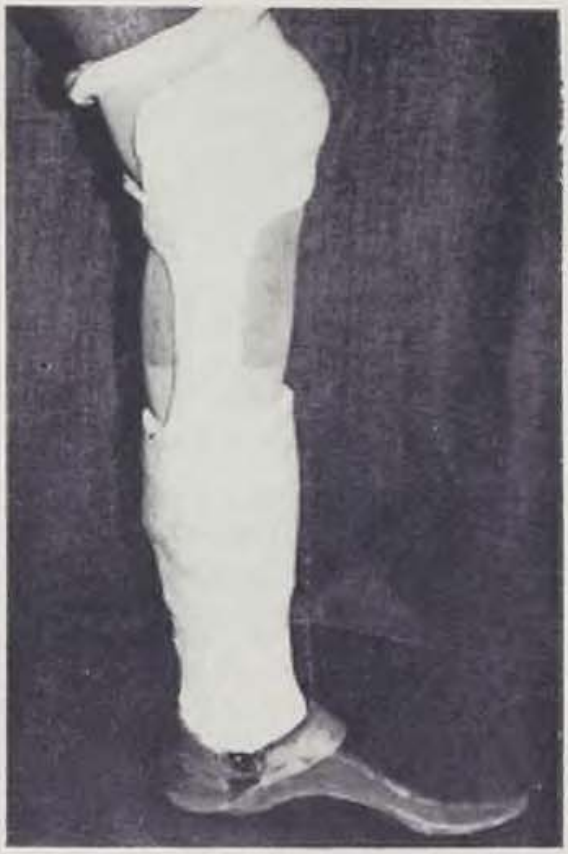


Fig. 11. The same observation. General appearance of the formed stump of the crus
Fig. 12. The same observation. The patient with the prosthesis of the leg

SUMMARY

Good results of surgical treatment and application of prostheses were obtained in 6 patients after autotransplantation of the skin of the plantar surface of the foot to the end of the stump using microsurgical method. In 5 patients, the transplant healed in and a stump capable of bearing weight was obtained.

RESUME

Emploi d'une méthode microchirurgicale dans la construction du moignon destiné à servir de soutien, application de prothèse.

Keyer, A. N., Scherbina, K. K.

De bons résultats ont été obtenus par le traitement opératoire, suivi de l'application d'une prothèse chez 6 malades. Le traitement consistait en autogreffe cutanée de la surface plantaire du pied, placée au bout du moignon, ce qui a été effectué par une méthode microchirurgicale. Chez 5 malades, la prise du greffon a été bonne, d'où résultait la création d'un moignon capable de servir de soutien.

ZUSAMMENFASSUNG

Die Anwendung der mikrochirurgischen Methode bei der Ausbildung eines als Stütze fähigen Beinstumpfes sowie bei dem Ansetzen der Prothese

Keyer, A. N., Schtserbina, K. K.

Gute Ergebnisse der operativen Behandlung sowie beim Ansetzen der Prothese wurden bei 6 Patienten nach einer Autotransplantation der Haut der flachen Beinoberfläche am Ende des Beinstumpfes durch die Anwendung der mikrochirurgischen Methode erzielt. Bei 5 dieser Patienten heilte das Transplantant gut zu und bildete einen Beinstumpf, der fähig war, als Stütze zu dienen.

RESUMEN

Uso del método microquirúrgico en la formación de muñón, capaz de servir de sostén y para colocación de la prótesis.

Keyer, A. N., Scherbina, K. K.

Buenos resultados del tratamiento operatorio y de la colocación de la prótesis lograron en 6 enfermos después de autotrasplantación de la cutis de la superficie plantaria de la pierna sobre el extremo del muñón usando el método microquirúrgico. En 5 enfermos el trasplantante se cicatrizó y formó el muñón, capaz de servir de sostén.

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COMPLICATED DEFECT OF THE FRONTAL REGION

M. TVRDEK, A. NEJEDLÝ

The following is a case report on the treatment of a large complicated defect using free flap transfer.

The patient, C. P., 42 years, a foreign national, cl. notes No. 149 638, was referred to our department for an osteomyocutaneous defect of her frontal region. The defect resulted from massive irradiation of the region for a malignancy of the reticulosarcoma type (Fig. 1, 2, 3).

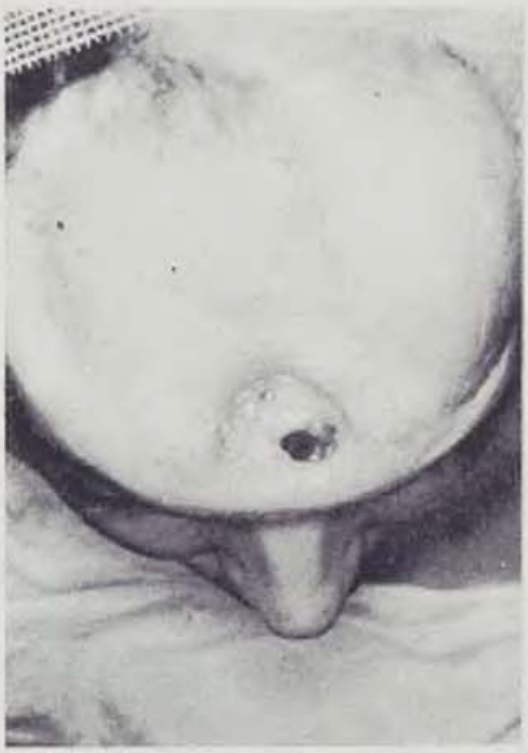

Fig. 1 Frontal region defect covered with transfer flaps. Open frontal sinus with fronto-nasal communication

Owing to progressive radionecrosis, the patient underwent a number of surgical operations designed to close the wound — from autotransplantation tolocal as well as distant tissue transfer. But it still seemed impossible to close the open frontal sinus with frontonasal communication or to provide the dura mater with a sufficiently protective cover.

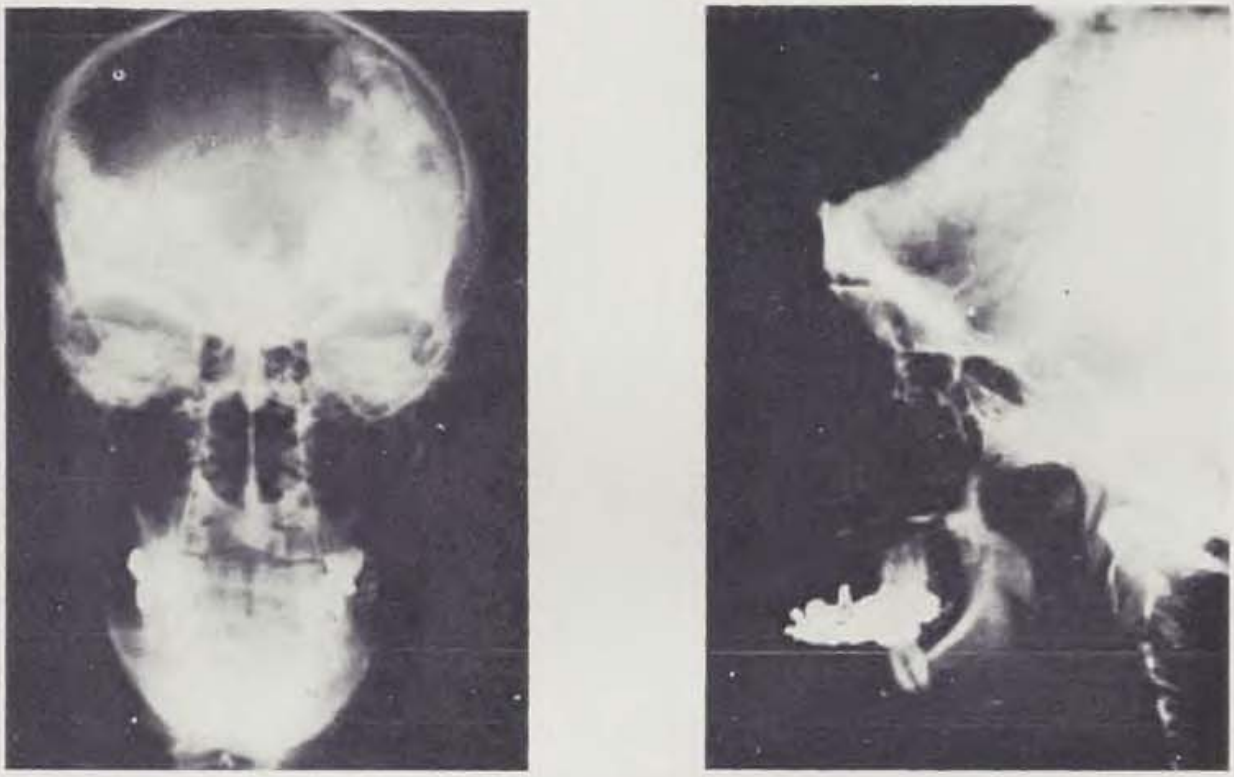

Fig. 2, 3 AP and lateral X-ray projections of the skull showing the bone defect extent
extent

In view of the distance of the recipient vessels and the nature of the defect it was essential to choose a myocutaneous flap with a sufficiently long vascular pedicle. The decision fell on a myocutaneous flap from the latissimus dorsi muscle as one meeting those requirements. The plastic operation proper was not attempted until after repeated bening excisions from the site of the defect and after consultations with an oncologist and a roentgenologist because of the possible progression of post-irradition osteolysis.

Having exposed the temporal fascicle and shifted it frontalward, we closed the base of the frontal sinus by rotating an island mucous flap, thus closing the frontonasal communication. Over the bone defect we mobilized the existing skin cover, retrotracting it but leaving enough space for muscle tissue interposition. This resulted in a skin defect 5 by 12 cm in size and a defect to be filled with muscle, 12 by 9 cm (Fig. 4).

The latissimus dorsi flap pedicled to the thoracodorsal fascicle was then transferred to the site of the defect, following its previous mobilization and

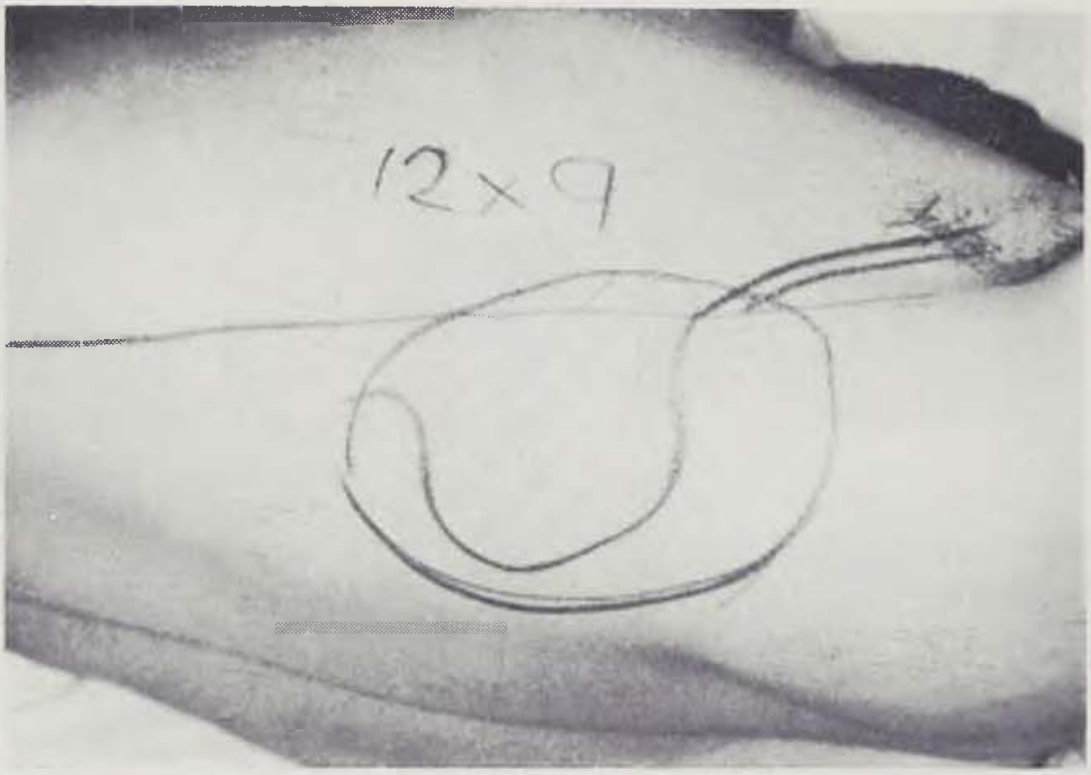

Fig. 4 Preoperative sketch of the flap. Free part wih skin cover, hatched, muscle tissue alone

Fig. 5 Free flap clamped pedicle

Fig. 6 Flap transferred to the site of the defect. Arrows indicate extent of venous graft at the anastomoses site. Above it, recipient artery anastomosing with the thoracodorsal artery. — Fig. 7 State at 7 days post-operatively

Fig. 8, 9 State at 3 weeks post-operatively

transsection of the fascicle (Fig. 5). The free muscle was then slipped underneath the existing skin cover, and also the frontal sinus was filled with muscle tissue. Using a previously prepared subcutaneous tunnel we threaded the vascular pedicle from the site of the defect to the recipient vessels, anastomosing the thoracodorsal and the superficial temporal arteries. A venous graft had to be used owing to the poor quality of the recipient temporal vein (Fig 6).

At three hours after the operation, oedema of the flap showed signs of congestion, which is why a revision was resorted to. Having resected another part of the siphoned recipient vein up to a point beyond the central anastomosis of the venous graft with the superficial temporal vein, we replaced the whole section including the original graft with a new venous transplant 8 cm long.

The rest of the post-operative course was uneventful. As long as a week after surgery (Fig. 7) the flap oedema, albeit receding, was still discernible. Three weeks after the operation, the patient was found completely healed, the transfer flap being perfused throughout it extent with no major excess tissue. The patient could then be dismissed for domestic treatment (Fig. 8, 9).

SUMMARY

The authors report on a case of successful surgical treatment for a large osteomyocutaneous defect of the frontal region using a free transfer flap. The defect resulted from massive irradiation of the frontal region for a malignant process, and remained refractory to all previous conventional surgical operations.

RESUME

Défaut compliqué dans la région frontale

Tvrdek, M., Nejedlý, K.

Les auteurs décrivent un cas du traitement opératoire réussi. Il s'agissait d'un vaste défaut ostéomyocutané dans la région frontale, traité par le transfert d'un lobe libre. Le défaut avait surgit dans le site d'un traitement par rayonnement massif, effectué afin d'éliminer un processus maligne. Les méthodes opératoires conventionnelles n'ont pas été efficaces pour la guérison du défaut.

ZUSAMMENFASSUNG

Ein komplizierter Defekt der Frontalgegend

Tvrdek, M., Nejedlý, K.

Die Autoren führen den Fall einer erfolgreichen operativen Lösung eines ausgedehnten osteomyokutanen Defektes der Frontgegend durch eine freie Lappenübertragung an. Dieser Defekt entstand nach einer massiven Bestrahlung dieser Gegend wegen eines malignen Prozesses, wobei es nicht gelang, ihn mittels konventioneller operativer Verfahren zu beseitigen.

RESUMEN

Defecto complicado de la zona frontal

Tvrdek, M., Nejedlý, K.

Los autores presentan la casuística de exitosa resolución operatoria del amplio defecto osteomiocutáneo de la zona frontal por medio de traslado del lóbulo libre. El defecto se produjo después de la irradiación maciza de ésta zona con motivo del proceso maligno, al cual no lograron curarlo por previas técnicas operatorias convencionales.

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RESTORATION OF HAND FUNCTION BY FREE MUSCLE TRANSPLANTATION

W. PISAREK

In 1970, Tamai et al. (1) reported on successful muscle transplantation by microneurovascular techniques used in the dog. In 1973, Harii et al. (4) performed the first successful transplantation of the live muscle for recovery of the paralysed facial muscles. In the same year, surgeons in Shanghai transplanted a portion of the greater pectoral muscle to the forearm (3). Other clinical cases were reported by Ikuta (5, 6), Schenk (7), O'Brien (8) and Manktelow (9, 10).

Free muscle transplantation involves the transfer of a skeletal muscle from one site to another with complete separation from the donor site. Survival and active muscle contraction are achieved by microsurgical vessel anastomoses and by suturing a motor nerve in the recipient site to the motor nerve of the transplanted muscle. The gracilis, the latissimus dorsi, and the greater pectoral muscles are used to replace the long flexor muscles of the finger or to recover paralysed facial muscles.

This paper is a case report of muscle transplantation to the forearm.

INDICATIONS

An appropriate selection of patients is important. The loss of muscles, resulting in functional deficit when simpler procedures such as a tendon transfer cannot be applied, should be treated with free muscle transplantation. To perform a successful free muscle transfer to the forearm, the following is required: a good passive ROM in the joints, adequate active extension of the fingers and thumb, intrinsic muscle function, good hand sensibility, good skin cover and bed for tendon gliding.

CASE REPORT

A 30 year old male sustained a right forearm injury in a train accident. All long flexor muscles of the fingers were crushed and extruded from the forearm. Both arteries of the forearm were damaged but the continuity of the

median and ulnar nerve was preserved. During the first-aid treatment the crushed muscles were excised together with the proximal parts of tendons. The wounds were debrieded and closed with split skin grafts both in the volar and dorsal aspects of the forearm. In the postooperative period necrosis of the skin of the distal part of the forearm and wrist developed. To save the live median nerve, necrectomy was performed and a pedicled abdominal flap applied. There was no complication in later treatment. Six weeks following the injury all the wounds healed well. The patient was recommended to undergo intensive rehabilitation. The check-up performed on the 22nd May, 1985, showed no active flexion of the fingers and the thumb and no active flexion in the wrist (Fig. 1). The active extension of all fingers and the wrist was complete. A good sensibility in the median nerve area and a good opposition of the thumb were observed. However, deficiency of ulnar nerve sensation area and weakness of intrinsic function were noted. We decided on a free muscle transplantation. Arteriography of the right upper extremity showed a short stump of the radial artery, absence of the ulnar artery with the interosseous artery being the only supply to the hand (Fig. 2). The aim was to make the interosseous branch of the median nerve function as a motor supply to the transplanted muscle. We intended to use the gracilis muscle as a motor unit.

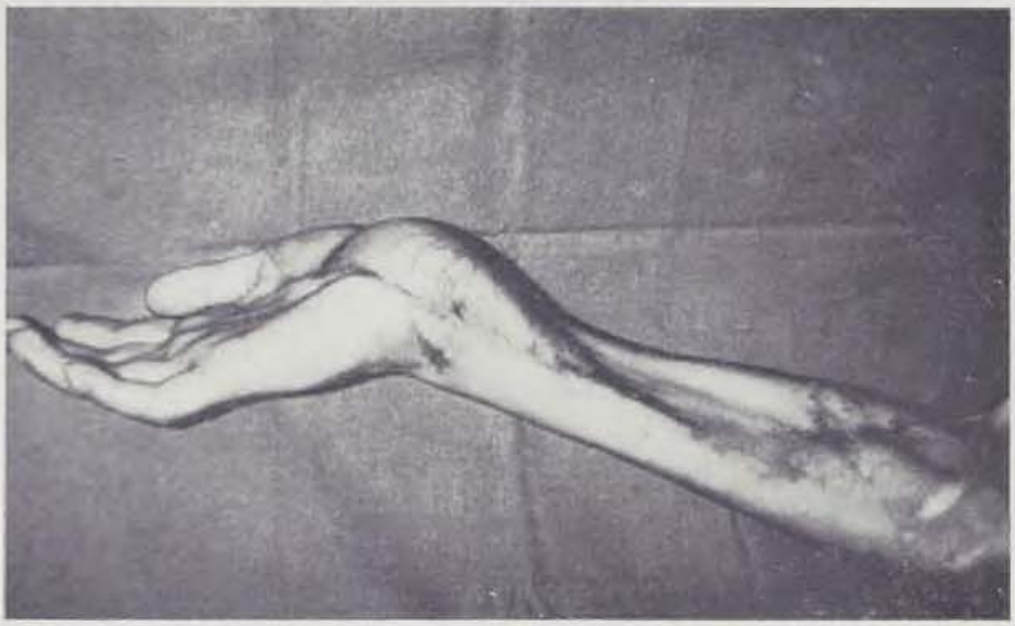

Fig. 1. Patient Z. D., 30 years old. Loss of forearm muscles. No active flexion of the finger or the wrist

Operative technique

The operative technique described below and applied to the forearm can be equally adopted in the treatment of any other extremity site. The operation was performed under regional anesthesia of brachial plexus along with epidural anesthesia at lumbar level.

Preparation of the forearm

The forearm incision was made in a zigzag fashion to expose adequately all the structures from the wrist to the medial epicondyle. The proximal stump of the radial artery with the two venae comitantes and the interosseous branch of the median nerve were prepared for the transplantation by meticulous dissection under tourniquet control. Thus the medial epicondyle and fascia of the common flexor origin were exposed. Then the deep flexor tendon of the fingers and the long flexor tendon of the thumb were exposed in the wrist.

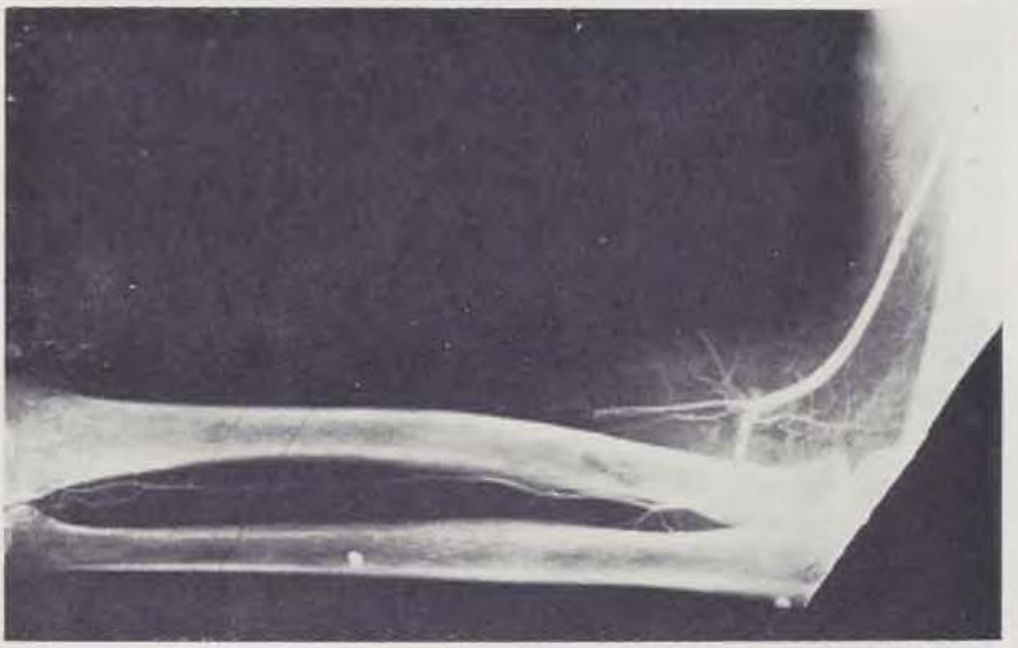

Fig. 2 Arteriography of the right upper extremity

Preparation of the gracilis muscle

The gracilis muscle was removed with the leg abducted and externally rotated and the knee flexed. The fusiform skin island above the gracilis muscle was incised. The island margin was fixed to the muscle with temporary sutures. The neurovascular bundle entering the gracilis muscle 10 cm from the muscle origin was exposed. The origin and the tendon of the muscle were transversally incised. Prior to the inicision, the length of the muscle was measured. The 4 cm long motor nerve and the vascular bundle consisting of one artery and two venae comitantes were divided at the origin of the deep femoral artery.

Musculocutaneous free flap transfer

The origin of the removed flap was sutured to the medial epicondyle and fascia. The gracilis muscle tendon was sutured to the tendons of all four deep flexors of the fingers and to the long flexor tendon of the thumb under original tension of the muscle with the wrist and fingers extended. Next, anasto-

moses of the artery and of the two veins were performed with 10-0 nylon sutures. The fascicular nerve was repaired with 11-0 nylon sutures, 1 cm close to neuromuscular junction. After revascularization the wound of the forearm in the central part was closed with the skin island, and in the proximal and distal part with the split skin graft. The area of the tendon fixation in the wrist was covered with an abdominal flap transplanted earlier. A suction drain was left under transplanted muscle.

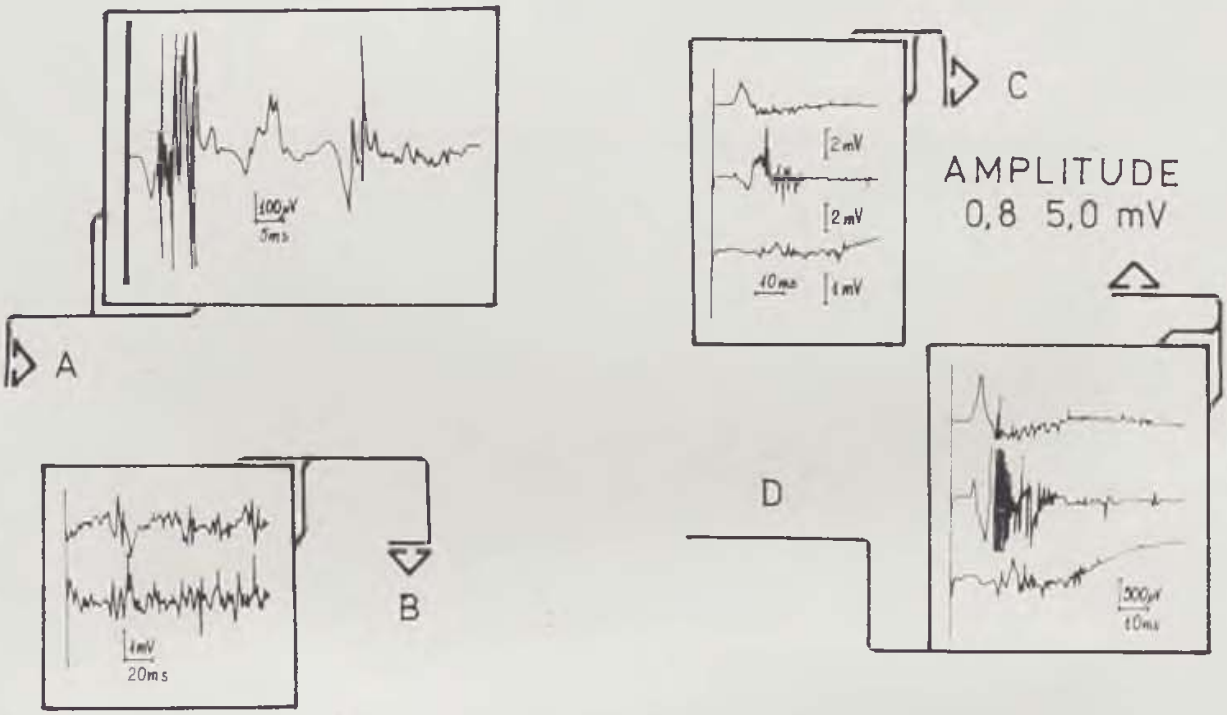

Fig. 3. Electromyographic records of the transplanted gracilis muscle — 6 months after surgery
EMG No. 1362, 1363 from November 11, 1986.
A — At rest: single fibrillations
Slight voluntary activity
Single motor unit potentials (MUPs)
Mean duration (of 21 MUPs): 11.8 ms (6 + 25 ms)
Amplitude: 0.3 — 2.6 mV; 40% of polyphasic potentials
B — Maximal effort
Decrease activity amplitude 2.8 mV
C — Evoked potentials from the transplanted muscle by
— electrical stimulation of the median nerve in the elbow
Distance 7.2 cm
Latency 5.4 ms
Amplitude 0.8—0.5 mV
mV
D — Morphology
Polyphasic potentials
Duration 49 — 76.8 ms
EMG No 1362 + 1363 of November 11th, 1986
Patient Z. D., age: 30

Postoperative care and rehabilitation

The forearm was splinted with moderate flexion in the wrist and fingers. Vital signs of the flap were carefully monitored during the first 24 hours. Adequate fluid replacement was provided. 500.0 ml Dextran and small doses (0.1) of aspirin were administered for the first days postoperatively. Four weeks following the operation passive movement of all joints and electrostimulation of the transplanted muscle were started.

RESULTS

The musculocutaneous flap survived. A partial skin island necrosis developed and was treated with split skin graft. Four weeks following the operation the wound healed completely. After six weeks muscle fibrillation was observed. After three months contraction of the transplanted muscle and small active movements of the fingers followed. After six months the EMG test showed potentials characteristic of active reinnervation (Fig. 3) with a rapid increase in the strength of the muscle contraction. A programme of active resistive exercises was started. After nine months tenolysis of the wrist was performed. One year after the free muscle transfer, the TAM was nearly complete (Fig. 4, 5, 6) and the grip strength achieved 50% of strength possessed by the other hand. The patient was able to hammer in nails.

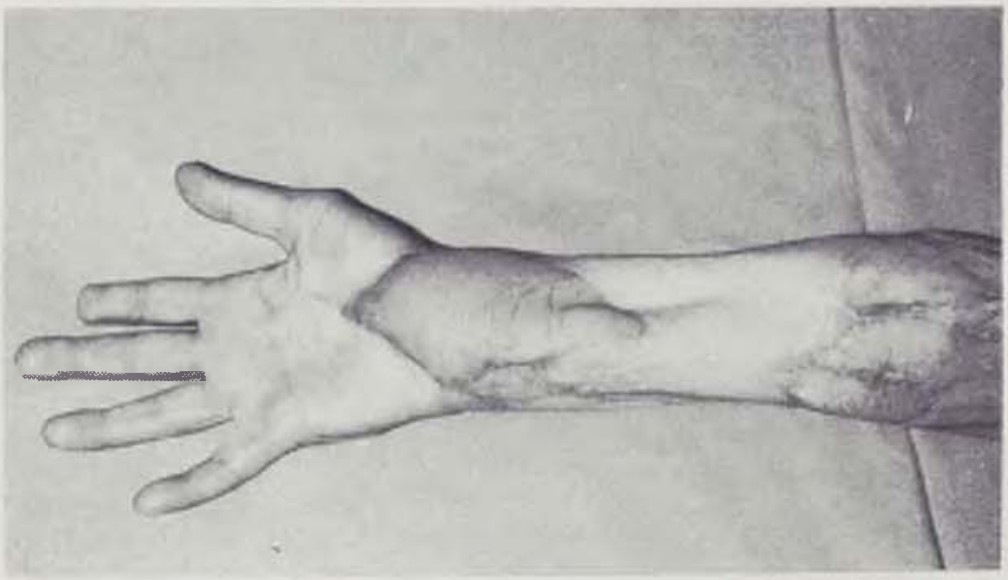

Fig. 4 Patient Z. D. Range of motion one year after surgery. Full extension of the fingers

DISSCUSION

Muscle transplantation is successful if the patient achieves a useful ROM and adequate grip strength under volitional control.

We feel that anatomic, microsurgical and dynamic factors must be considered in free muscle transfer (2).

The gracilis muscle possesses an adequate length and functional capability to replace the forearm musculature. It can be removed with no apparent defect. The muscle has a single motor nerve which is a branch of the obturator nerve. The motor nerve is composed of two to four fascicles (in our case three). The gracilis has two or three vascular bundles. The dominant pedicle enters the muscle about 10 cm from its origin and consists of one artery of 1 to

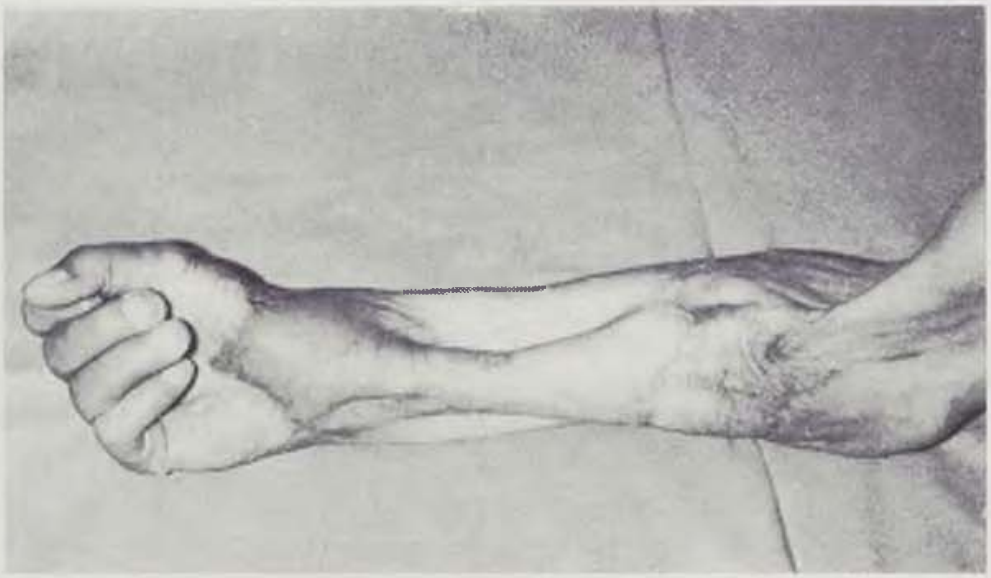

Fig. 5 Patient Z. D. Range of motion one year after surgery. Almost complete flexion of the fingers

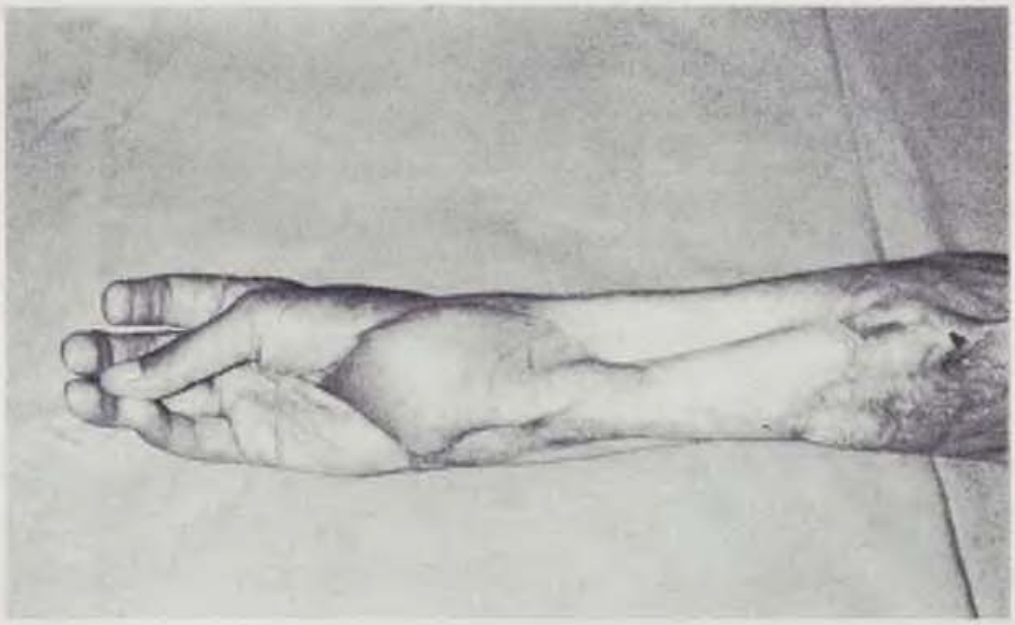

Fig. 6 Patient Z. D. Range of motion one year after surgery. Good opposition of the thumb

2 mm and two venae comitantes of 1. to 2.5 mm in diameter. Anastomoses are required to be technically perfect. The skin island can act as a monitor of vital signs of the flap. The nerve should be repaired as close to the neuromuscular junction as possible, as this makes reinnervation time shorter.

The functional potential of the muscle is to be achieved by supplying it with adequate tension. The gracilis has a great enough ROM in its normal site to provide full finger flexion and adequate contractile force.

The grip strength of our patient attained 50% of that in the other hand. We hope that it will continue to increase next year.

SUMMARY

Transplantation of a live muscle to the upper extremity is technically feasible if based upon microvascular anastomosis and fascicular nerve repair. Muscle transplantation to the forearm is indicated in a major functional impairment unless simpler techniques such as tendon transfer are available. The muscle is selected by anatomic, microvascular and dynamic criteria. The method of restoration of the forearm muscles and operative details of the free musculocutaneous flap transfer are described. One year following the free muscle transfer, the TAM was nearly complete and the grip strength achieved 50% of that in the other hand.

RESUME

Renouvellement de fonction de la main par un lobe libre musculocutané

Pisarek, W.

De point de vue technique, greffer un muscle fonctionnellement valide sur le membre supériur, c'est réalisable à l'aide d'anastomoses microvasculaires et d'une récupération du nerf fasciculaire. L'indication pour le tranfert d'un muscle sur l'avant-bras, c'est un important trouble fonctionnel, où des techniques plus simples — comme p. ex. greffe tendineuse — ne peuvent pas être utilisées. Le choix du muscle est décidé par les critères anatomiques, vasculaires et dynamiques. Les méthodes de reconstruction de muscles de l'avant-bras et le plan opératoire pour le tranfert du lobe libre musculocutané sont mises au point. Après un recul d'un an, la reprise du travail est presque complète et la force du bras (capacité de saisir) atteint 50 % du bras sain.

ZUSAMMENFASSUNG

Die Erneueung der Funktion der Hand mittels eines freien Muskellappens

Pisarek, W.

Eine Transplantation eines funktionell fähigen Muskels in das obere Gliedmass ist technisch möglich bei einer Anwendung der mikrovaskulären Anastomose und Erneuerung des faszikulären Nervs. Die Indikation für eine Muskelübertragung in den Vorderarm ist eine schwerwiegende Funktionsstörung, bei der eine einfachere Technik, so wie eine Sehnentransplantation, nicht anwendbar ist. Über die Wahl des Muskels entscheiden anatomische, vaskuläre und dynamische Kriterien. Die Methoden einer Rekonstruktion der Muskulatur des Vorderarms sowie Operationseinzelheiten der Über-

tragung eines freien Hautmuskellappens werden beschrieben. Ein Jahr nach der Transplantation des freien Muskellappens ist die Arbeitsfähigkeit fast vollständig und die Greifkraft der Hand erreicht 50 % derjenigen der anderen Hand.

RESUMEN

Restablecimineto de función de mano con ayuda del lóbulo libre muscular

Pisarek, W.

La trasplantación del músculo con función concervada de la extermidad superior es técnicamente ejecutable por medio de la anastomosis microvascular y del restablecimiento del nervio fascicular. Por indicación del traslado del músculo al antebrazo sirve und grave trastorno funcional, cuando las técnicas más simples, a ver la trasplantación del tendón, no son aplicables. Sobre la elección del músculo deciden los criterios anatómicos, vasculares y dinámicos. Están descritos métodos de la reconstrucción de la musculatura del antebrazo y los detalles operatories del traslado del lóbulo músculocutáneo libre. Al cabo de un año después de la trasplantación del lóbulo muscular libre el apto para el trabajo es pleno y la fuerza para empuñar logra a los 50% de la de otra mano.

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RECONSTRUCTION OF ELBOW JOINT FLEXION IN BRACHIAL PLEXUS INJURY

V. Kubáček, J. Válka, P. Brychta

INTRODUCTION

Brachial plexus injuries are relatively rare but quite serious in terms of subsequent function impairment. They are encountered, as a rule, in traffic accidents and in work with some efficient machines in industry and civil engineering.

Avulsion of the roots of the brachial plexus will paralyze either the whole upper extremity or some of the muscle groups. The extremity itself may not even show any signs of injury.

There is usually little difficulty in diagnosing a case of brachial plexus injury. What is worse, though, is the extremely limited scope for therapy in this kind of trauma. As a rule, attempts to restore movement of the upper extremity end in failure.

One of the methods capable, to a certain extent, of restoring movement in the paralyzed arm (the elbow or shoulder joints) consists in advancing the latissimus dorsi muscle from its physiological position to the arm. The first to report on this technique was Schottstaedt, followed by Zancolli, Mathes, Stern and Chase (3, 5, 2, 4, 1). Despite this, there is still a dearth of experience with this surgical technique, and in this country it is virtually nil. No doubt, this is also due to the circumstances that rather than after injuries of the brachial plexus, advancement of the latissimus dorsi tends to be indicated in cases of upper extremity paralysis due to poliomyelitis, a conditions which has been practically eradicated in Czechoslovaka.

In 1986, a decision was made at the 3rd Department of Surgery, Brno, to use this operation in one particular case, and the following is intended to be a preliminary report on our experience of the method.

CASE REPORT

Our patient, 40-year old J. T., sustained injuries in a car accident in 1985, with part of the brachial plexus involved. While the function of the hand re-

mained fully preserved, the elbow and shoulder joints were paralyzed. Since an arm so affected is of practically no use, we decided to try and restore flexion in the elbow joint by transferring part of the latissimus dorsi muscle, the function of which remained completely preserved. Another factor in support of our decision was that this was an intelligent patient greatly interested in the operation and offering perfect co-operation. This is a very important precondition for a satisfactory functional result of the operation and subsequent rehabilitation.

SURGICAL TECHNIQUE

The operation proceeded as follows:

From a skin incision on the dorsal side of the chest (Fig. 1) we exposed and mobilized an origin of the latissimus dorsi. (This muscle takes its origin as an extensive flat aponeurosis, the fascia thoracolumbalis, attached to the spines of the caudal thoracic and lumbar vertebrae with insertion to the crista

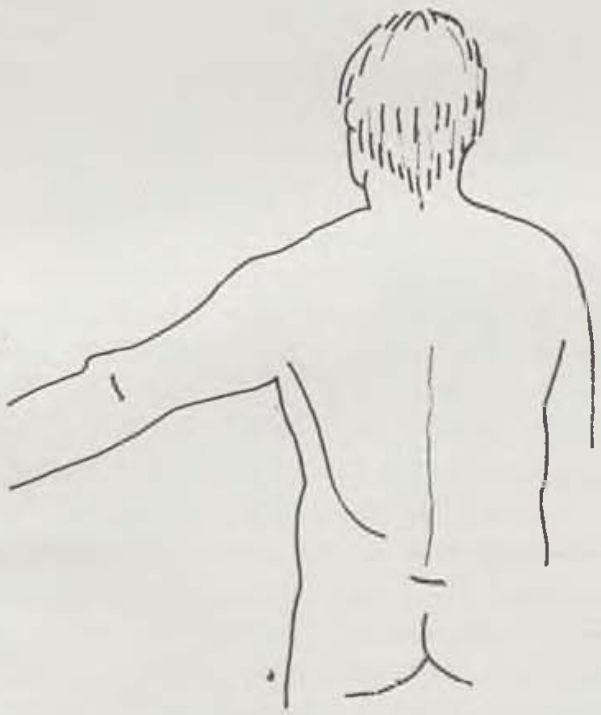

Fig. 1. With the patient in the prone position, a skin incision is made on the dorsal side of the chest parallel to the outer edge of the latissimus dorsi muscle to end up in the axilla

tuberculi minoris on the anterior side of the humerus. The muscle supplied from the thoracodorsal artery running along the outer and inferior sides of the muscle; its innervation is from the thoracodorsal nerve running parallel to the vessels. The tiny segmental vessels reaching the origin of the muscle are of little or no importance to its viability, and may safety be severed at mo-

bilization.) We then advanced the origin of the muscle thus mobilized into the axilla (Fig. 2) and created a subcutaneous tunnel on the anterior side of the arm to pull the muscle through it along the ventral side of the arm right down into the cubital pit (Fig. 3 and 4). Finally, we fixed the latissimus dorsi thus advanced to the lacertus fibrosus on the forearm (Fig. 5).

The axis for turning the muscle round during the operation is the neurovascular bundle (vasa et n. thoracodorsalis) which must never under any circumstances be traumatized in the process. Prior to its transfer to the new

Fig. 2a. With the skin and subcutis turned away the latissimus dorsi is mobilized at its origin and carefully advanced into the axilla. This is followed by closing the operation wound on the chest — Fig. 2b. Schematic representation of the same

Fig. 3a. On the ventral side of the arm a Péan's forceps is used to make a subcutaneous tunnel to accommodate the latissimus dorsi. To achieve that, a S-shaped skin incision is made in the cubital pit

position the muscle should be tubulized to match as much as possible the biceps in shape. Where the latissimu dorsi is found too bulky, we can also

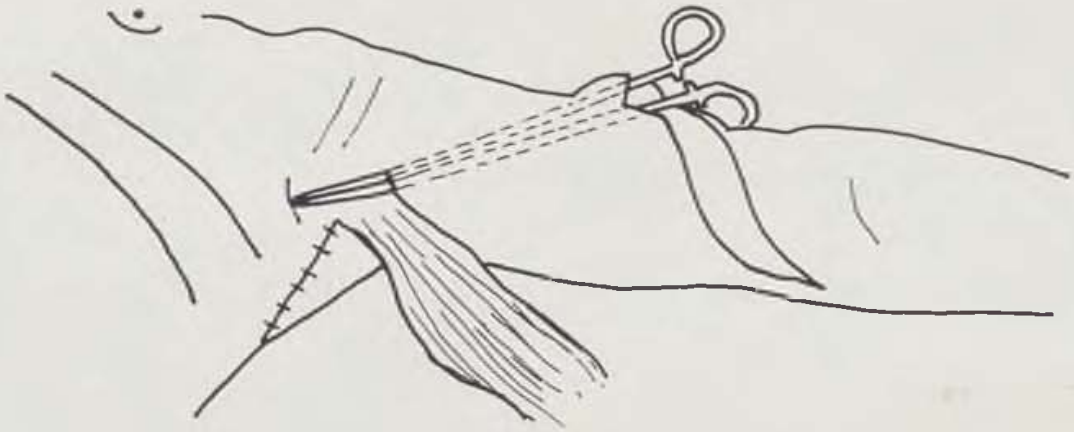

Fig. 3b. Schematic representation of the same

Fig. 4a. The muscle in its new position after partial tubulization with catgut suture

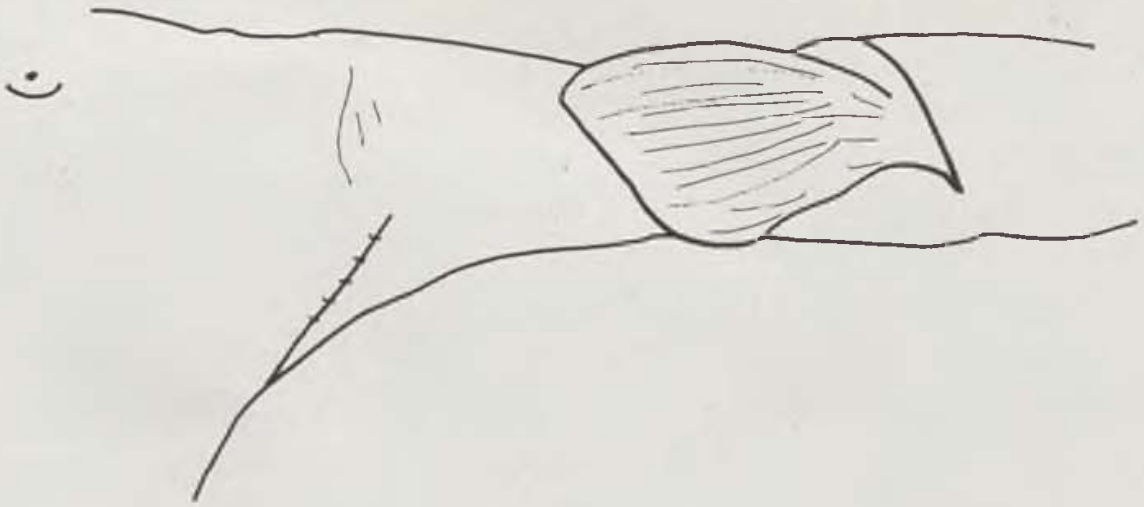

Fig. 4b. Schematic representation of the same

extirpate the m. biceps brachii, leaving no more than its origins and insertion. To avoid oppression of the latissimus dorsi, the fascia brachialis should be cut open all along the arm. The muscle has to be shortened so as to preserve its natural tension with the forearm flexed to 90—100 degrees. The extremity should then be kept fixed for 6 weeks. At 7 weeks we remove the fixation but do not allow the complete extension of the forearm until after 8 to 9 weeks after the operation.

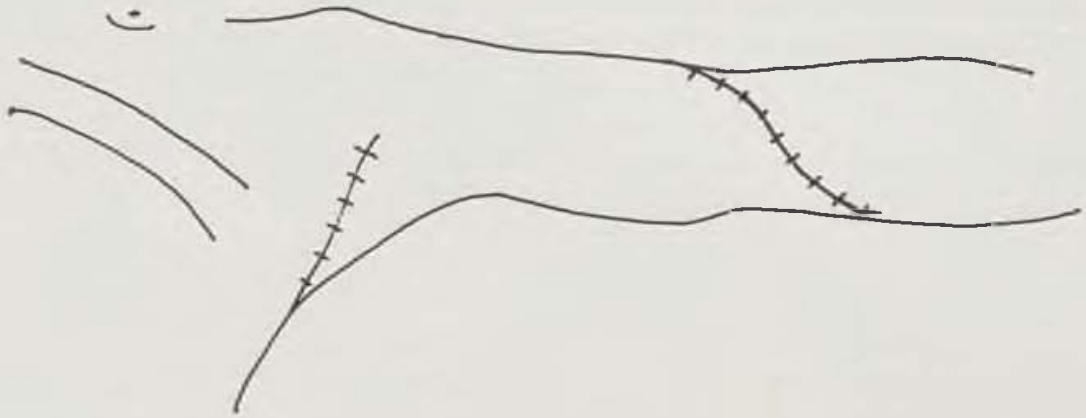

Fig. 5. Strong silon sutures are used to fix the origin of the muscle to the lacertus fibrosus in the forearm. After closing the operation wound on the forearm, the arm is fixed at 90—100 degrees elbow joint flexion

RESULT

Our patient's healing was quite uneventful. His general condition as well as the local finding were satisfactory throughout the post-operative period.

It is now quite obvious that there was no atrophy after the operation and that the muscle exhibits normal EMG activity. Thanks to rehabilitation passive movement in both the shoulder and the elbow could be preserved throughout. It is too early yet to make any objective assessment of the functional results as rehabilitation requires a very long time to complete (a minimum of 6 months). Active movement, for the time being, leaves little room for satisfaction (only a few centimetres excluding the force of gravity). However, intensive rehabilitation continues.

DISCUSSION

Some authors insist on the feasibility of the so called bipolar advancement of the latissimus dorsi muscle. This consists in that an additional incision is made along the deltopectoral line to expose the biceps brachii insertion to the processus coracoideus and to transfer to it the latissimus dorsi insertion from the crista tuberculi minoris. In their opinion, this is the way to achieve a greater shortening of the muscle and, thereby, an improvement in the biomechanical relationships.

We believe this kind of transfer is possible as a second time operation after the muscle has become adapted to the new position and after good union and scar consolidation has been achieved. We are prepared to use this operation unless the results of rehabilitation are satisfactory.

CONCLUSION

This is meant to be a preliminary report. We shall keep the reader posted on the results once the period of rehabilitation is over. Our aim was to draw attention to the possibility of advancing the latissimus dorsi muscle to the upper extremity with a view to restoring flexion in the elbow and/or shoulder joints. (Analogically, its extension can be restored by fixation to the olecranon ulnae.) Compared with a similar method — i.e., advancement of the pectoralis major on to the arm for the same purpose — advancement of the latissimus dorsi as reported in literature is a safer operation producing better functional results.

SUMMARY

In their preliminary report, the authors describe the reconstruction of flexion in the elbow joint after injury of the brachial plexus resulting in the impossibility of flexion in the shoulder joint while hand function remained preserved. For reconstruction, they used the method of latissimus dorsi muscle advancement to the ventral part of the arm using its neurovascular pedicle. The operation, described here in detail, was found relatively easy to perform.

RESUME

Restitution de la flexion d'articulation cubitale dans le traumatisme du plexus brachial

Kubáček, V., Válka, J., Brychta, P.

Dans leur rapport préalable, les auteurs décrivent un rétablissement de la flexion d'articulation cubitale chez un malade après le traumatisme du plexus brachial. La flexion d'articulation cubitale était impossible, la fonction de la main restait conservée. Pour la réconstruction, on a choisi une méthode de transposition de musculus latissimus dorsi sur le bord intérieur du bras, en conservant le pédicule neuro-vasculaire du lambeau. On fait remarquer la facilité relative de l'intervention et sa sécurité. La description de technique opératoire est détaillée.

ZUSAMMENFASSUNG

Die Rekonstruktion der Biegung des Ellenbogengelenks nach einer Verletzung des plexus brachialis

Kubáček, V., Válka, J., Brychta, P.

In einer vorlaufigen Mitteilung wird die Rekonstruktion der Biegung des Ellenbogengelenks bei einem Patienten nach einer Verletzung des plexus brachialis mit der Unmöglichkeit einer Biegung im Ellenbogengelenk unter Erhaltung der Funktion der

Hand beschrieben. Zur Rekonstruktion wurde die Methode der Übertragung des m. latissimus dorsi an der ventralen Seite des Arms unter Erhaltung seines Nerven-Gefäss-Stiels angewendet. Es wird auf die verhältnismässig einfache Ausführbarkeit und Gefahrlosigkeit der Operation unter detaillierter Beschreibung der Operationstechnik hingewiesen.

RESUMEN

Reconstrucción de la flexión de articulación del codo en caso de herida de plexus brachialis

Kubáček, V., Válka, J., Brychta, P.

En la información previa está descrita la reconstrucción de la flexión de la articulación de codo del enfermo después de la herida de plexus brachialis con la pérdida de la flexión en la articulación de codo con función de la mano conservada. Con fin de la reconstrucción emplearon el método de traslado de m. latissimus dorsi al lado ventral del brazo en condición de conservación de su pezón neuro-vascular. Está señalado que la operación está bastante simple del aspecto de su realización y seguridad, también está presentada la descripción detallada de la técnica operatoria.

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HOMOTRANSPLANTS IN RHINOPLASTY

K. FAHOUN

Diverse tissues are used to fill a collapsed contour of the nose, e.g., adjacent tissues for flap rhinoplasty. This technically demanding method is in place only where the surrounding tissues (mostly the lateral wings of alar cartilage) are available in sufficient quantity, and only for filling small defects and for minor correction. To fill a depression above the apex we can also use material mobilized from the bridge, though, of course, in only very few cases. Here, however, we do not intend to analyze the different surgical techniques.

For transplantation we can use corium, corio-fat implants, fascia, cartilage, bone or artificial plastic material. Cartilage is the best material as it is sufficiently strong and yet elastic, easy to form and to heal in at a minimum of volume change. Dermal and dermo-fat implants are soft and fit only where no support structure is needed; besides, their prospective volume is uncertain in terms of both plus (cicatricious tissue superposition) and minus (resorption). A bone implant, while sufficiently strong, is much too hard, inelastic, difficult to shape, and also subject to resorption or also superposition due to callus formation. Its chief function in the body is that of a building material. All of those implants can, for all practical purposes, be used only as autografts at the cost of an extra surgical operation necessary to obtain the required material.

Homotransplantation is the transfer of tissue from another individual of the same species (from man to man). The grafts are taken mostly from cadavers under precisely defined conditions in tissue banks where the material is preserved and stored. From there it is then ordered for the planned surgical operation, during which it is modeled to the required shape with all rules of sterility observed. The operation has to be planned well ahead for reasons of the time necessary to procure the material from the tissue bank.

Alloplastic materials have made tremendous progress over the past years. They are strong, elastic, easy to model, or, for the most part, ready-made in various shapes and sizes. However, they still remain foreign bodies in the or-

ganism with all that this entails (individual tolerance and reaction, susceptibility to infection, their shortage on the home market, etc.).

Our department has dealt with the problem of transplantation for rhinoplasty by starting a tissue bank of our own where we keep all the good-quality cartilaginous material obtained in reduction rhinoplastiy such as: resected dorsal eminences, resected dorsal and caudal parts of the septum as well as resected parts of the alar cartilages. This extremely valuable material is, as a rule, discarded after surgery. SHEEN proposed to preserve post-operatively the resected portions of cartilage in the surgical patient's subcutaneous pocket behind the auricle. However, the material thus stored cannot be used except as an autograft for any reoperation that may be needed in the future. Aware of the value of cartilage resected at rhinoplasty we devised the following procedure.

Each patient planned for rhinoplasty undergoes pre-operative medical check-up and laboratory tests for envisaged tissue donorship. At operation, all the resected parts are meticulously cleaned of all residual soft tissues and placed sterile in a bottle filled with antibiotic solution. Each bottle, carefully closed, is labelled with the date of withdrawal and stored in the refrigerator for a period of one month. In this way, we are able to accumulate sufficient quantities of good-quality homotransplantation material and to have it available at any time since rhinoplasty is part of our daily routine. We have been using this method regularly for more than a decade with most satisfactory results, making use of the homografts preserved in the above described way in scores of cases, so far without a single complication. We refrain from using antibiotics even as a peroperative precaution, and so far all at the homografts have produced union without any side reactions.

Advantages:

1. All the benefits of cartilage.
2. Variability of modelation and use.
3. Plentiful supply of material.
4. Immediate availability.
5. No additional operation is needed to obtain the graft (nasal concha, nasal septum).
6. No additional surgical scars (auricular concha, rib, hip).
7. Less operation time.
8. Simpler surgical technique.

Techniques of modelation and surgical uses of homografts in reconstructive rhinoplasty.

Principal indications:

1. Saddle nose.
2. Ridge elevation.
3. Adjustment of the line of the side of the nose.

4. Elevation of the tip of the nose.
5. Nasolabial angle correction.
6. Collapsed alae nasi lifting.
7. Collapsed vestibular valve.

We use exclusively the intranasal approach for all the implant operations, avoiding external incision in the middle of the columella since, in cosmetic and practical terms, we regard it as less well suited to the purpose. Instead, we choose medial or anterior intranasal transcartilaginous incisions.

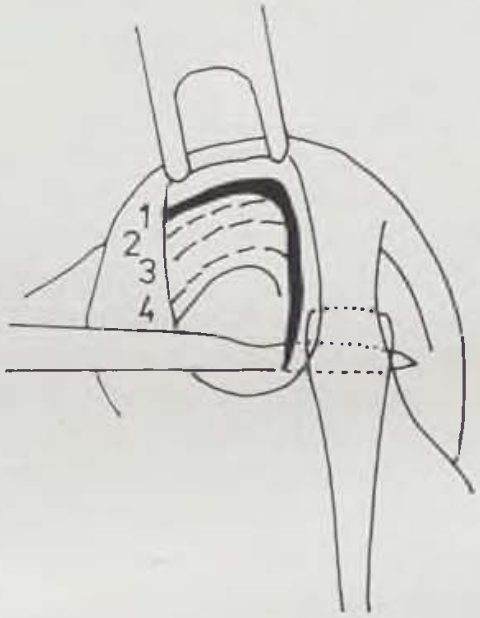

Fig. 1. Intranasal incision: transcartilaginous: 1 Anterior 2 Medial 3 Posterior 4 Intercartilaginous

The length of the incision depends on the nature of the operation. A unilateral intranasal incision is the less frequent case. Implantation involves, as a rule, yet another intervention (extirpation of cicatricious tissue, osteotomy) which we perform as a single-time operation. For that reason, we prefer the bilateral intranasal transcartilaginous incision as in normal rhinoplasty. In the majority of cases we perform the operation using topical and local anaesthesia, exceptionally also general intubation narcosis.

"Sunken tip" and knobbly ridge of the soft nose are due, for the most part, to excessively radical resection or extirpation of the lower lateral (alar) cartilages and to a lump of scarry tissue. The latter has to be resected first. In most cases, the opt for the anterior transcartilaginous approach although we do not actually proceed in the transcartilaginous way since the alar cartilages have already been removed. We go ahead with the separation using, first, a scalpel to mobilize the skin from the cicatricious block with the mucosa, and then curved dissecting scissors to avoid cutting the skin too thin. With the skin sufficiently mobilized, we proceed with separating the scarry tissue from

the mucosa, if possible, en bloc. Having finished on the right-hand side, we continue on the left side subsequently to remove the cicatricious block as a whole. This technique makes the mobilization easy to survey, thought the attemp to remove the scarry tissue in a single lump may not always be successful.

To lift the nasal tip we use a homograft from the apex modeled by leaving the medial portion with the septal dorsum in the shape of a reinforced little pillar. The bony part (from the nasal root junction) should then be modeled in the form of a tip or notch depending on the shape of the bony spine following the resection of the caudal portion of the septum on its shortening.

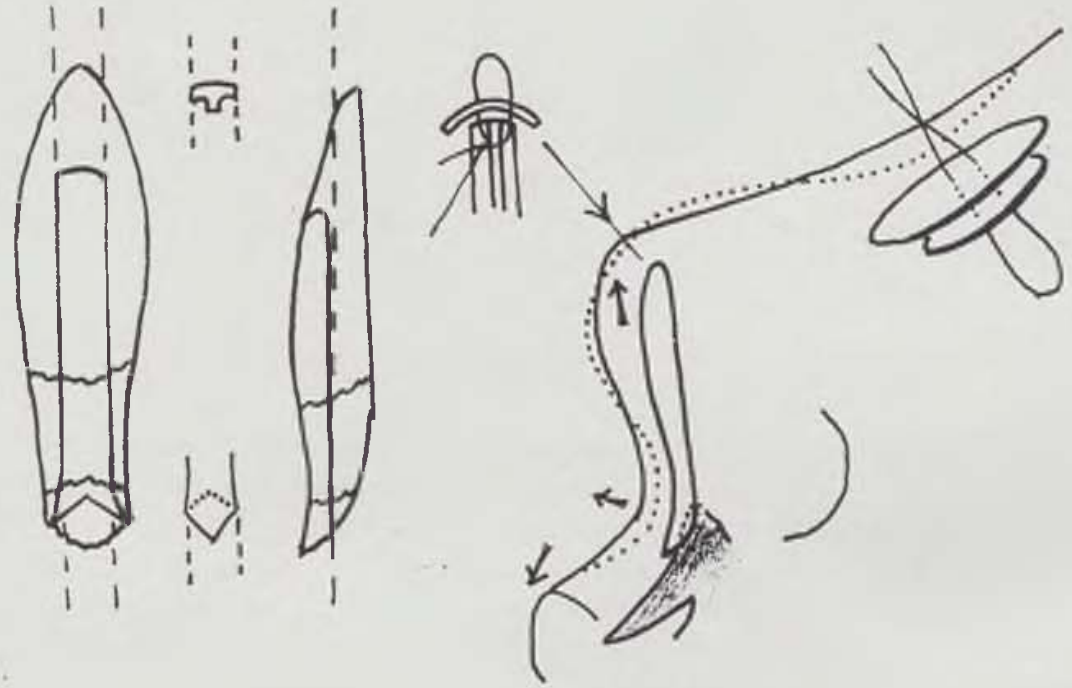

Fig. 2. Methods of nasal eminence working and implant positioning as a supportive pillar in the nasal columella

The pillar thus prepared should then be left abundantly high and not shortened until after implantation and after making sure that there is not too much pressure in the apex. The implant site is prepared in the membranous part of the columella anterior to the caudal edge of the septum (see Fig. 3).

We then use sharp scissors to penetrate from the top down to the spina nasalis, and to make a pocket in the membranous part of the columella by expanding the scissors open. Sharp single-prong little hooks are then used to dilate the upper edges of the columella and to slip the implant in. Now we can cut the implant to size. If needed, we can place on top of the pillar a shelf-shaped lateral part of the alar cartilage fixing it to septal ridge at the top of the implant with fine atraumatic suture (Fig. 2). In this way we can blunt the

tip if it is too pointed, and, at the same time, distribute the implant pressure on the skin more evenly.

The same technique is employed to fix the dorsal ridge of the septum obtained by resection from the nasal bridge homograf when reconstructing collapsed alae nasi as shown in Fig. 6.

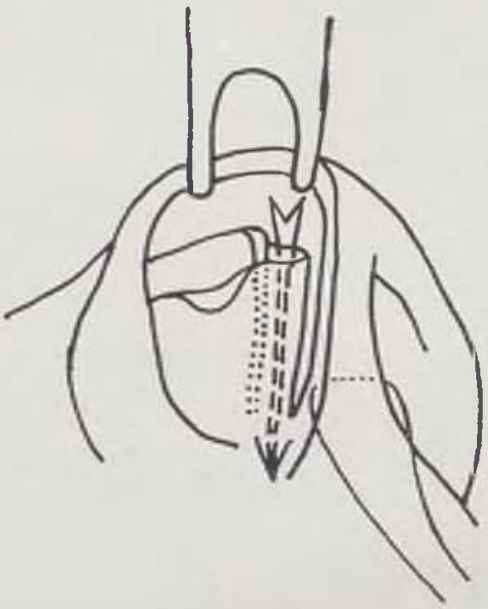

Fig. 3

The supportive pillar, now in position, should be fixed between the columella and the septum in the lower third with mattress suture which should be introduced at the start of the operation. In the course of the operation, this suture will help us to retract the anterior portion of the columella. Towards the end of the operation we use the suture to pierce the septum by gently pulling the columella upward or downward (see Fig. 4).

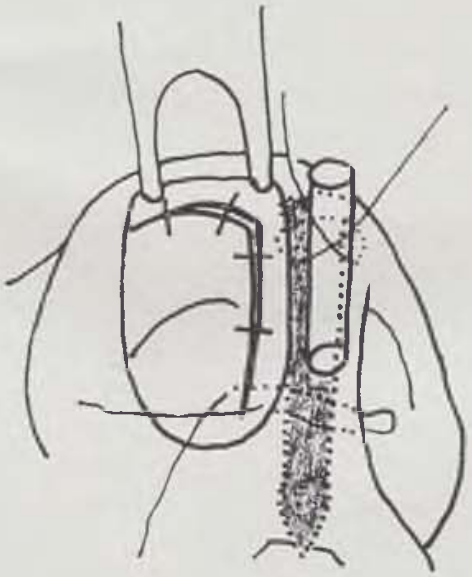

Fig. 4

The mattress suture permits us to give the nasolabial angle the desired shape and to relieve the pressure of the implant incide the tip. The shape of the anterior side of the implant is in natural correspondence with the nasolabial line. The slightly bulging part of the implant eminence gives shapes to the collumello-lobular angle while the junction between the bony part of the eminence and the root helps to shape the nasolabial angle (Fig. 2).

In the upper third, the implant should be fixed to the columella as follows: using a fine suture we pierce the implant forcing both ends of the stich from inside the columella into the skin along the edges of the anterior part. Prior to this, we make a fine incision from the membraneous part to open the columella in its middle so as to better accommodate the implant. The suture should be knotted over a piece of thin plastic tubing cut off from the infustion set tube. This is to fix adequately the position of the implant and to prevent the suture cutting into the skin of the columella. Single catgut stitched are then added to the suture.

The saddle nose can be reconstructed with an L-graft made from a homograft in the following fashion: we prepare the lower arm of the L-graft as described above and proceed to making a midline fork-shaped incision in the upper vertical part. We then fill the depression in the ridge of the nose with the ablated bridge implant wedging its lower end into the pillar bifurcation as schematically represented in Fig. 5.

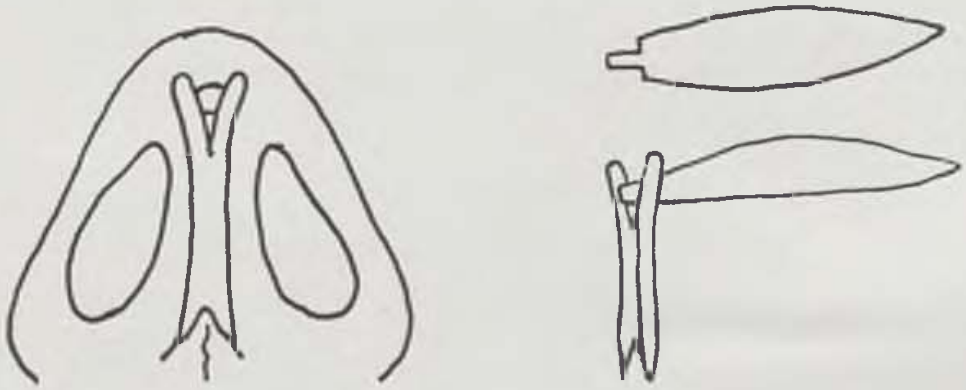

Fig. 5. L-graft construction using two resected nasal eminences as homograft

To elevate the ridge or to fill shallow depressions we use laminated auto- or homo-implants taken from the alar cartilage. (Fig. 2), fixing the implant leaves together in the middle with a fine silon suture, inserting it into the skin without knotting to prevent decubitus. We leave the loose ends longer fixing them, after placing the implant in position, to the skin with bands of adhesive paper, a technique invariably used to fix the skin under modellation plaster splints. This permits us to keep the suture in place until the end of the first post-operative week, the time we regularly check up on the result of the rhinoplasty, remodel and apply a new shape-giving plaster-of-Paris splint.

The functional reconstruction of a collapsed vestibular valve poses a great problem. We approach it using springy homografts — leaves of dorsal septum taken from the bridge and used also for the reconstruction of collapsed wings of the nose as shown in Fig. 6. One such leaf is placed across the nose over the collapsed vestibular valve and fixed with a needle. For the same purpose we can use alar cartilages sutured together or the lateral cartilaginous parts of the bridge of the nose.

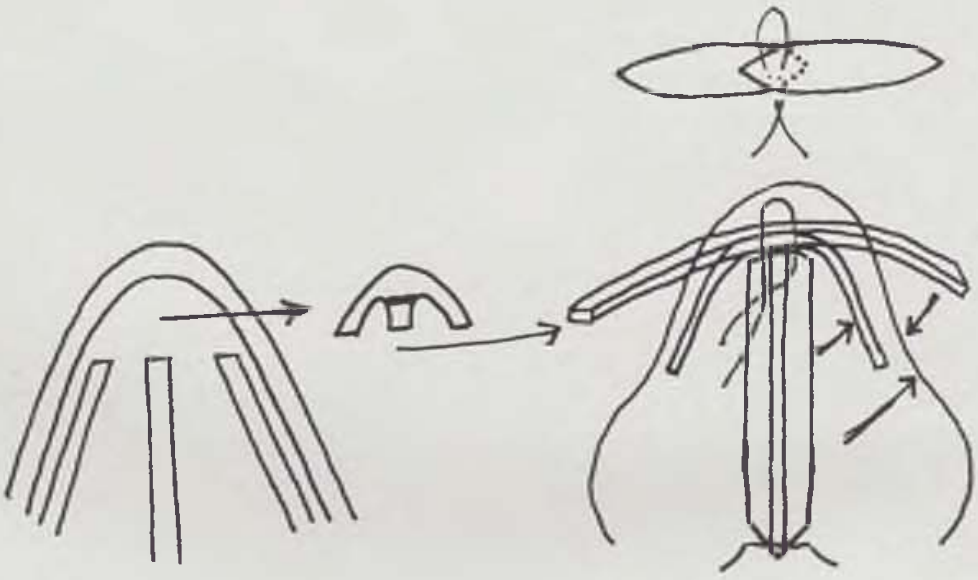

Fig. 6. Dorsal ridge of septum from resected nasal eminence used as a springy implant for collapsed nasal wings or vestibular valves

SUMMARY

The author presents different techniques of utilization of material resected in rhinoplasty (dorsal eminence, dorsal and caudal parts of the septum, and parts of the alar cartilages) for homoimplantation. This extremely valuable material is, as a rule, discarded after rhinoplasty. Details are given of methods for modelation, indication and techniques of surgical exploitation of homo-implants in reconstructive rhinoplasty.

RESUME

Utilization d'homogreffe dans rhinoplastie

Fahoun, K.

L'auteur décrit une façon d'exploitation du matériel réséqué au cours d'une rhinoplastie (bosses dorsales, parties dorsales et caudales du septum et parties des cartilages alaires) comme matériau d'homogreffe. Ce matériel bien précieux est habituellement, après une rhinoplastie terminée, jeté sans aucun profit. L'auteur met au point des façons de modelage et des techniques opératoires de rhinoplastie reconstructive pour l'utilisation d'un homo-implant. Les indications sont suivantes: nez ensellé, épine

nasale élevée, équilibration de ligne latérale du nez, augmentation de la pointe du nez, arrangement de l'angle naso-labial, élévation d'ailes du nez défaillies, défaillance de la valve vestibulaire.

ZUSAMMENFASSUNG

Die Anwendung eine Homotransplantats bei der Rhinoplastik

Fahoun, K.

Der Autor beschreibt die Methode der Ausnutzung resektierten Materials bei der Rhinoplastik (Buckel, dorsale und kaudale Teile des Septums, Teile des Alarknorpelgewebes) als Homoimplantat. Dieses sehr wervolle Material wird meistens bei der Rhinoplastik weggeworfen. Der Autor führt Arten einer Modellierung und Technik der Ausnutzung des Homoimplantats bei einer Operation und Rekonstruktion in der Rhinoplastik an. Indikation: Sattelartige Nase, Erhöhung des Nasenrückens, Ausgleich der Linie der Nasenseite, Aufsteigen der Nasenspitze, Regulierung des Winkels zwischen Nase und Lippe, Aufrichtung kollabierter Nasenflügel, kollabierte vestibulare Klappe.

RESUMEN

Uso del homotrasplantante en la rinoplástica.

Fahoun, K.

El autor describe el método de uso de material, obtenido por resección, en la rinoplástica (protuberancias dorsales, partes dorsales y inferiores del tabique y partes de cartílago de alas de la nariz) en calidad del homoimplantante. A este material de gran valor en la mayoría de casos después de rinoplástica se le botan. El autor aquí presenta los métodos de la modelación y técnicas de uso operatorio del homoimplantante para la rinoplástica reconstructiva. Indicaciones: nariz con ensilladura, elevación dorsal de la nariz, equilibración de la línea lateral de la nariz, elevación del pico de la nariz, corrección del ángulo lábionasal, elevación de las alas caídas de la nariz, caída valva vestibular.

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SUBSETS OF BLOOD MONONUCLEAR CELLS IN SEVERELY BURNED PATIENTS

M. JÍRA, V. POLÁČEK, J. STREJČEK, R. KÖNIGOVÁ, M. FÁRA

INTRODUCTION

In burned patients, sepsis significantly contributes to the morbidity and mortality. Even despite the introduction of very effective antibiotics in the 50s, the course of their illness may still be dramatically altered by infection. There is an increased evidence of the relationship between the host immune status and the incidence of postoperative infections. Cellular immunity seems to be more severely suppressed than the humoral one. Clinical alterations of the immunological status following thermal injury run paralel to quantifiable changes in lymphoid compartment morphology and cellular phenotype, T-cell dependent or cell-mediated immune functions, and alterations in B-production of immunoglobulins (3, 8).

The state of cell-mediated immunity appears to be reflected by lymphocyte ratio (T4 to T8 positive lymphocytes in humans) of the helper/inducer and suppressor (9). To extend information about the changes in lymphocyte subsets in burned patients, these indices were investigated in a group of patients after severe thermal injury.

MATERIAL AND METHODS

The study group consisted of 16 patients with thermal injury covering more than 20% (20—87%, mean 42,7%) of body surface area (BSA). Fourteen of them were men and two women aged 17—74 years (mean 39.9 years). The patients were treated at the intensive care unit according to standard protocol (8). No steroids were administered to this group of patients. Four of them developed sepsis during treatment and two patients died. Another patient died accidentally due to acute pulmonary embolism.

A group of 31 healthy subjects matched for sex and age served as controls.

Once a week, peripheral blood mononuclear cells (PBMCs) were isolated from heparinized venous blood by Ficoll-Hypaque density gradient centrifugation (5).

Leu-2a and Leu-3a monoclonal antibodies were purchased from Becton Dickinson, Mountain View, USA; anti-Ia came from Hybritech, La Jolla, USA; T3 monoclonal antibody was purchased from Coulter Immunology, Hialleh, USA, and Leu-7 antibody was kindly donated by Dr. Stockbauer, the Institute of Hematology, Prague.

Washed PBMCs were analyzed by indirect immunofluorescence. 1×10^6 cells were briefly incubated with monoclonal antibody under saturated conditions for 30 minutes at 4 °C, washed three times with phosphate-buffered saline containing 1% bovine serum albumin and 0.01% sodium azide, then incubated with fluorescein thiocyanate-conjugated swine anti-mouse immunoglobulins diluted 1:4 (the Institute of Sera and Vaccines, Prague, Czechoslovakia). Washed samples were then counted microscopically (Fluoval 2, Carl Zeiss Jena, the German Democratic Republic). At least 500 cells were counted in each sample. Statistical analysis was made by Student's t-tests and by linear regression using PC statistical software (Biostatics, Apple IIe).

Table 1. Lymphocyte subsets following thermal injury

Surface marker	CONTROLS (n = 31)	BURNED PATIENTS (n = 16) (after injury)				
		1st week	2nd week	3rd week	4–5 week	convalescence
T3	66.9 ± 9.6	58.6 ± 10.6	54.5 ± 13.0	54.9 ± 13.1	54.8 ± 12.0	64.7 ± 10.0
Ia*	14.8 ± 3.2	23.4 ± 5.0 **	22.1 ± 7.0 **	15.6 ± 8.9	14.0 ± 4.6	12.1 ± 3.9
Leu-7*	13.5 ± 2.8	23.8 ± 5.3 **	23.0 ± 4.9 **	17.8 ± 4.8	17.8 ± 4.7	18.1 ± 4.5
T4/T8	2.06 ± 0.37	1.40 ± 0.44 **	1.54 ± 0.43 **	1.55 ± 0.38 *	1.61 ± 0.47	1.86 ± 0.41
T4	51.8 ± 6.6	34.8 ± 7.5 **	36.8 ± 7.3 **	39.1 ± 6.9 *	44.9 ± 6.7	50.0 ± 6.8
T8	25.1 ± 4.9	24.8 ± 5.0	23.9 ± 4.9	25.3 ± 5.4	27.9 ± 4.8	27.7 ± 5.0

Results are expressed as a mean (in %) — 1SD
Stars indicate statistical significance when compared to controls
* $p < 0.05$
** $p < 0.01$

RESULTS

Percentage of cells bearing surface marker T3 was decreased following thermal injury with the maximum reached at 3rd week. Mononuclear cells bearing Ia antigen increased in the first weeks after injury. Similarly, percentage of Leu-7 positive cells increased in burned patients (Table 1).

The T4 to T8 ratio was very low from the first week. T4 positive cells were exclusively responsible for this effect since the percentage of T8 positive cells remained unchanged. The decrease in T4/T8 ratio and T4 subset, respectively, reached statistical significance from the first to the third week when compared with controls.

No correlation between BSA, age and susceptibility to the development of sepsis was found in any patient in respect to the changes in mononuclear cell subsets.

DISCUSSION

Preparation and subsequent availability of monoclonal antibodies to lymphocyte subsets has opened another approach to assessing immunological disturbances in various clinical conditions (9). In burned patients, functional impairment of cell-mediated immunity is believed to contribute to a high incidence of septic complications. Various defects of mononuclear subsets were described, including the increase of supressor cells, impairment of natural killers and decreased ability to produce interleukin-2 by T-cells helper (3, 8).

In this study we analyzed the phenotype characteristics of separated blood mononuclear cells in patients after severe thermal injury. Although the number of patients was relatively low, a consistent decrease in cells of T4 phenotype and T4/T8 ratio was demonstrated. T8 phenotype cells, however, remained unchanged. Concordant results were recently obtained by other investigators (1, 7). In experimental system they also demonstrated that some immunomodulators are able to prevent post-traumatic changes in lymphocyte subsets (10). Similar changes, however, were observed early after uncomplicated selective surgery (6). Furthermore, stress-induced dysbalances were also accompanied by changes in T4 subsets (2).

Alternatively, burn patients may benefit from the decrease in T4 cells in respect to skin allografting. These cells were found to correlate with adequate immunosuppression in kidney transplantations (4).

Cells of la-positive phenotype began to proliferate from the first week after injury. This increase may reflect the rise in activated T-cells or in B-cells. Leu-7 phenotype cells are associated with natural killer cell activity but this fuction is believed to be impaired after thermal injury (5). It is known that some cells of Leu-7 phenotype belong to suppressor cells. Thus the increase in Leu-7 positive cells may be associated with the rise in their suppressor subsets. The enhanced suppressor function following thermal injury may be alternatively mediated by Leu-7 positive cells or Leu-7 positive cells are not able to exert their NK functions, respectively. Leu-7 positive cells in burned patients

generally contained less azurophilic granula than the cells of the same phenotype in healthy individuals (data not shown).

This study has opened several questions which are to be answered by other methods. Indirect immunofluorescence cannot solve the problem if there are changes in the percentage of cells, or if these cells are unable to show their differentiation antigens properly. Double labelling of mononuclear cells for surface markers and fuctional characterization of the cells of the same phenotype can help answer some of these questions.

From the clinical point of view, we feel that there are also other factors which may significantly contribute to the changes in mononuclear cell subsets, including repetitive allografting, transfusions, anesthesia, etc.

Recovery was constantly accompanied by normalization of lymphocyte subsets. In some condition, this assay may be used as an additional marker of recovery of the immune system from thermal injury. However, the biological and clinical significance of subset disturbances which occured in extensively burned patients are still to be investigated.

SUMMARY

The state of cell-mediated immunity appears to be reflected by various mononuclear subsets. For these purposes, indirect immunofluorescence method with monoclonal antibodies recognizing T3, T4, T8, Leu-7 and Ia human differentiation antigens was used. Subsets of peripheral blood mononuclear cells were investigated in a group of patients after severe thermal injury (>20% BSA). Significant decrease in T4 positive subset was observed following burn injury but no changes in the percentage of T8 subsets were found. There was a slight decrease in T3 positive cells after injury. However, the proportion of Ia and Leu-7 positive cells was higher. Recovery was accompanied by normalization of these subsets in the peripheral blood.

RESUME

Sous-groupes de cellules sanguines mononucléaires des grands-brûlés

Jíra, M., Poláček, V., Strejček, J., Konigová, R., Fára, M.

L'état d'immunité cellulaire dépend, paraît-il, de divers sous-groupes de mononucléaires. Pour les étudier, on a adopté une méthode d'immuno-fluorescence indirecte, avec les anticorps monoclonaux qui distinguent les antigènes différentiels humains: T3, T4, T8, Leu 7 et Ia. Dans un groupe de grand-brûlés (brûlures supérieures à 20% de la surface corporelle), on a examiné les sous-groupes des cellules mononucléaires du sang périphérique. Après brûlure, on constata une diminution signifiante du sous-groupe T4, mais aucun changement quant au pourcentage du sous-groupe T8. Également, on constata une légère baisse du nombre des cellules positives T3. Cependant, le rapport de Ia à Leu7-cellules positives était élevé. La guérison a rendu normaux les sous-groupes du sang périphérique.

ZUSAMMENFASSUNG

Untergruppen mononuklearer Bultzellen bei Patienten mit schweren Brandwunden

Jíra, M., Poláček, V., Strejček, J., Königová, R., Fára, M.

Der Zustand der Zellenimmunität hängt anscheinend von verschiedenen Untergruppen mononuklearer Blutzellen ab, zu deren Studium die Methode der indirekten Immunofluoreszenz mit mononuklearen Gegenstoffen angewandt wurde, die menschliche Differenzierung-Antigene T3, T4, T8, Leu-7 und Ia unterscheiden. Bei einer Gruppe von Patienten mit schweren Brandwunden (mehr als 20% der Körperoberfläche betroffen) wurden die Untergruppen mononuklearer Zellen des peripheren Blutes untersucht. Nach dem Verbrennen wurde eine bedeutsame Verringerung der T4-positiven Untergruppe beobachtet, jedoch keine prozentualen Veränderungen der Untergruppe T8. Ebenso wurde eine leichte Verringerung der Anzahl der T3-positiven Zellen wahrgenommen. Dagegen war das Verhältnis der Ia- und Leu-7-positiven Zellen erhöht. Die Heilung wurde von einen Normalisierung dieser Untergruppen des peripheren Blutes begleitet.

RESUMEN

Subgrupos de células mononucleares de la sangre de enfermos con graves quemaduras

Jíra, M., Poláček, V., Strejček, J., Königová, R., Fára, M.

El estado de la inmunidad celular depende, por lo visto, de differentes subgrupos de los mononuclerares, con fin del estudio de los cuales emplearon el metodo de la inmunofluorescencia indirecta con anticuerpos monoclonales, capaces a detectar a los antígenos diferenciales humanos T3, T4, T8, Leu-7 y Ia. En el grupo de los enfermos gravemente quemados (con más que 20% de la superficie del cuerpo) investigaron subgrupos de las células mononucleares de la sangre periférica. En los recién quemados fue notada la disminución significante del T4-positivo subgrupo, pero ningunos cambios del porciento del subgrupo T8; también fue notada la disminución ligera de número de T3-positivo subgrupo. No obstante, la relación de Ia- y Leu-7-positivas células fue aumentada. El proceso de curación fue acompañado por la normalización de éstos subgrupos de la sangre periférica.

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IN MEMORIAM

Head surgeon Jiří K r e n a r, M. D., CSc., was born in the Moravian village of Krásno on Bečva on May 25, 1925. Already as a child he showed considerable talent for draughtsmanship, and the Moravian countryside provided him with plenty of inspiration for his first artistic attempts.

In addition to that he exhibited also a musical talent early in his life so that, not surprisingly, he was admitted at the conservatoire. However, at his father's wish he continued his grammar school education to complete it in the wartime year of 1944. Since the Germans had closed down Czech universities, he worked, for a time, as a farm labourer and, from September 1944 until the country's liberation, as a laboratory work at a clinic of the League against Tuberculosis.

In 1945, he enrolled at the Medical Faculty, J. E. Purkyně University in Brno. Already as a student he showed interest in work at the medical and gynaecological-obstetrical departments.

He graduated with flying marks on May 2, 1950 to take up the post of a houseman at the surgical ward of the hospital of Nové Město in Moravia where he worked until he was due to start military service.

In 1955 he started work at the Department of Plastic Surgery, Brno, in 1959 he was appointed deputy head of the department, a post which he held until his death. In 1956, he passed his 2nd-degree post-graduate qualification examination in plastic surgery. In 1965 he successfully defended his dissertation "Scope for plastic surgery in surgical gynaecology" to obtain the degree of candidate of medical sciences.

Dr. Jiří Krenar, CSc., is the author of a unique monograph "Plastic Surgery in Gynaecology" published in three editions in this country but also in the USSR and the FRG. In this book awarded the Czech Plastic Surgery Society Prize he went beyond the confines of his own specialty. He used his wealth of experience and surgical techniques of his own design to introduce them into surgical gynaecology, thus widening considerably the scope of this particular discipline, as generally appreciated in this country and abroad. The publication proved to be a happy union of his long interest in gynaecology and the results of the ministerial research assignment which he had spent years working on.

It was particularly at the time of his work on the book that he was able to put to full use his talent as an artist and his aptitude in matters of printing graphics. Thus, apart from his own monograph, he was subsequently invited to provide didactic illustrations to seven other medical publications and textbooks.

Besides his clinical work, Dr. Krenar had published some 40 studies in the professional press and, despite the load of work imposed upon him as deputy head of the department, he spent 25 years working as a research consultant in Brno and as a forensic expert in the fields of plastic and reconstructive surgery. In addition, he held other important positions in the trade union movement and in medical societies.

However, a mere list of his working achievements still falls short of representing the whole of Dr. Krenar's personality. He was a brilliant companion and debater, a man of extensive knowledge and versatile interest. His closest friends included a number of outstanding artists and musicians as music and art were his life-long companions.

Dr. Krenar was intrinsically fond of creative work, people and life. He dazzled people with his zest for life, with his optimism and sense of humour. He belonged among the most selfless physicians and the most noble-minded human beings. A good man. People paid him back his kindness, but life let him down. Without any warning, without any symptoms, in the middle of his working and personal plans for years to come, while he was on holiday Dr. Jiří Krenar, CSc., died suddenly on August 17, 1986. May his memory be honoured!

Prof. L. Bařinka, M. D., DrSc.
and clinical team

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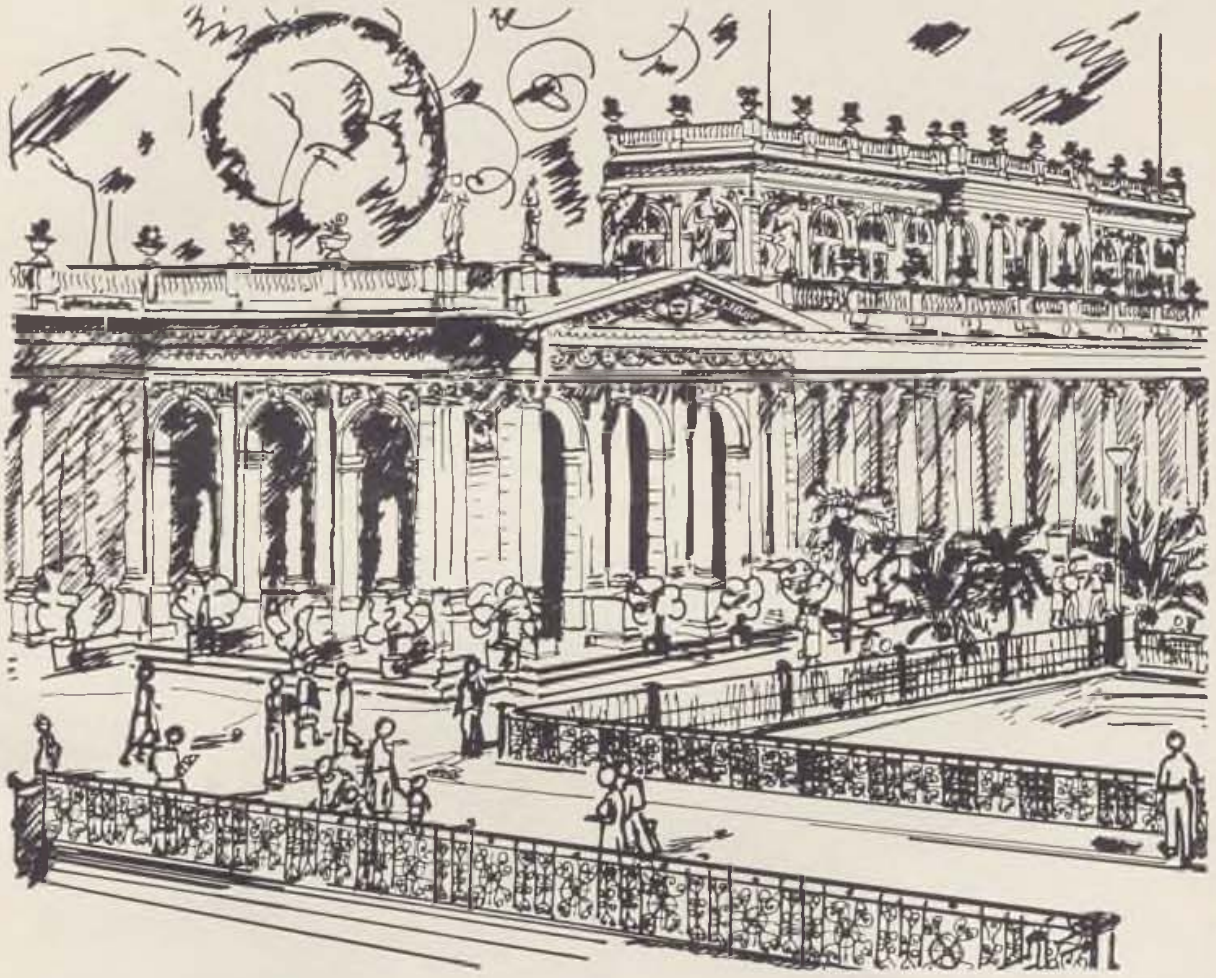
STOP FOR A MOMENT AND CONSIDER YOUR HEALTH



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

CZECHOSLOVAK SPAS — OASES OF HEALTH,
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