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IMPROVISATION IN WRAP-AROUND TOE-TO-THUMB TRANSFER

A. GOVILA

The thumb, an appendage of great complexities contained within a compact compartment of the hand, has caused countless challenges to the county of constructive surgeons. However, since the character of this discipline is to find and refine solution to all problems, the idea and the conception of surgery through magnification; the initial microsurgical dream, turning quickly into clinical reality, came to rescue in time for the team of reconstructive surgeons, when the great toe was transferred to the hand to replace thumb (Cobbett, 1969, Buncke et al., 1973, O'Brien et al., 1975). Soon, whole host of tissue, became available within no period, for thumb reconstruction, with the help of microsurgical methods, such as second toe (Yang and Gu, 1979) and part of great toe (Morrison et al., 1980, Foucher, 1980).

Since the results achieved by microsurgical methods, surpassed all other results, cosmetically, functionally, economically and technically, the method gained universal popularity. In context to Indian subcontinent, however, complete great toe, could not be spared, for use as thumb, since this left the patient with the problem of inability to wear slippers (Havai Chappals), which is most common foot wear of the common Indian citizen. The alternative of wrap-around partial great toe transfer was most suited to the Indian situation, which preserves the first web space of the foot and was welcomed by most Indian microvascular surgeons.

However the method involves an additional operating procedure of harvesting & shaping iliac bone graft and its added early and late morbidity.

In selected situations we defer the use of iliac bone graft and prefer to use second metacarpal, which does not need shaping, requires much less operating time, much easier to harvest, has an ideal ready made required shape of the bone graft and simultaneously deepens the first web space of the hand as a welcome bonus.

Harvesting the second metacarpal and its use unlike the iliac bone graft has no morbidity, and has additional merits of providing added function to the hand by deepening the first web space. In this paper we present its use.

CASE REPORT

A 30 years old male farmer sustained injury to both his hands while working on a hay chopper (Toka machine) and sustained bilateral amputations of fingers and thumb at varying levels on 30. 10. 1988 (Fig. 1 a). While the right non dominant hand was amputated at the level of proximal interphalangeal joint with only minimal loss of pulp of thumb, the left dominant hand sustained much severe injury; at a level proximal to metacarpal heads and thus lost all his fingers and thumb except proximal phalanx of the little finger (Fig. 1 b). His initial treatment consisted of split thickness skin grafting of the exposed stumps, since amputated parts were not brought with the patient. He was readmitted on 13. 3. 1989, for





Fig. 1a) Photograph showing bilateral amputation caused by hay chopper



Fig. 1b) X-ray appearance showing level and direction of amputation of left dominant hand creating a metacarpal hand



Fig. 1c) Close up of left hand showing good thenar eminence



Fig. 1d) Marking on the foot of the tissues to be harvested



Fig. 1e) Part of the great toe to be wrapped is raised on the dorsalis pedis artery



Fig. 1f) View of the reconstructed thumb on completing the operation



Fig. 1g) Second metacarpal as a bone graft is fixed over the first metacarpal in position

definitive reconstruction. Examination at this time revealed 60 degree of flexion at the metacarpophalangeal joint of the little finger stump. First metacarpal was found to be intact and good bulk and strong contraction could be palpated in the thenar eminence (Fig. 1 c). It was also noticed that the second metacarpal was reduced distally by one centimeter because of oblique amputation. A wrap-around free great toe transfer was planned (Fig. 1 d) and was performed (Fig. 1 e,f) on 31. 3. 1989. To provide bony support to the reconstructed thumb, second metacarpal was harvested through the dorsal approach (Fig. 1 a), and was fixed in position (Fig. 1 g). A strip of skin as wide as 1.5 cm was left over the great toe only. Lateral two third of nail and half of the distal phalanx of great toe was included in the tissue to be wrapped around.

Following repairs were performed.

1. End to end anastomosis of radial artery to dorsalis pedis artery (2 mm diameter; both).
2. End to end anastomosis of great saphenous vein to cephalic vein (2.5 mm diameter; both).
3. End to end anastomosis of one of the unidentified tributary from the subcutaneous tissue of the great toe to the tributary on the dorsum of hand (1 mm diameter; both).
4. Medial plantar nerve was co-opted with radial digital nerve of the thumb.
5. Bony arrangement and fixation: Distal half of the distal phalanx of the great toe was included in the wrap around tissue. Three centimeter of the shaft of the second metacarpal was pagged between the first metacarpal and the distal phalanx in the wrap around tissue from the great toe. Bony fixation was performed at 30 degree angulation by interosseous wiring (Fig. 1 h).

6. Split thickness skin graft was applied over some of the vascular pedicle, which remained exposed on the dorsum of the hand.

His postoperative course was uneventful and at the end of 4 weeks, all wounds were healed. Good bony union was observed at 3 months, and at 6 months sensory recovery was satisfactory. Except for two point discrimination, which continued to be more than 2 cm, the sensory recovery was functionally complete 12 months after reconstruction. Examination at this time showed good opposition (Fig. 1 i), giving him a very good grip of smaller objects (Fig. 1 j), as well as bigger objects (Fig. 1 k).

DISCUSSION

"The heart of the hand lies in it's thumb" or may be "Thumb is half the hand"; statement not only becomes more valid but also complex with the realization that this half is content in one fourth of the space the hand occupies. Obviously, much more intricate mechanism subsists in this little part than the rest of the hand. This complex organ demands mechanically opposite properties simultaneously, namely stability and mobility. If an appendage has to be stable mechanically, mobility can not be expected and vice versa, but the nature has managed to provide both. Requirement of sensation to this organ complicates already complex situation. Everything put together in the right perspective the reconstruction of thumb becomes such a gigantic challenge that not many reconstructive surgeons feel comfortable with the problem and venture to undertake it.

Conventional osteoplastic methods of reconstruction with a neurosensory island flap sustained the situation rather well especially in the post war period. However, with the advent of microsurgical methods of reconstruction the expectation in general arose high. A one time dream of a reconstructive surgeon to achieve stability, mobility and sensations in a single operation, initially emerged as a possibility on the horizon, eventually turned sensational and became a viable clinical proposition.

Excellence and its pursuit has been the persistent property of all reconstructive surgeons and in this pursuit the methods of thumb reconstruction climbed the ladder of evolution rather fast, but by no means the top of the ladder is as yet reached.

Several composite tissues were found to be sparable and became available overnight for reconstruction, such as great toe, second toe, and part of toes.

Ready made thumb like organs in the body became available such as toes of foot, the result of which initially had a dramatic appeal over a osteoplastic method, but gradually the difficulties and the shortcomings surfaced.

Great toe is often too great for the thumb, except in a sophisticated, fragilely and barely walked lady of exceptional beauty from a mongolian race and since such delicate combinations may despair others but do not hurt themselves commonly, an ideal great toe transfer is a rare opportunity. Great toe remains a great choice in a great manual worker, the stock of whom is in a sublime decendo.

Second option is a second toe and the result after its use is invariably finger like, then the thumb like; the aim what we set in, is thus defeated. Additionally, not only one extra joint is transferred, but the joints are closely placed, as compared to the thumb, and the pulp of the toe wobbles giving insecure pinch.

Therefore an attempt has been made, to "custom made" transfer, where vascularized tissues, borrowed from several parts of the body are fixed together to produce a thumb of identical size and shape, such as wrap-around technique (Morrison), or twisted toe transfer (Foucher). These methods, no doubt produced cosmetically most acceptable results,



Fig. 1h) X-ray showing bony arrangements after the transfer



Fig. 1i) One year postoperative results showing opposition



Fig. 1j) One year postoperative grip of small objects such as bottle neck



Fig. 1k) One year postoperative grip of bigger objects such as a paper box

and functionally a stable thumb but at the cost of loss of mobility at the distal joint. Since in any case, the functional mobility at the distal joints in the transferred great and second toes is not up to mark, on comparison the "custom made" designs seems superior.

Giving an Indian perspective to the whole context, where 80% of the Indians during 80% of their life time wear slippers (Havai Chappals), requiring first web to wear it, can not dispense with their great toe under any circumstances. Great toe transfers are not recommended and are not performed.

Wrap-around technique uses iliac bone graft for its support. The bone graft needs to be harvested from an additional operating area, requiring extra time for the preparation and drapping of the part and additional team; in a procedure, where time and teams are already in short supply. The bone graft needs to be shaped and leaves an additional scar on the groin with its associated morbidity; immediate and late postoperative.

To overcome this problem, we use second metacarpal from the hand, which we are going to reconstruct. Since hand is already prepared and draped by the operating team, ment to work on the hand neither any extra time is required in its preparation nor any extra operating team. Moreover, the shape of the metacarpal matches the shape required to support the tissues, which are going to be wrapped around the bone graft. As a bonus of significant proportions removal of second metacarpal deepens the first web space, which is so much desired, since it greatly enhances the function of the hand by means of increased grasp and better opposition.

Obviously, the method is most suited when the carpometacarpal joint is present and also some, if not all of the first metacarpal, is available along with the functional thenar group of muscles, and when the second metacarpal is lying unutilized in the palm, such as in oblique amputations of the hand at the level proximal to proximal interphalangeal joint.

SUMMARY

Wrap-around partial great toe transfer, a one time dream, is now a well established and universally accepted method of thumb reconstruction. In this technique, part of the soft tissue of the great toe are wrapped around and shaped to the size of the graft from iliac bone in such a manner that a thumb of normal dimensions and shape is produced. Instead of the iliac bone graft, we found great merit in using the second metacarpal from the traumatised hand to be reconstructed. In this paper its use and merits are elaborated.

Key words: thumb reconstruction, wrap-around-flap

RÉSUMÉ

Modification de reconstruction du pouce par transfert du lambeau wrap-around du grand-orteil

Govila A.

Le transfert partiel libre du gros-orteil, en forme de wrap-around-flap, n'étant autrefois qu'un rêve est devenu aujourd'hui un des procédés chirurgicaux de routine, appropriés aux reconstructions du pouce. D'une façon très satisfaisante on peut reconstruire le pouce par transfert libre des tissus mous de l'orteil, avec l'implantation simultanée d'un greffon osseux de crête iliaque. A la place du greffon osseux prélevé à la crête iliaque, l'auteur utilise dans les cas indiqués avec avantage le 2^e métacarpien de la main atteinte. L'article met en évidence le procédé opératoire, les avantages et les indications de ce type d'opération sont discutées.

ZUSAMMENFASSUNG

Neue Technik zur Rekonstruktion den Daumens mittels eines "Wrap around" Lappens aus der grossen Zehe

Govila A.

Eine freie Übertragung eines "wrap around" Lappens aus der grossen Zehe, die früher als ein Traum erschien, gehört heute zu den Methoden, die in der täglichen Praxis angewandt werden. Bei dieser Daumenrekonstruktion werden bei gleichzeitigen Implantation eines Knochenstückchens aus dem Beckenkamm der Daumen mit einem Weichteillappen aus der grossen Zehe bedeckt.

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SEQUELAE OF AN INJURY FROM THE SECOND WORLD WAR TREATED BY FREE FLAP TRANSFER

J. KLETENSKÝ¹, M. TVRDEK¹, A. NEJEDLÝ¹, Z. PROS¹, V. LEBEDA³,
J. PROKOPOVÁ², H. ŠTĚŇHOVÁ²

The development of reconstructive surgery in recent years is still an ample source of enlightenment and perhaps also of fascination for the engaged and well-informed. As evidence a case-history may serve which in our opinion is not without interest from the professional aspect and - due to wider associations also in the social and historical context.

Patient E. K., born in 1931, was injured during an Allies' air raid of the German occupied territory on March 25, 1945. He suffered an injury of the left lower extremity caused by a splinter of a phosphorus bomb. He was treated and operated in the Žatec hospital and discharged after six months hospitalization and attended then the hospital as an out-patient for dressings of the persisting soft tissue defect of the leg. To the Department of Plastic Surgery in Prague, headed then by Professor Burian, he was admitted on October 14, 1950. In the case-record a defect is described 5×3 cm in size, 3 mm deep, located in a transverse position below the patella on the left. On the floor of the defect the denuded tuberositas tibiae can be seen. The knee joint is in a 170° position with minimal excursions - active and passive - up to 20°. The patient was treated conservatively and after 5 days of hospitalization transferred to the Žatec Department of Surgery.

He was re-admitted to the Department of Plastic Surgery in September 1991 with the anamnestic data of 7-year persisting suppurative secretion from an osteomyelitic defect in the proximal third of the tibia. The original intention was excochleation of the osteomyelitic focus and reconstruction of soft tissues with the perspective to deal with the bone defect in the second stage (in cooperation with orthopaedists). On September 19, 1991 the patient was operated - excochleation of the tibial defect was performed, the osteomyelitically altered head of the fibula was removed and rotation of both heads of the gastrocnemius muscle into the defect with partial insertion of the medial head into the bone cavity was performed. The muscle was covered by a meshed skin graft.

When alternatives of the subsequent procedure after healing were considered, the cavity in the proximal third of the tibia was too large and the originally planned spongioplasty appeared uncertain from the prognostic aspect. In preoperative bacteriological examination, peroperative sampling and in drains after operation the following microorganisms were identified in the cavity: *Pseudomonas aeruginosa*, *Corynebacterium pseudodiphtheriticum*, *Staphylococcus aureus*, *Morganella morganii*, *Enterobacter cloacae*, *Streptococcus faecalis* and *Candida albicans*. Longer existence of the cavity, endangered beyond doubt, the stability of the tibial plateau and along with the infection persisting for a long period did not rule out the necessity of amputation in the near future. The best alternative under these circumstances seemed filling of the cavity with vascularized muscle. The patient was operated again on October 29, 1991 - a free transfer of the m.latissimus dorsi 1. sin. was performed by connection to the a.tibialis ant. and its committant vein. The originally oval



aperture at the site of the tuberositas tibiae was enlarged along the longitudinal axis, extended in the distal direction in a wedge-shaped manner so that the inserted part of the muscle would fill the maximum portion of the osteomyelitic cavity. On the flap a skin marker was left, the remainder was covered by a skin graft. Healing proceeded without complications, the Redon drain was removed from the bone cavity on the 10th day following operation.

After the patient's discharge we were interested in the fate of the osteomyelitic cavity and the behaviour of the muscle which filled the cavity. There were opportunities to examine the patient repeatedly by NMR and CT. On examination after operation in the bone cavity residual spaces above and below the flap were seen, filled with fluid with admixtures of blood derivatives. As the oedema receded and neurotrophic atrophy of the muscle proceeded during check-up examinations these spaces increased in size and to our regret remained stationary, the density of the fluid declined at that time. During the check-up examination in April 1993 - 18 months after operation the density in residual spaces reached the level of 12 H. During the subsequent examination in September 1993 - i.e. 23 months after operation it was concluded from the density of 30 H that the residual space was filled with granulation tissue. In the distal portion of the implanted flap calcification foci developed.

The patient recovered from the clinical aspect, there are no fistulae, he walks with a stick and burdens the extremity with cca 30 - 40 kg.

There are several remarkable facts in this case-history. Above all the unusually long interval between the primary injury, and as we hope, its final solution. There is also the fact that techniques which made this solution possible did not exist at the time of the injury and several subsequent decades. Finally the echo and aftermath of events which are already history for us and the opportunity to reflect on the development of a discipline so closely associated with treatment of war injuries during its beginnings in our country.

SUMMARY

The authors present the case-history of patient with chronic osteomyelitis of the proximal third of the tibia - resulting from an injury during the Second World War. The defect of bone and soft tissues was treated by free transfer of a musculocutaneous flap. The behaviour of the flap in the osteomyelitic cavity is followed up and checked by repeated CT and NMR examinations.

Key words: chronic osteomyelitis, free flap transfer

RÉSUMÉ

Séquelles d'un traumatisme de 2^e guerre mondiale résolues par transfert libre tissulaire

Kletenský J., Tvrdek M., Nejedlý A., Pros Z., Lebeda V., Prokopová J., Štěňhová H.

Les auteurs présentent un cas d'un malade avec l'ostéomyélite chronique du tiers proximal du tibia, séquelle d'un traumatisme acquis pendant la 2^e guerre mondiale. La lésion osseuse et des tissus mous était réparée par le transfert libre d'un lambeau musculocutané (MC). Le comportement du lambeau dans la cavité ostéomyélique est suivi et documenté par les examens répétés de CT et NMR.



Fig. 1. Condition of left lower extremity in 1950



Fig. 2. Condition of left lower extremity in 1991



Fig. 3. X-ray before operation - lateral projection



Fig. 4. X-ray before operation - anteroposterior projection



Fig. 5. Condition after closure of defect by transposition of both heads of the gastrocnemius muscle. Arrow - path of the ant. tibial artery

Fig. 6. NMR check after closure of defect by transposition of both heads of the gastrocnemius muscle. Arrows - borderline of partly inserted muscle



Fig. 7. Harvested latissimus dorsi muscle. Arrow - pedicle of flap

Fig. 8. Peroperative picture before free flap transfer. Arrow - recipient vessels



Fig. 9. Condition after healing

Fig. 10. NMR check two months after free flap transfer.
Arrows - residual spaces above and below flap



Fig. 11. NMR check 18 months after free flap transfer.
Arrows - residual spaces above and below flap

Fig. 12. Scout view on CT examination 23 months after free flap transfer

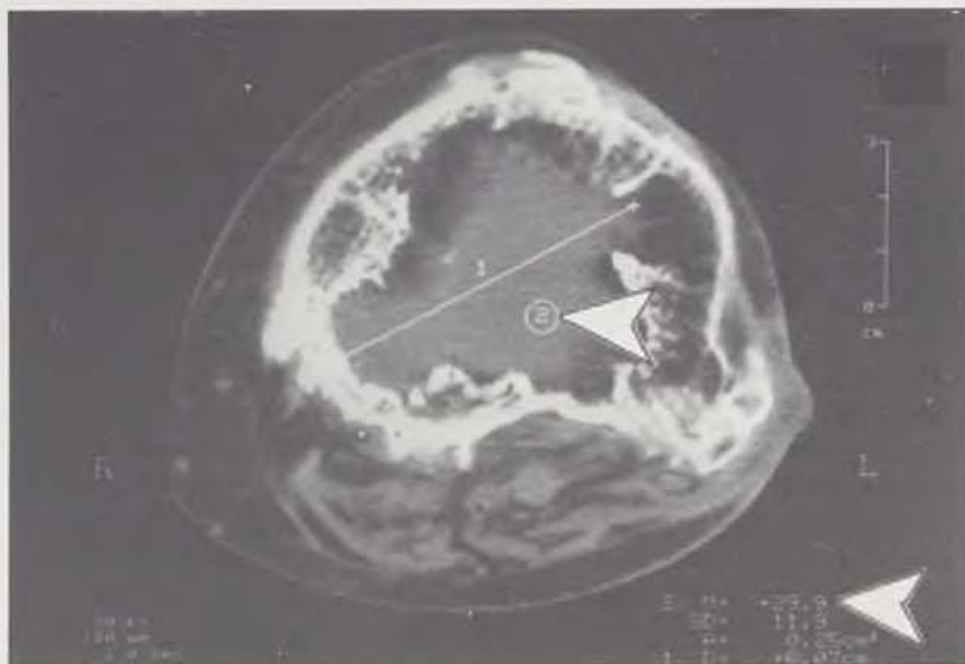


Fig. 13. CT check 23 months after free flap transfer - area beneath tibial plateau filled with granulation tissue



Fig. 14. CT check 23 months after free flap transfer. Arrow - calcification in muscle



Fig. 15. Check 23 months after free flap transfer



Fig. 16. Check 23 months after free flap transfer

ZUSAMMENFASSUNG

Die Folgen einer Verletzung im II. Weltkrieg, behandelt mittels eines Überpflanzung eines Weichteillappens

Kletenský J., Tvrdek M., Nejedlý A., Pros Z., Lebeda V., Prokopová J., Štěňhová H.

Die Verfasser beschreiben die Krankengeschichte eines Patienten mit chronischer Osteomyelitis des proximalen Drittels der Tibia - infolge einer Verletzung im II. Weltkrieg. Der Knochendefekt wurde mittels einer Transplantation eines muskulo-kutanen Lappens behandelt (MCL).

Das Verhalten des Lappens in der osteomyelitischen Höhle wurde durch wiederholte CT und NMR Untersuchungen verfolgt und dokumentiert.

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RECONSTRUCTION OF A DEVASTATING ELECTRIC INJURY: CASE-REPORT

Z. KAPOUNKOVÁ¹, M. TVRDEK², J. VÁCHAL³

In the following case-report a combination of a reconstructive and orthopaedic approach to a devastating shoulder and elbow injury is presented. A 26-year-old man suffered a high voltage current injury at work. He suffered very deep burns over 13% T.B.S.A. Immediate therapy was provided in a regional hospital. Neither unconsciousness, nor cardiac, respiratory and neurological abnormalities were reported. Before transport to the Prague Burn Centre partial necrectomy was performed. Because of extensive haemorrhage and rising temperature the man was admitted to our Burn Centre three days after the injury. In this particular case the localization of burns sustained is unusual. In most cases distal parts of upper extremities (hand, wrist or forearm) are affected by electric current injuries. In our case the high voltage current caused a devastating injury of the proximal part of the shoulder with an intact skin strip on the inner side of the arm. The neurovascular plexus also remained intact. The function of the hand and forearm was unimpaired. The local finding after admission was as follows: two defects on the head - on the right side there was a small circular defect 4 cm in diameter, on the left a larger defect 15×4 cm. Both defects were very deep, penetrating to the skull. Probable exit points were located on the buttock. On the right forearm was a second degree 1% T.B.S.A. and third degree burns 3% T.B.S.A. on the right side of the chest. On the left upper extremity, the shoulder and the elbow suffered the greatest damage (Fig. 1). The figure shows an extensive defect of subcutaneous tissue, muscles and capsule of the shoulder joint with a necrotic head of the humerus. Deep affliction of the elbow penetrating to the joint. After admission haemoglobinuria, hyperglycaemia and elevated transaminases were found.

In the course of 10 days the patient had four fascial level excisions on the chest and upper extremities, followed by xenografting. Two weeks after injury the proximal part of the humerus was removed 3 centimeters beneath the head of the humerus (Fig. 2). The distal stump was viable and after revision of the glenoid cavity necrotic muscles on the dorsal side of the shoulder were removed. Because the clavicle was partly necrotic, the stump of the humerus was fixed to the scapula, using 2 Kirschner wires and figure of - eight - loop (Fig. 3). Three weeks following injury, autografting of the right arm, chest and buttock was performed. Ten days later by means of a musculus latissimus dorsi flap the patient's left shoulder was reconstructed (Fig. 4). This flap was covered with 1:3 mesh autografting and with xenografts (Fig. 5). Six weeks following injury a rotation flap was raised to cover the defect in the left temporoparietal region. At the same time the orthopaedic surgeon performed osteosynthesis of the left elbow by means of 3 Kirschner wires at an angle of 90° (Fig. 6). Exposed bones were covered with a tube pedicle flap prepared beforehand on the left lower abdomen (Fig. 7).



Fig. 1. Left shoulder damage

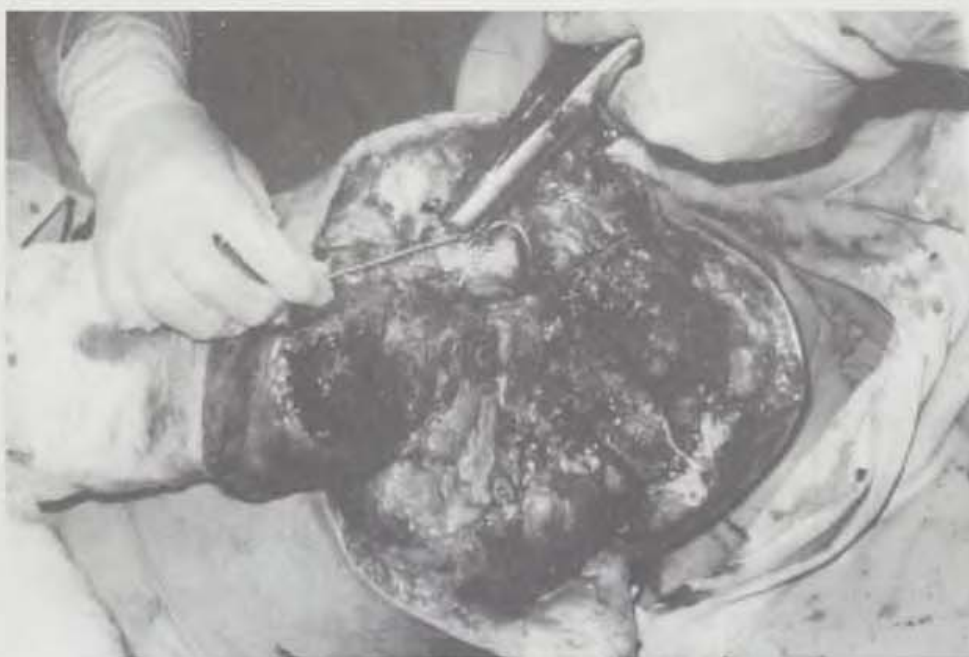


Fig. 2. Removing the proximal part of the humerus



Fig. 3. Fixation of scapula



Fig. 4. Musculus latissimus dorsi flap



Fig. 5. Flap autograft, mesh 1:3



Fig. 6. Osteosynthesis





Fig. 7. Tube pedicle flap from lower abdomen



Fig. 8. Condition after 9 months



Fig. 9. Condition after 9 months

The patient's poor condition made treatment more difficult. This recently married young man suffered severe emotional stress manifested as regression. He adopted the role of a child. Therefore instead of his pregnant wife his mother was admitted as an accompanying person. Decompensation of the mental state improved after birth of his child which was a strong motive for the patient and speeded up his recovery.

Nine months after the accident he was back at work retrained as a telephone operator in the same institute where he had been working as electrician before the injury (Figs 8, 9).

SUMMARY

In the submitted case-report the authors describe a combination of a reconstruction operation with an orthopaedic approach to a devastating injury of the shoulder and elbow in a 26-year-old patient after an electric current injury.

The total extent of the skin damage was 13 % T.B.S.A. with localization on the right side of the chest, right arm, left elbow and shoulder.

After fascial excisions the proximal part of the humerus was amputated with fixation by means of cerclage to the scapula.

This defect was covered with the musculus latissimus dorsi flap and the defect on the elbow was covered by a tube pedicle flap.

Key words: electric injury, shoulder and elbow damage, tube pedicle flap, musculus latissimus dorsi flap

RÉSUMÉ

Reconstruction d'un traumatisme dévastateur par courant électrique. A propos d'un cas

Kapounková Z., Tvrdek M., Váchal J.

A propos d'un cas du traumatisme dévastateur acquis par le coup du courant électrique chez un homme de 26 ans, on décrit une méthode combinant l'opération reconstructive avec une solution orthopédique du traumatisme dévastateur de l'épaule et du coude. L'étendue totale de l'endommagement de peau, situé au côté droit de la poitrine, au bras droit, au coude droit et à l'épaule, était de 13 %. Après les ecérèses fasciales, on a exécuté l'amputation de la partie proximale d'humérus avec fixation, à l'aide du cerclage vers scapula. Ce défaut était recouvert par le grand dorsal et celui du coude par un lambeau tubulé.

ZUSAMMENFASSUNG

Rekonstruktion nach einer devastierenden elektrischen Verletzung: Bericht über einen Fall

Kapounková Z., Tvrdek M., Váchal J.

Anhand eines Falles wird ein Verfahren beschrieben, das aus einer Kombination chirurgischer Rekonstruktion und orthopädischer Behandlung besteht und bei einem 26jährigen Patienten nach einer devastierenden elektrischen Verletzung der Schulter und des Ellbogens angewandt wurde. Insgesamt waren 13 % der Haut des Körpers betroffen, und zwar an der Rechten Seite des Brustkorbes, am rechten Arm, am linken Ellbogen und an der linken Schulter.

Nach der Exzision der Faszien folgte eine Amputation des proximalen Teiles des Humerus mit der Fixation zur Scapula mittels einer Zerklage.

Dieser Defekt wurde mit den musculus latissimus dorsi bedeckt und der Defekt am Ellbogen mit einem tubulierten Lappen.

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RECONSTRUCTION OF PENIS BY PREFABRICATION ON FOREARM

A. GOVILA

Penis is a unique creation and is a symbol of manhood. Its loss following trauma or excisional surgery is a misfortune that is impossible to refurbish.

The introduction and popularity of concepts of microvascular surgery and fasciocutaneous flaps, opened several new horizons in phallic reconstruction and the conventional methods of reconstruction (Maltz, 1946, Gillies and Harrison, 1948) were left behind. Many free fasciocutaneous flaps, with basic underlying concept of "tube with in a tube", such as in radial forearm flap (Chang and Hwang, 1984), ulnar forearm flap (Glarson et al., 1986), were then reported.

Several patterns such as a longitudinal design (Cricket bat pattern, Semple and Boyd, 1988) and transversally placed designs on forearm (Chang and Hwang, 1984) were utilized for phallic reconstruction.

All these reports proved the excellence of radial forearm flap for penile reconstruction. Therefore we decided to use this flap but in a manner that any general plastic surgeon can execute the procedure and thereby the procedure could be practiced by a much larger group of surgeons, and it does not remain within the confines of the microvascular surgeon.

It was also aimed that the desired size shape rigidity of penis and the neourethra are reconstructed as a "bench surgery" on the forearm so that the procedure is technically easy.

Additionally it was also planned to transport a well healed reconstructed penis from the forearm after satisfying from its shape, size, rigidity and from neourethra. If some additions, subtractions or revisions are to be undertaken they be taken now rather than after its transfer.

CASE REPORT

A twenty years old man suffered from posttraumatic loss of total penis along with both the testis, when his clothes were caught in the strap of a electric motor of a water pump, in November 1989. His immediate treatment at Dibrugarh Medical College in Assam consisted of implantation of one of the testis in the right groin. He was referred to us three months later for definitive reconstruction.

On examination (Fig. 1) he had total loss of penis and a small opening of the amputated urethra was visible on the pubic region through which an indwelling catheter was left for urinary drainage. A tender swelling of the implanted testis in the right groin was palpable.

Definitive reconstruction was performed by prefabrication of the penis, that consisted of reconstruction of the neourethra, a bone graft as penile stiffner and the creation of shape and the size of the penis on the left forearm using distally based radial forearm flap.



Fig. 1. Front view of the pubic region after total amputation of penis following trauma in a young man

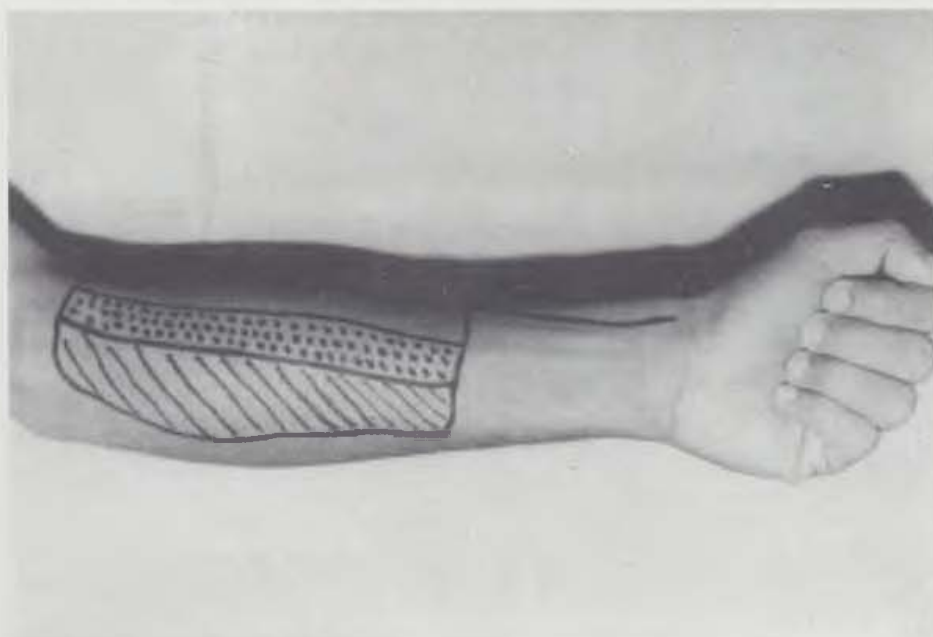


Fig. 2. Planning the design of the radial forearm flap



Fig. 3. Prefabrication of the penis on the forearm - peroperative view



Fig. 4. Reconstructed penis has been transferred to the pubic region by extracorporeal tissue transfer technique - perineal view



Fig. 5. Frontal view of the reconstructed penis. Notice a small tube seen in the opened up neourethra in the upper part of the penis

A radial forearm flap was raised of 10×18 cm dimensions (Fig. 2) from flexion crease of the elbow joint downwards so as to allow about 8 cm of the vascular pedicle at the wrist. Ulnar non hair bearing side of the flap of 2×18 cm size was used for the fabrication of the neourethra. An strip next to it, about one centimeter in width was de-epithelized so as to allow stitching of both the tubes (tube in side the tube). As a first step de-epithelization of the required segment was performed and then only the ulnar side of the flap was raised. Now by tubing the flap with skin side in around a 14 gauge Foley catheter neourethra was created.

Rest of the flap was raised and the vascular pedicle that was developed included radial artery, it's veinae communitentis and the cephalic vein for a distance of about 8 cm at the wrist right down to the joint crease. Proximally medial antibracheal nerve was dissected and harvested with the flap for a distance of about 8 cm.

Fifteen centimeters of the 8th rib was then splitted into four pieces and was placed around the reconstructed neourethra. Outer skin segment was now tubed to have the shape of the penis (Fig. 3) leaving a suction drain between the inner and the outer tube. Vascular pedicle was now wrapped in a sheet of split thickness skin graft. Donor area of the flap was skin grafted. To avoid retraction of the fabricated penis its proximal end was held in position next to the elbow joint crease line by a silk stitch.

After three weeks time when the fabricated penis was well healed its transfer to the pubic region was performed by bringing the wrist next to the groin and the inset of the most proximal part of the penis was given. Neourethra was stitched to the amputated urethral

stump. Medial antibrachial nerve which was earlier buried between the skin tubes was drawn out to attach it to the internal pudendal nerve. In this patient however internal pudendal nerve could not be identified and therefore could not be used.

In three weeks time the inset healed completely and the pedicle (Fig. 4) was excised. Except for the wound dehiscence of the neourethra at one spot no significant postoperative complication developed in this patient related to the procedure. This was closed at a later date.

Six months later at the follow-up clinic it was learned that he could manage to have sexual intercourse but of course more active participation was required from the other partner. It was however noted that he fractured the bone graft in the process (Fig. 5).

DISCUSSION

Penis has no parallel in human body - therefore its reconstruction is a greatest challenge to a plastic surgeon. There seems to be general consensus that a free neurosensory fasciocutaneous flap designed to create a "tube with in a tube" innervated by internal pudendal nerve provides the best possible results with an erogenous sensations up to 50 percent.

Microsurgical availability in spite of general increase of prosperity is not universal. Asian nations suffer the greatest in this regard. Therefore for many years our most important research project remained to evolve non-microsurgical methods which can transfer tissues of similar qualities as by microsurgical means, may it be at the cost of some additional stages. The method of prefabrication of an organ before its transfer, by extracorporeal means is a step in that direction. The method described has following advantages.

1. It is a non-microsurgical answer to a basically microsurgical problem.
2. The method could be practised by any general plastic surgeon.
3. An organ which is fabricated before transfer could be revised up to the satisfaction of the patient and the surgeon before transferring it.
4. Since the entire operation of fabrication is performed on the hand table it has the easy of "bench surgery" as in kidney transplantation.
5. Postoperative dressing and other management is far simpler on the forearm than in the perineum.
6. Since no anastomosis are involved the chance of 7 percent anastomotic block and total disasters eliminated.
7. Our own previous experience in one hundred cases with other problems has proved that the extracorporeal tissue transfer is 100 percent reliable.

SUMMARY

Posttraumatic total loss of penis in a 20 years old patient was reconstructed by prefabrication of the organ on the forearm using distally based radial forearm flap before transferring it to the perineum using extracorporeal method of tissue transfer. In this case report merits of the technique and the concept are discussed.

Key words: penis reconstruction, radial forearm flap

RÉSUMÉ

Reconstruction du pénis par lambeau préfabriqué de l'avant-bras

Govila A.

Après l'amputation traumatique du pénis chez un homme de 20 ans, on a effectué la reconstruction du pénis par le modelage d'un lambeau à pédicule distal de l'artère radiale de l'avant-bras. Le lambeau ainsi préparé, étant guéri sur l'avant-bras, a été transféré par jointure de son bout proximal dans la région périnéale. Sur les cas cliniques, le procédé opératoire est mis en évidence et les avantages de ce type de reconstruction sont discutées.

ZUSAMMENFASSUNG

Rekonstruktion des Penises mit einem präfabrizierten Lappen aus dem Unterarm

Govila A.

Nach einem traumatischen totalen Verlust des Penises erfolgte seine Rekonstruktion mit einem präfabrizierten radialen gestielten Lappen aus dem Unterarm. Mittels der Methode der extrakorporalen Übertragung der Gewebe wurde der proximale Rand des Lappens in die perineale Gegend fixiert. Anhand einer Kasuistik wird das Konzept und die Technik des Operationsverfahren erörtert.

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RECONSTRUCTION OF THE LOWER EYELID AFTER EXCISION OF MAJOR TUMOURS

J. AMBROŽOVÁ¹, J. MĚŠŤÁK¹, J. SMUTKOVÁ²

Skin tumours of the lower eyelid are among frequent facial affections which call for intervention by the plastic surgeon in collaboration with an ophthalmologist.

The surgical procedure is selected with regard to the size of excision on the lower eyelid. According to the extent of the excision surgical operations can be divided into three groups.

1. Excisions taking up less than 25% of the width of the lower eyelid. As a rule direct suture of the defect produces favourable postoperative results (Fig. 1a, b).
2. Defects taking up 25 to 66% of the width of the eyelid can be resolved by intermarginal discision, lateral canthotomy of the inferior tarsus and medial transposition of the whole eyelid (Fig. 1 c - e).
3. Tumours requiring 75-100% excision of the width of the lower eyelid call for more pretentious surgery. As a rule a two-grade or two-stage surgical technique is used (Fig. 1 f-i).

MATERIAL AND METHODS

Replacement of the lower eyelid is a rather difficult task and therefore to this purpose a whole range of different procedures was developed. In the authors' practice several procedures proved useful and the satisfactory results will be demonstrated on case-histories.

Case 1

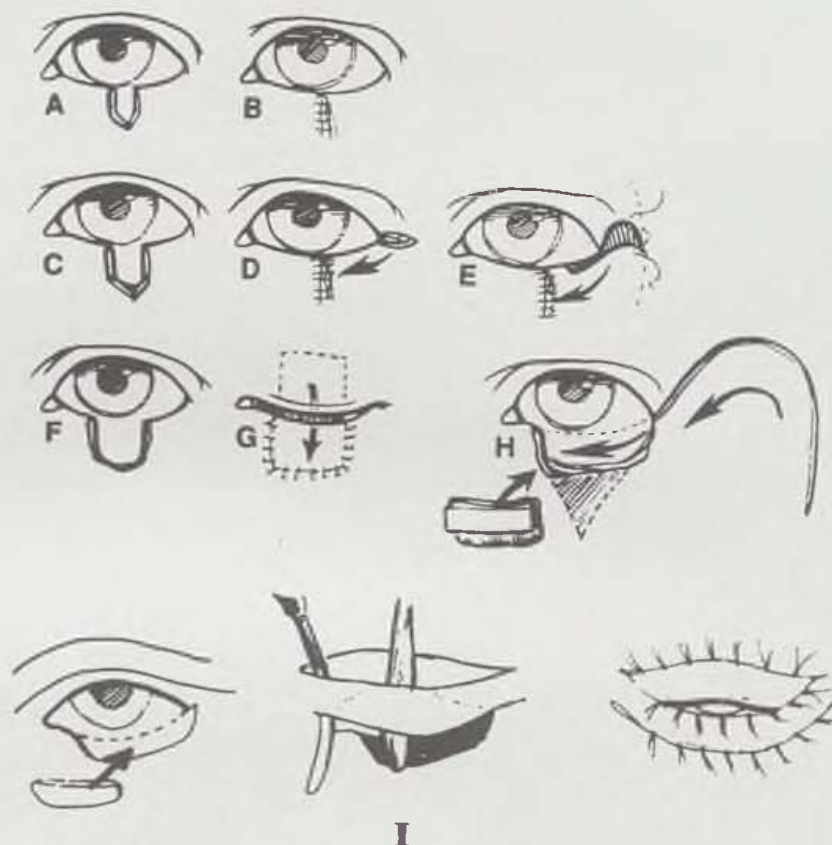
Mucochondral graft from the nose and rotation of the cheek.

A 72-year-old patient was operated on at the Department of Plastic Surgery in Prague in 1982 on account of a basaloma at the nasal root and right inner canthus. In January 1991 he developed a relapse on the lower eyelid, about 4 mm from the inner canthus with a diameter of 1 cm. The exulcerated tumour affected all layers of the eyelid incl. the conjunctiva and line of eyelashes.

Under general endotracheal anaesthesia excision of the tumour was made to the level of macroscopically sound tissue. The defect of the eyelid amounted to cca 2/3 of the length of the eyelid. Next a chondromucosal graft from the nasal septum was taken and inserted in the defect. The conjunctival margins were stitched to the margins of the mucosa, the margins of the cartilage to the residue of the tarsal plate. The arc-shaped incision in the direction towards the temporal region up to the right auricle lifting of a cheek flap made rotation to the site of the skin defect possible. The shift was safeguarded by cat gut and nylon stitches to the periostium of the zygomatic area, the margins of the flap were attached to the mucosal margin.



As to histology, a superficial exulcerated, partly solid, partly invasive basaloma of the skin was involved (Fig. 2 a - f).



I

Fig. 1a-i

Case 2

Tarsoconjunctival flap from the upper to the lower eyelid and a skin graft.

A 43-year-old female patient with a four-year history of a tumour of the lower eyelid on the left. The tumour takes up 3/4 of the eyelid, due to cicatrization considerable retraction developed, the margins of the tumour were indurated and the tumour affected all layers of the eyelid, incl. the conjunctiva which was grossly uneven, exulcerated.

Under general anaesthesia excision of the tumour was performed, incl. the conjunctiva 3 mm from the tumour margin. The resulting defect which is 28 mm wide takes up some 95% of the eyelid. The authors used a two-stage method, as described by Mustard: into the defect a 22 mm wide tarsoconjunctival flap from the upper eyelid was sutured. In the upper eyelid a 4 mm incision was made, the tarsus was dissected from the surface of the levator muscle and fixed to the defect of the lower eyelid. The musculocutaneous part was replaced by a full-width transplant from the retroauricular region. In the second stage after seven weeks the eyelids were separated.

Histological examination confirmed a solid, partly invasive basaloma (Figs 3,4 a-f).



Fig. 2a



Fig. 2b

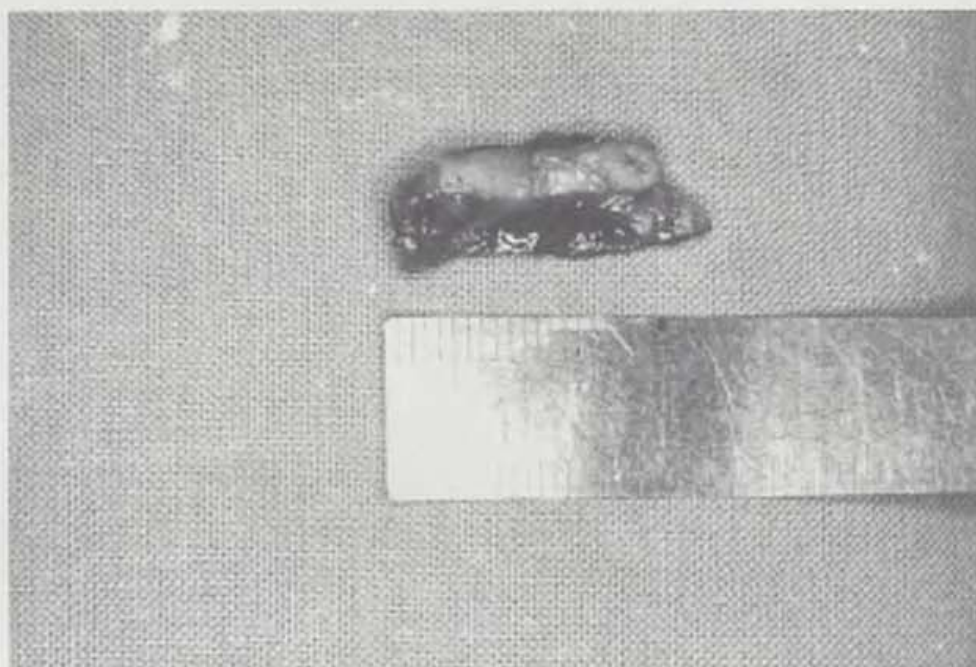


Fig. 2c



Fig. 2d



Fig. 2c



Fig. 2f

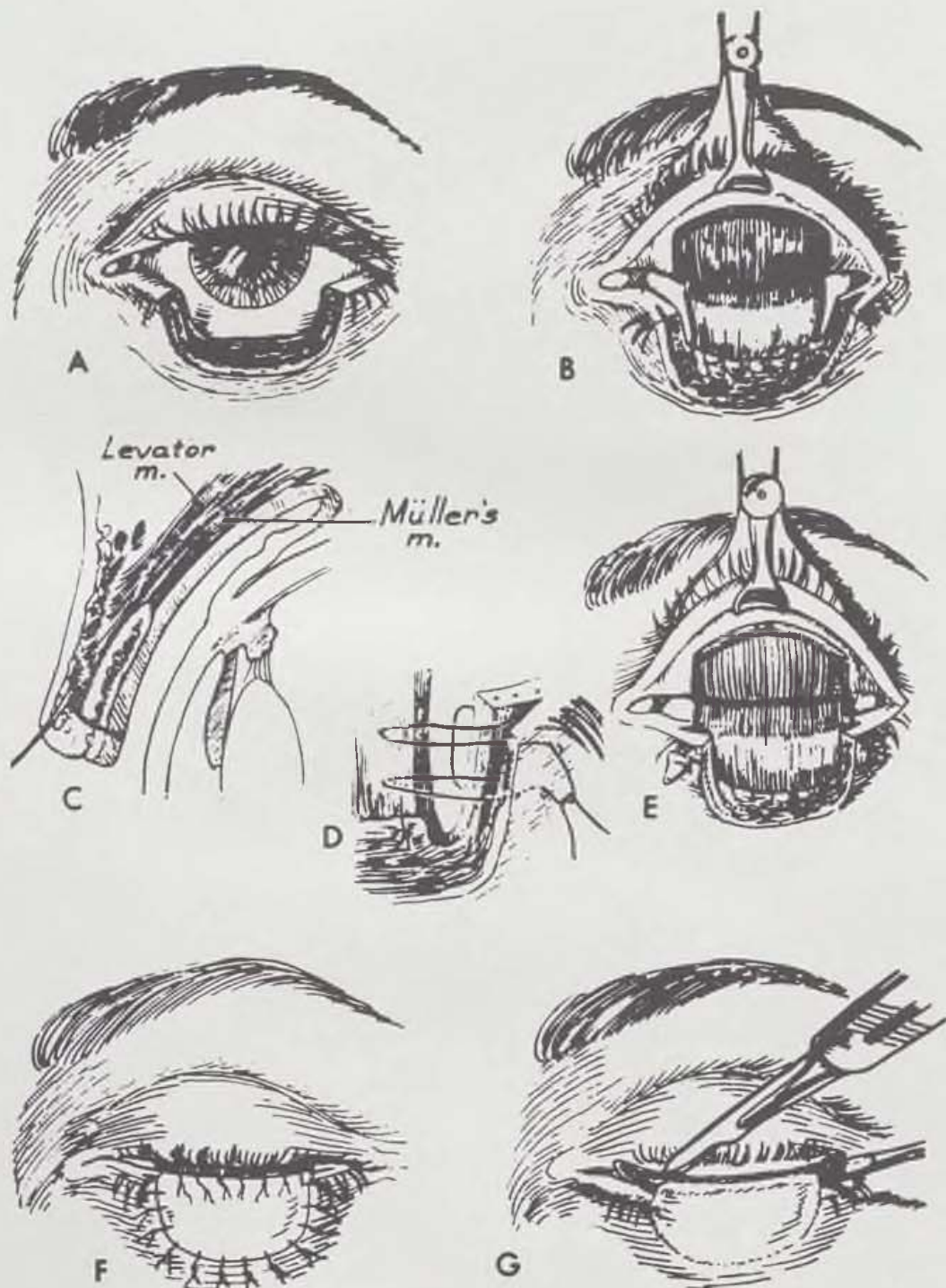


Fig. 3a-g



Fig. 4a



Fig. 4b



Fig. 4c

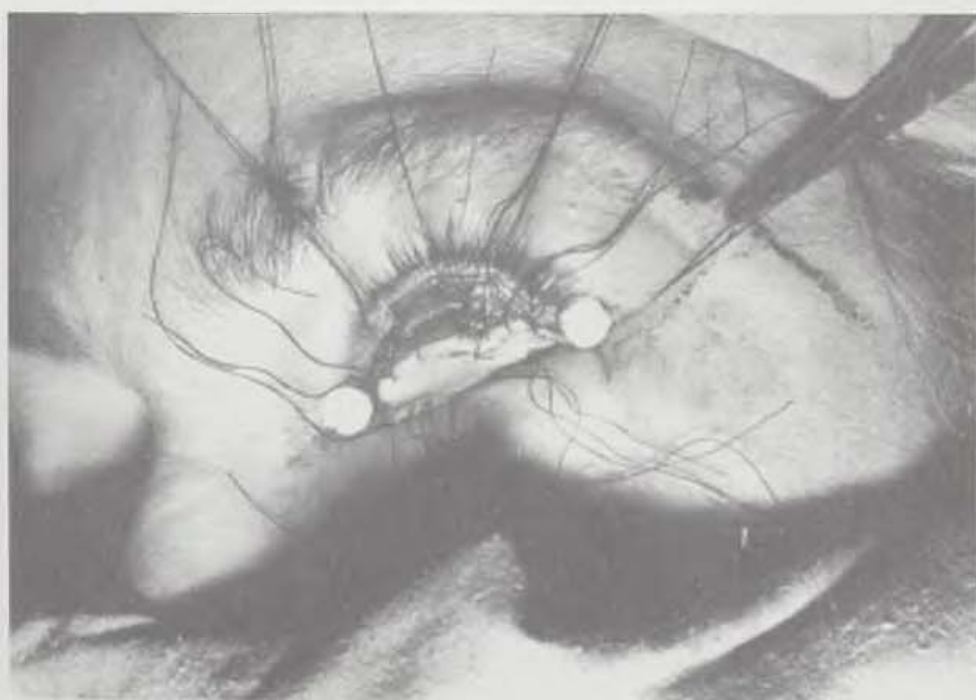


Fig. 4d

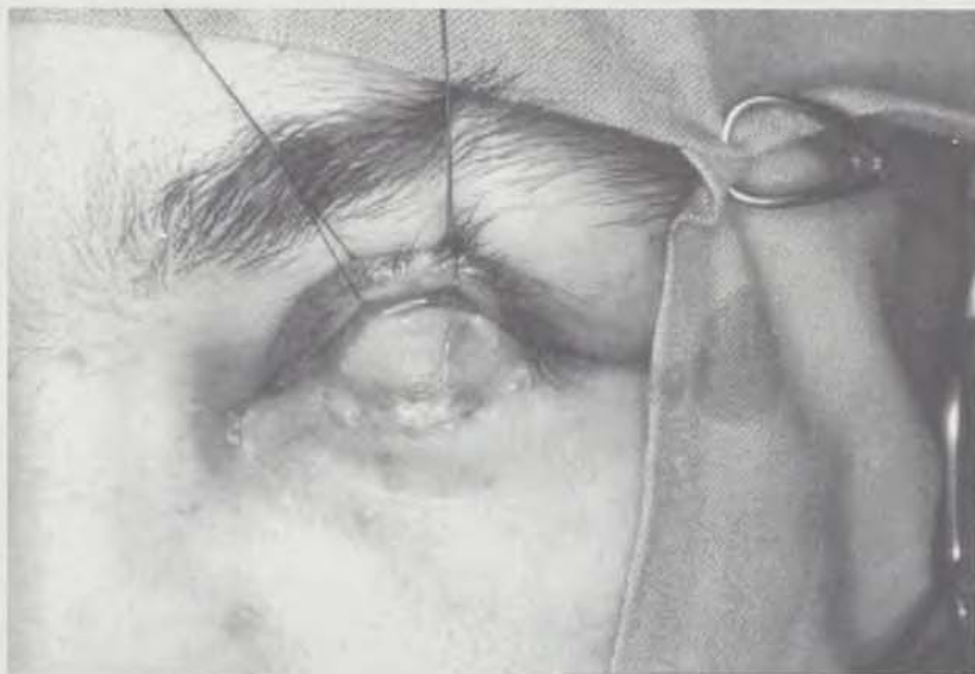


Fig. 4e



Fig. 4f



Fig. 5a



Fig. 5b



Fig. 5c



Fig. 5d



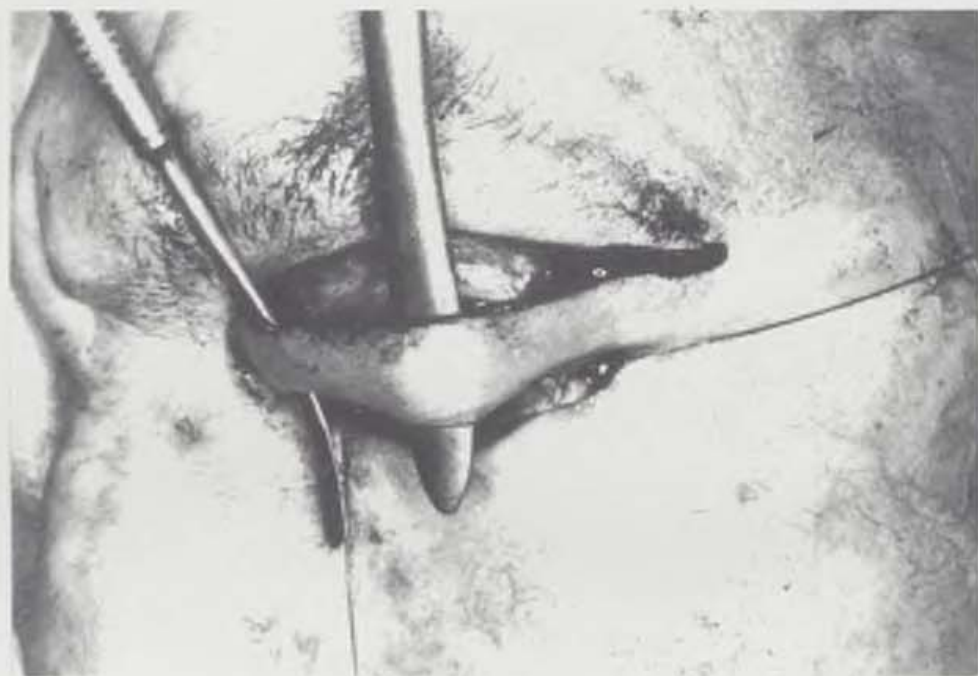


Fig. 5e



Fig. 5f



Fig. 5g

Case 3

Mucochondral graft from the nasal septum and bridge-shaped skin flap from the upper to the lower eyelid.

A 46-year-old patient with a history of frequent facial basalomas repeatedly hospitalized at the Clinic of Plastic Surgery.

On the left lower lid three tumours with thick margins, 8 - 10 mm in size. Under general endotracheal anaesthesia an excision of almost the entire lower lid was made; the punctum was preserved. From the nasal septum a chondromucous graft was taken and used to replace the conjunctiva and tarsus, the skin defect of the lower lid was replaced by a bridge-shaped skin flap with musculature from the upper lid.

After four weeks under local anaesthesia the flap in the inner canthus was separated, excess flap tissue was removed; suture; rinsing of the lacrimal pathways.

Histology: mostly solid type basaloma on the surface exulcerated (Fig. 5 a-g).

DISCUSSION

After implantation of a chondromucosal graft the mucous membrane can fully replace the lacking tarsal portion (Mustardé, 1966).

The method of using a tarsoconjunctival flap was described first by Landolt (1981) and developed by Hughes (1937). If the incision were made in the intermarginal area, entropion and trichiasis of the upper eyelid could develop. It is thus better to use a modification of Köllner's method (1911) where the horizontal incision runs parallel with the margin of the lid, at least 4 mm from the margin.

The tarsoconjunctival flap is an effective choice if the palpebral defect is 4-5 mm high; then the transposed tarsus and conjunctiva can be directly connected with the residue of the tarsal skeleton of the lower lid. The tarsoconjunctival part may be by as much as 25% narrower than the defect on the lower lid, in particular in older patients with flabby lids. The tarsus must be dissected along the surface of the levator, the dissection must be made in a sufficiently posterior and upper position as there is the risk of retraction of the upper lid and enhanced bulging.

After 6 - 9 weeks the lower lid is released from adhesions of the cicatrical tissue and shortened fibres of Müller's muscle. This manoeuvre assists prevention of residual retraction of the upper lid and leads to expansion of Müller's muscle.

CONCLUSION

It is important to emphasize the necessity of early diagnosis of tumours of the eyelid. The surgical solution is then much easier and the patient is not subjected to long anaesthesia, a long post-operative interval and the achieved cosmetic results are better.

Adequate surgery presumes in tumours primarily an adequately wide excision to prevent relapses.

In more extensive defects in the orbital area the authors recommend interdisciplinary cooperation.

SUMMARY

The authors report on a pretentious surgical procedure which is essential after excision of major tumours of the lower eyelid.

They describe in detail the reconstruction of the lower lid in case of a 70% loss of the lid. They used Mustard's method during which the tarsoconjunctival defect was replaced by a mucochondral implant from the nasal septum. After suture of the implant the residual skin defect was covered by rotation of a cheek flap.

A two-stage reconstruction of the lower lid was used in case of 95% excision of the width of the lid. In the first stage the authors transferred a tarsoconjunctival flap from the upper lid and covered the musculocutaneous part by a transplant of retroauricular skin. In the second stage they released the tarsoconjunctival flap with subsequent plastic surgery of the lower lid.

In 100% loss of the eyelid the authors used for replacement of the tarsus of the lower lid a mucochondral implant from the nasal septum and to cover the skin defect they used a bridge-shaped myocutaneous flap from the upper lid in the defect of the lower lid.

Key words: tumours of lower eyelids, extent of the tumour, types of reconstruction

RÉSUMÉ

Reconstruction de paupière inférieure après exérèse de vastes tumeurs

Ambrožová J., Měšťák J., Smutková J.

Les auteurs nous font connaître une technique opératoire assez exigeante qui s'avère indispensable après les exérèses de vastes tumeurs de la paupière inférieure.

Ils décrivent en détail une reconstruction de la paupière inférieure d'un cas de perte de substance de 70 %. Ils ont utilisé la méthode de Mustardé où la lésion tarso-conjonctive était substituée par un implant chondro-muqueux du septum nasal. Après la mise en place de l'implant, la lésion cutanée restante était recouverte par un lambeau facial de rotation. La reconstruction de la paupière inférieure à deux temps a été effectuée dans un cas d'exérèse de 95 % de largeur de paupière. La première étape consistait en transfert du lambeau tarso-conjonctif de la paupière supérieure, la partie musculo-cutanée étant recouverte par un greffon de la peau rétroauriculaire. Dans la seconde étape le lambeau tarso-conjonctif était dégagé à quoi suivit une plastie de la paupière inférieure.

Dans le cas de la perte totale de paupière, on a également utilisé comme matériel substituant le cartilage tarse l'implant chondro-muqueux du septum nasal. La lésion cutanée de la paupière inférieure était recouverte par un lambeau-pont musculo-cutané de la paupière supérieure.

ZUSAMMENFASSUNG

Rekonstruktion des unteren Augenlides nach der Exzision von ausgedehnten Tumoren

Ambrožová J., Měšťák J., Smutková J.

Die Verfasser erörtern die anspruchsvolle Operationstechnik, die nach einer Exzision von grösseren Tumoren des Augenlides nötig ist.

Sie beschreiben ausführlich die Rekonstruktion des unteren Augenlides nach einem 70% Verlust desselben. Zur Anwendung gelangte die Mustardsche Methode, bei der der tarsokonjunktivale Defekt mit einem mukochondralen Implantat aus dem Nasenseptum ersetzt wurde. Nach der Suture des Implantates wurde der restliche Defekt mit einem Lappen aus der Wange gedeckt. Die Rekonstruktion des unteren Augenlides erfolgte in zwei Etappen nach einer Exzision von etwa 95% der Augenlidbreite. In der ersten Etappe wurde ein tarsokonjunktivaler Lappen aus dem oberen Augenlid überpflanzt und der muskulokutaner Teil wurde mit der Haut aus der retroaurikulären Gegend gedeckt. In der zweiten Etappe wurde der tarsokonjunktivale Lappen freigesetzt mit einer nachfolgenden Plastik des unteren Augenlides.

Bei einem 100% Verlust des Augenlides wurde zur Rekonstruktion des unteren Augenlides auch hier ein mukochondraler Implantat aus dem Nasenseptum angewandt, zur Deckung des Hautdefektes diente ein überbrückender myokutaner Lappen aus dem oberen Augenlid.

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Department of Plastic Surgery, 3rd Medical Faculty, Charles University, Prague, Czech Republic

REDUCTION MAMMAPLASTY AT THE DEPARTMENT OF PLASTIC SURGERY IN PRAGUE

J. MEŠŤÁK, J. HRIVNÁKOVÁ, M. ČAKRTOVÁ, A. NEJEDLÝ, D. TOMÁŠEK, J. KORÝTKO

Defects which call for intervention by a plastic surgeon include also hypertrophy of the breasts. The size of the breasts and their weight cause, specially major hypertrophies, many complaints - orthopaedic, neurological, aesthetic, dermal and others.

In the world literature various surgical procedures are described which differ as to the method of reduction of hypertrophic mammary tissue (5, 6, 7, 8). Different departments of plastic surgery prefer one of the techniques traditional in their department or a procedure based on new findings.

In the Department of Plastic Surgery in Prague surgery in hypertrophy of the breasts has undergone a certain development (Fig. 1).

The first record on surgery of hypertrophic breasts was published in 1928 when Burian made a transposition of the mamillae with a vertical resection of the gland and skin.

In 1929 Burian was the first to use Biesenberger's method (1) when he reduced the gland in its external half and rotated the areola on the remainder of the gland into a new position (Figs 2, 3, 4, 5).

In 1935 Burian introduced Claoué's method (2, 3) which was the dominating surgical technique in our department up to 1960. The principle of the operation was to release the gland from the skin, its partial resection and surface plication in order to reduce the volume of the gland. In addition to this method at the department also other surgical procedures were used, e.g. the already mentioned Biesenberger method or subtotal amputation of the breast in extreme hypertrophy, combined with free transfer of the areolae.

In 1961 in our department for the first time Strömbeck's (11) method was applied which became the main surgical technique till 1980. The essence of the method is shifting the areola on a strip of corium pedicled on the lateral branches of the newly shaped breast.

One of the methods which proved very useful due to its simplicity and good postoperative results in women with minor or medium hypertrophy of the breasts is Weiner's method (12). By this method - a superiorly based dermal pedicle - which was introduced at our department in 1981 almost 300 women were operated (Figs 6, 7, 8, 9).

Recently at our department also other surgical procedures are used. Thus e.g. the technique of rotation of the areola on a decorticated superior lateral dermal areola flap. The method is based on the original model of Skoog's operation (10) supplemented by the technique of resection and rotation of the gland as suggested by Biesenberger (9). Its advantage is in addition to preserved sensitivity of the areolomamillary complex also a very satisfactory postoperative nutrient supply to the areolae (Figs 10, 11, 12, 13).

In major hypertrophy of the breasts an inferior pyramidal flap proved useful which ensures by the breadth of the flap base non-complicated nutrition of the areolae after operation (4).

Between 1928 and 1992 at the Department of Plastic Surgery in Prague more than 1000 women with hypertrophic breasts were operated (Tab. 1). Despite the relatively large

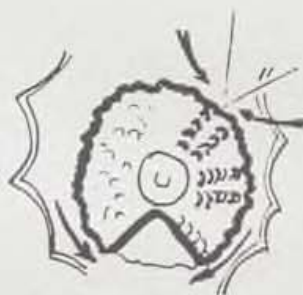
number of operated women it is not possible to take a uniform stand as regards preference of any surgical procedure. It depends always on a detailed analysis of the defect and the experience of the plastic surgeon which procedure he will select to make the final result optimal for the function and shape of the breast.

Table 1. Number of women with hypertrophic breasts operated at the Department of Plastic Surgery in Prague in 1928 - 1992

Year	1928 - 1960	1961 - 1980	1981 - 1992
Method	Biesenberger, Claoué et al.	Strömbeck et al.	Weiner et al.
Number	483	287	273
Total	1043		



**Biesenberger
1929**



**Claoué
1935**



**Strömbeck
1961**



**Weiner
1981**

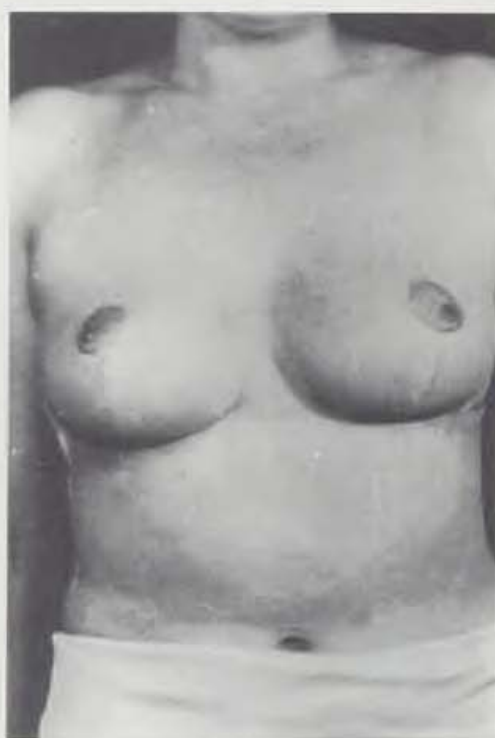
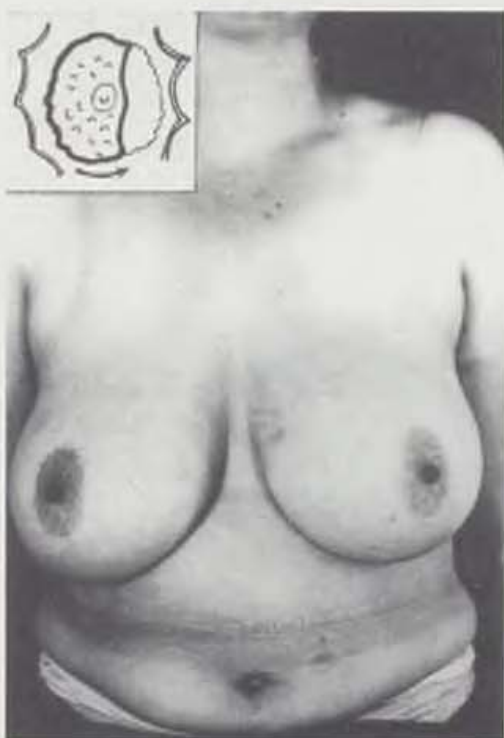


**Skoog modif.
1991**

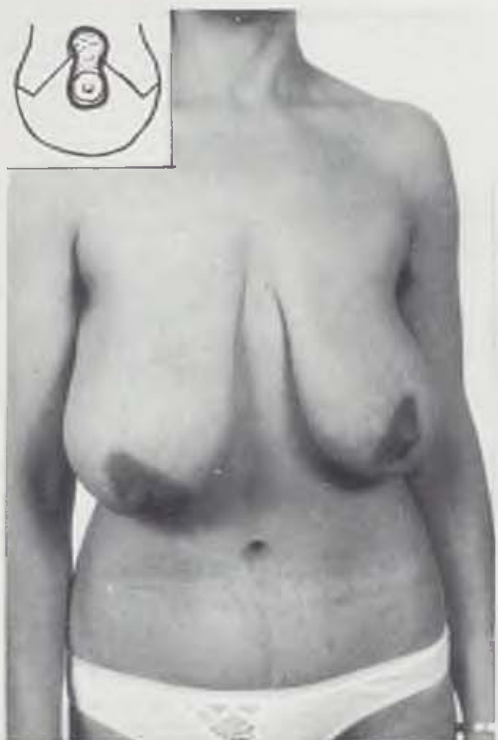


**Georgiade
1992**

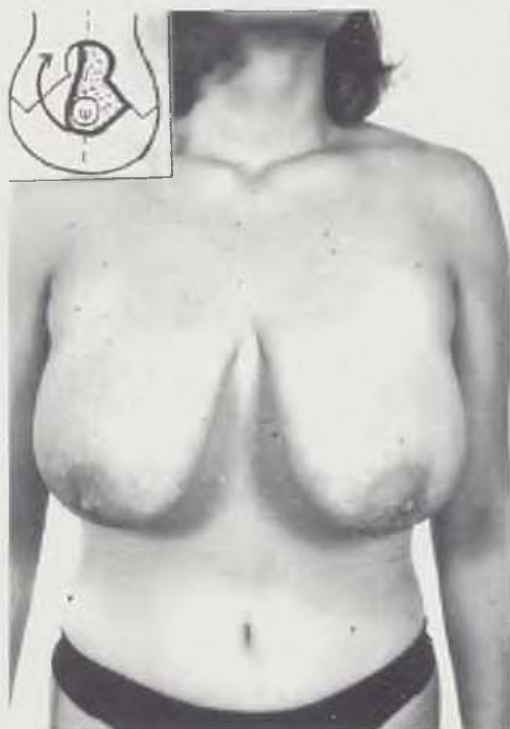
Fig. 1. Main surgical procedures used in hypertrophic breasts at the Department of Plastic Surgery in Prague



Figs 2, 3, 4, 5. Patient with hypertrophic breasts operated by Biesenberger's method



Figs 6, 7, 8, 9. Large ptotic breasts operated by Weiner's method



Figs 10, 11, 12, 13. Patient with hypertrophic breasts operated by a modification of Skoog's method

SUMMARY

The authors present a review on the history of surgery of hypertrophic breasts at the Department of Plastic Surgery in Prague. The period from 1928 to the present time was divided into stages by the dominating surgical technique. The authors emphasize the importance of careful selection of the surgical procedure with regard to the type and grade of the defect.

Key words: hypertrophy of the breasts, surgical procedures, evaluation

RÉSUMÉ

Opération réductrice de seins à la Clinique de chirurgie plastique à Prague

Měšťák J., Hrivnáková J., Čakrtová M., Nejedlý A., Tomášek D., Korýtko J.

Dans leur article, les auteurs ont présenté une revue sur l'histoire du traitement chirurgical de seins hypertrophiés à la Clinique de la chirurgie plastique à Prague. Toute la période suivie, dès 1928 au temps actuel, a été divisée aux étapes particulières selon la technique opératoire prépondérante. Ils ont également mis en valeur la nécessité d'un choix minutieux du procédé opératoire en fonction du genre et du degré de défauts des seins hypertrophiés.

ZUSAMMENFASSUNG

Chirurgische Reduktion der weiblichen Brust an der Klinik für Plastische Chirurgie in Prag

Měšťák J., Hrivnáková J., Čakrtová M., Nejedlý A., Tomášek D., Korýtko J.

In der vorliegenden Mitteilung liefern die Verfasser eine Übersicht über die Entwicklungsgeschichte der chirurgischen Behandlung der Hypertrophie der Brüste an der Klinik für Plastische Chirurgie in Prag.

Der gesamte Zeitraum von 1928 bis zu den heutigen Tagen wurde je nach der überwiegend angewandten chirurgischen Technik in einzelne Etappen unterteilt. Besonders betont wurde auch die Notwendigkeit einer sorgfältigen Wahl des angewandten Operationsverfahrens, je nach dem Typ und Grad der Brusthypertrophie.

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New Book

Computed Tomography and Magnetic Resonance Imaging of Head and Neck Tumors

GEORG THIEME VERLAG
STUTTGART - NEW YORK

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By Martin LENZ

1993. x, 203 pages with 524 illustrations & 28 tables, cloth DM 198.- (ÖS 1545, SFr 198.-). ISBN 3 13 112301 X

The book is divided into a methodologic part and a clinical part: The first part discusses the imaging technique, use of contrast medium, and specific types of images, etc. The second part is organized according to anatomy (sinuses and nasopharynx, orofacial region, hypopharynx and larynx, etc.). For each of these regions, the cross-sectional anatomy, clinical examination, the appearance of tumors and metastases, and differential diagnoses are discussed in detail and with numerous illustrations. The comparative values of CT and MRI are discussed for each area. The book is aimed to aid the radiologists in establishing and/or optimizing CT and MRI imaging methods at her/his hospital, as well as providing a guide for differential diagnosis of less well-known diseases. It also demonstrates the spectrum of modern imaging procedures to the ENT specialist and the dentist.

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TOOTH ERUPTION IN PATIENTS WITH CLEFT LIP AND PALATE

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It is well known that in patients with facial clefts the maxilla is both not fused and hypoplastic (1, 2, 3, 4, 5). This defect is very frequently associated with dental anomalies, in particular in the area of the cleft - duplication of the second deciduous and permanent incisors. Another associated phenomenon in patients with facial clefts is hypodontia, in particular of the second deciduous and permanent incisors and second permanent premolars (6).

Hypoplasia of the maxilla and practically normal mesiodistal dimensions of the permanent teeth lead very frequently to orthodontic anomalies, like crowding, rotation and eruption of teeth beyond the regular dental arch (2). The aim of the investigation was to find out how hypoplasia of the maxilla affects the rate of eruption of deciduous and permanent teeth in boys with a total unilateral cleft.

MATERIAL AND METHODS

To investigate tooth eruption in boys with a total unilateral cleft dental plaster casts of maxillae were used. As a criterium for tooth eruption the moment was selected when on the gum at least part of the crown of a permanent or deciduous tooth was revealed. With regard to the considerable scatter in the rate of tooth eruption between different patients (several years) this criterium is considered adequate.

The percentage of erupted teeth in the maxilla was calculated every year in 30 patients. From these values cumulative curves of tooth eruption were plotted for deciduous and permanent teeth. This mode of processing of results makes it possible to follow up the actual course of the process of tooth eruption in the gum in a population of boys with total unilateral clefts.

OBSERVATION

The curves of eruption of deciduous and permanent teeth were plotted from the quadrant of the maxilla with the cleft and from the contralateral quadrant without the cleft (Fig. 1).

In the first permanent incisor no difference was revealed as regards tooth eruption in the two quadrants of the maxilla and replacement takes place in both quadrants between the age of 6 and 9 years. The second deciduous and permanent incisor is most frequently a malformed tooth (duplication, reduced size) and/or is very often lacking. The difference

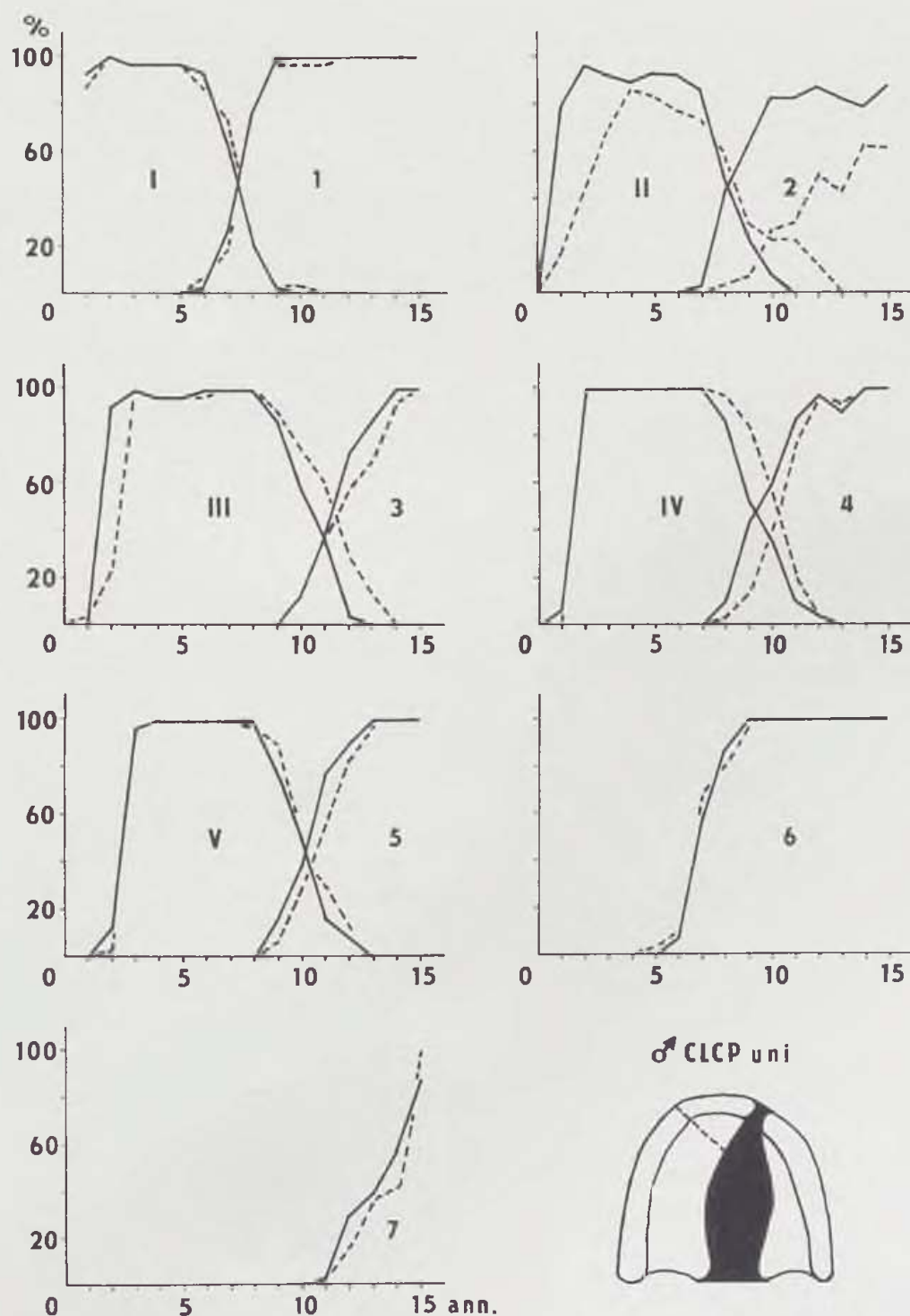


Fig. 1. Curves of eruption of deciduous and permanent teeth in the maxilla of patients with total unilateral clefts in per cent. Heavy line = quadrant of intact maxilla, dotted line = quadrant with cleft. Roman figures indicate deciduous teeth, Arab figures permanent teeth.

Abscisa: patient's age, ordinate: percentage of erupted teeth

in the eruption rate between the normal and affected side is apparent during eruption of the deciduous as well as permanent second incisor. The complete number of erupted permanent second incisors is not attained even in the intact quadrant of the maxilla where the prevalence of hypodontia is considerable. On the noncleft side the change of deciduous to permanent teeth takes place between the ages of 7 and 9 years, on the affected side the change is very retarded and takes place between the ages of 8 and 12 years. At the age of 15 years the second permanent incisor was present only in 60% of boys. In the deciduous as well as permanent canine the difference of the eruption time is approximately one year. On the noncleft side the change takes place between 9 and 12 years, on the cleft side between 9 and 13 years. Eruption of the first permanent premolar on the side with the cleft is retarded approximately by 1.5 years, its deciduous antecedent erupts simultaneously in both quadrants. The second permanent premolar is retarded only by 6 months.

Replacement of both premolars takes place between the ages of 9 and 12 years. The first permanent molar erupts symmetrically in both quadrants of the maxilla at the age of 6 - 8 years. The eruption of the second permanent molar is slightly retarded on the cleft side, i.e. it occurs between 12 and 15 years.

DISCUSSION

When the results of the observation are summarized, it may be stated that the eruption of the first permanent incisor and first permanent molar takes place symmetrically on the normal and afflicted side of the maxilla. Dramatically retarded eruption of the deciduous and permanent second incisor may be associated with its vicinity with the cleft. The dental base of the second incisor develops under normal conditions by fusion of two parts which are in the premaxilla (medial nasal prominence) and in the maxilla (maxillary prominence). As a result of non-fusion of the facial processes the two anlagen of the incisors are not connected and from each dental anlage one tooth develops and both second incisors are slightly smaller and pyramid-shaped, or in 40% they are absent. Evidently the malformed second deciduous and permanent incisor is the main reason for delayed eruption. The reason of late eruption of the permanent canine tooth and both permanent premolars is probably different. There are no striking morphological changes in the crowns of these teeth. It is known that the maxilla in patients with a total unilateral cleft is by 8 mm shorter than in subjects without clefts (2). As the mesiodistal dimensions of teeth in boys with total unilateral clefts are not significantly smaller than in controls (7), it is very probable that delayed eruption is due to lack of space in the maxilla.

SUMMARY

In boys with a total unilateral cleft the course of eruption of deciduous and permanent teeth in the quadrant of the maxilla with the cleft was investigated and compared with the intact quadrant of the maxilla. The greatest retardation (two years) during eruption was found in deciduous and permanent second incisors in the maxillary quadrant affected by the cleft. This retardation is according to the authors associated with gross morphological changes such as duplication of the second incisor and its altered shape.

The second upper permanent incisor erupts only in 60% of the patients and this can be explained by frequent hypodontia.

Retarded eruption was observed also in the maxillary quadrant with the cleft in the permanent canine (one year), the first (one and a half year) and second permanent premolar (six months). In these teeth the crowns are not perceptibly malformed and the delayed eruption may be associated with lack of space in the hypoplastic quadrant of the maxilla on the side of the cleft. The permanent first incisor and permanent first and second molar erupt symmetrically in both maxillary quadrants.

Key words: tooth eruption, cleft lip and palate

RÉSUMÉ

Eruption dentaire chez patients avec fente labiale et palatine

Peterka M., Tvrdek M., Müllerová Ž.

Chez les garçon, porteurs de fente totale unilatérale, nous avons suivi le processus d'éruption des dents temporaires et définitives dans le quadrant du maxillaire supérieur atteint de fente et nous l'avons comparé avec le quadrant du maxillaire supérieur exempt de fente. Le plus grand recul du processus d'éruption (de deux ans) était constaté chez la seconde incisive temporaire et définitive dans le quadrant du maxillaire supérieur du côté atteint par la fente. Nous voyons ce recul en relation avec de gros transformations morphologiques, comme p. ex. la seconde incisive doublée et la changement de sa forme. La seconde incisive définitive supérieure fait l'éruption seulement en 60 % de patients ce qu'on peut expliquer par une fréquente hypodontie.

Un autre recul d'éruption était trouvé dans le quadrant du maxillaire supérieur atteint de fente, et cela chez canine définitive (recul d'un an), première (recul d'un an et demi) et seconde prémolaire définitive (recul de 6 mois). Ces dents ne présentent pas de malformations visibles des couronnes, nous voyons le recul d'éruption en rapport avec le manque de place dans le quadrant hypoplasique du maxillaire supérieur du côté atteint de fente. La première incisive définitive et la première et la seconde prémolaire font l'éruption d'une façon symétrique dans les deux quadrants du maxillaire supérieur.

ZUSAMMENFASSUNG

Eruptionen der Zähne bei Patienten mit Lippen- und Gaumenspalten

Peterka M., Tvrdek M., Müllerová Ž.

Bei Jungen mit totalen einseitigen Lippen- und Gaumenspalten wurde der Verlauf der Eruption der Milchzähne und der permanenten Zähne im Quadrant des Oberkiefers an der betroffenen Seite verfolgt, und die Ergebnisse wurden mit den Eruptionen im Quadrant der gesunden Hälfte des Oberkiefers verglichen. Die grösste Verspätung des Eruptionsverlaufes bestand beim Milch- und permanenten zweiten Schneidezahn im Quadrant des Oberkiefers, der eine Spaltmissbildung aufwies (2 Jahre). Unserer Meinung nach bestand eine Beziehung zwischen dieser Verspätung und den markanten morphologischen Abweichungen, wie die Verdoppelung des zweiten Schneidezahnes und den Änderungen seiner Form. Die Eruption des zweiten oberen permanenten Schneidezahnes erfolgt nur bei 60 % der Patienten, was als die Folge seiner häufigen Hypodontie gedeutet wird.

Eine weitere Verlangsamung der Eruption bestand im Quadrant des Oberkiefers mit einer Spaltmissbildung beim Eckzahn (1 Jahr), beim ersten (ein und halb Jahren) und zweiten permanenten Prämolare (ein halbes Jahr). Die Kronen dieser permanente Zähne weisen keine offensichtliche Missbildungen auf, und es wird angenommen, dass die verspätete Eruption durch den Rummangel im hypoplastische Quadrant des Oberkiefers mit der Spaltmissbildung bedingt wird. Die Eruptio-

nen des permanenten ersten Schneidezahnes und der ersten und zweiten Molaren verlaufen symmetrisch in beiden Quadranten des Oberkiefers.

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New Book

Microvascular Tissue Transfer in the Head and Neck Region

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THE USE OF BONE GRAFTS IN OROFACIAL CLEFTS

Ž. MÜLLEROVÁ, M. BROUSILOVÁ, O. JIROUTOVÁ

The implantation of bone tissue - both the spongiosa and compact bone in patients with orofacial clefts plays an important role in the restoration of normal interrelations within the region of the cleft threshold of the nostril and of the alveolar process of the upper jaw. The implantation of bone grafts can be performed with various methods and in differing age groups.

Autotransplantation of primary bone grafts from the rib into the upper jaw of an infant simultaneously with primary lip suture effects a reconstruction of the nasal bottom and an insertion of wedges into the cleft maxillary segments (Fára et al., 1990 a). In most children operated upon with this method was required an intense preoperative orthodontic therapy applied from birth up to the primary lip suture. This treatment consisted of the application of removable plates which helped to restore (as far as possible) a normal arch in the region of the cleft and of the deviated segments of the maxilla. It was believed that a restoration of a normal pattern of the upper jaw with added and fixed bone grafts will grow normally during the subsequent development of the child, i.e. during the second and third decade of life and thus will prevent the development of deformations of the middle face occurring in clefts. However, this widely used surgical method failed to yield the anticipated results (Fára et al., 1990 b). The fresh scar within the anterior region of the maxilla, because of the implanted bone graft, just on the contrary interferes with the growth of the maxilla which is most markedly retarded during puberty (Friede and Johanson, 1982; Šmahel et al., 1992). This results in an anterior crossbite and vertically in an open bite (within the frontal segment), as well as in an abnormal slope of incisors and canines toward the cleft (Müllerová and Šmahel, 1989). In a mixed and permanent dentition orthodontic therapy applied after this surgical method is time consuming and therapeutic results represent a compromise, even after the use of fixed appliances. A bone graft repairs the cleft in the threshold of the nostril but in most cases it does not fill the defect within the alveolus. This method was preferred in patients with unilateral cleft lip, jaw and palate.

A secondary bone graft is detached and formed from the compact iliac bone and it is inserted into the upper jaw after the termination of the pubertal growth spurt, mostly after the age of 16 years (Fára et al., 1990 a). Wedges are inserted into the segments of the upper jaw at the level of the threshold of the nostril and accomplish a reconstruction of the nasal bottom in the region of the apertura piriformis. In bilateral complete clefts the wedges are used for the fixation of the moving premaxilla. It cannot be used for the shaping of the alveolar defect. This surgical method is associated also with certain drawbacks. Especially in complete clefts can follow a development of necrosis with an elimination of the bone graft, or of some of its segments. Primary and secondary bone grafts do not provide a complete elimination of residual oronasal or vestibulonasal communications. They persist in many cases and their localization and extent render them inoperable. Sometimes it is impossible to apply subsequently prosthetic treatment of the alveolar and dental arch with a fixed bridge.

During the last decade differs the method of application of a bone tissue graft. The spongiosa was substituted for compact bones, as the time of choice for surgery is considered the end of the first, or the beginning of the second decade of life, the period preceding the eruption of permanent canines (Enemark et al., 1985). With chips of the spongiosa of the iliac bone is filled the cleft below the threshold of the nostril and the defect of the alveolar process, with a subsequent closure of the oronasal communications. The bone is covered with mucoperiosteal flaps detached from the alveolar process. After healing a permanent canine, and sometimes also the lateral incisor erupt into the reconstructed alveolus (Bergland et al., 1986). Subsequently follows a routine orthodontic therapy with fixed appliances.

This method has numerous advantages:

- cleft segments of the maxilla are united with bone grafts;
- it does not interfere with pubertal growth spurt because of the absence of an extensive scar in the anterior part of the maxilla;
- it allows a simultaneous reconstruction of the threshold of the nostril and of the alveolar process;
- it eliminates oronasal communications;
- during the subsequent orthodontic therapy the teeth can be shifted into the reconstructed area.

The results of this technique of a spongy bone graft were studied in a series of 25 patients with unilateral and bilateral clefts; in all of them the time which elapsed after the surgical repair varies between 2 and 3 years.

The clinical results are very satisfactory. Defect healed, the bone graft is fully integrated into the jaw (Figs 1-2) and the growth of the anterior maxilla proceeds in a normal way as demonstrated also Semb (1988).

Orthodontic therapy and the subsequent prosthetic treatment are carried out under more favourable conditions. Oronasal communications are closed.

CONCLUSIONS

Autotransplantation of a spongy bone graft inserted into a cleft jaw towards the end of the 1st or at the beginning of the 2nd decade of life (prior to the eruption of permanent canines) eliminates the drawbacks of primary and secondary bone grafts consisting of a compact bone. This technique allows a reconstruction of the alveolar process and thus also of the upper dental arch, it allows the closure of oronasal communications and does not interfere with the pubertal growth spurt of the maxilla due to the absence of an extensive scar within the anterior segment of the upper jaw.

SUMMARY

In the repair of orofacial clefts can be used various techniques of bone transplantations. The authors describe the long term experience with untoward effects of primary bone grafts on the growth of the maxilla. They discuss the effects of a secondary bone graft consisting of a compact bone. This bone graft, however, does not eliminate the defect of the alveolar process. They prefer the technique of an autotransplantation of spongy bone grafts applied after the onset of puberty. This graft reconstructs the threshold of the nostril and the alveolar process. It exerted favorable effects on the development of the alveolar process and of the anterior segment of the maxilla.



Fig. 1a) Patient K. N., aged 10 years, a cleft area before a spongiuous bone grafting



Fig. 1b) Patient K. N., aged 12 years and 6 months, a cleft area after a spongiuous bone grafting





Fig. 2a) Patient V. V., 7 years and 6 months, a cleft area before a spongy bone grafting



Fig. 2b) Patient V. V., 12 years and 9 months, a cleft area after a spongy bone grafting

Key words: cleft lip and palate, primary bone graft, secondary bone graft, compact bone, spongy bone graft

RÉSUMÉ

Intérêt du greffon osseux dans les fentes faciales

Müllerová Ž., Brousilová M., Jiroutová O.

Le tissu osseux (autogreffe osseuse) peut être utilisé dans les réparations des fentes faciales dans la région d'apophyse alvéolaire bifide et de base de l'aile du nez, endommagée par moyens divers.

Les auteurs décrivent leurs expériences de plusieurs années avec l'autogreffe osseuse insérée au maxillaire simultanément à la suture primaire de lèvre, ils discutent aussi son influence défavorable sur la croissance du maxillaire. Leurs expériences avec l'implant secondaire, formé par l'os compact et mis en place au site de la base de l'aile du nez le plus souvent après la fin de la croissance du maxillaire, sont également discutées.

Néanmoins, ce greffon n'élimine pas le défaut d'apophyse alvéolaire. Les auteurs préfèrent la méthode d'autogreffe osseuse spongieuse au commencement de la puberté, vu que cette autogreffe ferme à la fois la base de l'aile du nez et forme l'apophyse alvéolaire. Après son intégration aux tissus osseux du maxillaire et du prémaxillaire, on a suivi, au cours de croissance pubertaire accélérée, l'influence favorable sur le développement d'apophyse alvéolaire du maxillaire.

ZUSAMMENFASSUNG

Anwendung der Knochentransplantation orofazialen Spaltmissbildungen

Müllerová Ž., Brousilová M., Jiroutová O.

Knochengewebe kann in der Form eines Autotransplantates zur Reparatur der fazialen Spaltmissbildung im Gebiet des gespaltenen alveolaren Prozesses und der missgebildeten Nasenlochschwelle, in unterschiedlicher Weise angewandt werden.

Die Verfasser beschreiben ihre langjährigen Erfahrungen mit der Implantation von Knochenautotransplantaten in den Kiefer während der primären Lippensutur und seinen ungünstigen Einwirkungen auf das Wachstum des Kiefers. Ferner wurden die Erfahrungen mit einer sekundären Implantation eines kompakten Knochens in die Nasenlochschwelle, meistens nach der Beendigung des Wachstums des Oberkiefers.

Diese Implantation beseitigt jedoch nicht den Defekt des alveolaren Prozesses. Deswegen betrachten sie als vorteilhafter die Methode der Autotransplantation eines spongiösen Knochens nach dem Beginn der Pubertät, der den Boden des Nasenloches ausfüllt und gleichzeitig eine Gestaltung des alveolaren Prozesses ermöglicht. Nach seiner Integrierung in das Knochengewebe der Maxilla und der Premaxilla wurde während des pubertalen "Spurtes" des Wachstums seine günstige Einwirkung auf die Entwicklung des alveolaren Prozesses des Oberkiefers verfolgt.

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EFFECTS OF SOFT TISSUE AND OSSEOUS BRIDGE ON FACIAL CONFIGURATION IN ADULTS WITH UNILATERAL CLEFT LIP AND PALATE

Z. ŠMAHEL¹, I. HORÁK²

In studies of craniofacial growth in cleft lip and palate are sometimes included into the studied series patients with complete clefts, as well as individuals with a soft tissue bridge (Simonart's bridge; Hellquist et al., 1983; Larson, 1983; Brattström, 1991 a.o.). It is believed that both forms of clefts have an identical postoperative development. However, we have demonstrated on an earlier study (Šmahel and Brejcha, 1983) that contrary to complete clefts incomplete clefts (with a soft tissue or osseous bridge) are not associated with a reduction of upper face height or with a wider nasal cavity, or with a reduction of the thickness of the upper lip and are accompanied by a smaller reduction of maxillary depth. Differences between these two forms of clefts result also in differences of certain characteristics, as e.g. total height of the face, the configuration of the profile, maxillary retrusion, sagittal jaw relations, occlusion a.s. On the contrary, dentoalveolar retroinclination, posterior displacement of the maxilla, shortening and deviations in the configuration of the mandible and a larger interocular distance showed no relation to the presence of a bridge. The purpose of the present study was to ascertain whether the above mentioned deviations were due to presence of an osseous bridge and whether patients with soft tissue bridge actually did not differ from individuals with complete clefts, or whether the presence of a soft tissue bridge exerted equally an effect on the configuration of the face in patients with clefts. The study was based on an analysis of an earlier reported series (Šmahel and Brejcha, 1983).

MATERIAL AND METHODS

The studied series included 26 Czech adult males, aged 20-40 years, with unilateral incomplete cleft lip and palate. At the time of diagnosis 16 individuals had an osseous bridge in the anterior pole of the maxilla, while 10 men had only a soft bridge situated at the threshold of the nostril. They were compared with a series of 32 males matched in age with an unilateral complete cleft lip and palate, as well as with a group of 50 normal adult males. All patients were operated upon with the same method: i.e. cheiloplasty according to Veau, mostly between the 7th and 9th month of life, without a repair of the alveolar process. Palatoplasty by pushback and pharyngeal flap surgery followed about the age of 5 years. Individual series differed by the frequency of required surgical corrections within the region of the nose or lip (in complete clefts 90.6%, in a soft tissue bridge 40%, in an osseous bridge 37.5%). Therefore the soft facial profile was not analysed in more detail. Orthodontic therapy was uniform; in the described period of time (patients born in 1945-62 incl.) still without the use of fixed appliances. Into the series were not included individuals with

associated malformations or patients subjected previously to maxillofacial osteotomy.

X-ray films were made under standard conditions during centric occlusion. The applied craniometric points and reference lines are presented on Fig. 1. The perpendicular distance of a point from a reference line is marked e.g. Pmp-NSL, the angles N-S-Ba or as a fraction of the pertinent reference lines (ML/RL) and the thickness of the upper lip at the level of the soft subspinale as Ss' (similarly Pr_i). The resulting craniogram is constructed on the basis of a larger number of dimensions than are presented in the table. The results were analysed with the non-paired t-test.

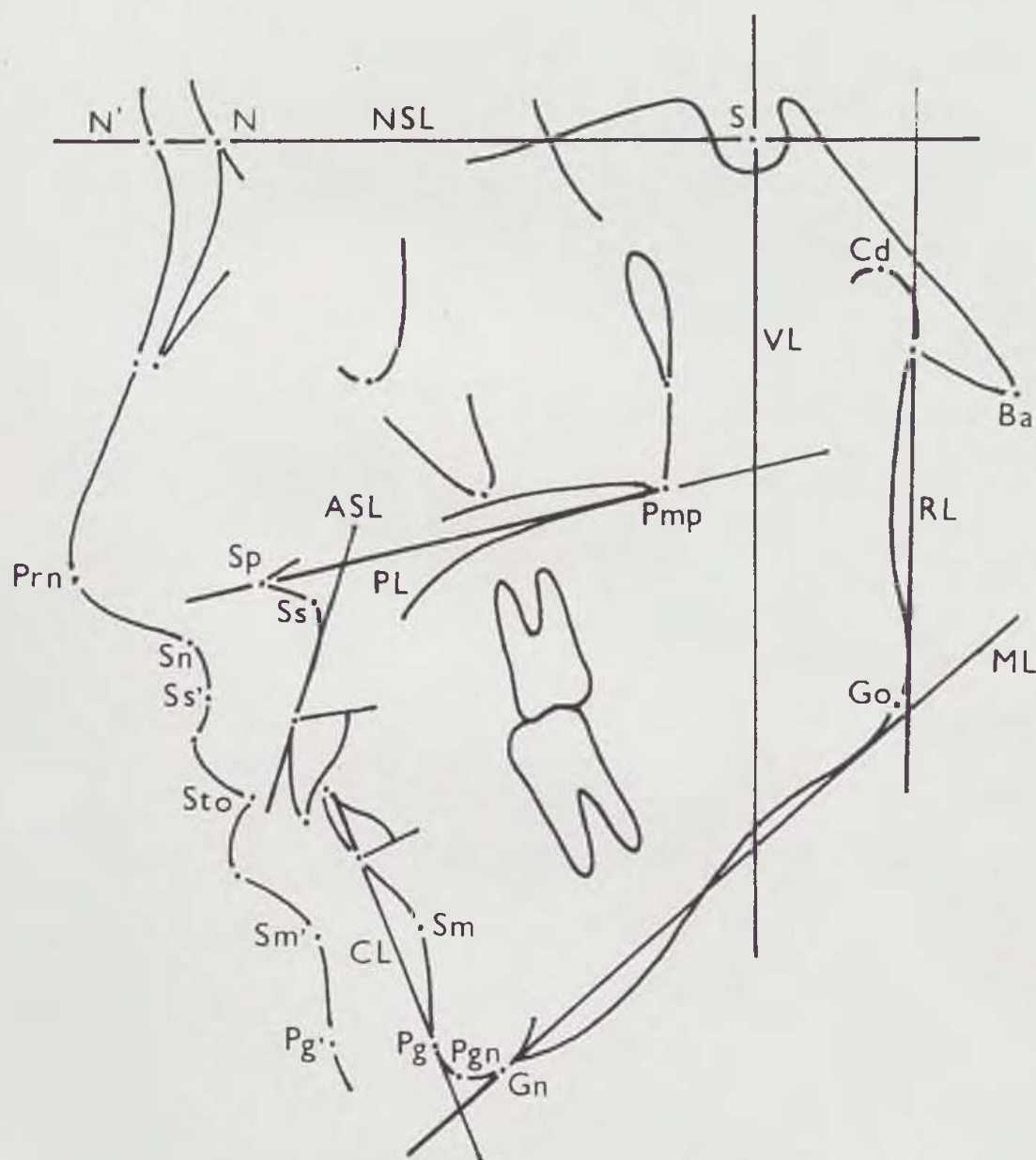


Fig. 1. Cephalometric points and reference lines used for the assessment of lateral X-ray films.
Dimensions assessed on A-P films are explained in the text

RESULTS

The results are summed up in table 1. They provide definite evidence that the shortening of the presellar part of the cranial base (N-S) is identical in all investigated forms of clefts while there is no shortening of its postsellar part (S-Ba) and that the angle of the cranial base (N-S-Ba) remains unchanged as well. In spite of the limited numbers of cases in individual series these similarities confirm their comparability.

The anterior and posterior height of the upper face (N-Sp, Pmp-NSL) are shortened both in clefts with a soft bridge and in complete clefts, while in clefts with an osseous bridge they did not differ from controls. The lower face (Sp-Pg) shows an identical prolongation in all types of clefts regardless of the presence or type of bridge. This deviation results in a prolongation of the face as a whole (N-Gn) in clefts with an osseous bridge, while in complete clefts and in clefts with a soft tissue bridge the prolongation of the lower face is "compensated" by the shortening of the upper face. The same interrelations shows the soft profile of the face (N'-Sn, N'-Sto, N'-Pg') with greater heights in clefts with an osseous bridge, as compared to complete clefts or to clefts with a soft bridge. The posterior height of the whole face (S-Go) is shortened in clefts with a soft bridge similarly as in complete clefts, while clefts with an osseous bridge were consistent with controls.

Maxillary depth (Ss-Pmp) was more markedly shortened in complete clefts than in clefts with a soft tissue or osseous bridge, where no differences were recorded. The retrusion of the upper jaw (S-N-Ss) was therefore less pronounced in clefts with soft tissue or osseous bridges than in complete clefts. The posterior position of the maxilla was identical in all investigated types of clefts (Pmp-VL). Retroinclination of the maxillary alveolar process (ASL/PL) is slightly more pronounced in complete clefts than in clefts with bridges, however the difference is not statistically significant.

The length of the mandibular body (Pgn-Go) and ramus (Cd-Go) differs only very little between patients with soft tissue and osseous bridges. The shortening is somewhat slighter than in complete clefts, however the difference is not significant. A steeper mandibular body (ML/NSL), an obtuse gonial angle (ML/RL), the chin angle (CL/ML) and a retrognathic mandible (S-N-Sm, S-N-Pg) are not related to the presence or type of bridge.

Sagittal jaw relations (Ss-N-Sm, Ss'-N'-Sm') and the convexity of the skeletal (N-Ss-Pg) and soft (N'-Sn-Pg', N'-Prn-Pg') facial profile deteriorate in the following order: clefts with an osseous bridge, clefts with a soft tissue bridge, complete clefts. The thickness of the upper lip (Ss', Pr₁) is reduced only in complete clefts.

The width of the face (Zy-Zy) and of the lower jaw (Go-Go) are not changed in the presence of clefts. The interocular distance (Mo-Mo) is regularly increased, most markedly in clefts with a soft bridge, but the increase is not related to the severity of the cleft. The distance between the outer margins of the orbits (Ek-Ek) was not significantly changed. The nasal cavity (Apt-Apt) is widened in clefts with a soft tissue bridge almost to the same extent as in complete clefts, while the widening is missing in clefts with an osseous bridge.

DISCUSSION

In one of our earlier studies (Šmahel and Brejcha, 1983) it was demonstrated that in unilateral cleft lip and palate a bridge over the cleft exerts a marked effects on three of the six basal facial skeletal deviations i.e. the depth, height and some width (nasal cavity) dimensions of the upper jaw. Since the original series included patients with both types of

Tab. 1. Cephalometric mean values for three investigated groups of unilateral cleft lip and palate and controls

Variable	Complete	Soft bridge	Bony bridge	Controls
Base				
N-S	73.19	73.70	73.25 (x)	75.04 +
S-Ba	49.16	49.20	50.06	49.32
N-S-Ba	130.28	130.40	132.00	132.16
Face				
N-Sp !!!	54.06	54.60 x	57.94	57.14 +++
Pmp-NSL !	47.16	47.00 (x)	49.25	48.94 +
Sp-Pg	73.03	72.80	73.56 xxx	67.66 +++
N-Gn (!)	132.62	132.00 (x)	136.62 xx	130.16
S-Go !!	85.16	84.80	88.50	88.10 +
Ss-Pmp (!)	47.25	49.80	49.19 xx	52.40 +++
Pmp-VL	11.97	11.50	11.31 x	14.28 ++
Pgn-Go	75.72	77.40	76.31	78.96 +
Cd-Go (!)	64.22	65.40	66.69	67.42 ++
ASL/PL	95.56	98.10	99.56 xxx	107.60 +++
ML/NSL	36.97	35.50	37.31 xxx	29.86 +++
ML/RL	129.03	127.70	128.94 xxx	121.96 +++
CL/ML	64.00	64.00	66.38 xx	70.76 +++
S-N-Ss	74.78	76.30	76.50 xxx	80.68 +++
S-N-Sm	75.94	76.30	75.75	78.20 +
S-N-Pg	77.81	78.30	77.25 (x)	79.84 +
Ss-N-Sm (!)	-1.16	0.00	0.75 x	2.48 +++
N-Ss-Pg !	185.50	183.40	180.94	178.12 +++
Soft profile				
N'-Sn !!	62.34	62.80	65.69	64.04
N'-Sto !	84.65	85.30 (x)	88.38	86.78 +
N'-Pg' !	121.06	120.90 x	126.06 xx	120.38
Ss'-N'-Sm'	2.00	3.70	4.56	7.16 +++
N'-Sn-Pg' !!	177.25	174.90	170.50 xx	164.64 +++
N'-Prn-Pg' !	144.75	143.90	140.00 xx	134.00 +++
Ss' _i	13.67	14.44	14.56	14.80 ++
Pr' _i	14.17	14.80	14.88	15.26 +
Face A-P				
Zy-Zy	147.53	147.90	148.06	147.18
Go-Go	111.52	110.30	112.62	112.55
Mo-Mo	29.78	31.20 x	28.88 xxx	26.90 +++
Ek-Ek	110.44	111.80	110.31	109.65
Apt-Apt !!!	37.59	36.50 (x)	34.19	34.67 +++

+ significant differences between complete clefts and controls at $p < 0.05$, ++ $p < 0.01$, +++ $p < 0.001$

! significant differences between complete clefts and clefts with bony bridge at $p < 0.05$, !! $p < 0.01$, !!! $p < 0.001$, (!) $p < 0.1$

x significant differences between neighbouring columns at $p < 0.05$, xx $p < 0.01$, xxx $p < 0.001$, (x) $p < 0.1$ (i.e. controls vs. bony bridge, bony bridge vs. soft bridge and soft bridge vs. complete clefts)

bridges i.e. soft bridges alone or in combination with osseous bridges it remained open to question whether the above mentioned characteristics are affected by the presence of a soft bridge, or only by the occurrence of an osseous bridge. The remaining three skeletal deviations i.e. the posterior position and the dentoalveolar retroinclination of the maxilla and mandibular deviations showed no relation to the presence of a bridge. The thickness of the upper lip was not decreased in the presence of a soft bridge. The shortening of the lip was related to the applied surgical corrections.

Our observation showed that the height of the upper face was not reduced in the presence of an osseous bridge, while a soft bridge did not interfere with its shortening. This fact supports the hypothesis that the missing interaction between the nasal septum and the cleft jaw leads as early as in the prenatal period to a deficient vertical growth of the maxilla. However, the causality of this interaction remains unclear (Siegel et al., 1985). The deviation does not develop in the case of a maintained continuity of the dentoalveolar arch. The continuity of the arch interferes also with a widening of the nasal cavity, which attained almost the same extent in clefts with soft tissue bridge alone as in complete clefts.

An osseous bridge prevents only partially, yet significantly a shortening of maxillary depth. Contrary to expectation we failed to disclose any difference between the effect of a soft tissue bridge and an osseous bridge, which could be due to the small number of cases. However within the scope of global facial configuration an impairment of sagittal jaw relations and a flattening of the face were more pronounced in clefts with a soft bridge, than in the presence of an osseous bridge. Yet they were always less marked than in complete clefts. In contrast to the height of the maxilla and of the width of the nasal cavity a soft tissue bridge alone exerts a favourable effect on the configuration and a retrusion of the maxilla and thus also on the relations between both jaws and the configuration of the face.

The thickness of the upper lip shows a relation to the presence of a soft bridge. Deviations of the lower jaw and the posterior position of the upper jaw are not related to the presence of either type of bridge. A somewhat slighter retroinclination of the alveolar process in clefts with a soft tissue or osseous bridge than in complete clefts could be due to the slighter tension of the lip after an initially slighter tissue deficiency and in the case of an osseous bridge because of the higher resistance of the alveolar arch to the unfavourable postoperative effects. However, because of the high variability of the characteristic the differences from complete clefts were not significant. The other differences in facial configuration between individual forms of clefts were derived from the above mentioned basal changes.

The configuration of the face in unilateral cleft lip and palate with an osseous bridge shows marked differences of some characteristics (maxillary height and depth, width of the nasal cavity) from complete clefts and at the same time some of these characteristics do not differ from controls (maxillary height, width of the nasal cavity). The extent of these differences is illustrated on Fig. 2. In clefts with a soft bridge most parameters are consistent with the corresponding values in complete clefts, but for the unchanged thickness of the upper lip and a slighter shortening and retrusion of the upper jaw resulting in a slighter impairment of sagittal jaw relations and a less pronounced flattening of the skeletal and soft profile of the face. Because of the paramount importance of these parameters for the analysis of therapeutic results in clefts, it is not possible to pool clefts with soft bridges with complete clefts, if there is no definite evidence that the compared series of patients contain the same proportion of both above mentioned forms of clefts. But, it is equally not possible to pool them with clefts with an osseous bridge.

The effect of Simonart's bridge in unilateral cleft lip and palate was discussed by Semb and Shaw (1991). They reported that the presence of this bridge was associated with a

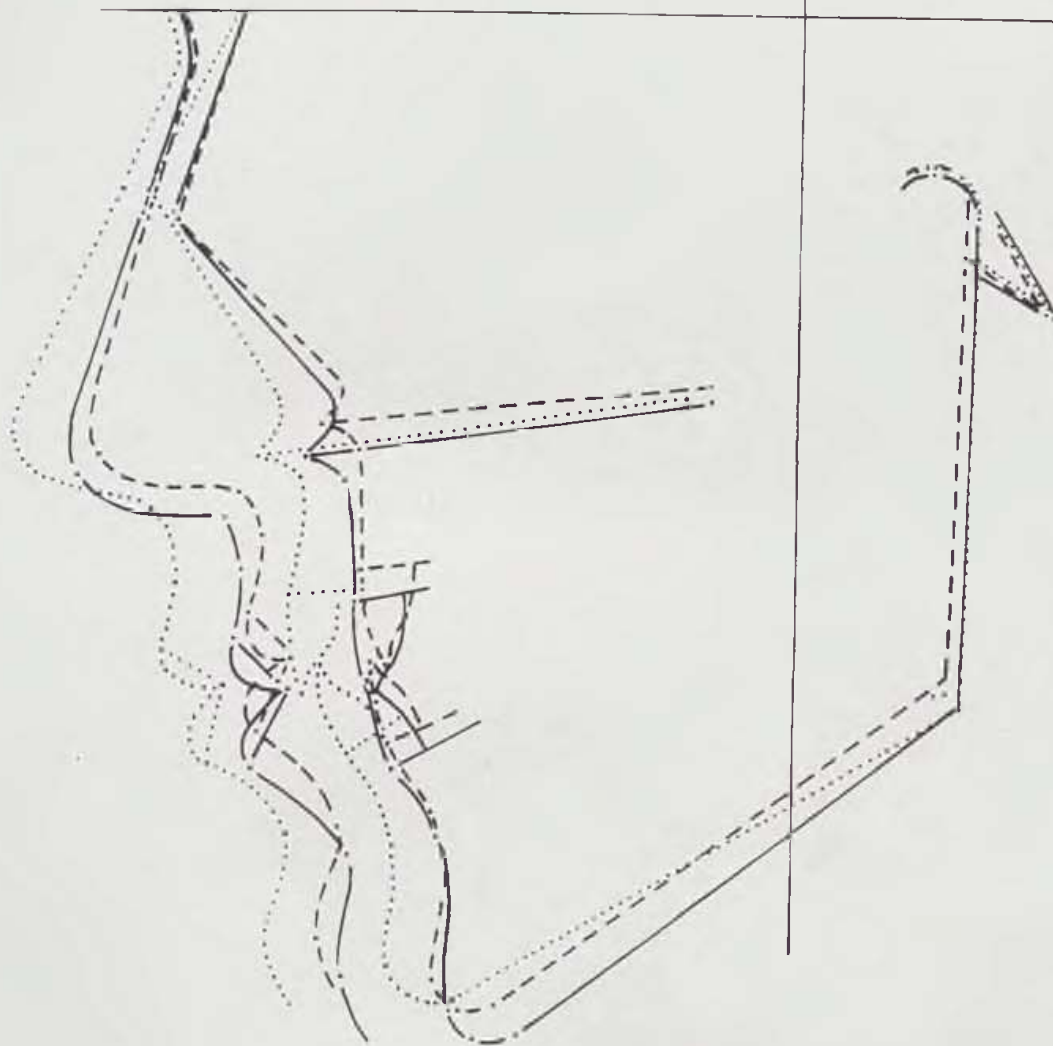


Fig. 2. Craniograms in adult patients with unilateral cleft lip and palate with bony bridge (solid line) as compared to patients with complete unilateral clefts (broken line) and controls (dotted line)

slightly more favourable maxillo-mandibular relations and, after the termination of growth, with a less marked shortening of the upper jaw. They believed that the differences were due to a less pronounced teratogenic impulse, to a slighter tissue deficiency as well as to the smaller number of secondary operations. These conclusions were confirmed by our results. These authors believe that in most research studies it is possible to pool complete clefts with clefts with Simonart's bridge, but they warn against the presence of larger disbalances in the proportions of both forms of clefts in the compared series. Our view is even stricter and we believe that an exclusion of patients with Simonart's bridges provides more favourable conditions for the comparison of the results reported by various authors.

SUMMARY

Roentgencephalometric study was used for the assessment of 16 adult males with unilateral cleft lip and palate and an osseous bridge and of 10 males with a soft tissue bridge. They were compared with 32 individuals with a complete cleft and with a control group of 50 normal males. All patients were operated upon and subsequently treated with the same methods. In contrast to the soft bridge, an osseous bridge prevents the reduction of upper face height, and an increased width of the nasal cavity. Both an osseous and a soft tissue bridge exert a favourable effect on the shortening and retrusion of the maxilla and thus also on the maxillo-mandibular relations and on facial configuration. The thickness of the upper lip is related to the presence of a soft bridge, while deviations of the lower jaw and the posterior position of the maxilla are not related to the presence of either type of bridge. Alveolar retroinclination was insignificantly smaller in the presence of both types of bridges. These differences disclosed that clefts with soft bridges cannot be pooled with complete clefts (or with clefts with osseous bridges), when there is not definite evidence of the same proportion of both forms of clefts in the series used for comparison.

Key words: unilateral cleft lip and palate, osseous and soft tissue bridges, craniofacial morphology, roentgencephalometry

RÉSUMÉ

Influence du pontage mou et osseux sur formation du crâne chez fentes labio-palatines unilatérales: état après la fin de croissance, à l'âge adulte

Šmahel Z., Horák I.

Par les examens radiocéphalométriques, on a évalué 16 hommes adultes, porteurs de la fente labio-palatine unilatérale, avec le pontage osseux, et 10 hommes au pontage mou. Ils étaient comparés avec 32 sujets de la fente totale et avec 50 hommes sains de contrôle. Tous les patients étaient opérés et consécutivement traités par les mêmes procédés. La présence du pontage osseux, différemment au pontage mou, restreint la diminution de la hauteur d'étage supérieure de visage et de l'élargissement de cavité nasale, les pontages osseux et mous influencent favorablement le raccourcissement et la retroussion du maxillaire et conséquemment aussi des relations intermaxillaires et la formation du profil de visage. L'épaisseur de lèvre supérieure dépend de la présence du pontage mou, les déviations du maxillaire inférieure et la position postérieure du maxillaire supérieure ne témoignent pas de dépendance du pontage de type quelconque. La rétroinclinaison alvéolaire était insignifiquement plus petite en présence des deux types de pontage. Des différences alléguées on peut conclure que les fentes au pontage mou ne peuvent pas être rassemblées dans les groupes communs avec les fentes totales (et avec les fentes au pontage osseux non plus), sauf si elles ne soient pas distribuées proportionnellement dans les groupes comparés.

ZUSAMMENFASSUNG

Einwirkungen der weichen und knöchernen Brücken auf die Gestaltung des Schädels bei einseitigen Lippen- und Gaumenspalten anhand der Untersuchungen von Erwachsenen

Šmahel Z., Horák I.

Röntgenzephalmetrische Untersuchungen erfolgten bei 16 erwachsenen Männern mit einseitigen Lippen- und Gaumenspalten und einer knöchernen Brücke, und bei 10 Männern mit einer



weichen Brücke. Sie wurden mit 32 Männern mit totalen Spaltmissbildungen und mit einer Kontrollgruppe von 50 gesunden Männern verglichen. Sämtliche Patienten wurden mit denselben chirurgischen und orthodontischen Methoden behandelt. Im Unterschied zu einer weichen Brücke hinderte eine knöcherne Brücke die Verkürzung der Obergesichtshöhe und die Erweiterung der Nasenhöhle. Sowohl die weiche, wie auch die knöcherne Brücke übten einen günstigen Einfluss auf die Verkürzung und Retrusion der Maxilla und dadurch auch auf die Beziehungen zwischen beiden Kiefern und auch auf die Gestaltung des Gesichtsprofiles. Die Oberlippendicke ist abhängig von dem Vorliegen einer weichen Brücke wogegen die Abweichungen am Unterkiefer und die rüchwertige Verschiebung der Maxilla sind in keinem Zusammenhang mit dem Vorliegen einer Brücke.

Bei beiden Typen der Brücken bestand eine unbedeutende Reduktion der alveolaren Retroinklination. Die erwähnten Unterschiede zeigen, dass Spaltmissbildungen mit weichen Brücken nicht in dieselbe Gruppe eingereiht werden können, wie die totalen Spalten (bzw. wie die Spalten mit knöchernen Brücken), wenn die erwähnten Typen nicht in derselben Proportion der Fälle vertreten sind.

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FACIAL ASYMMETRY: TYPE, EXTENT AND RANGE OF NORMAL VALUES

B. ŠKVAŘILOVÁ

Morphological asymmetry can be defined as a deviation from complete symmetry during development of the organism and of its different parts in relation to the median plane of the body. These asymmetries are within certain limits a physiological and regular phenomenon. They are the outcome of genetic, epigenetic and exogenous factors, they can change with age and be manifested to a varying extent.

Asymmetries reflect developmental aspects of the organism, the measure of its homogeneity (heterozygosity) and are associated with the manifestation of congenital defects. Subjects with various congenital defects who are always more homozygous are characterized by a greater morphological (and other) variability incl. larger asymmetries (Livshits and Kobylansky, 1987, 1991). Larger asymmetries are thus a certain measure of developmental instability of the organism and can be not only an indicator of developmental disorders but also of adverse influences of the external environment (stress), a poorer health status of the individual or of altered function.

There are two types of asymmetry: fluctuating and directional. In fluctuating asymmetry the larger size of the right or left side in individuals is accidental and is not obvious in a series as whole (the difference between the two sides is not significant). On the contrary in directional asymmetry a series is characterised by a significantly larger size of one side. But even this asymmetry has a fluctuating component which can be identified by subtraction of the directional component and which reflects the mentioned developmental instability of the organism (the directional component reflects rather the effect of function). In addition to evaluation where we take into account the positive or negative sign indicating which side is larger (so-called signed asymmetry) we can evaluate asymmetry regardless of the sign as absolute values of right / left differences. Such asymmetries are called absolute asymmetries. It is useful to express their magnitude also in per cent of the size of the respective characteristic and this asymmetry is described as relative. It makes it possible to compare the magnitude of asymmetry in dimensions of different size.

Investigations of asymmetry are important not only from the aspect of general developmental principles and developmental disorders caused by endogenous and exogenous causes but also for practical reasons such as defining the range of normal and abnormal asymmetry. The objective of the present investigation therefore was to follow up the development of facial asymmetry in relation to age and sex, to evaluate its magnitude and type and to define the range of normal and abnormal asymmetry of different structures and characteristics.

MATERIAL AND METHODS

In order to evaluate facial asymmetry the authors selected a group of 720 normal subjects aged 6-18 years (360 boys and 360 girls) examined in Prague schools. They were divided according to sex into two-year age categories, each included 60 subjects. The selection was made at random so as to attain the required number of subjects. Asymmetry was assessed in 12 direct dimensions measured by a sliding calliper (in characteristic go-gn by a spreading calliper) on both sides of the face (Fig. 1).

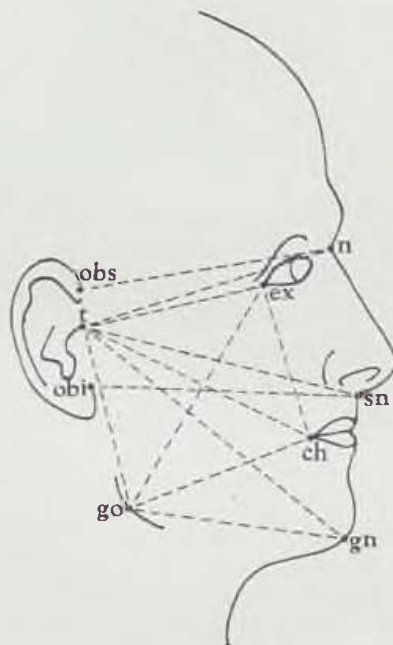


Fig. 1. Cephalometric points and measured characteristics (dashed line) used in the study

From the assessed values for every subject the differences between the right and left side were calculated and with regard to the sign (signed asymmetry), the mean values and standard deviations were determined. To test whether these differences (asymmetries) differ significantly from zero the paired t-test was used. Because of the large number of t-tests the level of $p < 0.01$ was used as the critical level for differentiation of fluctuating and directional asymmetry. Since the standard deviations in individual age groups did not differ, their mean values were determined (\bar{X}_{s_j}) and the double value was used to define the borderlines of normal and abnormal asymmetry. In addition to the mentioned characteristics also values of absolute and relative asymmetry were calculated. For these characteristics standard deviations were not calculated as absolute values of differences between both sides do not have a normal distribution. Since values of absolute and relative asymmetries were not age-dependent, only mean values of all age groups are presented.

RESULTS

Mean values of signed asymmetry in lateral facial dimensions are given in table 1. Significant values (differences between the right and left side) suggesting the directional type of asymmetry were recorded in the majority of age groups only in the distance of the mandibular angle from the outer eye canthus (go-ex) and in half of the age groups in the

Tab. 1. Mean values of signed asymmetry in the series

Years	M				F				M				F											
	go-ex								t-sn								t-ch							
6-8	0.55				0.88 xxx				0.65 x				0.67 x				0.78 xx				0.83 xx			
8-10	1.00 xx				1.13 xxx				0.06				0.43				0.08				0.17			
10-12	0.85 xx				0.37				0.80 x				0.73 x				0.70				0.43			
12-14	0.52				1.25 xxx				-0.28				0.78 xx				0.08				0.45			
14-16	1.43 xxx				1.08 xxx				-0.27				0.18				0.28				0.27			
16-18	1.29 xxx				0.98 xx				0.83 x				0.08				0.05				0.08			
	go-gn								t-gn								obs-n							
6-8	-0.23				-0.18				-0.18				0.85 x				0.60 x				0.95 x			
8-10	0.18				-0.05				-0.17				0.45				-0.03				0.77 x			
10-12	-0.57 x				-0.52 x				0.10				0.07				0.87 x				0.07			
12-14	-0.40				-0.45 x				-0.43				0.22				-0.20				0.22			
14-16	-0.30				-0.65 xx				-0.73 x				-0.75 x				-0.02				-0.02			
16-18	-0.41				-0.65 x				-0.79 x				-1.02 xxx				1.02 x				0.53			
	go-ch								t-go								obi-sn							
6-8	0.55 x				0.18				0.62 x				0.73 x				1.07 xxx				0.93 xx			
8-10	0.83 xx				0.35				-0.06				0.22				0.63				0.82 x			
10-12	1.55 xxx				-0.22				0.63 x				0.15				1.52 xxx				1.02 xx			
12-14	0.73 x				0.27				0.70 xx				0.40				0.40				0.82 x			
14-16	0.62				-0.22				0.83 x				0.93 xx				0.27				-0.02			
16-18	0.41				0.08				0.60				0.67				0.67				-0.03			
	t-n								t-ex								ex-ch							
6-8	0.05				0.68 x				0.50				0.93 xxx				0.10				0.08			
8-10	-0.40				0.63				0.55				1.15 xxx				0.23				-0.08			
10-12	0.27				0.20				1.27 xxx				0.65 x				-0.40				0.07			
12-14	-0.50				0.27				0.30				0.82 xx				-0.12				-0.23			
14-16	-0.62				-0.25				0.50				0.35				-0.42				0.08			
16-18	0.78 x				-0.03				1.50 xxx				0.52				-0.89				-0.23			

x $p < 0.05$,xx $p < 0.01$,xxx $p < 0.001$,

minus symbol indicates left side greater

distance of the tragon from the outer canthus (t-ex). The differences varied about 1mm in favour of the right side. In the other investigated characteristics significant differences were recorded only in some age groups, frequently at a low significance level ($p < 0.05$). In some age groups the left side is insignificantly larger and this confirms fluctuating asym-

Tab. 2. Occurrence of directional asymmetry in individual age groups (at $p < 0.01$)

Age		6 - 8	8 - 10	10 - 12	12 - 14	14 - 16	16 - 18
go - ex	M		x	x		x	x
	F	x	x		x	x	x
go - gn	M						
	F					-x	
go - ch	M		x	x			
	F						
t - n	M						
	F						
t - sn	M						
	F				x		
t - gn	M						
	F						-x
t - go	M				x		
	F					x	
t - ex	M			x			x
	F	x	x		x		
t - ch	M	x					
	F	x					
obs - n	M						
	F						
obi - sn	M	x		x			
	F	x		x			
ex - ch	M						
	F						
Number of significant findings		6	4	5	4	4	4

-x = significantly greater left side

12 significant tests in males and 15 in females out of 144 calculated tests

metry. A more marked predominance of the left side over the right side appeared to be present in the length of the mandibular body (go-gn) and after puberty in the characteristic t-gn. Thus the analysis indicates a predominance of the vertical dimension go-ex on the right and depth go-gn on the left. On the whole, however, the asymmetry of lateral facial dimensions is rather of the fluctuating than directional type, as illustrated by table 2. With the exception of characteristics go-ex and t-ex the others can be classified as fluctuating asymmetry. The distribution of significant findings in the table 2 is not age-dependent and there are no sexual differences. If directional asymmetry occurs, the right side dominates (but for two exceptions out of 27 significant tests).

The standard deviations of signed asymmetry expressed by mean values for the whole group (\bar{X}_{s_d}) are for all characteristics in both sexes regularly within the range of 2-2.5 mm (Table 3). Double values of the latter ($2\bar{X}_{s_d}$, Table 3), i.e. right/left differences up to 4-5 mm, can therefore be considered in lateral facial dimensions as normal.

Tab. 3. Mean value of standard deviations of the signed asymmetry from individual age groups ($\bar{X}s_{\bar{d}}$). Mean values of absolute (\bar{X}_{abs}) and relative (\bar{X}_{rel}) asymmetry from individual age groups

Variable/Sex		$\bar{X}s_{\bar{d}}$	$2\bar{X}s_{\bar{d}}$	$\bar{X}_{abs.}$	$\bar{X}_{rel.}$
go-ex	M	2.24	4.5	1.98	2.16
	F	2.14	4.3	1.91	2.17
go-gn	M	2.11	4.2	1.61	1.87
	F	1.66	3.3	1.30	1.55
go-ch	M	2.24	4.5	1.96	2.53
	F	2.06	4.1	1.59	2.11
t-n	M	2.60	5.2	2.01	1.72
	F	2.28	4.6	1.76	1.57
t-sn	M	2.59	5.2	1.99	1.61
	F	2.25	4.5	1.81	1.53
t-gn	M	2.70	5.4	1.89	1.40
	F	2.41	4.8	1.99	1.55
t-go	M	2.33	4.7	1.80	2.46
	F	2.87	5.7	1.85	2.64
t-ex	M	2.16	4.3	1.83	2.39
	F	1.99	4.0	1.65	2.24
t-ch	M	2.56	5.1	1.95	1.84
	F	2.19	4.4	1.67	1.63
obs-n	M	2.74	5.5	2.18	1.99
	F	2.54	5.1	2.02	1.92
obi-sn	M	2.65	5.3	2.13	1.93
	F	2.48	5.0	2.02	1.90
ex-ch	M	2.25	4.5	1.53	2.14
	F	1.94	3.9	1.56	2.21

Values of absolute asymmetry expressed again as mean values for the whole group (\bar{X}_{abs}) vary as a rule in individual characteristics within a narrow range of 1.5-2 mm (Table 3). These values expressed in per cent of the size of a characteristic (relative asymmetry) are 1.5-2.5% (\bar{X}_{rel} , Table 3). Absolute and relative asymmetry did not change with age and no intersexual differences were found.

DISCUSSION

The findings revealed that facial asymmetry has mostly a fluctuating character which does not change with age. Despite a certain predominance of the right side over the left most differences did not attain the significance level. However, they are not quite negligible, as it is illustrated by 25 significant tests in favour of right-side dominance and only two tests in favour of left side dominance. Out of 144 calculated tests this accounts for 17.4% and 1.4% significant findings, as compared with the expected 1% ($p < 0.01$). In some areas or some parameters therefore the predominance of one side, as a rule the right side, can be manifested more markedly and attain a directional character. In our series this

Despite the great practical and general importance of the problem of asymmetries in the morphology and function of the human body so far no adequate attention was devoted to these problems. Further investigations are therefore essential.

SUMMARY

For analysis of facial asymmetry (signed, absolute, relative) a group of 720 normal children aged 6-18 years was examined. Twelve direct dimensions measured on both sides of the face were assessed. The results revealed that the extent of facial asymmetry is the same in both sexes and does not change with age. Facial asymmetries have mostly a fluctuating character, usually with slight predominance of the right side. With the help of double standard deviations of signed asymmetry, the range of normal asymmetry for lateral facial dimensions was determined as 4-5mm. The definition of the borderlines of normal and abnormal asymmetries may be of practical value in some medical disciplines.

Key words: facial asymmetry, fluctuating vs. directional asymmetry, cephalometry, range of normal values

RÉSUMÉ

Asymétrie du visage: type, grandeur et limite de la normale

Škvařilová B.

Dans le but d'analyser les asymétries de visage (signées, absolutes, relatives), on a utilisé un groupe de 720 enfants sains, âgés de 6 à 18 ans. On a évalué 12 dimensions directes, mesurées sur les deux côtés du visage. Les résultats ont montré que le taux d'asymétries de visage est égal chez les deux sexes et ne change pas en fonction de l'âge. Les asymétries de visage présentent en prépondérance un caractère fluctuant, habituellement avec une dominance modérée du côté droit. Les limites de l'asymétrie physiologique pour les dimensions latérales du visage étaient fixées à 4-5 mm, comme le double d'écart déterminant de l'asymétrie signée. La détermination des limites d'asymétrie physiologique et non-physiologique peut se révéler importante pour la pratique dans beaucoup de spécialités médicales.

ZUSAMMENFASSUNG

Gesichtsasymmetrie: Typ, Ausmass und Grenzen der Norm

Škvařilová B.

Die Analyse der Gesichtsasymmetrie (plus bzw. minus, relativ, absolut) an einem Untersuchungsgut von 720 gesunden Kindern im Alter von 6 - 18 Jahren. Gewertet wurden 12 Dimensionen, die an beiden Seiten des Gesichtes gemessen wurden. Die Ergebnisse zeigten ein gleiches Ausmass der Gesichtsasymmetrien bei beiden Geschlechtern und ihre Unabhängigkeit vom Lebensalter.

Die Gesichtsasymmetrien weisen meistens Schwankungen auf, regelmässig überwiegt die rechte Seite des Gesichtes. Mit zweifachen Standardabweichungen der plus bzw. minus Asymmetrien wurden als Grenzen der physiologischen Asymmetrie der lateralen Gesichtsdimensionen mit 4-5 mm bestimmt. Die Bestimmungen der oberen Grenze der physiologischen und unphysiologischen Asymmetrie ist von praktischer Bedeutung in einer Reihe von medizinischen Disziplinen.

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Book Review

ATLAS OF MICROVASCULAR SURGERY

*Berish Strauch and Han-Liang Yu,
in collaboration with Zhong-Wei Chen
and Ralph Liebling*
Georg Thieme Verlag, Stuttgart-New York, 1993

This year, the well known publishers of medical books brought about a very incentive and practical compendium - an atlas of microvascular surgery. It has been written by a team of American and Chinese authors, members of the Albert Einstein College of Medicine, and the Montefiori Medical Center, Bronx, N.Y., and the Zhong Shan Hospital, Shanghai.

The authors present a comprehensive survey of the free flap types and detailed description of their anatomy, inclusive of their anatomical varieties. They give brief and very instructive outlines of operation techniques regarding the harvesting of the flaps. The book representing a rich source of useful information on the free tissue transfer is divided into four main parts. In the introductory chapter, the authors deal with the tissue transfer itself, briefly and very exactly. The subsequent 4 parts are inscribed according to main anatomical regions of the human body. Within their individual chapters, it is possible to find notes on the so far known and clinically used types of free flaps. At the end of every chapter belonging to the respective anatomical region, the access to main recipient arteries is described.

The book has 560 pages, and contains the description of 98, both fundamental and subordinate techniques for the mobilization of free flaps and 38 operational accesses to the main and most often used receiving vessels. It contains 570 coloured illustrations, showing step-by-step operative procedures.

In the form of the book so far described, the reconstructive surgery using free flap transfer received a comprehensive and rather concise information that, in individual cases, will prove itself to be most useful in choosing the most suitable type of the flap and in deciding the very best operation procedure.

The book may be recommended not only to plastic surgeons, but also to surgeons of other specializations, in which the free flap in sense of interdisciplinary treatment might bring a great benefit for the patient. In spite of its rather great volume, the atlas is easy to handle and to understand. It gives to the reader a fair and expedient information on the field of reconstructive surgery, undergoing stormy development.

Aleš Nejedlý MD,
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