

ACTA CHIRURGIAE PLASTICAE

INTERNATIONAL JOURNAL
OF PLASTIC SURGERY

24 · 4

1982

CS ISSN—0001—5423

AVICENNUM · CZECHOSLOVAK MEDICAL PRESS
PRAGUE

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

5048

EDITORIAL BOARD

H. PEŠKOVÁ, *Head of the Editorial Board*

R. VRABEC, *Scientific Secretary*

INTERNATIONAL

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

Distributed by PNS. Information on subscription can be obtained from and orders are accepted by every administration of PNS, post-office, postman and PNS Central Expedition Prague. Orders for abroad are accepted by PNS Central Expedition and Press Import, administration of press export Kafkova 19, 160 00 Praha 6.

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

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

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

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

J. E. Purkyně University Medical Faculty, Brno (Czechoslovakia)
Clinic of Plastic Surgery
Head Prof. V. Kubáček, M. D., DrSc.

HEALING OF WOUNDS

J. Pospíšilová

INTRODUCTION

The main presumption of every surgical intervention is successive healing and wound repair. Healing belongs to the basic regenerative manifestations of living organism. In mammals only a partial regeneration takes place during which for not fully clear reasons, the epithelial, blood and connective tissues regenerate. Highly differentiated tissues, like muscular and nerveous, do not regenerate, they are mostly being replaced by connective tissue.

Connective tissues differ in the mutual ratio of substitution of cells, fibres and interstitial matrix. In an adult a dense fibrous connective tissue is most important, in which a majority of collagenous fibres are contained. Besides having a connecting and supporting function this tissue primarily takes part in regeneration of the skin, the tendons of the muscle, fascia and of joints.

According to the arrangement of collagenous fibres the dense fibrous connective tissue is divided into:

a) Skin fibrous connective tissue in which collagenous fibres are arranged in mutually interwoven bundles. Solitary cells have an elongated shape. This tissue forms the corium of the skin and the joint bursae (Fig. 1). This kind of tissue is not distinctly differentiated from areolar tissue which accompanies blood vessels and nerves.

b) Tendon fibrous connective tissue is the densest form of connective tissue. A parallel collagenous fibres are bundled together compactly and closed by winglike cytoplasmic cells. These cells are compressed by the surrounding fibres so that they resemble thin rods in profile view but are stellate in cross section (Fig. 2a, b).

c) Aponeuroses and ligaments are constructed in similar shapes but their fibres are less compactly arranged. Collagenous and elastic fibres form parallel lamellas which are mutually interconnected (Fig. 3).

The study of processes evolving in connective tissue during its metabolic activation has amplified knowledge of repair in several fields. The reason of this paper is a brief review of factors influencing wound repair.

PHYSIOLOGIC AND BIOCHEMICAL ASPECTS OF WOUND HEALING

When tissue continuity is broken a wound forms and the regenerative process of healing initiates, the result of which is the formation of a scar (Fig. 4). The process is controlled by endogenous neurohumoral functions. Depending on the extent of the injury a damage occurs, which will influence the process of healing.

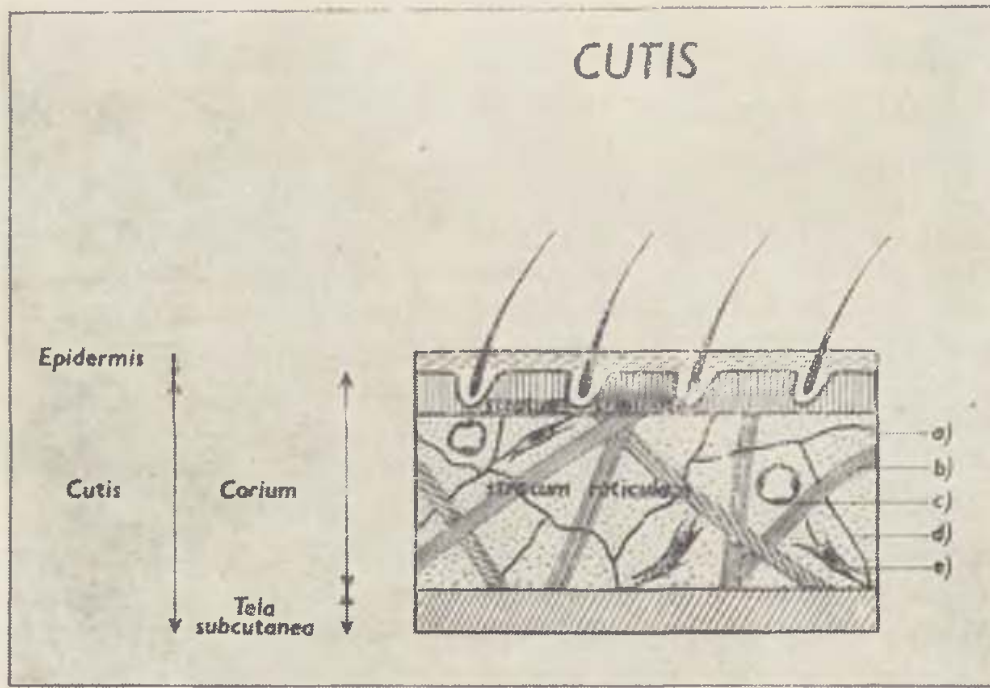


Fig. 1. A longitudinal section of the skin: a) intercellular matrix, b) collagenous fibres, c) vessels, d) elastine fibres, e) fibroblasts

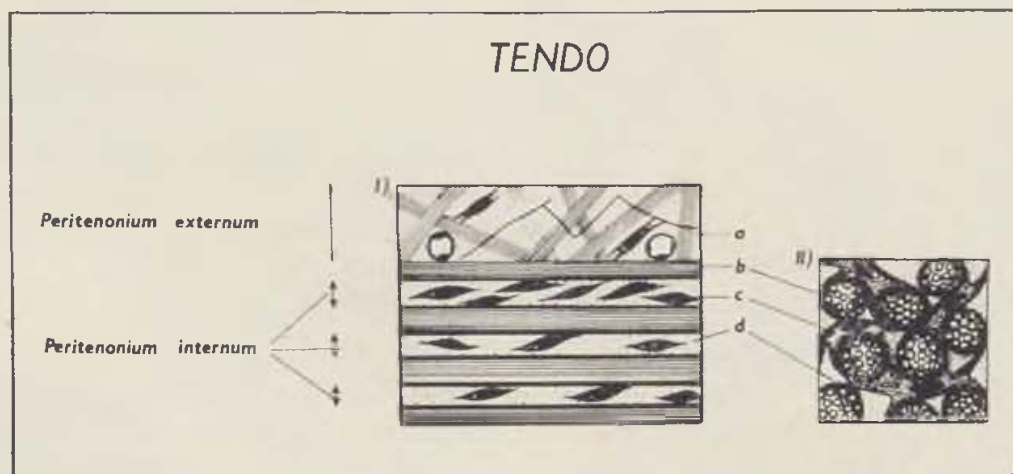


Fig. 2. A longitudinal and cross section of the tendon: a) intercellular matrix, b) collagenous fibres, c) fibroblasts, d) as a)

Primary healing develops along sharp cuts, where after injury the edges of the wound join at almost the same spots they were originally. No interspace must arise and the wound must not carry infection. This healing represents a minimal stress for organism, it is in fact a regenerative microprocess with slight energy demands.

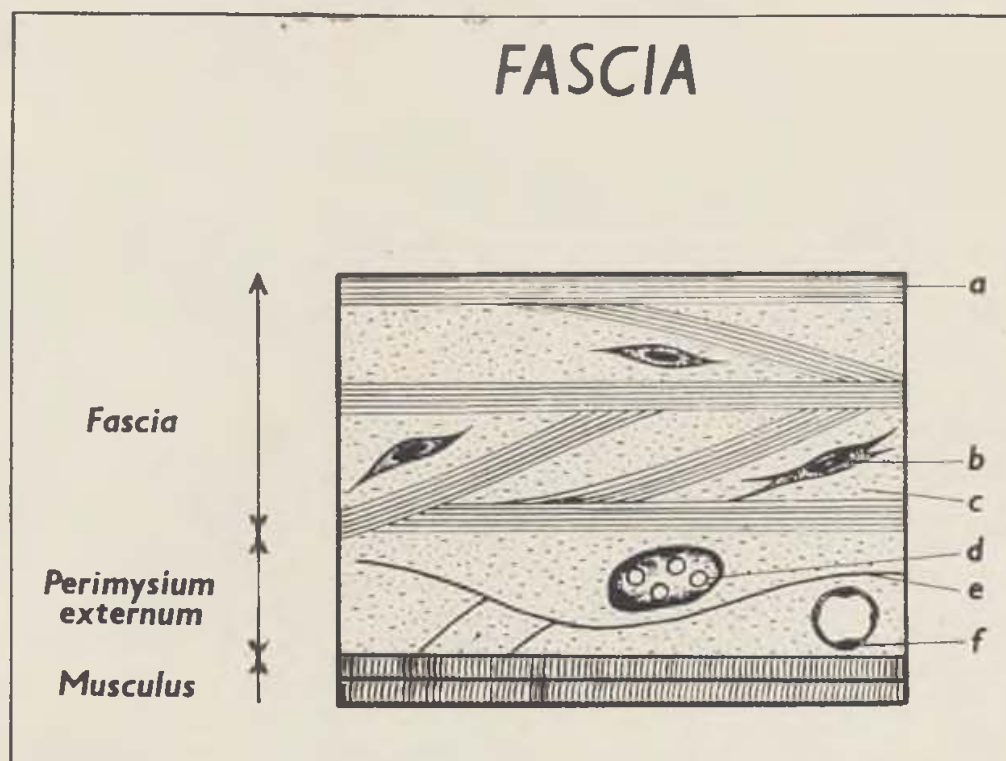


Fig. 3. A longitudinal section of muscle fascia: a) collagenous fibres, b) fibroblasts, c) intercellular matrix, d) fat cells, e) elastic fibres, f) vessels

Table 1. Changes in the tissue during different stages of the healing and the mean time of duration of this changes

Stage of healing	Changes in tissue	Time interval after injury
1. Inflammatory	Infiltration by PMN and MPS Migration of fibroblasts	several hours 1-3 days
2. Proliferative	Neovascularization Fibroblasts division Collagen and GAC synthesis	2-4 days 2-6 days 2-16 days
3. Tissue reorganization	Rebuilding of collagen Reduction of collagen tissue Rebuilding of fibrous tissue into coriofatty	9-60 days 9-60 days about 6-12 months

Secondary healing appears where the damage to tissue is extensive and the edges of the wound are jammed, infected or disjoined in some other way. Depending on the extent of damage, the whole organism is more or less stressed. In cases of very extensive injuries (e. g. burns) the regenerative powers of the system may be completely exhausted and the whole organism succumbs.

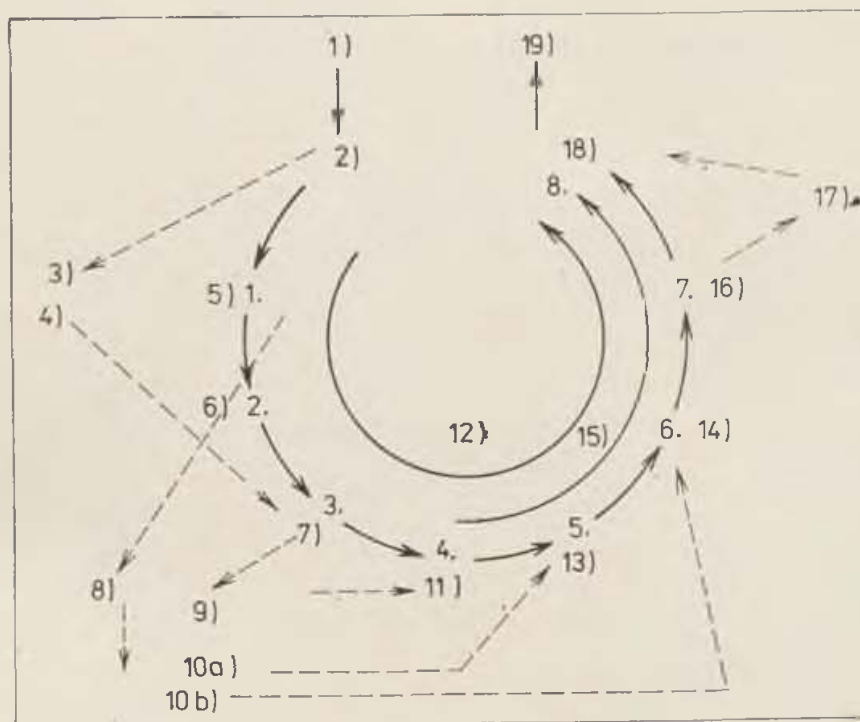


Fig. 4. Process of healing from injury to scar formation including main factors which step into

- | | |
|---|---|
| 1. WOUND | 10b. collagenenase |
| 2. damaged vessels, defect of tissue | 11. mitosis of fibroblasts |
| 3. lower P_{O_2} | 12. epithelization |
| 4. higher P_{CO_2} | 13. synthesis of collagen and glycosaminog |
| 5. inflammation, release of PMN leukocyte | 14. rebuilding of collagen |
| 6. migration of fibroblasts | 15. contraction of wound |
| 7. neovascularization | 16. reduction of vascularization |
| 8. phagocytosis | 17. lower P_{O_2} |
| 9. higher P_{O_2} | 18. rebuilding of fibrous into coriofatty tis |
| 10a. higher concentration of lactates | 19. SCAR |

The secondary healing enables a differentiation between the respective stages of healing. Under physiological conditions in a healthy organism the replacement of damaged tissue takes place in three basic stages which overlap with respect to time (table 1). Parallel to replacement of tissue, epithelization of its surface and a contraction of the wound occurs (Fig. 4).

1. Inflammatory stage of healing (Fig. 5)

This stage begins instantly after injury has occurred (item 1 to 5, Fig. 4). The space of injury gets infiltrated by platelets, polymorphonuclear leukocytes (PMN) within several hours, progressing from injured vessels during their trombose. By aggregation of platelets with damaged collagen and by accumulation of fibrine the first closure of the wound is formed. Simultaneously with

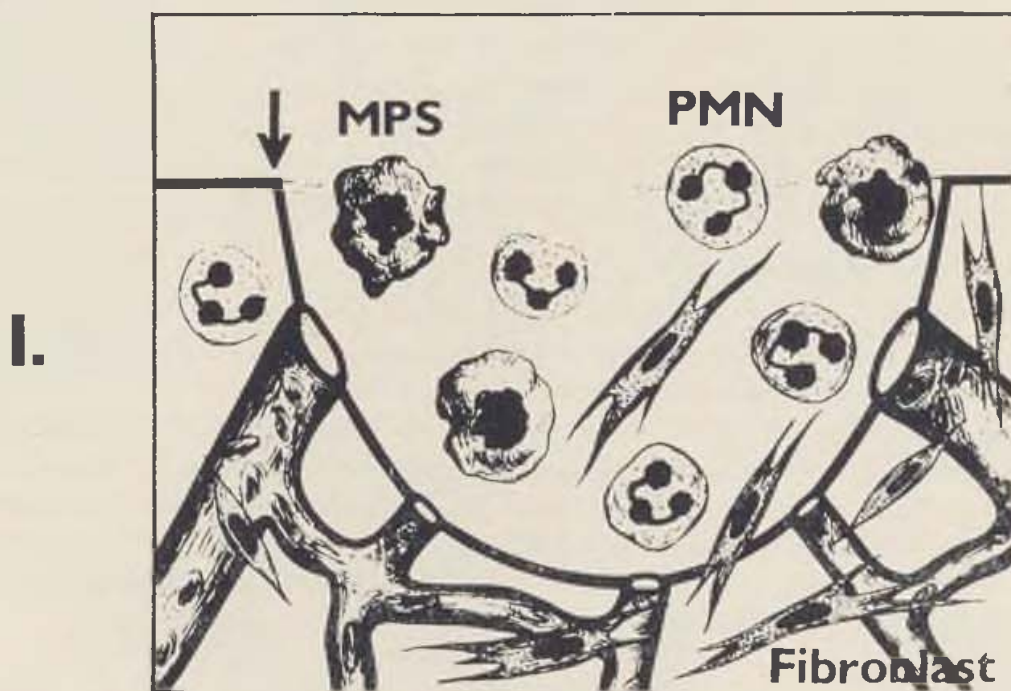


Fig. 5. Proliferative stage of healing: MPS] macrophages, PMN] neutrofilis, F] fibroblasts

PMN cells large mobile cells — macrophages appear (MPS i. e. mononuclear phagocytic system). In various regions macrophages have been given special names (e. g. monocytes, splenocytes, Kupffer cells, dust cells). The term "reticuloendothelial system" is often applied to the entire collection of macrophages and cells with macrophage potentialities. Macrophages do not require a higher oxygen tension (P_{O_2}) in the surroundings, nor are they susceptible to a lesser local changes in pH. Macrophages are the key cells at the inflammatory stage of healing. Producing humoral factors they control the number of cells of their own population as well as of other cell lines like fibroblasts. They may even stimulate the neovascularization of the cicatrice. Furthermore macrophages are actively phagocytic and cann digest macromolecules of damaged tissue to dissociate them enzymatically and exclude the products of digestion. In this way they prepare basic building matter which is necessary for formation of the new tissue. Damaged PMN leukocytes help them by releasing proteolytic, collagenolytic and fibrinolytic enzymes, while the undamaged ones phagocyte useless microparticles. Macrophages secrete during their

lytic activity lactates as final products. A higher local concentration of lactates has a stimulatory effect on the synthetic activity of fibroblasts, which comes into action during the next stage of healing.

The defence mechanism against dead cells and other substances can be influenced by fibronectin. Fibronectin is a large cell-surface and blood glycoprotein which mediates adhesion of cells to the extracellular matrix. It is produced by many types of differentiated cells. Fibronectin plays a role in blood coagulation, in gram-positive bacteria opsonization and in directing differentiation of certain cells. In connective tissue it mediates the growth and migration of cells. The lack of cell-associated fibronectin in transformed cells could play an important role in the malignancy and in other diseases. Thus the increasing information about fibronectin gives a new insight in wound healing, where it could be clinically used in some pathologic tissue repairs.

2. Proliferative stage of healing (Fig. 6)

At this stage neovascularization in the blood and lymphatic vessels system begins and culminates (item 7, Fig. 4). The impulse for cell division in both systems is evidently local hypoxia, which occurs in the damaged tissue. Further positive factors are the rising concentration of histamine, liberated from the damaged mast cells and from basofils and the supply of A vitamin. If the A vitamin supply is low or the liberation of histamine is limited, for example in case of a higher level of catecholamines, the newly formed tissue is poor in vessels. Vascular regeneration is also poor in radiation-damaged tissue, in steroid treated patients and under the influence of some antibiotics. A newly

II.

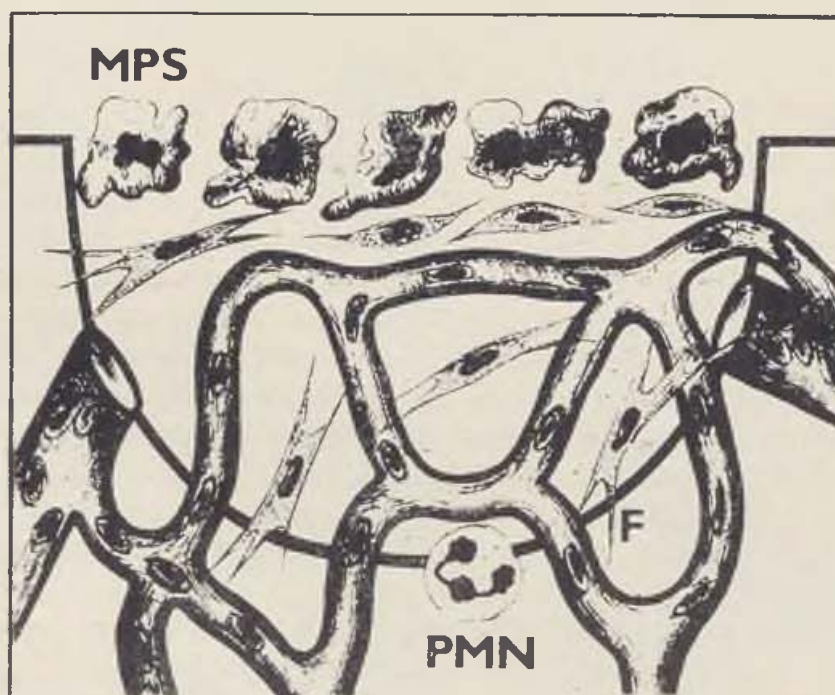


Fig. 6. Stage of tissue reorganization: MPS) macrophages, F) fibroblasts, TB) fat cells

formed capillary system ensures a satisfactory supply of oxygen, necessary for division and synthetic action of fibroblasts (item 11 and 13, Fig. 4).

Most fibroblasts seen in the actively healing wounds appear to arise from perivascular cells. Their migration, division and synthetic function is activated by macrophages. The reason why fibroblasts gradually stop dividing is not exactly known so far. On the basis of experience with cultivation of cells in tissue cultures it appears that regulation of the cell count is given by their overgrowing in a given space, the so called "density dependent regulation". Cultivated tumor cells do not have this regulation. The reason for regulation may be an insufficiency of energy originating in overgrowth, an insufficiency of oxygen or of other important matter for construction of a new cell. Chalon feed back is also being considered. Chalons are glycoproteins specific in point of tissue, unspecific as to species. If they appear free in the tissue, they stop mitosis of cells in a certain phase. It is possible that when overgrowing of the cells occurs, they dissociate themselves in a way hitherto unknown from the linkage, which inactivates them during activation of cell division. It is possible to slow down the speed of cell division artificially by some antibiotics, by cutting down the supply of oxygen and to stop the division by cytoplasmic poisons, which also influence neovascularization of tissue.

A part of the overgrown fibroblasts is being differentiated into myofibroblasts, which play a special role during the healing process. The resulting fibro-, chondro-, osteoblasts (according to the kind of damaged tissue) synthesize collagen and glycosaminoglycans (GAG), by which the intercellular space of the tissue defect is gradually filled. For their synthetic activity the fibroblasts need a mildly acid medium (an increased local concentration of lactates), a reducing medium (supply of ascorbic acid) and a oxygen tension of 10—20 torrs. The synthesis of collagen begins approximately on the second day after injury and reaches its maximum on the fifth to seventh day for the first formed collagen (type III or AB), then simultaneously the synthesis of final collagen in the scar begins to rise. Synthesis of the latter reaches its maximum between the 40th to 50th day after injury depending on the state of organism and the extent of injury. Within this time the tissue temporarily shows a minimum of collagen (round about the third week of the wound's age), caused by the lowering of synthesis in the first collagen and by the so far still insufficient synthesis of the final collagen (type I for skin and bone tissue, type II for joints).

The synthesis of glycosaminoglycans mostly begins simultaneously with the synthesis of collagen. After reaching its maximum (in about the second week of healing), synthesis of GAG decreases to the basic level needed for the renewal of intercellular tissue. The glycosaminoglycans undergo an extensive change in quality. They consist of polymerized disaccharides which contain glycuronic or induronic acid and hexosamine. Hexosamine is gradually sulfated on the fourth or fifth carbon. The increasing extent of GAG sulphation and the decreasing volume of bound water specify the age of cicatrix or of the connective tissue from the ontogenetic viewpoint. The first GAG present

in the wound and in foetus is most often hyaluronic acid, which is not sulphated at all. The latter is gradually replaced by chondroitinsulphate. Glycosaminoglycans undergo a further change in the process of ageing of the connective tissue by gradual increased linkage to proteins. Larger units called proteoglycans are formed. The protein, most often collagen, is connected with glycosaminoglycans by O-glycosidic linkage through aminoacids of serine or threonine. The linkage is also connected with a loss of water. Changes taking place in the metabolism of GAG are already part of the third stage of healing.

3. Tissue reorganization (Fig. 7)

At this period primarily a rebuilding of collagen occurs (item 14, Fig. 4). Collagen, which appears very early during the process of healing forms a dense net-work. It mostly does not comply with the functional postulate for tissue. Collagen which is formed first is usually also different from the final type. The inflammatory collagen corresponds to collagen type III or AB. Its reconstruction by gradually breaking down and by synthesis of the definite type occurs according to principles known from collagen biosynthesis, its breakdown and hormonal control of collagen metabolism.

At the stage of tissue reorganisation the scar is under the influence of natural tractions and pressures. On the basis of the piezoelectric effect electric charges occur in the tissue which may cause an adequate orientation of collagen fibres and their linkage to glycosaminoglycans. A scar influenced by a slight mechanical tractions is therefore firmer and reaches the last stage of healing sooner than a scar protected from mechanical influences. This rule

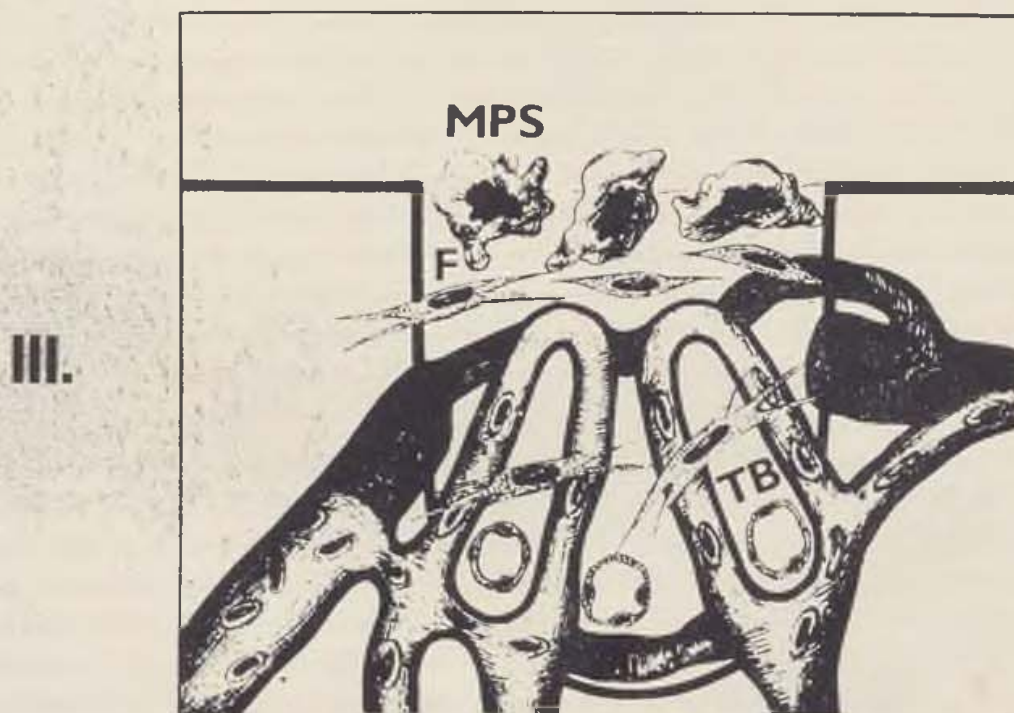


Fig. 7. Stage of tissue reorganization: MPS) macrophages, F) fibroblasts, TB) fatcells

does not apply to pathological scars. Included among these are also skin scars which between the seventh and ninth day do not form the so called healing wall, in bone tissue the callus. Hereby a defect in link between the synthesis of the first formed collagen and the replacement by final collagen is signalized to the physician. It is caused either by a more rapid breaking down of the first collagen or by a slower synthesis of the final one. In skin injury a dehiscence of the scar may occur, the firmness of which drops especially towards the end of the third week of healing. Besides already stated factors necessary for the normal development of the scar this state is enhanced by hypovolaemia, by chemotherapeutics, antibiotics, by starving, by steroid hormones and by infections.

At the last stage also a reduction of vessels in the scar occurs (item 16, Fig. 4). Hereby again the tension of oxygen sinks and its fall is probably a factor contributing to deposits of fats being formed in the rebuilt corium. It is only then that the scar becomes macroscopically and microscopically an integral part of the injured skin.

CONTRACTION OF THE WOUND

(Fig. 4)

The three stages described above are complemented by contraction of the wound which occurs from the second stage of healing. It depends on the presence of myofibroblasts which are differentiated fibroblasts, synthetizing myofibrils instead of collagen. Contraction of the wound is caused by myofibroblasts present on the edges of the wound. They resemble the cells of smooth muscles and contain the protein actomyosine which is contractile. For their activity they need oxygen and energy mostly supplied by phosphate metabolism. The contraction of the wound is inhibited by substaces relaxing smooth muscles and by antiinflammatory steroids.

The scar contraction is timed for the period in which the defect of the tissue is connected by precisely directed final collagen fibres that keep the scar contracted.

EPITHELIZATION OF THE WOUND

(Fig. 4)

Simultaneously with the repair of the lost tissue epithelization of its surface occurs. The epithelium covers the whole external and internal surface of the body and is therefore injured most often. It has its own way of healing. First a division of cells at the edge of the wound occurs, then horizontal migration of cells over the base of the wound, finally a closure of the defect and a ripening of the epithelium by division in vertical direction into already normal structure. The normal structure is formed by one or more layers of epithelial cells according to the character of the tissue. This whole process has varied duration depending on the extent of injury and on character of the tissue.

Epithelization depends on a good oxygen supply, the cells do not divide and do not migrate over dead tissue, although they survive. The drying up of the wound and the scab inhibit epithelization, as does infection. Steroid hormones stop epithelization, A vitamin supports it and again renews it if stopped. Also some antibiotics slow down epithelization.

Epithelization of the skin takes a special course because it not only originates in the edges of the wound, but also in the residue of skin adnex. However, in case the injury is deeper (e. g. in burns of the third degree), epithelization develops only from the edges of the wound and the area gets covered more slowly.

CONCLUSION

The course of healing described above corresponds to contemporary knowledge about metabolism of collagen and the healing of wounds. Within the range of complex papers dealing with this subjective refer to the papers of Gross (1974), Shoshan and Gross (1974), Friedman (1976), Hunt and Van Winkle (1976), Kivirikko (1976, 1981), Horobin et al. (1979), Pospíšilová (1980), Ruoslahti et al. (1981).

The aforementioned facts show that between the wound at the beginning and the formation of the scar at rest many parallel processes occur, the dynamics of which is also dependent on chemical and physical conditions in the area of injury. More complicated even is the influencing of this dynamics by biological factors. It also is necessary to presume the existence and influence of pathological changes. Nowadays however it is already within the means of the surgeon to prevent a pathological process of healing.

SUMMARY

The described course of healing from the moment of injury to the formation of non-problematic scar corresponds to the contemporary knowledge about metabolism of collagen and the healing of wounds.

The aforementioned facts show that in the course of the wound healing many processes occur at the same time and their dynamics is dependent on chemical and physical conditions in the area of injury. Insignificant changes can provoke disorders in the wound healing, especially its prolongation. Nevertheless the dynamics of healing is influenced also by biological and pathological factors. At present it is already within the means of the surgeon to prevent the pathological process of healing. The deeper knowledge of the organism's condition at the moment of injury and observance of the principles of the appropriate wound treatment contribute to it.

RESUME

La guérison des plaies

Pospíšilová, J.

On a décrit le processus de la guérison des plaies, dès le traumatisme jusqu'à la cicatrisation définitive, ce qui correspond aux connaissances contemporaines sur le métabolisme du collagène et de la guérison.

Il en résulte que — parallèlement à la guérison — s'effectue un grand nombre de processus dont la dynamique dépend des facteurs physico-chimiques agissant dans la plaie. Même les changements insignifiants peuvent causer des troubles de la guérison, surtout sa prolongation. La dynamique de la guérison est aussi déterminée par des facteurs biologiques et pathologiques.

A l'heure actuelle, les possibilités du chirurgien permettent de prévenir un processus pathologique de la guérison. Si, au cours du traitement, les soins médicaux se basent sur les connaissances les plus profondes de l'organisme traumatisé et sur les principes modernes, l'état des malades montrera une amélioration remarquable.

ZUSAMMENFASSUNG

Heilung der Wunden

Pospíšilová, J.

Der beschriebene Verlauf der Heilung seit der Verletzung bis zur Entstehung der Ruhenarbe entspricht den gegenwärtigen Kenntnissen des Kollagenstoffwechsels und der Heilung.

Aus dem angeführten ist zu ersehen, dass während der Heilung gleichzeitig mehrere Prozesse vor sich gehen, deren Dynamik von einer Reihe chemischer und physikalischer Faktoren am Ort der Verletzung abhängig ist. Geringfügige Veränderungen können eine Störung der Heilung hervorrufen, vor allem ihre Verlängerung. Die Dynamik der Heilung beeinflussen jedoch auch biologische und pathologische Faktoren. Gegenwärtig ist es schon in den Möglichkeiten des Chirurgen, dem pathologischen Verlauf der Heilung vorzubeugen. Dazu tragen die tiefere Kenntnis des Standes des Organismus bei der Verletzung und die Einhaltung der Grundsätze der richtigen Behandlung der Wunde bei.

RESUMEN

Cicatrización de las heridas

Pospíšilová, J.

El proceso de cicatrización tal como se describe, desde que se produce la herida hasta la formación de la cicatriz, corresponde a lo actualmente conocido sobre el metabolismo del colágeno y la cicatrización.

De lo expuesto resulta que en el tiempo de la cicatrización transcurren simultáneamente muchos procesos cuyo dinamismo está en dependencia de una serie de factores químicos y físicos en el lugar de la herida. Hasta alteraciones más ínfimas, si se producen, pueden causar desajustes en la cicatrización, en particular su prolongación. Sin embargo, el dinamismo de la cicatrización se ve influido igualmente por factores biológicos y patológicos. Actualmente, el cirujano dispone de medios para prevenir los desarrollos patológicos de la cicatrización. A ello contribuye, así mismo el que se tenga un buen conocimiento del estado de organismo en el momento de producirse la herida y la observación rigurosa de los principios de la curación de la herida.

REFERENCES

1. Gross, J.: Animal Collagenases: Specificity of Action and Structures of the Substrate Cleavage Site. Bioch. Bioph. Res. Comm., 61 : 605, 1974.
2. Shoshan, S., Gross, J.: Biosynthesis and Metabolism of Collagen and Its Role in Tissue Repair Processes. Jsr. J. Med. Sci., 10 : 537, 1974.

3. **Friedman, D. L.:** Role of Cyclic Nucleolides in Cell Growth and Differentiation. *Physiol. Rev.*, 56 : 652, 1976.
4. **Hunt, K. T., Van Winkle, W.:** Wound Healing: Normal Repair. In *Fundamentals of Wound Management in Surgery*, Chirurgecom, Inc. South Plainfield, 1976.
5. **Kivirikko, K., Risteli, L.:** Biosynthesis of Collagen and Its Alterations in Pathological States. *Medical Biology*, 54 : 159, 1976.
6. **Horrobin, D. F. et al.:** The Nutritional Regulation of T Lymphocyte Function. *Medical hypotheses*, 5 : 969, 1979.
7. **Kivirikko, K., Savolainen, E. R.:** Genetic Disorders of Collagen. *Medical Biology*, 59 : 1, 1981.
8. **Pospíšilová, J.:** Physiology and Pathophysiology of Connective Tissue. *Acta Chir. plast.*, 22 : 1, 1980.
9. **Ruoslahti, E., Engvall, E., Hayman, E. G.:** Fibronectin: Current Concepts of its Structure and Function. *Coll. Res.*, 1 : 95, 1981.

Dr. J. Pospíšilová, J. E. Purkyně Medical Faculty,
Berkova 34/38, 612 00 Brno, Czechoslovakia

**Fourth International Symposium on Plastic
and Reconstructive Surgery of the Head and Neck
To Be Held May 29—June 3, 1983, in Los Angeles, CA**

Leading specialists in head and neck plastic surgery from around the world will share their knowledge and techniques at the Fourth International Symposium on Plastic and Reconstructive Surgery of the Head and Neck, to be held in Los Angeles, May 29—June 3, 1983.

The Symposium, sponsored by the American Academy of Facial Plastic and Reconstructive Surgery, will bring together the expertise of all disciplines who perform such surgery — including otolaryngologist-head and neck surgeons, ophthalmic plastic surgeons, plastic surgeons and dermatologic surgeons.

Focusing on all aspects of plastic surgery of the head and neck, the scientific program will include a well-balanced curriculum of lectures and courses. Also featured will be exhibits, panel discussions, question and answer periods, demonstrations, and problem clinics.

In addition, the Academy's Post Graduate Audiovisual "Learning Center" will operate continuously, giving attendees the opportunity to see and hear selections from a comprehensive library of video-tapes, films and micro-fiches.

Those attending the Symposium will qualify for continuing education credits of the American Medical Association.

According to Walter E. Berman, M. D., Beverly Hills, CA, General Chairman, the Symposium will also include programs of special interest to wives of the physicians and to nurses attending the meeting, as well as unique programs designed to inform the general public.

For additional information write:

Walter E. Berman, M. D.
Fourth International Symposium
9735 Wilshire Blvd.
Beverly Hills, CA 90212

Péterfy S. Hospital, Budapest [Hungary]
Department of Plastic Surgery

MICROVASCULAR FREE FLAP TRANSPLANTATION

G. Gulyás, I. Kartik, L. Takács, F. Máté

Many new methods have been introduced in plastic surgery recently. The microvascular free flap transplantation has a great importance among them [4, 6].

The definition "free flap" was first used by O'Brien in 1973 at the British Hand Society Meeting at Harrogate, England. The first successful microvascular flap was performed in September 1972 [Harii, Ohmori and Ohmori, 1974] using a free scalp flap based on the superficial temporal vessels and measuring 15 cm long by 3 cm wide. The new method has spread rapidly because we are able to avoid the distant transfer flap [1, 2, 10, 11, 14]. We prefer local flaps for the reconstruction of soft tissue defects. If it is impossible because of the condition of surrounding tissues we should apply distant transfer or free flap transplantation.

The use of microvascular free flaps eliminates the protracted and unpleasant fixation of the limbs. These flaps with their whole thickness of subcutaneous fat do not only protect the deep structures but reduce the direct effect of pressure on the skin as well. The flap can be used for reconstruction of skin sensibility when anastomoses are performed between sensory nerves of the flap and the nerves of the recipient area. Microvascular free flaps ensure a better blood supply in the recipient area and improve the healing of surrounding structures [5, 7, 14]. The new technique of reconstruction requires not only adequate practice in plastic and microsurgery but continuous training under microscope as well.

The anatomical regions of the body which are supplied by direct cutaneous arteries are potentially donor areas of free flaps. The vascular pattern can be explored with exact methods (angiography or Doppler flow meter) and can be drawn over the skin surface. Once we know the local blood supply system of the body we are able to prepare pedicled axial pattern flaps, island flaps — the pedicle contains the vessels only- or free flaps. The next table shows the frequently used donor areas and arteries.

Magnifying glasses have been applied since 1964 and microscope since 1974 for reconstruction of peripheral nerves and vessels in our department. After

Donor areas	Direct cutaneous arteries
Groin (iliofemoral)	Superficial circumflex iliac artery
Deltopectoral	Superficial epigastric artery
	Anterior perforators of internal mammary artery
Dorsalis pedis	Dorsalis pedis artery
Axilla	Lateral thoracic artery
Forehead	Superficial temporal artery
Medial side of the knee	Distal saphenous artery

practicing the technique of microvascular anastomoses in experiments on rats we performed the first clinical free flap transplantation in 1978. We had performed 5 free flap transplantations till September 1981. The first 3 cases were unsuccessful. They were old patients and we chose free flap transplantation instead of distant transfer. They would not have been able to tolerate fixation of limbs. The failure was caused by the thrombosis of venous anastomoses in

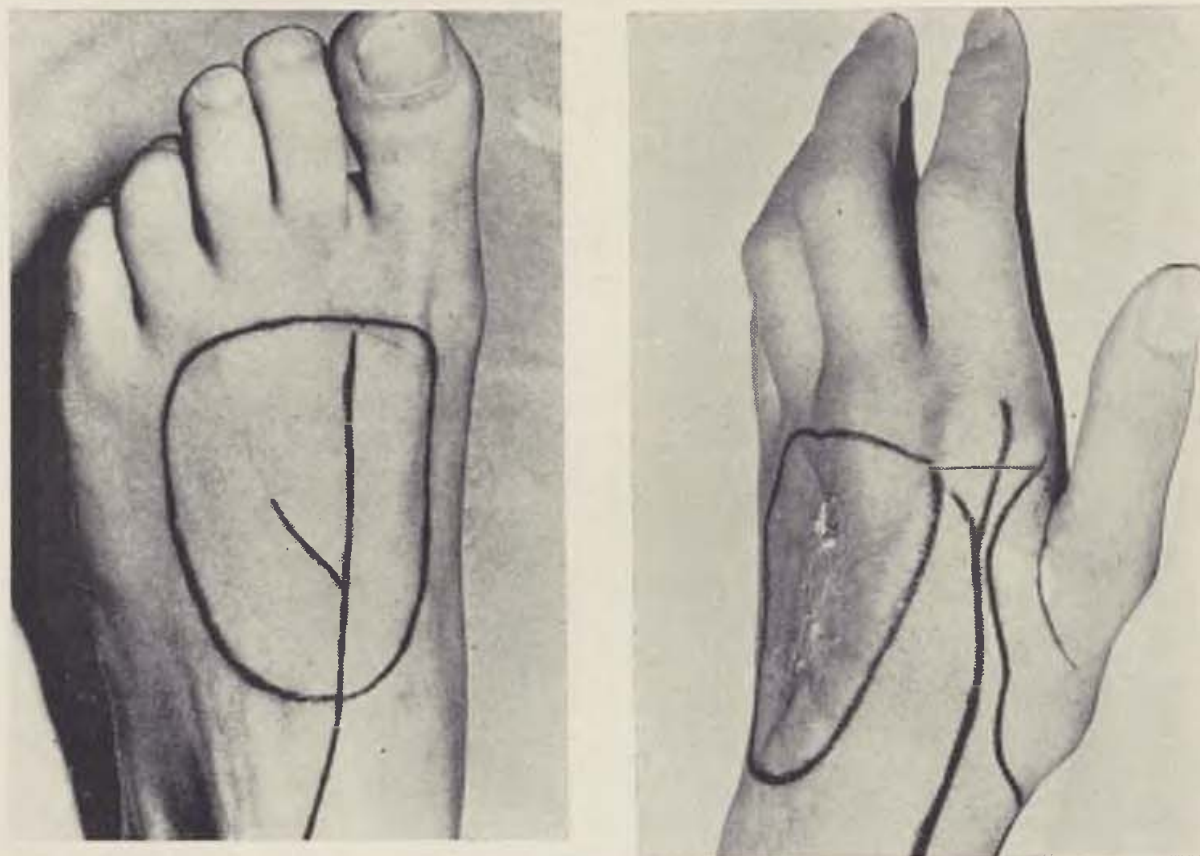


Fig. 1—2. On the dorsal surface of the left hand the atrophic skin adhered to the bone. The drawing of radial artery and caephalic vein can be seen. The designed dorsalis pedis flap

each case. A reoperation was performed in only one case. After resection of a completely closed anastomosis a vein graft was applied and reanastomosed. The flap was lost 72 hours later because of another thrombosis. The recipient area was covered by split skin graft. The wound disappeared but we were unable to reach the desired result (9). I should like to present two patients that we have operated on successfully.

In 1980 a 34 year old woman wounded her left hand with a knife which penetrated between the third and fourth metacarpal bone. Subsequently serious inflammation developed. Exploration and debridement had been performed several times. Skin necrosis developed on the dorsal surface of the hand and contracture in the middle and ring finger MP joint. She was admitted in 1981 with an ulcer of the dorsal side of her hand, which was 1 x 1 cm in size



Fig. 3—4. The dorsalis pedis flap has just been prepared. The flap is in place, the vessels are clamped with micro clamps

and 4 x 6 cm atrophic skin in the surrounding area. The MP joint of the middle and ring finger was fixed in a straight position. On April 13th we performed free flap transplantation from the dorsalis pedis area. The first team prepared a 5 x 7 cm dorsalis pedis free flap. The second team removed the ulcer of left hand and capsulotomy was performed on the middle and ring finger. After that we explored the branches of radial artery and cephalic vein. At the recipient site the arteries (dorsalis pedis artery and radial artery) were repaired end-to-end by Cobbett technique first. The diameter of the arteries was 1,5 mm. Then we anastomosed the two venae comitantes of dorsalis pedis artery and two branches of cephalic vein. The wound healing was uneventful. The transplanted skin graft healed at the donor area. Physiotherapy was started on the 7th day after operation.

61 year old man who was operated on in 1976, a tumor (basal cell carcinoma) was removed from the left nasolabial sulcus. At that time he got X-ray therapy. He was admitted at our department first in 1981 with a tumor in the irradiated area. The tumor was 6 x 2,5 cm large and half cm deep at the left nasolabial sulcus and spread over the cheek, ala of the nose and the upper lip too. On September 3rd we removed the tumor (basal cell carcinoma) and covered the defect with free flap transplantation. The first team prepared a 8,5 x 4,5 cm iliofemoral flap. The second team removed the tumor. After



Fig. 5—6. The donor and recipient area two months postoperatively

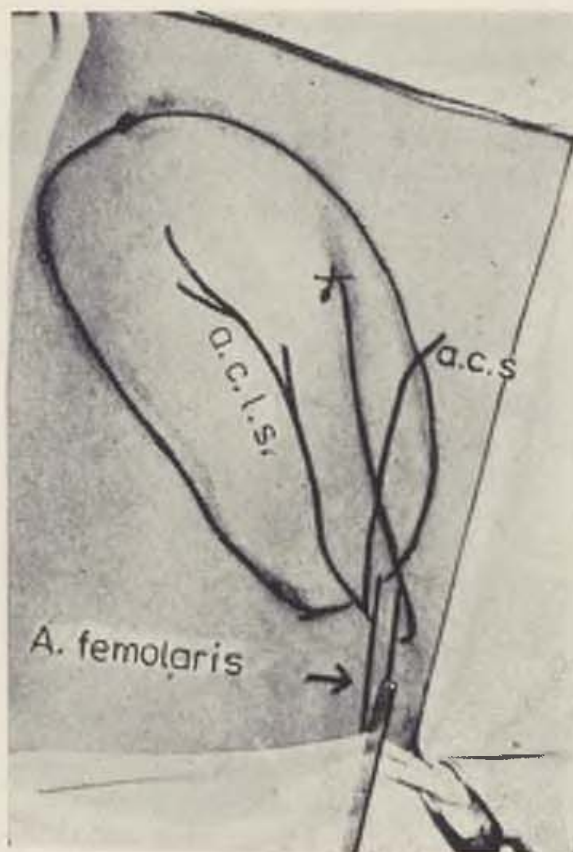


Fig. 7—8—9. Tumor on the left face. The designed donor flap. X- means anterior superior iliac spine. The flap is ready to transfer

transferring the flap to the face, we performed the anastomoses between the arteries (superficial circumflex iliac artery and facial artery) between the veins (superficial axial vein and facial vein). The donor area was sutured. Two weeks later he left the hospital. During the 3 months follow up the flap was well vascularised and the patient has not developed any more tumor.

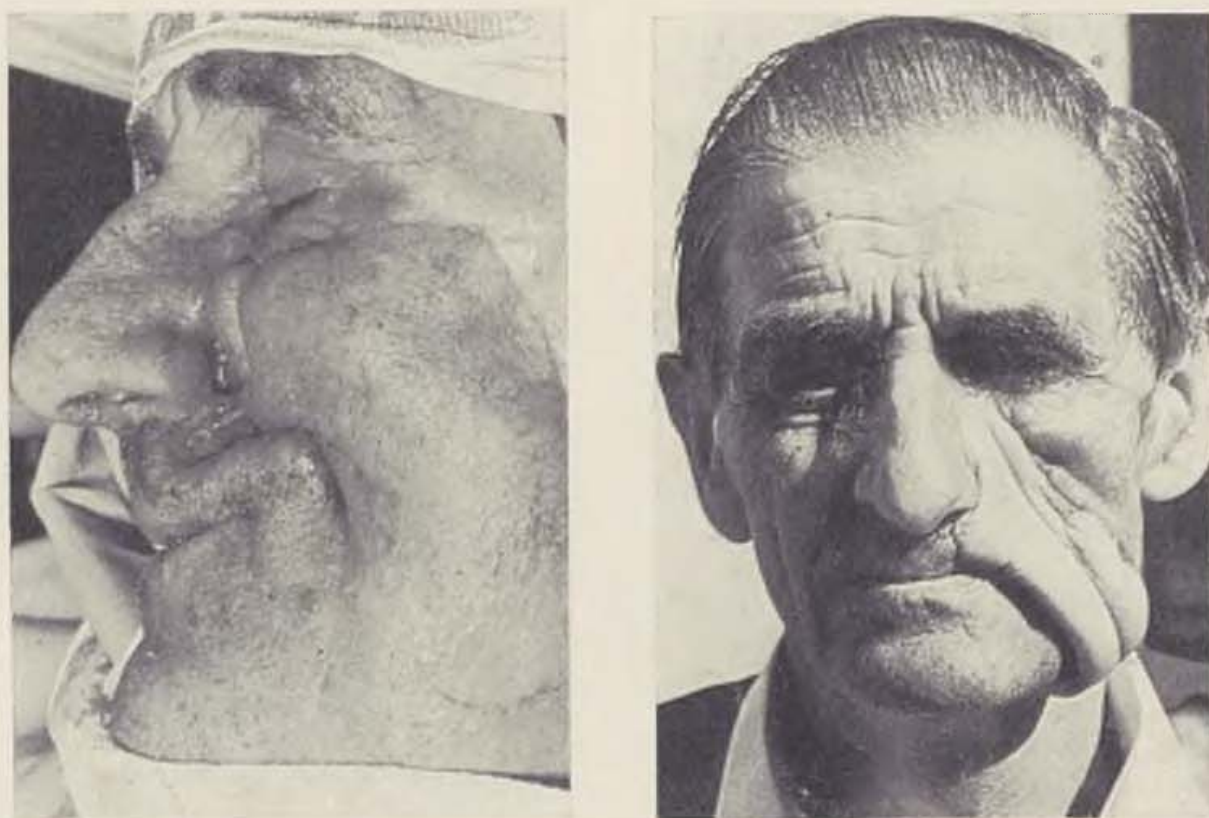


Fig. 10—11. The flap after the operation and one month later

During the operation we did not use cooling or perfusion. The vessel ends were washed out with heparinized saline (1000 IU / 100 ml) before end-to-end anastomosis. The recirculation started about 15 minutes after finishing the arterial anastomosis. The period of operation changed between 4 and a half to 6 hours. Postoperatively we did not use Heparin but in each case we applied antibiotics and aspirin 1 mg daily. The skin colour, skin temperature, capillary pulse and Doppler machines were direct methods for checking the circulation of flap (8, 13, 15).

SUMMARY

Reconstruction of skin and subcutaneous tissue loss — if the surrounding skin is unfitted for covering the defect — the best functional and aesthetic result can be obtained with free flap transplantation. Microvascular free flap transplantation improves the circulation of recipient area, eliminates the un-

pleasant fixation of limbs, decreases the hospitalisation and safely covers the deep structures with one operation. Two microvascular free flaps are presented.

RESUME

Greffes libres microvasculaires (en forme du lobe)

Gulyás, G., Kartik, I., Takács, L., Máté, F.

En réalisant une reconstruction de la peau et du tissu souscutané absents, si le voisinage de la région à combler n'autorise pas la taille de lambeaux adjacents suffisants, on peut obtenir les meilleurs résultats fonctionnels et esthétiques par la transplantation d'une greffe libre en forme du lobe. Utilisation d'une greffe libre microvasculaire améliore la circulation sanguine dans la région receveuse, élimine une fixation indésirable des membres, abrège l'hospitalisation et bien couvre même de profonds défauts et tout cela n'exige qu'une seule intervention.

On a décrit deux réalisations de la technique citée.

ZUSAMMENFASSUNG

Transplantation mikrovaskulärer freier Lappen

Gulyás, G., Kartik, I., Takács, L., Máté, F.

Bei der Wiederherstellung der fehlenden Haut und des Unterhautgewebes, wenn die umliegende Haut nicht imstande ist, den Defekt zu decken, können funktionell und ästhetisch beste Ergebnisse am Wege der Transplantation eines freien Lappens erzielt werden. Die Transplantation des mikrovaskulären freien Lappens verbessert den Blutkreislauf im Aufnahmeareal, eliminiert die unerwünschte Fixation der Extremitäten, verkürzt den Aufenthalt im Krankenhaus und deckt mit sicherem Ergebnis auch tiefe Strukturen in einem Eingriff. — Es wurden zwei mikrovaskuläre freie Lappen beschrieben.

RESUMEN

Transplantación de lóbulos microvasculares libres

Gulyás, G., Kartik, I., Takács, L., Máté, F.

Los mejores resultados, tanto desde el punto de vista funcional como estético, en la reconstrucción de la piel y el tejido subcutáneo faltantes, siempre que la piel de junto al defecto no sea capaz de cubrir este último, se conseguirán mediante la transplantación de un lóbulo libre. Este procedimiento tiene efectos benéficos mejorando la circulación en la zona receptora, evitando la necesidad de fijar las extremidades, reduciendo el tiempo de hospitalización y finalmente pudiendo cubrir sin problema aun estructuras profundas con una sola operación. — Se describen dos lóbulos microvasculares.

REFERENCES

1. Acland, R. D.: The Free Iliac Flap a Lateral Modification of Free Groin Flap. *Plast. reconstr. Surg.*, 64 : 30, 1979.
2. Baudet, J., Lemaire, J. M., Guimberteau, J. C.: Ten Free Groin Flaps. *Plast reconstr. Surg.*, 57 : 577, 1976.

3. **Bostwick, J. III., Nahai, F., Wallace, J., Vasconez, L.:** Sixty latissimus dorsi Flaps. *Plast. reconstr. Surg.*, 63 : 31, 1979.
4. **Buncke, H. J.:** The Development of Microsurgery. Daniller, A. I., Strauch, B. Symposium on microsurgery. The C. V. Mosby Co. 1976.
5. **Byrd, S. H., Cierny, G., Tebbets, J. B.:** The Management of Open Tibial Fractures with Associated Soft Tissue Loss: External Pin Fixation with Early Flap Coverage. *Plast. reconstr. Surg.*, 68 : 73, 1981.
6. **Cobbett, J. R.:** Microvascular Surgery. *Surg. Clin. North. Am.* 47 : 521, 1976.
7. **Farkas, J.:** A kézsérülések ellátásában alkalmazható műteti módszerek. Kandidátusi értekezés. Budapest. 1980.
8. **Goodstein, W. A., Buncke, H. J. Jr.:** Patterns of Vascular Anastomoses in Success of Free Groin Flap Transfers. *Plast. reconstr. Surg.*, 64 : 37, 1979.
9. **Gulyás, G.:** Nyeles lebeny szabad átültetése. Kézsebészeti kerekasztal konferencia., Szeged. 1980.
10. **Harashina, T., Fujino, T., Aoyagi, F.:** Reconstruction of the Oral Cavity with a Free Lap. *Plast. reconstr. Surg.*, 58 : 412, 1976.
11. **Morello, D. C., Shaw, W., Baker, D. C., Converse, J. M., Ohmori, K.:** Microvascular Free Groin Flaps. *New York State J. Med.*, 77 : 921, 1977.
12. **Nahai, F., Hill, L. Hester, R.:** Experiences with the Tensor Fascia Lata Flap. *Plast. reconstr. Surg.*, 63 : 788, 1979.
13. **Renner, A., Manninger, J., Sántha, A.:** A mikroszkopos sebészet lehetőségei a traumatológiában. *Orv. Hetil.*, 122 : 40, 2455, 1981.
14. **Serafin, D., Buncke, H. J. Jr.:** Microsurgical Composite Tissue Transplantation. The C. V. Mosby Co. St. Louis 1979.
15. **Simonka, J. A., Endrodi, J., Kiss, Gy., Doczi, T., Frater, L.:** Hüvelykujj pótlás Lábuujj szabad átültetésével. *Orv. Hetil.*, 122 : 40, 2455, 1981.

More literature available at the authors.

G. Gulyás, M. D., Gellérthegey u. 23, Budapest, Hungary 1016

N. I. Pirogov Institute of Traumatology, Sofia (Bulgaria)
Director Major-General As. Prof. Dr. M. Vanev, CSc.
Department of Thermal Injuries
Head As. Prof. Dr. Y. Chervenkov, DrSc.

REPLANTATION OF ABRUPTED SKIN

Y. Chervenkov, R. Diakov

The method of abrupted skin treatment as published by Krasitov in 1937 permitted the successful management of traumatic defects caused by violent detachment of skin. In spite of that the technique of adipose tissue excision with scissors is a time and labour consuming process, the full-thickness graft is difficult to supply on the damaged area. It was not until Scheinis introduced the dermatomic technique that the cutting of split-skin grafts was made possible, i. e. transplants offering far better conditions for blood supply.

A total of 300 patients with traumatic skin defects were operated on at the N. I. Pirogov Institute Department of Thermal Injuries, there-of 60 patients with traumatic detachment of skin of different area and localization. 49 of the cases were industrial injuries, 8 were the results of traffic accidents. Characteristically, patients with skin abruption had practically all suffered trauma of the extremities and the scalp except one, whose trauma was localized in the scrotal region. In 23 patients the area of detached skin was greater than 500 cm².

Until 1969, we had treated detached skin and subcutis to obtain dermo-epidermal split-skin grafts by using specially designed skin fixateurs to make that part of the cylinder surface which fitted the dermatome in operation. The skin was cemented to the dermatome in a fashion similar to that in cutting autografts.

In 1972, B. Shindarski introduced his modification of Scheinis's method for the treatment of detached skin and subcutaneous tissue in skin and scalp abruption. Since 1979, this technique of cutting has been made easier thanks to an instrument designed by Chervenkov et al. — a hand-operated dermatome fixed to a support. This makes for a faster, more comfortable and higher-quality treatment of the skin; at the same time, another surgeon, working on another table, can prepare the wound surface for the implantation of the prepared skin. In this way, the traumatic and contaminated pieces of separated skin are much easier to debride; moreover, the operation takes much less time to perform, which is important in cases of severe mechanical trauma. For the same purpose and, in particular, for the treatment of skin in lymphoedema, L. Bařinka of

Brno, Czechoslovakia, designed a special instrument which, in our opinion, however, is too big to handle, and too difficult to control and sterilize; all its parts are piece-made instead of coming from series production. The device of our own design can treat skin without breaking its integrity. Another of its

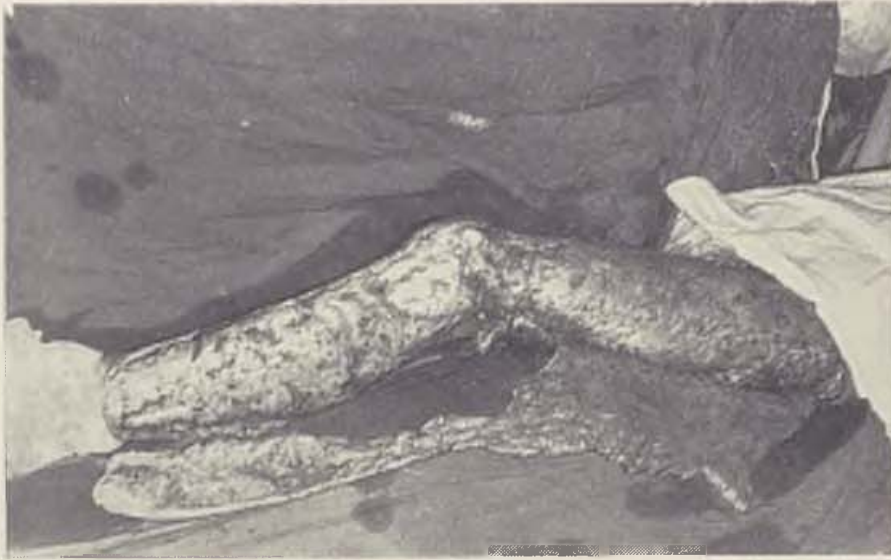


Fig. 1. Extensive skin abrasion in left lower extremity

advantages is that it can be fitted to any of the hand-operated, "Krasnogvard-eyets"-type dermatomes which our health service institutes are equipped with (Fig. 3). In addition to that, the device is ready-to-use and, following drum sterilization, easy to transport to any therapeutical institution in the country



Fig. 2. Detached skin is separated from extremity and prepared for dermatomic treatment



Fig. 3. Dermatic treatment of detached skin using a hand-operated dermatome fixed to the wall. Epidermal side of skin in opposition to the dermatome drum with no cement used



Fig. 4. Dermatome-cut skin is replanted as free skin autograft



Fig. 5. Replanted skin has taken very well



Fig. 6. Extremity function fully restored

in cases of urgent consultation or operation on patients unfit for immediate transport wherever they may be, including the remotest districts. At present, the N. I. Pirogov Institute of Traumatology uses the modified Scheinis technique, and detached skin replantation is performed immediately on the patients' admission (with the aid of a specially designed device). The device is also used for the treatment of skin preserved from amputated limbs or their parts to cover skin defects of other localization or on the amputation stump.

The technique of using the device which has already been introduced into our practical work is shown in patient I.P.G., case record 19760 of Oct. 12, 1979. The patient was admitted in our institute half an hour after a street accident, in which a bus wheel caused him skin abruption on the thigh and leg (Fig. 1). Since the blood supply was completely disrupted in the part of detached skin, the skin was separated from the extremity and treated for free grafting (Fig. 3). Immediate replantation followed (Fig. 4). The skin healed in all over the area except in a few places where it had been too traumatized to hold, and where free autografts had to be transplanted (Fig. 5). The patient subsequently recovered completely without any functional impairment of the extremity (Fig. 6).

J. H.

SUMMARY

A total of 300 patients with traumatic skin defects of different size and localization were operated on at the N. I. Pirogov Institute Department of Thermal Injuries in the course of five years. Skin and subcutaneous tissue detached in injuries involving skin and scalp abruption were treated according to the Scheinis method. Since 1979, this technique has been made easier thanks to a dermatome designed by Chervenkov et al. with another surgeon working at another table to prepare the wound surface for the implantation of the prepared skin.

RESUME

Replantation de la peau enlevée

Chervenkov, Y., Diakov, R.

Pendant 5 ans, à la clinique du traitement des traumatismes thermiques de l'Institut N. I. Pirogov, on a opéré en somme 300 malades avec défauts traumatiques de la peau, différents par leur étendue et leur localisation.

La préparation de la peau et des tissus sous-jacents scalpés a été réalisée à la méthode de Scheinise. Depuis 1979, cette technique est facilitée grâce à l'appareil construit par Červenkov et comp. A l'autre table, le second opérateur peut préparer simultanément la plaie à recevoir le transplantat.

ZUSAMMENFASSUNG

Replantation der abgerissenen Haut

Tscherwenkow, V., Diakov, K.

Im Verlauf von fünf Jahren wurden an der Klinik für die Behandlung des thermischen Traumas des Institutes N. I. Pirogow insgesamt 300 Kranke mit traumatischen

Hautdefekten verschiedener Fläche und unterschiedlicher Lokalisation des Traumas operiert.

Die Verarbeitung der abgerissenen Haut und des Unterhautzellgewebes bei der Hautabreissung und Skalpierung wurde nach der Methode von Scheinis durchgeführt. Seit dem Jahre 1979 ist die technische Durchführung dieser Verarbeitung durch ein Gerät erleichtert, das von Tscherwenkow u. Mitarb konstruiert wurde. Gleichzeitig arbeitet ein zweiter Operateur an einem anderen Tisch, wo er die Oberfläche der Wunde für die Aufnahme der verarbeiteten Haut vorbereitet.

RESUMEN

Replantación de la piel desgarrada

Chervenkov, Y., Diakov, R.

Durante cinco años, en la clínica para tratamiento de traumas térmicos del Instituto N. I. Pirogov, fueron operados en total 300 enfermos con defectos traumáticos de piel, con diferente superficie y localización del trauma.

Al ser tratada la piel y el tejido subcutáneo en la abrupción se procedió por el método de Scheinis. Desde 1979, técnicamente este procedimiento está facilitado gracias a un dispositivo, construido por Chervenkov y el col., simultáneamente trabaja un segundo operador quien ajusta la herida para recibir la piel preparada.

REFERENCES

1. **Shindarski, B.:** Replantation of Skin in Large Skin and Scalp Abruption Defects. Scientific Military Medical Conference, May 15—17 (in Bulgarian), 1972.

2. **Barinka, L.:** The Technique of Ex-

cisional Operation for Lymphoedema of the Lower Extremity Using a New Instrument. — Lymphoedema, Supplement to "Lymphology", Georg Thieme Publishers, Stuttgart, 1977.

Dr. Y. Chervenkov,
N. I. Pirogov Institute of Traumatology,
Sofia, Bulgaria

NEW BOOKS

A new book "**Aesthetic Plastic Surgery of Head and Body**" by Ivo Pitanguy was published by Springer Verlag Berlin—Heidelberg—New York 1981.

There are 412 pages and a wealth of illustrations totalling 1494 photographs and sketches. The author is a well known and popular personality of plastic and, in particular, aesthetic surgery. Professor Ivo Pitanguy is member of the Brazilian Academy of Sciences, and professor of plastic surgery at the University of Rio de Janeiro and several other specialized working units.

The book sums the author's 20 years of work and experience in the field, and provides an objective account of the development of aesthetic surgery techniques over the past two decades, although the basic principles have remained unchanged. In the literary review section the author draws upon a large number of his own previous studies quite apart from other specialists' reports.

The book is intended for plastic surgeons, particularly those of the younger

Continued see page 248

J. E. Purkyně University Medical Faculty, Brno (Czechoslovakia)

Department of Plastic Surgery

Head Prof. MUDr. V. Kubáček, DrSc.

HAEMANGIOMAS

Notes on their classification

V. Riebelová

As the suffix in the word haemangioma suggests, vascular lesions thus classified display the characteristics of tumours. However, the term is routinely used to designate vascular affections of different types and aetiology. This obviously gives rise to confusion in diagnosis and in therapeutical indications. Proceeding from systematic, long-term follow-up of patients with vascular lesions treated at our Department we were able to develop a clinical classification system which, we believe, might in practical work mitigate some of the diagnostic embarrassment as well as facilitate the choice of therapeutical options.

Vascular affections conventionally referred to as haemangiomas fall into two groups:

- A. congenital malformations of the vascular system, and
- B. haemangiomas — vascular tumours.

The latter are further classified as

1. temporary tumour growth haemangiomas, and
2. true haemangiomas which may be benign, progressive or malignant.

A. Congenital malformations of the vascular system

(Synonyms: congenital vascular defects, vascular system dysplasia, angiodysplasia.)

The vascular system is made up of vessels arranged hierarchically in accordance with their respective lumina from the largest to the thinnest arteries via the capillary region of arterial as well as venous type to the veins ranging from the smallest to the largest lumina with perfect functional balance between the arterial and venous zones. Only this kind of micro- and macroscopic morphological groundwork can be a guarantee for haemodynamic equilibrium complete with the required scope of tolerance for load. Malformation during embryonic life will cause changes in the micro- and macrostructures of the vascular system resulting in blood circulation disorders in the given

area or even in its vicinity, disorders, the severity of which is directly proportional to that of the defect. Given certain conditions, considerable large portions of the vascular system may thus be turned into a maze of variously large, irregularly shaped vascular spaces with imperfectly formed walls, with pathological junctions between the arterial and venous zones (A-V shunts), and with partially or totally disrupted circulation. Lymphatics may sometimes be malformed as well so that the term lymphangioma is equally inadequate as lesions of this kind, too, should be referred to as congenital malformations.

The histology of the congenital malformations of the vascular system presents a varied picture though, essentially, it provides little more than a description of the microscopic structure of the selected part of the vascular lesion. Where capillaries are affected, the histologist will refer to a "capillary haemangioma", in case there are larger vascular spaces he will classify the lesion as "cavernous haemangioma". Should he find changes in the larger vessels he will speak of arterial, venous, racemose "angiomas", arteriophlebectasy, etc.

The vascular network may be affected by congenital malformation anywhere in the following ways:

- as a solitary or multiple lesion,
- to a small or large extent,
- in one or several tiers of lumina,
- in different mutual combinations,
- with concomitant congenital defects of some other type, e. g. clefts, etc.

This extremely wide scope accounts for an unusually rich and variegated range of clinical pictures. True, these can be arranged in related groups but there are no clearly defined dividing lines between them while variability is high. Some types can be proved to be hereditary, though most cannot.

The most important of these include:

Telangiectatic defects (TA) of corium vascular systems. Present-day terminology refers to them as:

medial (MTA) and

lateral (LTA) telangiectatic naevi characterized by defects in capillary and venular walls. Either can occur independently.

Lateral telangiectatic defects (LTA) are often seen combined with other malformations in other parts of the vascular system and constituting characteristic clinical entities which were in the past described as a number of syndromes and diseases. These are:

Sturge-Weber syndrome (LTA, malformations of the vascular systems of the pia mater, uvea and choroid),

spinal cord angiomatosis (LTA, congenital malformation of the vascular network of the spinal cord, its envelopes or even vertebrae),

Klippel-Trénaunay-Parkes-Weber syndrome (LTA, malformations of the deep venous system beneath LTA, soft tissue and skeletal hypertrophy, and, non-constantly, A-V shunts),

Hippel-Lindau syndrome (vascular malformations of the retina, cerebellum and, non-constantly, LTA),

naevus angiokeratoticus — sclerosing haemangioma (LTA with capillaries reaching the epidermis, hyperkeratosis of the skin, nonconstantly — deep vascular malformations beneath TA),

Rendu-Osler disease (multiple TA of the skin and mucous membranes in hereditary vascular dysplasia in the subpapillary layer of the corium).

The group includes also congenital types of angioma stellatum and some of the rarer types of telangiectasia (cutis marmorata teleangiectatic congenita, cerebello-oculo-cutaneous telangiectasia, and so on).

The remaining group then includes all congenital malformations of the vascular system free from telangiectasia of the corium, e. g. what are known as systemic "haemangiomas" affecting the venous layer of the subcutis, or solitary vascular lesions in the subcutis and deeper seated organs, arterial and venous racemose "haemangiomas", genuine arteriophlebectasia, etc. A new addition to this group is the recently reported congenital malformation of Hunter's canals, i. e. physiological arterio-venous communications, a defect of the lower extremity venous circulation taking the form of early varicose complex and chronic crural ulcers, and provable by arteriography.

There is no distinct dividing line between congenital malformations of the vascular system and tumours. The most important transitional types include Corham's osteolytic syndrome and haemangiomatosis. However, owing to their rare incidence it has been difficult so far to decide whether either of them is in fact a congenital malformation or a tumour.

In spite of their considerable variability, congenital malformations of the vascular system share some common features:

- a) they are developed already at birth,
- b) they never disappear spontaneously,
- c) there is no way of proving their neoplastic growth,

d) later on in the affected individual's life, signs appear of circulatory decompensation in the malformed area and, sometimes, also distal to it — slight enlargement, swelling, thrombosis, calcifications, inflammation, chronic ulceration, irritation and oppression of functional structures (nervous paraesthesia or even paresis, headache, epileptic paroxysms, paraplegia, etc. depending on the localization of the vascular lesion,

e) as the originally eufunctional arterio-venous exchange zones are decompensated the affected site grows rapidly in size, thus simulating a neoplastic process. Acute ulcerations may develop on the surface of the lesion in association with repeated, severe, or even life endangering bleeding.

B. Vascular tumours — haemangiomas

1. Temporary growth vascular tumours

1. The most important and abundant lesions of this group are haemangiomas characterized by rapid initial growth and subsequent spontaneous in-

volution, tumour described by Vrabec as true haemangiomas. These are characterized as follows:

a) They appear soon after birth; less often they are found already fully developed at birth.

b) Their rapid growth begins in the first weeks of life and ends, as a rule, around the 6th month of life. The tumour arises from embryonic-type endothelial cells and is often classified by histologists as a malignant growth.

c) The growth attacks the capillary systems of the corium, mucous membranes and subcutis, exceptionally also those of the underlying tissues.

d) The tumours give rise to several typical forms of shape and appearance depending on whether the cutis, the subcutis or both are affected — hence cutaneous, subcutaneous or combination-type haemangiomas.

Cutaneous haemangiomas are:

tuberous — "raspberry" type — with only a small area of the vessels of the corium involved,

planotuberous — with larger areas of the corium vascular networks affected.

Subcutaneous haemangiomas are referred to as

nodose tumours — with subcutaneous vessels affected by the neoplastic process.

Combined-type haemangiomas are described as

tuberonodose tumours.

e) Spontaneous involution begins around the end of the first year of life. In the cutaneous forms it tends to be complete in a high proportion of the cases concerned, and may take anything from 3 to 5 years. In the subcutaneous forms the process of involution is slower or may not occur at all though the growth is always arrested.

f) Ulcerations are a frequent complication during the rapid growth period and in the initial period of involution in cutaneous haemangiomas. Their development is enhanced by mechanical insult, maceration, hypoxia, thrombosis and anaemia, a "physiological" phenomenon in toddlers.

g) Histologically speaking, the cutaneous forms have a capillary, subcutaneous, capillary-cavernous structure. Sclerosing haemangiomas is the term sometimes used to describe them during the period of involution.

h) Their size may be negligible or they may cover large areas of the face, trunk, extremities, etc.

i) The growth can be slowed down using prednisone and actinotherapy though the latter is not used for the treatment of haemangiomas at our institution.

II. According to discoveries made by Schnyder and Keller the group of temporary-growth haemangiomas also includes:

senile haemangiomas,
where a period of growth with capillary proliferation was proved. In the no-growth phase, these may be no more than a few dilated capillaries beneath the epidermis. This is also where haemangiomas of the lower lip and venous "lakes" of the pinna belong.

2. True vascular system tumours — true haemangiomas

These are vascular lesions with histologically demonstrable tumour growth. There are benign, progressive and malignant true haemangiomas with no distinct dividing lines between them.

I. Benign haemangiomas:

glomangioma — a congenital tumour arising from the neuromyoarterial glomus and remaining latent until adulthood, and

mixed haemangiomas — angiofibroma, angiolipoma and angioleiomyoma.

II. Progressive haemangiomas:

This is where we include vascular tumours characterized by progressive growth and, occasionally, by malignant course. There is no distinct dividing line between benignity and malignancy. There are:

progressive, multiple angiomas,
gemangiomas,
haemangiopericytomas.

III. Malignant haemangiomas:

These include: metastatic haemangioma,
haemangioendothelioma,
haemangiosarcoma,
Kaposi's idiopathic sarcoma.

Some special forms of vascular lesions

Kasabach-Merritt syndrome:

Severe congenital vascular defects and some large vascular tumours where the pathological vascular system is too large and too chaotic may sometimes feature consumption coagulopathy with marked thrombocyte count reduction. Cases of this kind mostly come under the heading of the Kasabach-Merritt syndrome.

Pyogenic granuloma:

This is a lesion half way between tumorous and inflammatory vascular affections. There is hyperplastic capillary growth resulting from minor injury and subsequent infection. It is like true haemangiomas only in clinical appearance.

CONCLUSION

By way of conclusion let it be said that the routine, indiscriminate use of the ending -ioma for vascular lesions is an impediment on the development of diagnosis and treatment. The prognosis of tumours, i. e. true haemangiomas, as well as their treatment is thus made too one-sided and limited. The very notion of congenital vascular malformation calls for activity and active search for reconstructive techniques, a most desirable approach to the treatment of those defects.

J. H.

SUMMARY

The authoress presents a brief clinical classification of haemangiomas and angiodyplasias, recommending a division into: A. congenital malformations, malformations of the vascular system (angiodyplasia) fully developed already at birth, never disappearing spontaneously and with only signs of decompensation seen in later development. B. tumours of the vascular system — haemangiomas, subclassified into:

1. temporary-growth tumours — these include a group of children's haemangiomas characterized by rapid initial growth and subsequent spontaneous involution,
2. true haemangiomas which may be benign, progressive and malignant.

RESUME

Les hémangiomes. Notes à leur classification.

Riebelová, V.

Le travail présente une brève classification des hémangiomes et des angiodyplasies.

La distinction suivante est recommandée:

A. les défauts congénitaux, de vascularisation (angiodyplasies). Ceux-ci apparaissent toujours dès la naissance, ne disparaissent jamais spontanément. Le processus suivant n'apporte que la décompensation.

B. les tumeurs vasculaires, hémangiomes, qui sont divisés

1. en des tumeurs passagers. Avant tout c'est un groupe des hémangiomes infantiles, caractérisés par l'accroissement initial rapide avec la régression suivante,
2. en de vrais hémangiomes qui peuvent être bénignes, progressifs ou malignes.

ZUSAMMENFASSUNG

Hämangiome — Bemerkungen zu ihrer Klassifikation

Riebelová, V.

In der Arbeit wurde eine kurze klinische Klassifikation der Hämangiome und Angiodysplasien vorgelegt.

Es wurde folgende Teilung empfohlen:

A. angeborene Fehler, Malformationen des Gefässnetzes (Angiodysplasien), die in allen Fällen bereits bei der Geburt gebildet sind, niemals spontan verschwinden, im weiteren Verlauf kommt es bei ihnen lediglich zu Dekompensationserscheinungen.

B. Geschwulste des Gefässnetzes — Hämangiome, die sich weiter teilen in

1. Geschwulste mit vorübergehendem Wachstum — hierher gehört die Gruppe der Kinderhämangiome, charakterisiert durch schnelles initiales Wachstum mit nachfolgender spontaner Involution,
2. echte Hämangiome, die gutartig, progressiv oder bösartig sein können.

RESUMEN

Hemangiomas. Notas acerca de su clasificación

Riebelová, V.

En el trabajo se da una breve clasificación clínica de hemangiomas y angiodisplasias.

Se recomienda una división siguiente:

A. defectos congénitos, malformaciones de la red vascular (angiodisplasia) que siempre existen ya al nacer, nunca desaparecen espontáneamente presentando en su desarrollo posterior sólo síntomas de descompensación.

B. Tumores de la red vascular — hemangiomas, que se subdividen en la forma siguiente:

1. tumores con crecimiento por un periodo transitorio — abarcan el grupo de hemangiomas de niños característicos por un rápido crecimiento inicial y subsiguiente involución espontánea,

2. hemangiomas auténticos, que pueden ser benignos, progresivos y malignos.

REFERENCES

1. **Bek, V. et al.:** Childhood Angiomas (in Czech). SZdN, 1st ed., Prague, 1966.
 2. **Brown, G. S. Jr., Nurbert, R. C., Fonkalsrud, E. W.:** Prednisone Therapy in the Management of Large Haemangiomas in Infants and Children. *Plast. reconstr. Surg.*, 71: 168, 1972.
 3. **Bureau, I.:** 30 Years of Experience of Angioma Treatment. *Ann. Chir. plast.*, IX, 4, 1964.
 4. **Dufourmental, C., Mouly, R., Preaux, J., Serege, F.:** Place de la chirurgie dans le traitement de angiome cervico-faciaux. *Ann. Chir. plast.*, IX, 4: 290, 1964.
 5. **Chenkas, M. C., Toto, P. D. et al.:** Sclerosing Cavernous Hemangioma of the Maxilla. Report of a Case. *Oral Surg.*, 16: 17, 1963.
 6. **Leterman, C.:** Cutaneous Haemangiomas of the Face in Pregnancy. *Plast. reconstr. Surg.*, 29: 293, 1962.
 7. **Meyer, J.:** Evolutive Growth Occurring Suddenly During Tuberous Angioma Treatment. *Ann. Chir. Plast.*, IX, 4, 1964.
 8. **Miller, S. H.:** Compression Treatment of Haemangiomas. *Plast. reconstr. Surg.*, 58, 8: 537, 1976.
 9. **Riebelová, V.:** Ulceration in haemangiomas (in Czech). *Acta Chir. orthop. Traumat. čech.*, 33: 360, 1966.
 10. **Schneider, S., Vogel, K.:** Gemmangiom der Mamma. *Zbl. Chir.* 98, 3: 97, 1973.
 11. **Verdan, C.:** Traitement chirurgical des hémangiomas des membres et aspects particuliers de leur localisation à la main. *Ann. Chir. plast.*, IX, 4: 304, 1964.
 12. **Váchová, A., Riebelová, V.:** Some New Aspects of Care of Children with Haemangiomas (in Czech). *Čs. Pediat.*, 33, 9: 527, 1978.
 13. **Weisman, F. A.:** Angioma of the Lips. An Unresolved Problem. *Plast. reconstr. Surg.*, 28: 43, 1961.
- More literature available at the author-ess.

Dr. V. Riebelová,
Department of Plastic Surgery,
Berkova 34/38,
612 00 Brno, Czechoslovakia

Specialized Centre for Burns, Košice-Šaca (Czechoslovakia)
Head surgeon MUDr. Š. Šimko, CSc.

EXPERIENCE OF CHILDREN'S BURNS TREATMENT

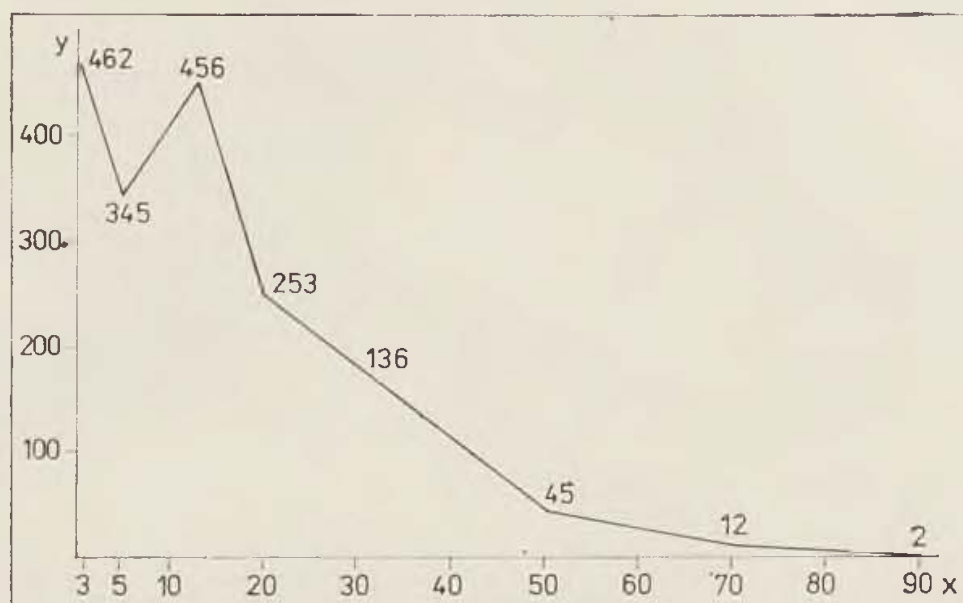
J. B l a h a

Burns in children represent a major problem of burns treatment. This is not only because the younger the child the greater the threat to its life, but also because of the physical and physic effects which often persist until adulthood. There have hardly been any fewer accidents recently, rather the opposite is true. Although, as far as plain numbers are concerned, thermal injuries fall far behind other types of injury — occupying the 4th or 5th places according to world statistics — they are definitely much higher on the list in terms of the consequences. The overwhelming majority of major burns represents direct interference in the child's subsequent life plans with, very often, adverse effect on the whole family as witnessed by far from rare cases of broken homes. Oddly enough, there are no national statistics of thermal injuries in children as these might serve as a basis for effective prevention. The numbers of children admitted to our specialized centre are fairly high. This obviously comes as a surprise not only to us, or how else to account for the fact that not a single clinical department for burns is equipped with a separate children's ward, and that we seem to be the only institute in the country to hospitalize children of all age groups. Our youngest patient was only four hours old.

A child's organism responds to injury in a way different from an adult's. Children are, so to speak, more labile. The anatomical and physiological differences arising from the rate of growth and maturation of the body as a whole and each of its systems require special therapeutical care in children. One thing to be born in the mind all the time is the need for flexible adaptation to those special requirements and functions during resuscitation, particularly in children under two years of age. In older children the differences tend to be more quantitative by nature.

Even under basal conditions, children are noted for increased metabolic requirements, for higher oxygen consumption. The child's body weight will, as a rule, double within the first six months of life. In very young children, there is a disproportion between body weight and surface, an impediment on thermoregulation and a factor placing increased demands on oxygen consumption. This disproportion lasts until puberty, and accounts for increased loss of water through evaporation. Of no less importance is the state of cir-

culatation and the respiratory system. The latter is well developed and highly resistant in healthy individuals. Children's lungs are mature by the end of the first month of life to provide adequate ventilation though with very low marginal reserve due to the infant's considerably high metabolic demands.



Graph 1. y — Number of children burned, x — Burned area in %

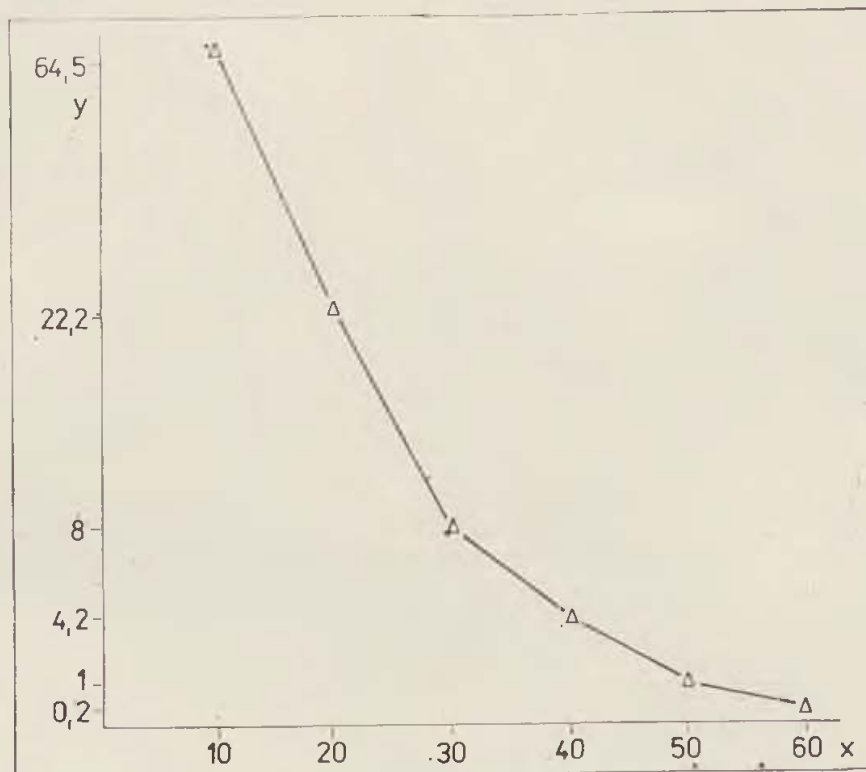
This reserve keeps increasing in accordance with growth mainly as a result of changes in the ratio of weight: body surface and metabolism. For that reason, in children under the age of two years, any process which puts limitations on respiration, reduces the respiratory surface or restricts chest movement may prove to be fatal.

Children are at a disadvantage with regard to renal function. The amount of glomerular filtrate approaches that of an adult between the 9th and 12th months of life as a result of uneven maturation of glomerular and tubular functions. As a result of that, children have half the capacity of an adult's osmolar concentration, they are unable to excrete sodium, chlorides or other ions; there is no water reabsorption and therefore increased production of thin urine. This accounts for easy overloading or even dehydration in children.

The child's skin is delicate, with no adnexa, which is why burns, too, tend to be deeper than could be expected given the temperature and exposure time. For the same reason, increased care is advisable in the taking of grafts, too.

Thermoregulation poses an equally difficult problem, particularly in infants. In infants under the age of 6 months the temperature is regulated through thermogenesis without quivering, a process involving catabolism of brown fat supplies and highly increased oxygen consumption which is why prolonged hypothermia may lead to excessive lactate production and acidosis. After

the age of 6 months, the child is capable of quivering but even then it tends to lose body heat easily so that keeping the external temperature high continues to be essential. For that reason, the temperature in operating theatres should be kept above 30 °C, and the operating table and the child's bed should be equipped with heated mattresses to prevent loss of body heat through radiation and evaporation.



Graph 2 y — Number of patients in %, x — Extent of burn in %

All this should be born in mind while treating children, especially those of the lower age groups.

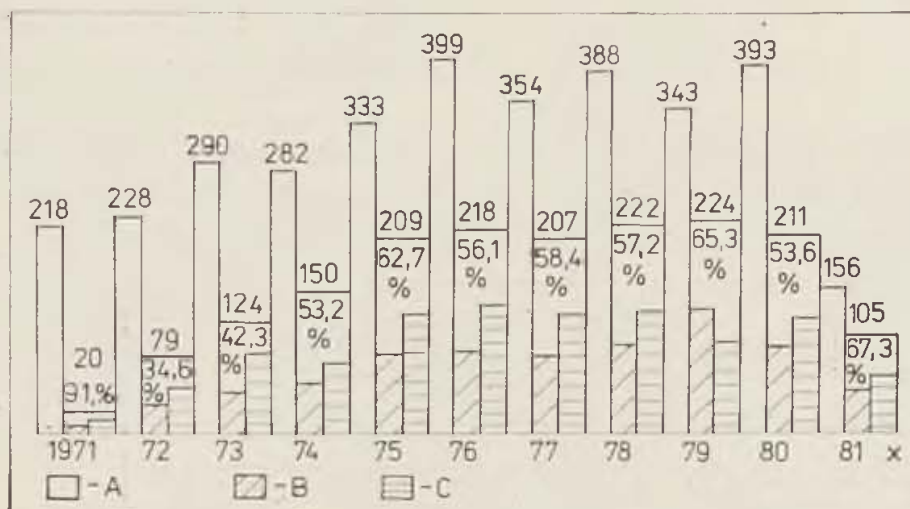
From the time our burns centre was launched in 1971 to the middle of 1981, a total of 5,155 patients were admitted, thereof 1,784 children under the age of 14, i. e. 34.6 % (Tab. 1).

Table 1. Number of admissions

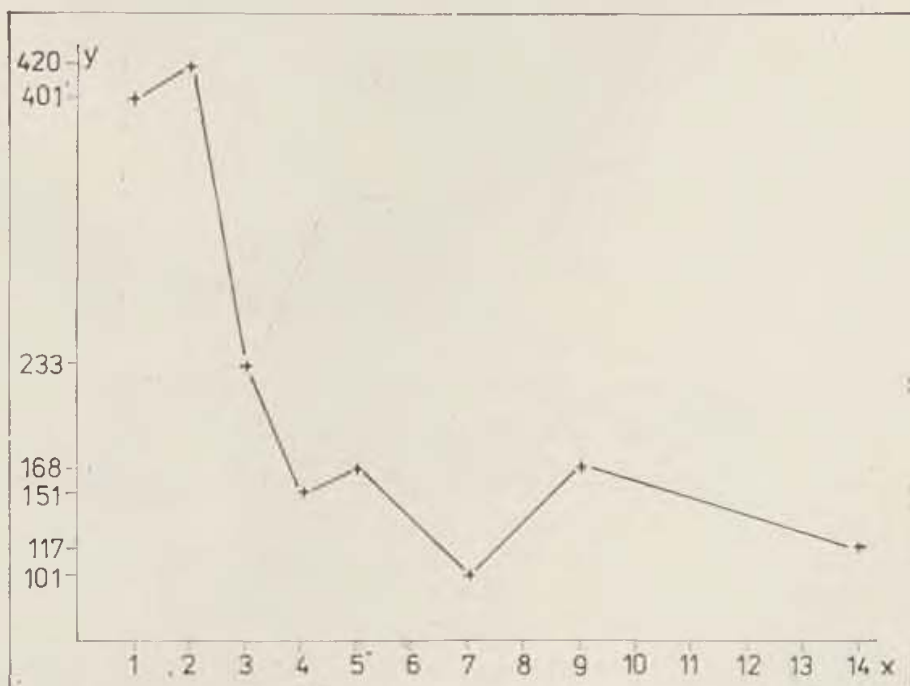
Adults	3371
Children	1784 — 34.8 %
Total	5155

Graph 3 gives the numbers of admissions for adults and for children in each year, and the boys:girls sex ratio. 1,022 boys and 762 girls were admitted.

The predominant age group are children under the age of 3 years, a total of 1,061 patients, thereof: 401 — infants up to the age of 1 year, 420 — up to 2 years of age, 233 — up to the age of 3 years. The share of the older age groups ranges from 97 to 135 patients admitted (Graph 4).



Graph 3. Number of admissions. x — Year, A — adults, B — girls, C — boys



Graph 4. y — Number of children hospitalized, x — Age of admitted children

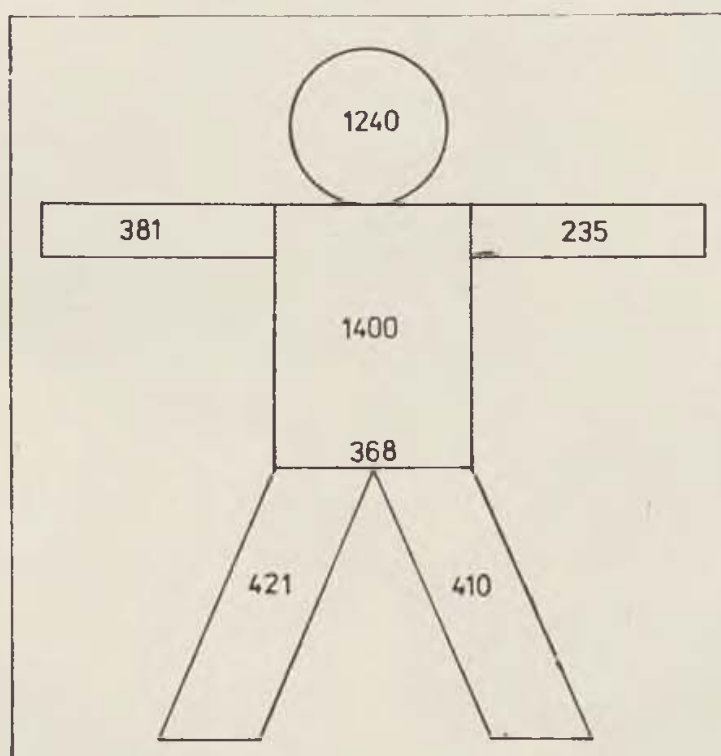
Hot fluid or steam were the most frequent causes of thermal injury (see Scheme 2). The overwhelming majority of accidents occurred in the children's homes (Tab. 2).

Table 2. Place of accident in children

Home	1775
School	9

In terms of extent, burns involving up to 10 % of the body surface are at the top of the list (see Graph 1). The per cent representation can be found in Graph 2.

In terms of localization, there was a moderate preponderance of the right upper and right lower extremities, though the head was involved relatively frequently, too (Scheme 1).



Scheme 1

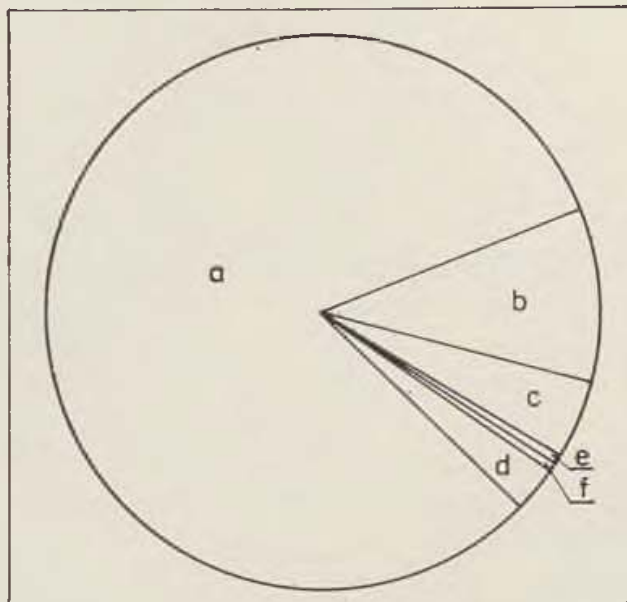
The overall death rate at our centre was 5.05 %, and 6.9 % for children (Table 3).

Table 3

Number of children admitted	Deaths
1784	66 — 6.9 %

The average period of hospitalization was 35.9 days in 1971, 22 days in 1972, since when it has been ranging from 18 to 21 days.

Our experience resulting from the treatment of those children can be summed up as follows: Since the introduction of the Slovak Ministry of Health methodological directives concerning the treatment and transfer of patients to specialized units, there has been a considerable drop in the number of children referred to admission without adequate therapy or, in case of need,



Scheme 2. Mechanism of injury

a — Hot fluid — steam	1435
b — Flame	208
c — Explosion	188
d — Electric current	52
e — Other causes	3
f — Sun	5

venous cannulation. This caused a correspondingly pronounced drop in the number of children in severe shock with high mortality. In children where shock failed to be managed or where infusion therapy failed to be started the death rate is in excess of 60 %. To calculate the amounts of fluids — crystalloids and colloids — in the immediate post-accident period, we use Brooke's formula. Crystalloids as well as colloids are diluted with 5% glucose at a ratio of 1 : 3. It is the moral duty of every physician that in extensive burns he should start with resuscitation involving the i.v. supply of fluids as soon as possible. Fluid supply in children is indicated whenever more than 15 % of the body surface is affected in superficial burns, or more than 5 % in deep burns.

There are quite a number of formulae for the calculation of fluids loss replacement during shock. Recent additions include the Parkland formula calculating 4 ml Ringer-lactate per kg b. w. and per cent of the area affected during the first 24 hours. For the second 24-hour period, albumin should be

added as required. To improve the results of resuscitation, other techniques and procedures have been developed such as the HLFD (hypertonic albuminated fluid demand resuscitation) method, a technique involving the infusion of hypertonic solutions and credited for reduced fluid consumption, increased diuresis and shortening of resuscitation time. Vure is an exception there as he proceeds not according to a formula but according, primarily, to the child's clinical conditions, pulse rate, blood pressure and urine output. He supplies Hartman's fluid, Rheomacrodex and blood. In this mode of treatment, solid experience of patient monitoring makes all the difference. Sodium and water are undoubtedly the essential factors of treatment. Balanced Ringer-lactate or Hartman's fluid seem to be commendable there. During the first 24 post-accident hours, plasma will cause no significantly better increase in the volume of circulating fluids than Ringer-lactate. Its effect is substantially better after the first 24 hours. Our team favour the use of colloid — Dextrane — in the immediate post-accident period because of its oncotic effect which is several times higher than that of plasma in order to prevent pulmonary complications. Obviously, there is no ideal mixture or ideal formula for fluid quantity calculations. In spite of that, a formula does provide the necessary basis individually adaptable from case to case. Such facts as how much fluid can be supplied, its composition and rate of supply stand out prominently in any resuscitation effort. Whether or not the fluid supply is adequate can be judged by the amount of urine excreted, which — depending on the children's age — ranges from 15 to 50 ml per hour. Supplying fluids per os is as inadvisable in children as it is in adults since children have a predilection for acute gastric dilatation and vomiting. In addition to urine output per hour we make 8-hourly tests for haematocrit, blood count, ionogram, acid-base balance, blood pressure and the pulse and respiratory rates. Precise intake and output records are kept, keeping an eye on the child's body weight all the time.

As for deep burn management, we are in favour of necrectomy as the active surgical approach, which we resort to as soon after the accident as the situation permits using autografts to cover the wound without any undue delay. For temporary postnecrectomy covers we use biological or synthetic materials. As for the latter, Synkryt proved to be unsuitable for infants under the age of 6 months since the wound area underneath it tends to dry up, thus making repeat necrectomy inevitable. Biological covers proved a better option since, provided the necrectomy was a success, they prepared the wound well for autografting. As for cases where temporary covers are necessary, regardless of whether biological or synthetic ones, 48 hours after the application proved to be the optimum time for its removal. Provided the cover is correctly managed for time, we can speed up the process of healing and prevent many complications likely to occur if the time factor has been neglected. We perform tangential excision, the success of which depends on the correct estimate of the patient's overall condition, adequate anaesthesia, ample supplies of blood, and good surgical teamwork. It is unlikely that this active procedure could be feasible at all surgical clinics; it should rather be reserved

for specialized units since inadequate surgical operation may prove to be more of a hazard for the patient than conservative treatment. Infection is the main enemy for a patient after inadequate surgical treatment.

The more superficial burns are given conservative treatment with antibiotics and ointments applied to the wound areas. Antibiotics are given systematically or locally depending on the results of wound sample cultivation and on the patients sensitivity.

Hyperbaric oxygenation was used in 37 children. While during shock it fell short of expectations, oxygen proved to be a powerful adjuvant factor in the healing of autografts. In our opinion, it may not have changed the flora but perhaps reduced the virulence of bacteria. There was an average of five sittings.

Having assessed the mechanism of thermal injury in children hospitalized at our centre, we decided that the overwhelming majority belong in the category of avoidable injuries such as should not have happened at all. According to Feller, up to 90 % accidents belong in this category. There are a number of problems which ought to be approached through consistent prevention. This concerns mainly children's clothing which ought to be made of non-inflammable fabrics or, at least, buyers should be warned which of the garments have been made of inflammable materials. Electric wiring and gas installations should be more strictly checked for compliance with safety regulations and precautions. More attention should be given to industrial products design as well as to the architectonic design of housing units. In other words, not all the blame can be put on the parents, their momentary inadvertence, often with unforeseeable consequences for the rest of the child's lifetime, though, to be sure, this is the crucial factor in children's thermal injuries. If this formidable range of urgent problems is to be coped with, health workers in the sphere of prevention should not remain in isolation, and co-operation with other interested institutions should be improved to bring down the number of those serious accidents.

J. H.

SUMMARY

The author reports on his experience of the treatment of 1784 burned children hospitalized at his specialized burns centre from 1971 to the middle of 1981, stressing the importance of early i.v. treatment during the period of shock, and assessing the formulae used for the calculation of fluid loss replacement during that period. Information is included on the surgical treatment of burns as practised in the centre. Prevention is seen as the decisive factor of any effort to reduce the number major burns in children.

RESUME

Les expériences avec le traitement des brûlures chez des enfants

Blaha, J.

L'auteur décrit ses expériences avec le traitement de 1784 enfants qui ont été hospitalisés au Centre des brûlures depuis 1971 jusqu'au juin 1981.

Il souligne l'importance du traitement intraveineux immédiat dans la période du choc, il apprécie les formules indicantes la quantité des liquides suppléants, utilisées habituellement dans cette période. Il démontre la méthode du traitement chirurgical, pratiquée au Centre.

D'après lui, la prévention représente un facteur décisif pour l'amenuisement du nombre de graves traumatismes.

ZUSAMMENFASSUNG

Erfahrungen mit der Behandlung der Kinderverbrennungen

Blaha, J.

Der Autor berichtet über seine Erfahrungen mit der Behandlung von 1784 Kindern, die von 1971 bis Mitte 1981 in ein spezialisiertes Zentrum für die Behandlung von Verbrennungen aufgenommen wurden. Er unterstreicht die Bedeutung der frühzeitigen intravenösen Behandlung in der Schockphase, und beurteilt die Formeln, die für die Berechnung des Flüssigkeitsverlustersatzes in dieser Phase benutzt werden. Er gibt Informationen über die chirurgische Behandlung von Verbrennungen, so wie sie im Zentrum durchgeführt wird. Für entscheidenden Faktor in der Frage der Herabsetzung der Zahl dieser schwerwiegenden Unfälle hält er die Vorbeugung.

RESUMEN

Experiencias con el tratamiento de las quemaduras en niños

Blaha, J.

El autor expone sus experiencias adquiridas en el tratamiento de 1784 niños ingresados en el Centro Especializado de Tratamiento de Quemaduras, desde el año 1971 hasta mediados de 1981. Recalca la importancia de un tratamiento oportuno i.v. en el período de la conmoción, evalúa las fórmulas utilizadas para calcular la restitución de la pérdida de líquidos en esta fase. Informa sobre las formas de tratamiento quirúrgico de quemaduras que fueron empleadas en el Centro. El factor decisivo que contribuye a la reducción de estos accidentes graves es, en la opinión del autor, la prevención.

REFERENCES

1. Artz, C. P., Moncrief, J. A., Pruitt, B. A.: Burns. A Team Approach. Saunders W. B. Company. Philadelphia—London—Toronto 1979.
2. Baxter, C. R.: Guidelines for Fluid Resuscitation. J. Trauma, 21, 8:687, 1981.
3. Giljohann, A.: Adolescents Burned as Children. Burns, 7, 2:95, 1980.
4. Langley, J., Silva, P. A.: Childhood Accidents Involving the Electric Jug — Options for Prevention. Burns, 7, 4:286.
5. Vure, E. et al.: A Practical Approach to the Treatment of Burn Shock in Childhood. Burns, 8, 4:245, 1982.

Dr. J. Blaha,
Kuzmányho 19,
040 00 Košice, Czechoslovakia

Charles University Medical Faculty of Hygiene, Prague (Czechoslovakia)
Department of Plastic Surgery
Head Prof. MUDr. M. Fára, DrSc.
Czech Institute of Technology, Faculty of Electrical Engineering, Prague
Head Prof. Ing. O. Taraba, DrSc.

SCOPE FOR ULTRASOUND DIAGNOSIS OF THE DEPTH OF THERMAL DAMAGE

PRELIMINARY REPORT

J. Moserová, P. Hlava, J. Malínský

Diagnosing the vertical extent of skin damage caused by thermal injury continues to be a frequent topic of clinical and experimental studies. Most of the existing methods (besides routine clinical and bioptic tests) make use of momentary changes in the blood supply to the affected area to show the state of blood supply either directly, e. g. methods of intravenous vital staining, or indirectly such as by thermography. However, the blood supply may be influenced by systemic circulatory changes or by pre-existing changes in the blood circulation in the affected extremity, etc. For those reasons, the authors of the present study tried to find diagnostic methods designed to reveal physical and chemical changes in thermally damaged skin.

Theoretically speaking, ultrasound — widely used in industry for the detection of hidden structural defects and, of late, in medicine, too — may just as well be utilized for the detection of tissue density changes typical of thermal denaturation. The use of ultrasound presents absolutely no hazard for the patient. The contact end of the ultrasound probe can easily be sterilized.

In their first, exploratory series of experiments the authors did not seek to study methods of thermal damage detection *in vivo*, in burned patients; instead, the measurements were carried out on isolated pig hides (pig croupon), intact as well as thermally damaged.

MATERIAL AND METHODS

An ultrasound impulse defectoscope UID-S (manufacturers: Laboratorní přístroje, Chotětice) was used for the measurements. The apparatus emits ultrasonic pulses at a frequency of 10 MHz for periods of 6 μ s at a rate of 100 Hz. The emitted ultrasonic pulse passes through the tissue (being absorbed there to a certain degree) rebounding from any possible barriers

to be subsequently received by the emitting transducer. (The transducer contact area is circular, 20 mm in diameter.)

Biological material

For their experimental measurements the authors used the skin of domestic pigs (pig hide or croupon) obtained in a slaughterhouse, i. e. skin from the back and flanks. Pig hides, fresh from the slaughterhouse, were shaved; the burns were placed 11—12 cm from the middle line. The burns were each time placed on both sides in the same anatomical locality. On one side, a dermal burn was produced, the result of short time exposure to the heat source, while on other side longer time exposure was used to produce a deep dermal (full thickness) burn (Fig. 1).

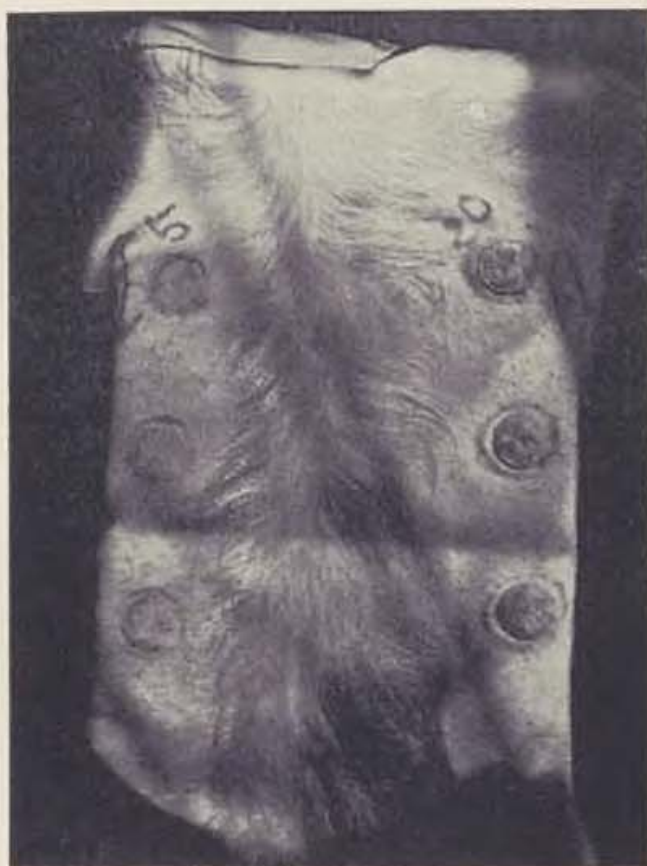


Fig. 1. Burned areas in isolated pig hide

Heat source

A contact apparatus with a thermostat-controlled circular contact area of 19.7 cm^2 was used. The nominal temperature of the contact plate was $347 \pm 5^\circ\text{C}$. A 5 sec. exposure to the heat source was chosen to produce a dermal burn; to produce a full thickness burn (deep dermal burn) a 15 sec.

exposure was used. The reproducibility of the experimental thermal damage was checked by immediate contraction measurements [Moserová, J., Běhounková, E., 1976; Moserová, J., 1980] and by histological tests.

Measurements with the UID-S ultrasonic impulse defectoscope were carried out on isolated strips of skin in the centre of each burned area (4 to 6 burns

Table 1. Controls — thermally undamaged skin (readings)

Pig hide I	Pig hide II	Pig hide III	Pig hide IV
40 mm	50 mm	45 mm	50 mm
45	45	45	50
45		50	50
50			45
50			50
50			50
45			
50			
45			
$\bar{X} = 47.62 \pm 3$		$\% 100 \pm 6.2$	
		$n = 21$	

were placed on each strip depending on its size), and on undamaged skin about 1 cm away from the burned area circumference. The mean value and standard deviation were then calculated for the controls. The values obtained from measurements in the burned areas (5. sec. and 15 sec. exposure times) were expressed in relative values related to the mean controls value in undamaged skin (100 %). The results obtained for all three groups (undamaged skin, superficial dermal burn, deep burn) were evaluated using Student's t-test.

In all three groups, samples for histological tests were taken to make for an objective evaluation of the depth of the burn and the width of the zone of homogenization. They were immediately fixed in Baker's fluid and

Table 2. Dermal burns (5 sec. exposure to heat source), relative values in % related to the controls

Pig hide I	Pig hide II	Pig hide III	Pig hide IV
73.49 %	83.99 %	83.99 %	67.19 %
88.19	79.79	46.19	58.79
83.99		62.99	83.99
83.99			
79.79			
$\bar{x} = 75.09 \pm 12.7 \%$		$n = 13$	

Table 3. Full-thickness burns (15 sec. exposure to heat source), relative values in % related to the controls

Pig hide I	Pig hide IV
20.99 %	31.49 %
52.49	20.99
25.19	52.49
37.79	
41.99	
$\bar{x} = 35.42 \pm 12 \%$	$n = 8$

treated with the usual techniques. The sections were stained with the use of Masson's yellow trichrome staining method (haematoxylin-eosin-sofronin).

RESULTS

Table 1 shows control values in undamaged skin (4 isolated pig hides).

Table 2 gives relative values for dermal burns (5 sec. exposure) in relation to the controls.

Table 3 gives a list of relative values obtained in deep dermal burns (full thickness burns in the centre of the areas, 15 sec. exposure) related to the controls.

Table 4 demonstrates a comparison of the mean values.

The results of Student's t-test showed the differences between the three groups tested as statistically highly significant.

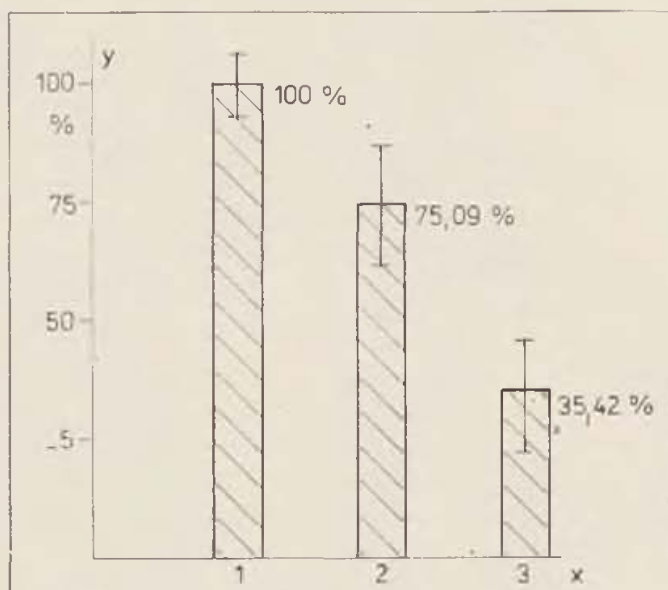
Table 4. Relative values in controls, dermal burns and full-thickness burns

Controls	5 sec. exposure	15 sec. exposure
100 ± 6.2	75.09 ± 12.7	35.42 ± 12

Graph 1 gives a graphical representation of mean values for each group of tests (undamaged skin, thermal damage resulting from 5 sec. and 15 sec. exposure to the heat source). As shown by histological tests, the homogenization zone in 5 sec. exposure burns is quite superficial whereas in 15 sec. exposure it extends deeper though not farther than the middle layers of the corium.

DISCUSSION

Experiments with the UID-S ultrasonic impulse defectoscope show that with the use of this apparatus undamaged skin can be distinguished from



Graph 1. x: 1 — controls, 2 — 5 sec. exposure, 3 — 15 sec, exposure; y: %



Fig. 2. Undamaged pig skin

thermally damaged skin exposed to a contact heat source for 5 and 15 seconds. Significant differences were also found between 5 sec. and 15 sec. burns although, histologically, the difference in the depth of the burns was not very marked. The differences between all three groups were found to be of high statistical significance despite the atypical conditions, under which the measurements were carried out. The device was designed for non-destructive testing of large steel objects, and its power of resolution is 1 mm. In addition to that, the thin layer of skin under observation is, in fact, in the dead zone of the apparatus. Nevertheless, the amplitude of the signal corresponding to the rebounding signal (the signal rebounds from the bottom side of the coupon tested) could be registered. Thus, the signal passed twice through the tested skin vertically containing information on the total amount of absorbing material in the tested area.

The authors presume that in thermally damaged, denaturated skin the physical structure of the tissues changes (Fig. 2, 3), consequently absorbing ultrasound waves to a greater extent. It may also be assumed that part of the impulse energy rebounds before passing through the whole thickness of the skin and is subsequently suppressed by the device. *The results of*



Fig. 3. Homogenization of dermis after thermal trauma in the pig (in vivo burn)

this preliminary study show the signal absorption rate as being directly related to the vertical extent of the thermal damage.

The prospects for ultrasonic diagnosis of the depth of burns, therefore, seem quite realistic especially if more sophisticated ultrasound detectors are used.

J. H.

SUMMARY

Experiments were conducted to test the possible uses of ultrasound for measuring the depth of thermal damage. Standard superficial dermal and deep dermal burns were produced on isolated pig hides. The authors proceeded from the hypothesis, according to which the rate of ultrasound wave absorption could help to distinguish different degrees of skin homogenization and thermal denaturation. An ultrasonic impulse defectoscope was then employed to make measurements in intact skin and in thermally damaged skin. (Isolated pig hides were used.) The mean values obtained for each group (undamaged skin, superficial dermal burns and deep dermal burns) revealed statistically highly significant differences. Ultrasound diagnosis, a wholly non-hazard method, appears to be one of the ways to a more precise determination of the vertical extent of thermal damage.

RESUME

Les possibilités du diagnostic de la profondeur des brûlures par l'ultra-son Information préliminaire

Moserová, J., Hlava, P., Malínský, J.

Les auteurs ont fait des expériences d'orientation pour attester les possibilités d'employer l'ultra-son dans le diagnostic de la profondeur des brûlures. Pour les expériences a été utilisée la peau isolée des cochons, sur laquelle on a causé des brûlures standardes, légères ainsi que profondes. Les auteurs ont voulu vérifier l'hypothèse qui supposait que l'aménuissement du passage de l'ultra-son soit capable de distinguer les degrés de l'homogénéisation et de la dénaturation thermique de la peau.

Une comparaison entre la peau du cochon saine et brûlée a été effectuée en utilisant le défectorscope ultra-sonique d'impulsion. Les résultats moyens, obtenus par les mesures de trois groupes de la peau (peau saine, brûlée légèrement, brûlée profondément), se distinguent significativement, du point de vue statistique.

Le diagnostic à l'aide de l'ultra-son ne présente aucun danger pour le malade et il ouvre une des voies vers un diagnostic plus précis en ce qui se touche de la profondeur d'une brûlure.

ZUSAMMENFASSUNG

Möglichkeiten der Ultraschalldiagnostik der Tiefe der Verbrennung Vorläufige Mitteilung

Moserová, J., Hlava, P., Malínský, J.

In Orientierungsversuchen überprüften die Autoren die Möglichkeit der Anwendung von Ultraschall in der Diagnostik der Tiefe der Verbrennung. Zu den Versuchen

benutzen sie isolierte Schweinhaut, an der sie standardmässige oberflächliche dermale und tiefe dermale Verbrennungen hervorriefen.

Die Autoren gingen von der Arbeitshypothese aus, dass die Hemmung des Durchganges des Ultraschalls den unterschiedlichen Grad der Homogenisierung und der thermischen Denaturation der Haut unterscheiden kann. Mit Hilfe eines Ultraschallimpulsdefektoskopes unternahmen sie dann Messungen an gesunder Haut und von thermisch geschädigter Haut. (Es wurde isolierte Schweinhaut benutzt.) Die gefundenen Mittelwerte, die bei einzelnen Gruppen (gesunde Haut, oberflächliche dermale Verbrennung und tiefe dermale Verbrennung) gemessen wurden, unterschieden sich statistisch hoch signifikant. Die Ultraschalldiagnostik, die für den Kranken völlig risikofrei ist, scheint einer der Wege zur genaueren Diagnostik des vertikalen Umfangs der thermischen Schädigung zu sein.

RESUMEN

Ultrasonido en el diagnóstico de la profundidad de la quemadura y sus posibilidades Información preliminar

Moserová, J., Hlava, P., Malínský, J.

En experimentos tentativos, los autores verificaron la posibilidad de implementación del ultrasonido en el diagnóstico de la profundidad de la quemadura. Utilizaron para los experimentos piel aislada del puerco en la cual provocaron típicas quemaduras dérmicas, tanto superficiales como profundas.

Los autores partían de la hipótesis de que la amortiguación del ultrasonido en el pasaje puede distinguir los diferentes niveles de homogenización y desnaturalización de la piel. Con un defectoscopio impulsor de ultrasonido sondearon luego tanto la piel sana como la que llevaba heridas térmicas (al utilizarse piel aislada del puerco). Los valores promedios comprobados en los diferentes grupos (piel sana, quemadura dérmica superficial y quemadura dérmica profunda) difieren estadísticamente en alto grado. El diagnóstico mediante el ultrasonido, que no presenta riesgo alguno para el enfermo, parece ser uno de los caminos más señalados hacia métodos más exactos al comprobarse la magnitud vertical de los defectos térmicos.

REFERENCES

1. Moserová, J., Běhounková, E.: The Standard Non-Contact Burn. Immediate Contraction of Burned Skin. Acta Chir. plast., 18 : 152, 1976.
2. Moserová, J.: Skin Loss and Methods of Covering (in Czech). Avicenum, 1980.

Dr. J. Moserová,
Burns Unit, Lidových milicí 63,
120 00 Prague 2, Czechoslovakia

Municipal Institute of National Health — Enterprise Institute of National Health —
East Slovak Iron Works, Košice-Šaca (Czechoslovakia)
Department for Burns Treatment and Reconstructive Surgery
Head MUDr. Š. Šimko, CSc.

PAEDIATRICIANS' EXPERIENCE OF THE TREATMENT OF BURNED CHILDREN

R. Prekop, Š. Šimko, E. Antónyová, L. Pillarová

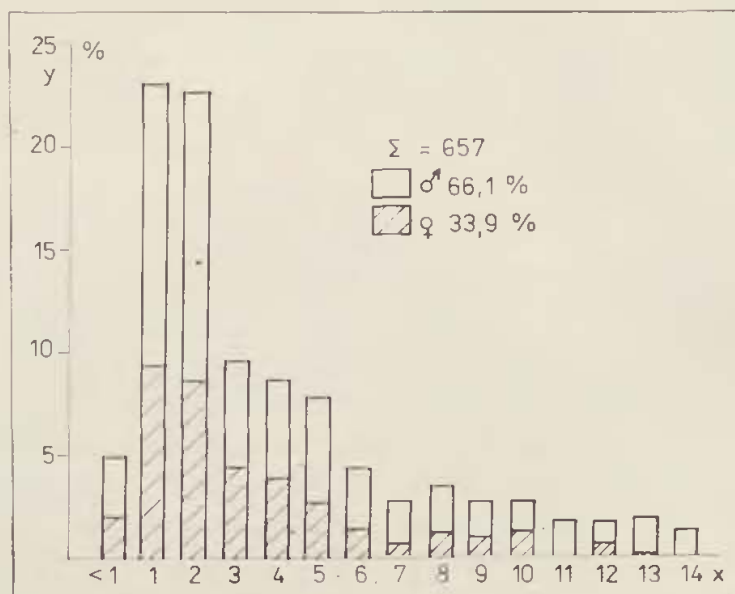
Generally speaking, burns in children represent a rather unusual problem for paediatricians, rarely, and if so, only marginally discussed at paediatric gatherings. This is an undesirable state of affairs if only because the paediatrician is, as a rule, the first medical specialist the parents will take their burned child to. Many paediatricians encountering this type of grave injury during their booster course at our department are often greatly surprised to learn that a burn is, indeed, a disease involving the whole body with more organs and systems being affected. Physiological specificities of childhood, relative functional immaturity of quite a number of organs — especially during the first few years of life — account for the fact that a child responds to the burn trauma differently from an adult. Our contribution presents an analysis of the most frequent pathological clinical findings.

MATERIAL

Our series consists of 657 children hospitalized for burns at our department for burns treatment during the 1978—1980 period — Graph 1. Most of them were 2 to 3 year old toddlers, fewer were infants under the age of one year, and the least numerous group were pre-school children and older ones. In each group, and consequently in the whole series, boys were in the majority.

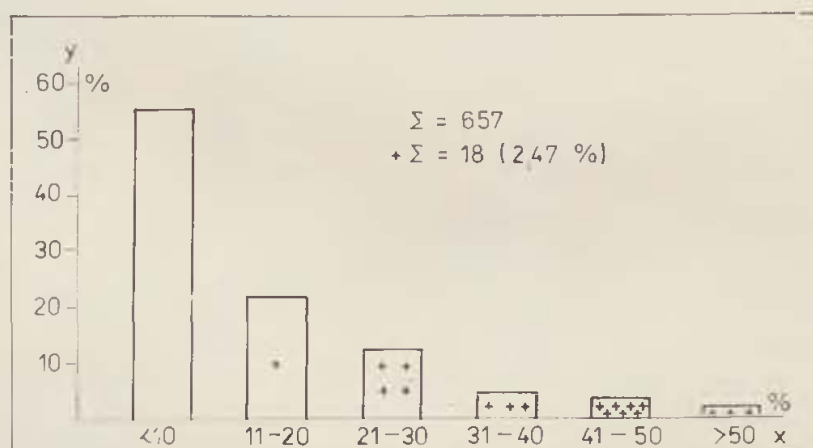
The burned surface proportions are in Graph 2. The largest group were moderate burns involving up to 10 % of the body surface. Hospitalization was necessary mainly because of the serious nature of the burn usually calling for surgical treatment. 18 of the children, i. e. 2.47 %, died. All of them had deep burns involving more than 20 % of the body surface except one who was admitted in a state of severe shock and internal environment breakdown, with severe consciousness disorders, neurological disturbances and extensive inflammatory involvement of the respiratory tract in the form of tracheobronchitis, pneumonia and pleurisy. The child survived for two days.

The largest burned area was 87 %; the patient died within 5 hours of the time of admission. The salient features in the clinical picture of the four children who died within 24 hours were severe shock, internal environment disturbance, pulmonary oedema, neurological disorders due to brain oedema,



Graph 1. Age and sex in hospitalized burned children in % — 1978—1980

gastrointestinal tract bleeding, and inflammatory involvement of the respiratory tract. The children who died within a week of admission (6 patients) also presented with severe shock with subsequent bleeding and post-shock nephropathy, haematuria and signs of renal insufficiency (4 children), some of them with persistent heart and circulatory damage. The predominant clinic-



Graph 2. Proportion of burned surface in children hospitalized in 1978—1980; y — % children, x — % burned surface

Table 1. The most frequent pathological organ findings (in %) = 657 children

Respi- ratory	Pharyngitis 6.17	Tonsillitis 0.90	Tracheo- bronchitis 17.42	Pneumonia 1.08	Pleurisy 0.90	Others 1.99
Circu- latory	Shock 10.70	Heart 4.17	Tachy- 6.97	Arrhy- 2.17	Pathol.EKG 10.77	Others 0.90
Neuro- logical	Consci- ousness disorders 3.99	Convul- sions 0.36	Pareses 0.72	Others 2.54		
Develop- mental retarda- tion	10.16	Anaemia 41.52				

al symptoms in those who died later on (8 children) were sepsis or septicaemia in spite of intensive treatment with antibiotics and immunotherapy. The most frequently involved organs were the lungs, pleura and, relatively often too, the kidneys in a picture of pyelonephritis (4 children). Two children displayed renal insufficiency and haematuria.

Tab. 1. shows the proportion of the most frequent pathological disturbances, most of them respiratory tract affections, mainly tracheobronchitis. Shock was the salient feature of circulatory disorders. Let me stress here that the children were given paediatric examination, as a rule, the next day after admission, one or more days after anti-shock treatment was started. Neurological disturbances were diagnosed in the severest burns with internal environment affections, mainly mineralogram and acid-base balance and clinical signs of cerebral oedema. More than 10 % of the children were retarded in their psychosomatic development. Nearly half of them were found to suffer from anaemia — either normochromic, usually during the first days of hospitalization, or, subsequently, hypochromic.

DISCUSSION

It follows from the above facts, that in burned children the diagnostic and therapeutical schemes should be geared not only to the treatment of the burn proper but also to pathological states of paediatric nature. Respiratory tract inflammatory involvement, mostly tracheobronchitis, may be due to thermal injury sustained by the respiratory tract mucous membranes. In quite a few cases, however, there was no aetiological connection with the burn. Often, there were respiratory infections, mostly of virus origin, a complaint typical of children in the first three to four years of life. As regards the therapeutical strategy, it is imperative that those children should be isolated from the rest of the patients right from the beginning of hospitalization to avoid spreading infection. Nosocomial infections like these only

prolong and complicate the therapeutical regimen. Children who prior to admission were treated for respiratory infection often had to pay dearly for the still used obsolescent treatment "inhalation over a pot of chamomile decoction" which proved to be the cause of scalding (18 children).

The relatively high proportion of 10 % burns in psychosomatically retarded children suggests how inadequately those children are cared for.

Convulsions, often attributable to brain oedema, are a prognostically serious complication. The aetiopathogenesis of nontraumatic brain oedema is a complex and largely uncharted problem. Apart from circulatory disorders as part of shock its development is often due to homeostatic disorders such as hyponatremia, hypocalcaemia, acid-base disbalance, inadequate supply of hypotonic solutions, etc.

Burn anaemia possesses an interesting problem, too, as in our group it proved to be the most frequent laboratory finding. At first, it tends to be normochromic as a result of haemolysis of heat-damaged erythrocytes only to gradually assume the form of hypochromic sideropenic anaemia. There seem to be more factors co-responsible for its pathogenesis: disordered iron kinetics with increased storage and fixation in the reticulohistiocytic system, decreased haeme production, but also metabolic disorders, disturbed globin production and erythropoiesis in the bone marrow. To a lesser degree, the later phases of the burn disease are characterized by reduced erythrocyte survival time due to burn trauma (Bernát); this, too, has a share in the persistence of anaemia. Burn anaemia is reported to be highly refractory to antianaemic treatment, and to persist for long periods of time, sometimes long after the burn was healed. Altogether it has an adverse effect on the course of treatment and on the taking of grafts. In burned children, anaemia tends to be more pronounced and more protracted than in adults. Infants and toddlers seem to be predisposed mainly because of lack of blood-producing substances, especially iron, because of greater demands on haematopoiesis in view of the expansion of the vascular bed in proportion to the rate of growth in children, and also because of the higher consumption of iron in immunity reactions considering the higher rate of infection in that particular age group.

CONCLUSION

1. Diagnosis and treatment of burns in children should be a comprehensive effort shared by a paediatrician.

2. Close and continual co-operation between the burns surgeon and paediatrician is one of the essential conditions of the comprehensive therapeutical strategy. Among other things, it involves also the determination of the period or even extent of surgical treatment.

J. H.

SUMMARY

An analysis is presented of the cases of 657 children hospitalized for burns at the Department for the Treatment of Burns, Enterprise Institute of National Health, East Slovak Iron Works, in 1978—1980. 18 children, i. e.

2.47 %, died. The most frequent concomitant paediatric complaints were: inflammatory involvement of the respiratory tract, anaemia, circulatory disorders, homeostatic disturbances, sepsis, diseases of the uropoietic system and neurological disorders. The authors stress the need for close co-operation between paediatricians and burn surgeons in both diagnosis and therapy, including the determination of the best time for surgical treatment.

RESUME

Les expériences du pédiatre avec le traitement des enfants brûlés

Prekop, R., Šimko, Š., Antónyová, E., Pillarová, E.

Les auteurs présentent l'analyse de 657 enfants qui ont été hospitalisés à l'établissement hospitalier des Aciéries est-slovaques, au centre des brûlures, pendant la période de trois ans (1978—1980). 18 enfants ont décédé, ce qui fait 2,47 %.

Les maladies pédiatriques les plus fréquentes étaient: inflammation des voies aériennes, anémie, troubles de la circulation sanguine, troubles de la composition du milieu interne, états septiques, maladies du système uropoétique, troubles neurologiques.

Les auteurs accentuent l'importance de la coopération étroite parmi tous les spécialistes de l'équipe, surtout celle du pédiatre avec le chirurgien qui doivent se consulter au sujet des procédés diagnostics et thérapeutiques, ainsi que du traitement chirurgical.

ZUSAMMENFASSUNG

Erfahrungen des Pädiaters in der Behandlung verbrannter Kinder

Prekop, R., Šimko, Š., Antónyová, E., Pillarová, E.

Die Autoren legen vor die Analyse von 657 Kindern, die in der Abteilung für die Behandlung von Verbrennungen in der Betriebspoliklinik des Institutes für Volksgesundheit der Ostslowakischen Eisenwerke in den Jahren 1978—1980 hospitalisiert wurden. Es sind 18 Kinder gestorben, d. h. 2.47 %.

Die häufigsten pädiatrischen Erkrankungen waren: Entzündungszustände der Atemwege, Anämie, Blutkreislaufstörungen, Störungen der Zusammensetzung des inneren Milieus, septische Zustände, Erkrankungen des uropoetischen Systems und neurologische Störungen.

Nachdruck wird gelegt auf die enge Zusammenarbeit des Pädiaters mit dem Chirurgen der Abteilung für Verbrennungen im diagnostischen und therapeutischen Verfahren einschliesslich der geeigneten Zeit der chirurgischen Behandlung.

RESUMEN

Experiencias del pediatra en el tratamiento de niños quemados

Prekop, R., Šimko, Š., Antónyová, E., Pillarová, E.

Los autores presentan un análisis de 657 casos de niños con quemaduras, hospitalizados en el pabellón de tratamiento de quemaduras del Centro de la Salud Nacional adscrito a la Fábrica Siderúrgica de Eslovaquia del Este, de 1978 a 1980. Sucumbieron 18 niños, e. d. el 2,47 %.

Las enfermedades pediátricas más frecuentes fueron las siguientes: inflamaciones de las vías respiratorias, anemias, defectos de la circulación, defectos de la composición del medio interior, estados sépticos, enfermedades del sistema uropoético y trastornos neurológicos.

Se recalca la estrecha cooperación existente entre el pediatra y el cirujano en cuanto al procedimiento diagnóstico y terapéutico, incluyendo el tiempo adecuado y oportuno para intervención quirúrgica.

REFERENCES

1. Artz, C. P., Moncrief, J. A., Pruitt, B. A.: Burns. W. B. Saunders, co., Philadelphia 1979.
2. Bernát, J.: Az égési anaemia pathogenesis. Akadémia Kiadó, Budapest 1971.
3. Carvajal, H. E., Parks, D. H., Larson, D. H.: Management of the Acutely Burned Child. Wholesale book dealers, Indialantic, Florida 1977.
4. Gans, S. G.: Surgical Pediatrics, Non-operative Care, Crune and Straton, Inc., New York 1980.
5. Rehbein, F.: Der Unfall in Kindesalter. Hypokrates Verlag, Stuttgart 1972.
6. Stephanini, P., Speranza, V.: International College of Surgeons. Excerpta Med., Amsterdam. Amer. Elsevier com., New York 1973.

Dr. R. Prekop,
ZÚNZ VSŽ Hospital,
044 53 Košice-Šaca, Czechoslovakia

generation. The author did his best to include what in his opinion are the most progressive surgical methods and techniques, making a particular point of providing details of technical problems such as tend to be ignored or glossed over in other communications though they are often crucial for a successful aesthetic outcome of the surgical operation.

The book falls into three basic chapters:

- I. Body contouring surgery (chest, abdomen, upper and lower extremities)
- II. Aesthetic surgery of the head and body
- III. General aesthetic problems

Mammoplasty

Reporting on the technique of reduction mammoplasty in what is a thorough-going analysis the author gives details of his own method known as the Pitanguy technique. Drawing upon my own experience I should like to emphasize the advantages

of the method in contrast to other techniques.

1. The surgeon is allowed considerable freedom of choice as regards his decision on the individual shape of the breast, and the localization of the mamilla and areola in what is an improvement on the set pattern method. The technique of drawing is simple.

2. A small percentage of complications (more than one half lower than in other common methods of reduction mammoplasty according to the author's report). Necrosis of the mamilla or skin is very rare and so are haematomas since the technique leaves no dead space.

3. The aesthetic results are very good, the method can be applied both to small reduction mammoplasty and to large hypertrophies. In view of the surgeon's considerable freedom of decision the resulting shape is very much dependent on his experience and aesthetic sense.

Continued see page 254

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

PSYCHOLOGICAL ASPECTS OF PAEDIATRIC BURNS

I. Pondělíček, R. Königová

Any major or minor injury resulting in scar deformity of a part of the body, particularly of parts which are exposed and therefore visible, affects the mental state of the injured. In some cases the patient gradually becomes reconciled with his condition and adjust to it, but in other cases even decompensation of the mental state can develop. A highly important factor here is the patient's mental state before the injury, his or her age (the older the patient, the more easily he does adjust), and finally his or her family and social environment.



Fig. 1 — The facial triangle

The worst danger of mental traumatization occurs in the case of facial injuries, especially of the facial triangle (Fig. 1), since the face is most exposed to view. There are at least three reasons why the face represents its owner's personality: its importance is social, aesthetic and communicative.

Face deformities affect the mental balance more strongly than any other, particularly in the lower age categories. Particularly young people in post-pubertal age, adolescents, or single men or women feel less self-assured, suffer from feelings of inferiority, and are much more strongly affected by the change in their appearance than older persons or persons who find psychological support in their married life.

There are different outward manifestations of their feelings — mostly introspection and attempts to isolate oneself from the ambient world, or also increased aggressiveness to compensate for the desire to demonstrate one's own worth and to dominate the hostile world.

This so called psychosyndrome can also be subclinically identified in children in pre-pubertal age. While the symptoms listed above are not yet manifested on the behaviour level, they can already be recognized as prodromes on the experience level.



Fig. 2 — Patient J. H., 6 years, severely burned in the face, neck and hands

The following case history can be offered as an example:

The patient is J. H. (Fig. 2), aged 6 years, who suffered a deep burn of his face, neck and hands, psychological tests 4 years later.

The boy's parents are divorced and his education was influenced by his very strict grandmother. The boy was well-behaved before his injury, but about one year after it there was a considerable turn for the worse. He is disobedient, mean, rude and cruel to children, stubborn in his attitude to authority, and lacking in self-control.

We were interested to know if he is not mocked by members of his age group because of his facial deformity. We found that rather the contrary was true: he plays the leading role in a boys' gang. He says that he has 18 pals. If this is true, it is a proof of his sociability; if it is only a boast, it is a proof of his tendency towards sociability.

The Rorschach test showed that his strongest character trait is aggressiveness, and a feeling of loss of personal identity is also indicated. The drawing test (Fig. 3), produced an interesting result. Being asked to draw a figure, the patient drew a figure, the patient drew a soldier armed to the teeth, with a submachine gun, grenades, in full batteldress complete with helmet, in firing position (aggressiveness).



Fig. 3 — The drawing test

The drawing is a left-side profile, although children usually draw figures in en face positions in such tests. A reason for this could be that the patient wishes to conceal the defect on the right side of his own face. While the drawing includes details, the soldier has fingers missing, which again could be seen as the patient's attempt to conceal his own defect.

The Lüscher test reveals certain other personality traits, particularly a subconscious search for a milieu in which the 10 year old boy could satisfy his need for identification. However, in that search he came to assume a stubborn and rebellious attitude. He cannot cope with the conditions which life imposes. Sooner or later, this will lead to feelings of personal inadequacy. He employs pseudocompensating maneuvers to deceive himself and others, including the destructive assessment of others, as a method which could perhaps serve him to offset his own feelings of powerlessness and frustration.

The case described above is not exceptional. It confirms that persons — particularly young people and children — who have suffered burns on exposed parts of the body, who almost always leave the hospital with deformations visible to others, require special care both during hospitalization and later during integration in normal life.

We believe that following requirements are of primary importance in this respect:

1. Continuous care for burned patients by the stable team of doctors and nurses from the beginning of treatment to the end.
2. Direct participation of a psychologist in the treatment of burns, both during hospitalization and during rehabilitation and convalescence.
3. Close cooperation between the physician and the psychologist on the one hand, and the patient's family or representatives of his other milieu (school, employment) on the other.

It is only thus that we can alleviate the mental anguish of those whom we send out as "healed" to face life and perhaps also help to prevent those children from turning later, in their adolescence, into totally dissociated and anomalous individuals suffering from loss of personal identity.

SUMMARY

In a follow-up study to their interpretation of the "disfigured-face syndrome" the authors discuss the prodromes of the syndrome in childhood. To illustrate this they present the case of a pre-puberty boy who sustained severe burns in the face, neck and hands, at the age of 6 years, and who had to be examined by psychologists at the age of 10 years during a subsequent hospitalization for reconstructive surgery. The authors stress the likelihood of adverse social prognosis for the patient's adult age. Hence their emphasis on the need for continual and long-term teamwork aimed at the patient's rehabilitation and readjustment to his new living conditions, and also for the direct participation of a psychologist specializing in this kind of follow-up care, and for close co-operation between the surgeon and clinical psychologist and the patient's family and friends.

RESUME

Les brûlures des enfants et leurs aspects psychologiques

Pondělíček, J., Königová, R.

Les auteurs se basent sur leur interprétation de soi-disant „disfigured face syndrome“ et avertissent de leurs prodromes en enfance.

Ils nous l'ont démontré par une casuistique d'un garçon à l'âge pré-pubertaire qui a été — à l'âge de 6 ans — gravement brûlé à la face, au cou et aux mains. Plus tard, à l'âge de 10 ans, pendant sa réhospitalisation pour une intervention réconstructive, il a été examiné par le psychologue.

Les auteurs soulignent la probabilité du pronostic social défavorable dans la période de l'âge adulte. Ils accentuent la nécessité de la coopération intime de plusieurs spécialistes. Le traitement des brûlures nécessite une équipe entraînée qui puisse soigner le malade continument jusqu'à la réhabilitation, l'équipe qui soit capable de l'aider à la réadaptation aux nouvelles conditions de la vie. Cette réadaptation exige le contact étroit du chirurgien plastique et du psychologue clinique avec la famille du malade et avec son environnement social le plus proche.

ZUSAMMENFASSUNG

Psychologische Aspekte bei den verbrannten Kindern

Pondělíček, J., Königová, R.

Im Zusammenhang mit ihrer Interpretation des sog. „disfigured-face Syndroms“ weisen die Autoren auf seine Prodrome im Kindesalter hin. Sie bringen es kasuistisch näher auf dem Fall eines Jungens im Präpubertätsalter, der im Alter von 6 Jahren im Gesicht, auf dem Hals und auf den Händen schwer verbrannt und während der späteren Hospitalisierung wegen eines Wiederherstellungseingriffes im Alter 10 Jahren psychologisch untersucht wurde.

Die Autoren betonen die Wahrscheinlichkeit der ungünstigen sozialen Prognose im Erwachsenenalter des Patienten. Und deshalb betonen sie die Notwendigkeit der in Teamarbeit durchzuführenden kontinuierlichen und langfristigen Betreuung, die in die Rehabilitation und Readaptation an neue Lebensbedingungen münden soll, ferner die direkte Teilnahme des Psychologen-Spezialisten an dieser Behandlung und Readaptation sowie die enge Zusammenarbeit des Verbrennungschirurgen und des klinischen Psychologen mit der Familie und der nächsten sozialen Umwelt des Betroffenen.

RESUMEN

Aspectos psicológicos en los niños quemados

Pondělíček, J., Königová, R.

Partiendo de su interpretación del llamado “disfigured-face syndrome”, los autores señalan los prodromos de éste en la edad infantil. Como ejemplo concreto presentan el caso de un muchacho prepubertal quien, a los seis años de edad, resultó gravemente quemado en la cara, el cuello y las manos. A los diez años de edad el muchacho fue sometido a exámenes psicológicos en ocasión de su hospitalización para una operación reconstructiva.

Los autores enfatizan la probabilidad de una prognosis social desfavorable en la edad madura del paciente. Por lo tanto, acentúan la necesidad de un tratamiento coordinado, continuo y a largo plazo con subsiguiente proceso de rehabilitación y readaptación a las nuevas condiciones de vida. En este tratamiento y esta readaptación se precisa de una participación directa del psicólogo-especialista así como de una estrecha cooperación del cirujano de quemaduras y del psicólogo clínico con la familia y el medio social circundante más cercano del paciente.

REFERENCES

1. **Bohm, E.:** Lehrbuch der Rorschach-Psychodiagnostik. 4th edition. Verl. Hans Huber, Bern, Stuttgart, Wien, 1972.
 2. **Lüscher, M.:** Farbentest. Verl. Hans Huber, Bern, Stuttgart, Wien, 1976.
 3. **Pondělíček, I., Königová, R.:** Facial Disfiguration: Motivation for Plastic Surgery and Its Psychological Interpretation. Paper presented at the 1980 Prague Seminar of the Plastic Surgery Department. — Also to be found in: Königová, R., Pondělíček, J.: Reconstructive Surgery and Rehabilitation in Burned Patients. Section 6. (In Czech.) In press — Avicenum Prague.
- Dr. I. Pondělíček, Burn Centre,
Lidových milicí 63,
120 00 Prague, Czechoslovakia

For augmentation mammaplasty, the author recommends the transareolomamillary technique which he himself uses and describes. At this point, I should like to draw the readers' attention to the augmentation technique via the axilla which I myself have been using at our unit and which, according to my experience, offers some substantial advantages. Although more exacting, it guarantees excellent aesthetic result with no scars on the chest, a feature of utmost significant for the woman. Yet another advantage of that method is that the very next day after the operation the patient can be left free from any dressing, and that exercise and massage can already then be started to prevent the most salient of long-term complications, namely the development of a hard fibrous capsule around the implant.

In the author's concept, aesthetic mammaplasty includes the whole reconstructive surgery of the breasts and deformities of the mamillary-areolar complex, which in my view is fully justified. There

follow once again precise descriptions of the particular surgical operations and technical procedures complete with an abundance of case report and a number of documentary photographs. For reconstructions of the whole breast, the author makes use of extensive mobilization and large direct transfer flaps without resorting to bipedicle tube flaps, which strokes me as a correct and modern approach.

Abdominoplasty

For abdominal wall plastic operations, the author uses exclusively the horizontal suprapubic incision with abdominal wall mobilization, plastic operation on the musculoaponeurosis as far up as the xiphoid, and reimplantation of the navel. This technique is aesthetic in the true sense of the word as the resulting scar is always situated so as to be covered up by the swimming suit panties. Its advantages against the anchor-shaped scar used in

this country are partly aesthetic in nature but also marked by fewer complications such as necrosis in the middle part at the point where the three sutures meet. Judging from the rich photographic documents, it appears that the technique can also be used for case of massive overhanging of the abdominal wall.

Buttocks — thighs

Corrections for the deformities of the gluteal region and the thighs are performed as routine operations. The most important phase involves the making of the correct sketch of the part to be resected, which is always consulted with the patient. Her consent is also necessary as regards the situation of the resulting scars. The purpose is to choose the scars so that they can be covered up by the swimming suit. The principle of the surgical technique is rotation and upward sliding of the lower flap so as to bring the line of the upper part of the excision as high as possible since this is what determines the resulting scar. Corrective operations for the arms follow essentially the same pattern.

Aesthetic surgery of the head and neck

Rhytidectomy (Face lift)

The author gives a detailed and plastic description of the traditional skin flap technique only to introduce also the more recent radical methods, the so called muscular lifts, which are now beginning to be used as an increasingly popular technique by a growing number of plastic surgeons. The muscular lift involves the lifting of the superficial musculo-aponeurotic system of the face, including the platysma.

Blepharoplasty

The technique of surgical operation on the eyelids is presented in its classical form with stress laid on the correct outlining of the surgical incisions with regard to the resulting line of the scar, especially in the lower lids.

Rhinoplasty

The technique of rhinoplasty is presented using the intercartilaginous approach and retrograde preparation of the alar cartilages. This is now a routinely used technique with low-to-high osteotomy. There is no reference to the technique of intercartilaginous incision which offers some advantage and, oddly enough, seems to be little used in the countries of the West. This particular chapter on what is the most difficult problem of aesthetic surgery is presented in mere outlines with very little detailed description although this would be invaluable for any plastic surgeon engaged in rhinoplasty.

Otoplasty

The author presents the description of only one operation for lop ears, which, in my view, falls far short of the whole complex problem of surgical correction for prominent external ears. The surgeon should obviously take an individual approach to otoplasty, and should be experienced in the use of different techniques to be able to use combinations flexibly. The part on reconstructive operations merely recounts already established techniques without introducing anything new.

General aesthetic problems

This part includes chapters such as: combination aesthetic plastic operations making use of several different operations, haemangiomas, large congenital pigmented naevi, injuries, surgical treatment of some tissues, and the problem of scars.

Last, let me stress the main contribution of the whole book, namely its opening part fittingly entitled "Body contouring surgery". The author's bibliography is almost entirely based on references to Anglo-Saxon authors, and so I was a little sorry not to have found a single reference to Czechoslovakia's František Burian, a towering figure of plastic surgery if there ever was one.

K. Fahoun, M. D.,
Jeremenkova 85,
147 00 Prague 4, Czechoslovakia



ETHICON

LIMITED

A New Synthetic Absorbable Suture from Ethicon Limited

Ethicon Limited announce a major advance in synthetic absorbable sutures with the introduction in the U. K. and Eire of coated VICRYL Polyglactin 910 sutures.

Coated VICRYL sutures are the result of an extensive research, development and clinical trial programme and are designed to overcome many of the disadvantages frequently associated with synthetic absorbable materials. The braided suture material is coated with an absorbable coating which provides significant improvements in knotting and handling characteristics. Knots tie down and hold with substantially less force than uncoated synthetic absorbables and knot placement and tensioning is smooth and precise. The trauma and sawing action normally associated with the passage through tissue of synthetic absorbables is also dramatically reduced. VICRYL Polyglactin 910 suture is a copolymer of glycolide and lactide having extremely high initial tensile strength (only Stainless Steel is stronger gauge for gauge) and in vivo strength retention is unsurpassed by any other synthetic absorbable. Coated VICRYL 910 is, however, absorbed faster than other synthetic absorbables thereby minimising the possibility of long term reaction. Total absorption is usually complete between the 60th and 90th day.

Coated VICRYL sutures are available in 1,5 metre lengths or attached to an extensive range of needles.

For further information and technical data sheet, contact: ETHICON LIMITED, P. O. Box 408, Bankhead Avenue, Edinburgh EH11 4HE

or

ČTK — Made in... (Publicity), Kotorská 16, 140 04 Praha 4, tel. 422155—8, British department.

CONTENTS

Pospíšilová J.: Healing of Wounds	193
Gulyás G., Kartik I., Takács L., Máté F.: Microvascular Free Flap Transplantation	205
Chervenkov Y., Diakov R.: Replantation of Abrupted Skin	213
Riebelová V.: Haemangiomas. Notes on their classification	219
Blaha J.: Experience of Children's Burns Treatment	227
Moserová J., Hlava P., Malínský J.: Scope for Ultrasound Diagnosis of the Depth of the Thermal Damage. Preliminary report	235
Prekop R., Šimko Š., Antónyová E., Pillarová L.: Paediatricians' Experience of the Treatment of Burned Children	243
Pondělíček I., Königová R.: Psychological Aspects of Paediatric Burns	249
News	204
News Books	218, 248, 254, 255

STOP FOR A MOMENT AND CONSIDER YOUR HEALTH



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

**CZECHOSLOVAK SPAS — OASES OF HEALTH,
QUIET AND INSPIRATION**

**KARLOVY VARY — FRANTIŠKOVY LÁZNE — MARIÁNSKÉ LÁZNE — JÁCHYMOV —
TEPLICE V ČECHÁCH — PODEBRADY — JANSKÉ LÁZNE — TREBON — JESENÍK
LUHAČOVICE — TEPLICE NAD BEČVOU**



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