ANATOMICAL-SURGICAL ASPECTS IN GENIAN TUMOURS

V.V. Costan, C.I. Drochioi, Daniela Sulea*, A. Nicolau, Oana Elena Ciurcanu*, Andrada Doscas, M.L. Ciofu

"Grigore T.Popa" University of Medicine and Pharmacy, Iasi, Romania
Faculty of Dental Medicine
Department of Oral and Maxillo-Facial Surgery

ANATOMICAL-SURGICAL ASPECTS IN GENIAN TUMOURS (Abstract): The facial skin offers rich resources to cover the loss of substance, having specific characteristics that differ from one region to another. The knowledge and understanding of the properties of the local flaps as well as of the appropriate technique for their realization will contribute to obtaining superior aesthetic results. The aim of this study is to identify the main morpho functional and aesthetics characteristic of local flaps used in jugal reconstruction after tumour excision. The retrospective study was conducted on 36 patients with facial skin carcinomas. A proper experience is required from the surgeon, because each aesthetic unit must be reconstructed only in a certain way, as far as possible separated from the other. Much imagination is needed, since there are frequently additional limitations, due to existing premalignant changes in the skin adjacent to the defect, but also due to pre-existing scars from previous surgery or from traumas suffered previously by the patient. **Key-words:** GENIAN TUMOURS, ROTATED FLAPS

INTRODUCTION

The facial skin offers rich resources to cover the loss of substance, having specific characteristics that differ from one region to another. The knowledge and understanding of the properties of the local flaps as well as of the appropriate technique for their realization will contribute, together with the surgeon's creativity, to obtaining superior aesthetic results (1, 2).

The success of the facial reconstruction by using local flaps consist in ensuring a suitable axial vascularization depending on the need of the plasty procedure. Knowing the anatomy of the tegument and especially the vascular anatomy are of major importance for the correct understanding and realization of the various types of local flaps (3, 4).

Changes that occur with age or certain pathological conditions at the level of the vascularization of the skin limit the use of certain types of reconstruction in view of the survival of the flaps (5).

Vascularization of a flap is of major importance because its survival lies in ensuring optimal tissue perfusion at its level. Multiple systemic factors can influence the blood supply to the skin and thus influence the survival of the flap (6, 7).

One of these factors is body temperature, as well as exposure of the skin to temperature variations of the environment. Skin blood circulation has two important functions: to supply tissues with nutrients, and a second function of thermoregulation. Its role in the mechanism of thermoregulation is also the reason why the rate of cutaneous blood circulation is ten times higher than the rate required to ensure optimal nutritional intake, even under normal temperature conditions (8, 9).

Under the conditions of maximum vasodilation, the rate of cutaneous blood circulation increases up to seven times the value under ordinary conditions, and when the skin is exposed to extreme cold, vasoconstriction will cause the cutaneous circulation to decrease to the lower limit in ensuring tissue nutrition. The regulation of arterial resistance and venous capacity is under the control of the autonomic

Fig. 1. Left genian region carcinoma.

Fig. 2. The reconstruction was made with a genian rotated flap

central nervous system through its role in modulating arteriovenous communications (10,11,12).

Based on the knowledge of skin vascularization patterns, the choice of shape, size and location of the flaps is made to ensure their survival. One of the principles long established in the creation of local flaps with random vascularity was the belief that ensuring an increased viable length of the flap can be achieved by increasing the width of its base. On this respect, if the base of the flap is made of adequate width, a flap of almost any length can be obtained. The length-width rate is purely indicative and cannot guarantee success, and this is explained by knowing the irrigation of random flaps.

Their vascularization comes from the closest cutaneous perforant artery, penetrating the base of the flap and supplying it through the connection between the dermal and subdermal plexuses. In this way, the viable length of the flap does not depend on the width of its base, but on the perfusion pressure of the vessels and the intravascular resistance. Even if the first enlargement of the flap base includes additional vessels, all of them will have the same infusion pressure and will face the same resistance, and survival will not be improved (13, 14, 15).

The arteriovenous capillaries communications have also been implicated in the explanation of the flap delay phenomenon. Thus, in the case of the local flaps with random vascularization, it is preferred to make parallel incisions on the edges of the flap, the latter remaining attached at the ends, while the subcutaneous portion will be undermined for interrupt perforants. At the time of transfer, the distal end of the flap is cut. In the case of the axial flaps, the incision of the edges is enough, without the need for undermining. Although there is no clear data on the required duration, generally the flaps are delayed for 10-21 days. After the period of 3 weeks up to 3 months the benefits of delay are lost (16, 17).

The aim of this study is to identify the main morpho functional and aesthetics characteristic of local flaps used in jugal reconstruction after tumour excision.

MATERIAL AND METHOD

The retrospective study was conducted on 36 patients with tumours located at the level of the facial tegument, involving the genian region. All patients were admitted and treated in the oro-maxillofacial Clinic of "St. Spiridon" Emergency Hospital in Iasi.

RESULTS

Local and regional flaps were used for the plasty of the defects. The postoperative results were favourable in all cases, with minimal complications.

In some cases, rotated flaps were used. They are pivoting flaps with a curvilinear configuration that must be made immediately adjacent to the defect, their edge becoming the mobilization limit. The flap basically involves a rotation around a pivot point as well as an advancement of the flap. The rotated flaps can be used in different regions of the face, and within the same region of the face with different sizes.

To illustrate, we present two cases from the study group in which rotated flaps of different sizes were used. A first case is a man with a left genian basal cell carcinoma (Fig. 1). The reconstruction of the operative defect was made with a rotated flap from the genian region (Fig. 2).

Fig. 3. One year follow up – maintenance of facial symmetry and the presence of discrete postoperative scars

Fig. 4. Clinical aspect of a basal cell carcinoma in the superior third of the genian region

Fig. 5. Rotated flap of the cheek

The postoperative result at 1 year was excellent, both in terms of maintaining the patient's facial symmetry, but at the same time the postoperative scars are discrete (Fig. 3).

In certain situations, the size and placement of the tumour formation makes it necessary to use large rotated flaps. This procedure was performed in a 72-year-old patient with a genian carcinoma involving the entire upper third of the right cheek region (Fig. 4). A cheek flap was made (Fig. 5).

Despite the complex appearance of the flap and long incision lines, the one-year postoperative aspect is excellent. The correct placement of the incision lines camouflaged them efficiently, and the rotated and released flap efficiently allowed obtaining both aesthetic and excellent functional results (Fig. 6).

None of the flaps were totally lost. There was marginal necrosis in a number of 7 flaps. A clear delimitation of the devitalized areas from flaps was expected, which was then surgically removed. No further intervention was required for secondary correction. Only in the case of some of the frontal flaps was a second surgery needed in order to autonomize the frontal flap.

Fig. 6. Clinical aspect after surgery

In one of the patients there was a scar ectropion whose resolution consisted of placing a skin graft harvested from the upper eyelid, which released the lower eyelid, thus disappearing the ectropion.

DISCUSSIONS

The coverage of skin defects with local flaps is based on certain properties of the skin that allow the closure of the primary defect as well as the place of harvesting of the flap. The optimal distribution of the tegument available at the level of these areas is mainly based on its elasticity used correctly, by implementing an appropriate technique (18).

The tegument is a dynamic organ that can adapt to the forces that are applied to it due to its elastic properties. Collagen and elastin content are the main determinant of skin elasticity. Immediately after applying a force, the first ones responsible for deformation are the elastin fibres. Due to these, the skin is extensible, being easily deformed by stretching in an initial phase. If this phase continues, the next ones that react are the collagen fibres that will gradually align along the force direction. This will result in a more difficult deformation ; a greater force being required to obtain the same degree of stretching. When the collagen fibres have completely aligned with the deforming force, an additional strain produces only minor changes. The elasticity of the skin decreases with age (19).

The tension exerted on a flap is inversely proportional to the blood flow through it, an important factor to consider especially in the case of large flaps.

The principle underlying tissue expansion and serial excision is stress relaxation. This occurs when the skin is under constant tension for days to weeks, which will cause the skin to adapt by increasing its volume which will result in decreased tension (20, 14, 16).

Extremely important for the avoidance of tension in the realization of local flaps is the knowledge of cutaneous lines of minimum tension that are perpendicular to the lines of maximum extensibility. Noticing them is easy because they overlap natural wrinkles and lines. These indicate the incision placement areas to obtain optimal extensibility of the edges for wound closure, minimal tension and will result in an imperceptible scar (17).

One factor that can lead to vascular insufficiency and necrosis is the existence of exaggerated tension in the flap. The formation of hematomas or seromas can influence the viability of the flaps, both by increasing the tension at the postoperative wound level, as well as by the compression effect that exerts on the blood vessels. Also, products resulting from hematoma degradation can cause a direct toxic effect. In this sense it is important to suppress the existence of dead spaces by different methods, especially by using drainage in the case of large flaps. The rejection of flaps can also be caused by the infection of the postoperative wound, which is favoured both by immunosuppression conditions and by local factors (15, 18, 20).

Compression of the flaps produced by various causes, including by incorrect placement of the bandage, will reduce the blood flow and may lead to consecutive necrosis of the flap.

One of the basic rules in facial aesthetics is the careful placement of incisions along the lines of minimal skin tension. These have been described by Dupuytren, they are also called Langer's lines and they overlap with the face's natural wrinkles and folds, camouflaging the incisions. Also, when this indication is respected, the tension in the wound is minimal, resulting in discrete postoperative scars (17, 14).

In making the flap design it is important to take these lines into account, especially regarding closing the defect at the harvesting site.

Additional factors that may limit the positioning of the incisions and the choice of flap used for reconstruction are pre-existing scars located in the adjacent regions of flap harvesting. They may influence flap vascularity and careful consideration must be given to the positioning of the flap.

Furthermore, particularly in sun-exposed areas like the genian and frontal regions, there are several skin areas that have pre-malignant changes and limit the positioning of the flap for reconstruction.

In our study, the achieved favourable results were due to the careful consideration of all the previously listed factors, which allowed an optimal flap choice and positioning, with adequate defect closure, good vascularity, minimal tension, well-hidden scars and a good match of skin texture and colour.

CONCLUSIONS

Our study shows that with proper technique and flap selection, the genian region can be reconstructed with optimal results and minimal complications. Awareness of the reconstructive principles that ensure good flap vascularity, minimal tension at the reconstructed site, and adequate restoration of facial subunits, increases the chances for flap survival and decreases the rate of complications.

REFERENCES

1. Jackson IT. *Local flaps in head and neck reconstruction*. The C.V. Mosby Company, St. Louis, Toronto, Princeton, 1985.
2. Baker SR. *Local flaps in facial reconstruction*. Elsevier, 2007.
3. Michael Miloro, G. E. Ghali, Peter E. Larsen, Peter D. *Peterson's Principles Of Oral And Maxillofacial Surgery* Second Edition, Waite, Bc Decker Inc. 2004.
4. Jon-Paul Pepper ; Shan R. Baker. Local Flaps : Cheek and Lip Reconstruction, *JAMA Facial Plast Surg*. 2013.
5. Emmet AJJ. The closure of defects by using adjacent triangular flaps with subcutaneous pedicules. *Plast Reconstr Surg* 1977 ; 59 : 45-52.
6. Gillies HD. *Plastic surgery of the face*. London : Oxford University Press, 1920.
7. Gonzales-Ulloa M. Restoration of the face covering by means of selected skin in regional esthetic units. *Br J Plast Surg* 1956 ; 9 : 212-22.
8. Andradedes PR, Calderon W, Leniz P, et al.Geometric analysis of the V-Y Advancement flap and its clinical applications. *Plast Reconstr Surg* 2005 ; 115 : 1582–1590.
9. Kalus R, Zamora S.Aesthetic considerations in facial reconstructive surgery : the V-Y flap revisited. *Aesthetic Plast Surg* 1996 ; 20 : 83–86.
10. Cook JL. A review of the bilobed flaps design with particular emphasis on the minimization of alar displacement. *Dermatol Surg* 2000 ; 26 : 354–362.
11. McGregor JC, Soutar DS. A critical assessment of the bilobed flap. *Br J Plast Surg* 1981 ; 34 : 197–205.
12. Mulliken JB, Healey NA. Pathogenesis of skin flap necrosis from an underlying hematoma. *Plast Reconstr Surg* 1979 ; 63 : 540–545.
13. Aasi SZ, Leffell DJ. Bilobed transposition flap. *Dermatol Clin* 2005 ; 23 : 55–64.
14. Gaboriau HP, Murakami CS. Skin anatomy and flap physiology. *Otolaryngol Clin North Am* 2001 ; 34 : 555–569. Review.
15. Taylor GI, Corlett RJ, Caddy CM, et al.An anatomic review of the delay phenomenon : II. Clinical applications. *Plast Reconstr Surg* 1992 ; 89 : 408–416.
16. Larrabee WF Jr, Sutton D. The biomechanics of advancement and rotation flaps. *Laryngoscope* 1981 ; 91 : 726–734.
17. Attempts to augment survival in skin flaps : mechanism of the delay phenomenon. Myers MB. In : Myers MB, Grabb WC, eds. *Skin flaps Boston* : Little Brown, 1975 : 65–69.
18. Reinsch JF. The pathophysiology of skin flap circulation. *Plast Reconstr Surg* 1975 ; 54 : 585–598.
19. Gullane PJ, Henneman H. Regional flaps in the head and neck Self-instructional package. Washington DC : *American Academy of Otolaryngology–Head and Neck Surgery*, 1982.
20. Cutting C. Critical closing and perfusion pressures in flap survival. *Ann Plast Surg* 9 : 524, 1982.

**** Corresponding author***

Daniela Sulea
e-mail: daniela.sulea@umfiasi.ro

Oana Elena Ciurcanu
oana.ciurcanu@umfiasi.ro