Case Report
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Supraclavicular Flap for Reconstruction of the Face

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The aesthetic and functional role of the human face can not be overemphasized. It is keystone in perception of self-identity and represents the most striking features of an individual's being. Being a place of concentration of major perceptive organs, like eyes, ears and nose, the face also has direct involvement in emotional and social communication.

Facial disfigurements may present in different forms, varying from minor nuisances to severe debilitating problems. The main goals in reconstruction of severely deformed face include restoration of function, comfort and appearance. Nowadays we have plenty of surgical modalities to fulfill these tasks, including cadaveric face transplantation. However, neither of the procedures can be considered as fully consistent in terms of achievable results.

Here we describe reconstruction of face by expanded supraclavicular flap. Two clinical cases are presented.

We performed a three-stage reconstruction, which included implantation of tissue expander in supraclavicular area, subsequent transfer of a fasciocutanous flap onto the face, and finally, pedicle division of the flap with additional scar revision. A satisfactory fascial shape has been achieved.

We believe that supraclavicular flap, prefabricated by expansion is a powerful tool for autologous reconstruction of face and can be successfully used in selected cases.

Keywords: face, burn, reconstruction, expander, supraclavicular, flap

Introduction

Face has a great importance, both from aesthetic and functional point of view in a human life. It is keystone in perception of self-identity and represents the most striking features of an individual's being. Being a place of concentration of major perceptive organs, like eyes, ears and nose, the face also has direct involvement in emotional and social communication [1, 2].

Disruptions of face features vary in their severity from minor nuisances to severe debilitating problems. There are many causes which may make patient seek facial reconstruction. Mechanical traumas, burns and tumors are among major causes [2]. As final result the patient gets a conglomerate of scarred tissues which can interfere with mouth, nose and eyes functions, cause painful or unpleasant sensation (including intense itching) and often burden the affected person with unbearable psychosocial problems [3].

The goals of reconstruction of severely deformed face include therefore, restoration of function, comfort and appearance. Nowadays, there are many methods of reconstruction of severely scarred facial skin. Small lesions can be directly excised and closed primarily either by linear suture or by adding Z-plasticies if necessary. More large areas require local flaps, which are particularly usable in reconstructions around natural orifices. Burn scars, particularly those including 1 or 2 aesthetic areas can be covered by suitable skin grafts, i.e. from preauricular, mastoid or clavicular area [1, 3]. However,

this technique doesn't give predictable results in many cases. Complex problems, such as central facial tissue defects usually require free transfers of autologuous tissues. Almost complete scarring of facial skin remains challenge for reconstruction. Face allotransplantation was offered as a solution in such cases since 2005. Although, preliminary results were promising there are still many issues related to donor selection, graft failure (rejection), comorbidities induced by immunosuppressive drugs, graft availability and ethical considerations [2].

Because of unique quality and quite a large area of the face many conventional techniques fall short in results of reconstruction of large facial defects. The supraclavicular area represents most suitable donor area for substitution of the skin of the face, being closer to face skin both in sense of texture and pliability. There are different methods of utilizing supraclavicular skin, including prefabrication by transferring different vascular pedicles in this area and usage of tissue expanders [4, 5, 6].

The usage of free flap for prefabrication definitely adds donor site morbidity and prolongs time of operation. Insufficiency of insurance cover and all consequences that follows should also been taken in consideration. Although we perform all kinds of microsurgical procedures we decided to use more simple technique on our patients, as their family members insisted on the use of procedures with no risk of total flap failure.

Supraclavicular flap is a fasciocutaneous flap based on branch of transverse cervical artery. It can be used as pedicled, free or even as perforator flap. As a regional flap it can be used for closure of defects in lower neck and lateral areas of the face [7].

Here we present 2 patients with face disfigurement, one after burn and other after necrosis of vascular malformation. In both patients we used expansion of supraclavicular flap with subsequent transfer of the expanded flap to scarred area and pedicle division after 2 weeks from transfer.

Case Presentation

Case 1

A 15-year-old female was referred to our clinic for the treatment of severe face disfigurement. She was burned at age 5 having fell when jumping over a traditional fire place used on Novruz celebration.

Physical examination showed coarse scarring involving almost all the face, except the perioral area. There were pigmented patches of abdominal skin grafts on forehead and both cheeks. Both lower lids were pulled down by the scar tissues which caused moderate to severe ectropions. Moderate contractures were found on anterior cervical skin and submental area. (Fig. 1a).

We planned the operation in three stages. The first stage included subcutaneous implantation of 400 cc rectangular tissue expander into supraclavicular area. The expander was filled intraoperatively by injection of 10 cc of saline with subsequent regular filling 2 times a week in 20-25 cc amounts. After achieving overexpansion with 620 cc volume the filling stopped for 1 month. The second stage was then performed and consisted of removing of the expander and dissection of supraclavicular flap. After mobilization of the flap the reach of it was checked and scared area of the cheek was excised. The flap was sewn on do-

Figure 1. a - Pre-op face appearance, note bilateral ectropion; **b -** Suprascapular flap markings; **c -** Suprascapular flap after expansion; **d -** Cheek after removing scars and raised suprascapular flap; **e -** Suprascupal flap transferred to the cheek with pedicle preservation.

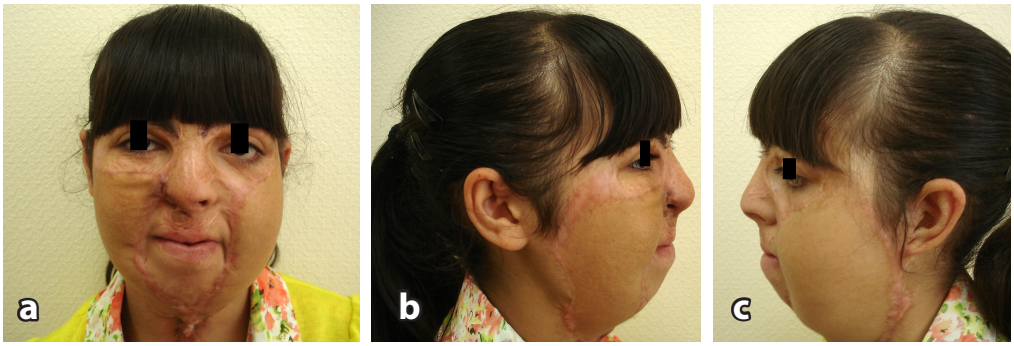

Figure 2. a - Final result after scar revisions, flap debulking and canthopexies, note normal lower lids; **b -** Final result after scar revisions, flap debulking and cantopexies, right side; **c -** Final result after scar revisions, flap debulking and cantopexies, left side.

nor area without disturbing pedicle. The donor site was closed primarily. On the 15th day after second stage the pedicle of the flap was constricted by elastic drainage. After confirmation of adequacy of the circulation the pedicle was divided and final scar revision was performed (Fig. 1 b-e).The same procedure was subsequently performed on the contralateral side.

The postoperative course was even. Hypertrophic scarring on some parts of suture line occurred what required additional scar revision procedures as well as conservative therapy in forms of intralesional steroids and silicone sheets wearing.

Additional partial debulking of the left flap and bilateral cantopexies were performed (Fig. 2 a-c).

As of the last control, the patient had more acceptable appearance. She reported increase in self confidence and social activity. She also developed very good tactile sensation on areas covered by the flap. The ectropion was corrected bilaterally. She continues conservative therapy against scar hypertrophy.

Case 2

A 9 year old female patient referred to us for treatment of face disfigurement. As a child, she got sclerotherapy for large lesion, (presumably large vascular malformation or hemangioma) which occupied major part of her left hemiface. This resulted in fulminant tissue necrosis with secondary infection and consequent scarring. Physical examination showed atrophic scarring involving left cheek, insufficiency of lower lip and loss of the lower 2/3 of the left external ear. We planned reconstruction with expanded supraclavicular flap. First, 320 cc rectangular expander was placed under the left supraclavicular area and gradually expanded twice a week until final size of 400 cc. Then, the expanded flap was transferred to surface of the left cheek after excising the scars. The pedicle of the flap left undisturbed. On the 15th day after second stage the pedicle of the flap was constricted by elastic drainage. After confirmation of adequacy of the circulation the pedicle was divided and final scar revision was performed (Fig 3 a-d).

Figure 3. a - Pre-op face appearance, note insufficiency of lower lip; **b -** Suprascapular flap markings; **c -** Suprascapular flap after expansion; **d -** Suprascupal flap transferred to the cheek with pedicle preservation.

Figure 4. a, b - Preoperative left external ear appearance; **c -** After reconstruction with split rib and full skin grafts, lateral view; **d -** After reconstruction with split rib and full skin grafts, posterior oblique view; **e -** Final result after scar revisions and Abbe flap transfer to lower lip, note oral competence.

Additionally she underwent left ear reconstruction with rib cartilage (Brent's procedure), lower lip reconstruction with Abbe flap and mucosal advancement and suspension of the left corner of mouth to the zygomatic arch by prolene suture (Fig. 4 a-e).

As of the last control, the patient had more acceptable appearance. Her parents reported increase in self confidence and social activity. The skin sensation on the flap area was satisfactory. She has got more symmetry of the position of the lips in static state.

Discussion

Restoration of severely disfigured face still constitutes a challenge. The main goals of facial reconstruction include restoration of acceptable appearance to achieve positive impact on self-confidence and social communication, as well as augmentation of impaired functions. Main causes of fascial disfigurement include mechanical and burn trauma and defects after tumor resection [1, 2, 4].

Nowadays the large spectrum of reconstructive techniques of face can be viewed as repair with either autologuos or alien tissues. The wide use of facial allotransplantation is still hindered by availability of transplants, need in life-long immunosuppressive therapy, ethical issues etc. Small defects of the face can be readily repaired by using conventional techniques like skin grafting or local flaps with sufficiently good results whereas gross disfigurements require transfer of ample amount of tissues, number of operations and still fall short from the ideal [4, 5].

The use of supraclavicular skin for substitution of the face skin has been proposed long ago. However this area is limited in quantity of material. Numerous methods have been proposed to overcome this shortage, among which prefabrication of flaps by implantation of vascular pedicle and consequent expansion has gained popularity [3, 4]. Nevertheless, this adds technical challenges, prolongs the operational time and creates additional donor site morbidity. A different approach is provided by idea of suprascapular flap, which has been largely investigated in N. Pallua's works [7, 8, 9, 10]. This fasciocutaneous flap is based on branch (the supraclavicular artery) of transverse cervical artery. The vasculature of the flap is located at a point which is approximately 3 sm above the clavicle, 8.2 sm lateral to sternoclavicular joint and 2.1 cm dorsal to the lateral edge of sternocleidomastoid muscle. The size of the native flap can vary from 10x20 to 16x30 square centimeters. The dimensions of the flap may be extended far beyond cited ones by using of tissue expanders. The flap can be used as pedicled by tunneling it under cervical skin to the face, or as a free flap.

Because of safety reasons, to exclude the chance of pedicle incarceration we used three-stage transfer. The first stage included incision along clavicular lower border, development of subfacial pocket and placement of expander. After the period of expansion the next stage was performed. It consisted of remove of expander and full mobilization of the flap, which was transferred

to the face area without disturbing the pedicle. After flap "take", the pedicle was divided on 15th postoperative day with simultaneous additional scar revisions.

Our patients had major disfigurement face, which prevented them greatly from social interactions, impaired self-confidence as well as created some functional problems like ectropion, nasal obstruction and insufficiency of the oral sphincter. Thus, there was need in both functional and aesthetic restoration. After the discussion of the available options we chose the usage of the pre expanded supraclavicular flap. As a result, we achieved quite acceptable external appearance of the face together with fixing of functional problems.

The pre expanded supraclavicular flap provides ample amount of similar skin for substitution of large scarred areas on the face. Presence of vascular pedicle allows the use of flap as a regional or even distant (free), without additional microsurgical prefabrication [9, 10]. To be sure of proper flap circulation the pedicle can be left over the neck skin until flap "take" on the donor area, which was done in our cases. We believe that usage of suprascapular flap, being both simple and effective, should be a method of choice in treating cases with major disfigurement of the face.

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