CHEILOPLASTY IN POST-BURN DEFORMED LIPS

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SUMMARY. The lip is a part of the face that is frequently affected by burn injury. Post-burn scar sequelae in this area often result in cosmetic disfigurement and psychological upsets in patients, especially young adult females. A burn destroys the aesthetic features and lines of the lip. Plastic and reconstructive surgery of the face has a long history. Many local and regional flaps have been used for reconstruction of surgical or traumatic defects. Procedures to enhance the cosmetic features of the lips have been performed for centuries. Only within the past 25 years, however, has augmentation cheiloplasty become commonplace. Within that time, a number of different techniques have been developed. The goal of reconstruction is to achieve aesthetic results using plastic materials having the same properties as the affected area. This paper describes some clinical situations and possible reconstructive solutions.

Introduction

The lips are a very important structure in the beauty of the face. People - especially those of the female sex - pay special attention to care of the lips as they are a key element for conveying expressions, emotions, and attractiveness.[1]

Cupid's bow gives the lip its characteristic appearance. The white roll circumferentially outlines the upper lip at the border of the cutaneous element and the vermilion substance. Reconstruction of Cupid's bow and the white roll is crucial in preserving the aesthetic nature of the lip; even slight alterations or misalignments of these areas are overtly noticeable.[1] The lower lip's aesthetic line has a particular shape that characterizes the chin area below and the vermilion substance above.[2,3]

The vermilion substance is cosmetically the lip's most apparent portion. Its pink-to-red colour is due to the area's extensive superficial vasculature.[5] Deep burns destroy the vermilion substance and alter its red colour to a depigmented scarred colour. The attractive colour of red lips has to be the object of very meticulous reconstruction as regards their form and pigmentation. This can be done only by using the buccal mucosa. A graft is less indicated.[6]

The normal aesthetic appearance of the skin in the perioral region is an important factor in the attractiveness of the lips. In men, the persistence of moustache care, including shaving, is an expression of masculinity.[7]

Burned lips are rarely an isolated injury, and in most cases they constitute part of a burned face.[8] Many factors may aggravate the problem, e.g. increased burn depth, late presentation, incorrect primary treatment, incorrect aftercare and surgical reconstruction, and the timing of surgical reconstruction.[9,10] In male burn victims, scars may cause grotesque disfigurement to the upper lip and lower face.[11] Post-burn alopecia of either the moustache or the beard is a very common burns sequela in male burn victims.[12,13] Other post-burn lip problems include oral commissure contracture, and other contractures.[14]

The deformity may be complex, i.e. it may be a functional disfigurement (in that it interferes with eating, airways, speech, and oral hygiene) and/or an aesthetic disfigurement.[15] Primary wound care influences the result, and careful conservative management therefore minimizes the need for reconstructive surgery.[16,17] Surgery is postponed pending scar maturation and scar control.[18]

This work considers the aesthetic reconstruction of the lips in females and males. Different techniques were used to restore the aesthetic units of the upper and lower lips 8-12 months after wound healing. The results are assessed on the basis of cosmetic outcome and patient satisfaction.

Patients and methods

This study was carried out in the Department of Plastic Surgery, Assiut University Hospital, Egypt, between 20 May 2005 and 5 January 2007 on 46 patients (age range, 17-37 yr; 34 females and 12 males) out of a larger group of 86 patients.

Thirty-six of the 46 patients (41.9%) had isolated facial burn scars (27 females and 9 males, respectively 31.4% and 10.5%), while ten (11.6%) had facial burn scars as part of total body burn (7 females and 3 males, respectively 8.1% and 3.5%).

Forty patients (28 females and 12 males) presented with functional problems due to a major facial burn as their main complaint, in addition to aesthetic disfigurements of the lips. The functional problems included inter-

ference with eating, partial nostril obstruction, speech problems, and bad oral hygiene. Reconstructive surgery was performed to overcome the functional problems - this group was excluded from the total number presenting with deformities after facial burns. Our target group consisted only of the patients who complained of aesthetic disfigurement of their lips (*Table I*).

Table I - Study group

Number of patients	Type of deformity	Percentage
46	Aesthetic disfigurement only	53.5%
40	+ Functional problems (excluded from the study)	46.5%

The post-burn aesthetic lip disfigurements analysed in the 46 patients (53.5%) consisted of the following: deformed lip lines, unattractive lines; lazy M of the upper lip liner (Cupid's Bow) and lazy U of the lower lip liner; vermilion substance scarring; skin scarring; and, in males, alopecic moustache area.

Twenty-eight of the 46 patients (60.9%) presented early, between one and six months after healing of their burns (21 females = 45.7%; 7 males = 15.2%), and 18 patients (39.1%) presented late, six or more months after healing (13 females = 28.3%; 5 males = 10.7%). Four out of these 18 patients had had primary surgery for their facial scars, while 14 (30.4%) had not had any surgical reconstruction before (*Table II*).

Table II - The study group of patients

Number of patients	Sex	Time of presentation	Priory primary surgery
21	Female	Early	No
7	Male	Early	No
13	Female	Late	-
5	Male	Late	-
4	-	Late	Yes
14	-	Late	No

Each patient's chart was reviewed for the following data : age, sex, burn type, burn percentage area, estimated time for complete healing, wound complications during dressing, facial scar types (recent, mature, controlled or not, hypertrophic or keloids, primary or secondary after previous surgery).

Lip scars were categorized in all patients as isolated lip scars, lip scars as part of facial burn scars, or lip scars as part of total body burn scars. Burned lip deformities were analysed and classified as upper lip Cupid's bow scarring and deformities, upper lip vermilion scarring, upper lip alopecic scars in males, lower lip lining deformities, or lower lip contractures.

A scar control protocol was designed for patients with recent immature scars. This included pressure garments, topical corticosteroid creams, topical anti-scar gels, topical silicone sheets, and corticosteroid injections. The programme was conducted for 6-12 months until complete control of active scars and subsidence in the activity of hypertrophic or keloid scars.

All patients underwent pre-operative assessment of their general condition for pre-operative fitness - 12 patients had their operation postponed owing to anaemia and hypoalbuminaemia.

A series of photographs were taken of each deformed lip at the time of presentation, pre-operatively, and immediately and late post-operatively.

All patients subjected to surgery signed a consent form stating the importance of their compliance with the long and detailed aftercare programme and the need of immediate post-operative scar control.

The surgical plan was designed in 14 females (30.4%) for the resurfacing of geographic facial areas, release of contractures, and aesthetic lip line reconstruction; 20 females (43.5%) were designed only for cheiloplasty; 8 male patients (17.4%) were designed for the release of contractures and cheiloplasty, and 4 male patients (8.7%) were designed only for cheiloplasty.

Our surgical technique for upper lip cheiloplasty in females was performed as follows: excision of the scarred Cupid's bow (*Figs. 1, 2*), upper lip vermilion lifting to augment the vermilion and redraw the lazy M shape of Cupid's bow (*Figs. 2, 3*). Lower lip cheiloplasty was designed for bordering, using a full-thickness graft for the skin of the chin area (*Fig. 4*).

Fig. 1 - Upper lip - deformed Cubid's bow.

Fig. 2 - Marking of area to be excised.

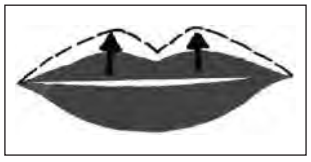

Fig. 3 - Upper lip - lifting of vermilion.

Fig. 4 - Final result.

Post-burn cheiloplasty in males was performed by excision of both the scarred Cupid's bow and the alopecic skin; complete or partial moustache reconstruction was performed using an island superficial temporal artery scalp flap.

The aftercare programme included physiotherapy, prevention of scarring, prevention of hyperpigmentation, and advice on camouflaging and permanent make-up.

Case reports

Case 1

A 27-yr-old female presented 12 months after healing from a flame burn affecting the lips as part of a face burn. The scarred lip aesthetic disfigurement was analysed. Cheiloplasty was performed by upper lip bordering and vermilion lifting, lower lip bordering by full-thickness skin graft, and correction of eversion. Aftercare consisted of the application of anti-scar gels and corticosteroid creams for 6 months following complete healing, plus local care of the full-thickness graft donor site. The follow-up examination after 18 months demonstrated the end result of our cheiloplasty technique in post-burn deformed lip aesthetics and good patient satisfaction (*Figs. 5-10*).

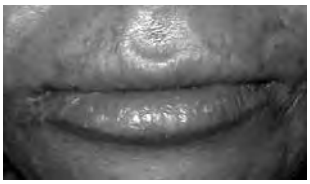

Fig. 5 - Pre-operative upper lip deformity.

Fig. 6 - Marking the deformed area.

Fig. 7 - Marking the area to be excised.

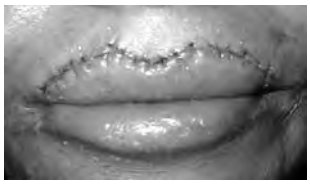

Fig. 8 - Immediate post-operative view.

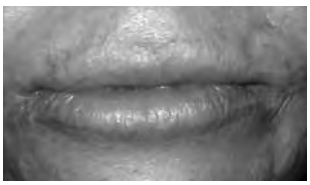

Fig. 9 - Late post-operative view.

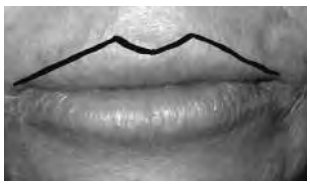

Fig. 10 - Drawing the new Cupid's bow.

Case 2

A 15-yr-old female presented 8 months after healing from primary surgery as a previous trial to correct a lower lip deformity due to flame burn that included the lips as part of a body burn. Scar control was performed for 6 successive months. The scarred lip aesthetic disfigurement was analysed. Cheiloplasty was performed by upper lip bordering and lifting, plus lower lip bordering by full-thickness skin graft and correction of the eversion deformity. The aftercare programme consisted of the use of pressure garments and silicone sheets, the topical application of anti-scar gels and corticosteroid creams for 6 months following complete healing, and local care of the full-thickness graft donor site. The follow-up examination at 6 months demonstrated the result of our technique for cheiloplasty in post-burn deformed lip aesthetics and good patient satisfaction (*Figs. 11-14*).

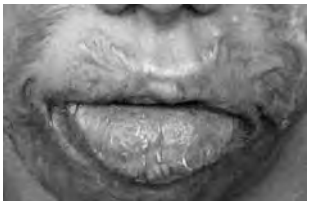

Fig. 11 - Pre-operative view.

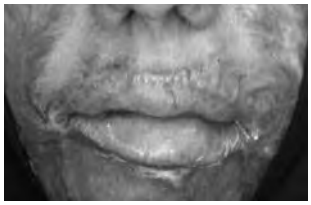

Fig. 12 - Three months post-operatively.

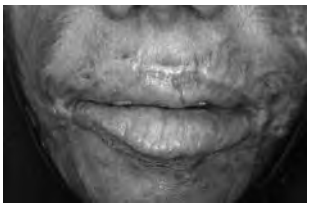

Fig. 13 - Nine months post-operatively.

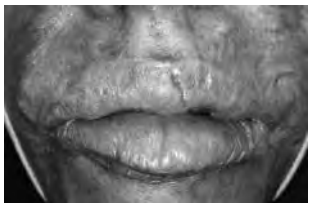

Fig. 14 - Eighteen months post-operatively.

Case 3

A 35-yr-old female presented 24 months after healing from a flame burn that included the lips as part of a facial burn. She had two surgical operations in one session to correct her lip commisure contracture and to reconstruct her lower lip eversion deformity. The scarred upper lip aesthetic disfigurement was analysed. Cheiloplasty was performed by upper lip bordering and vermilion lifting. The aftercare programme consisted of the topical application of anti-scar gels and corticosteroid creams for 6 months following complete healing. The follow-up examination at 12 months demonstrated the result of our cheiloplasty technique in post-burn deformed lip aesthetics and good patient satisfaction (*Figs. 15, 16*).

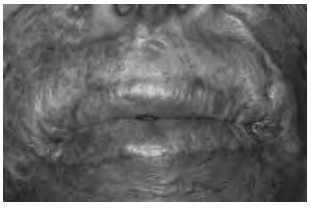

Fig. 15 - Pre-operative view.

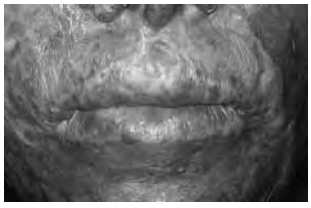

Fig. 16 - Twelve months post-operatively.

Case 4

An 18-yr-old male presented 19 months after healing from a flame burn in the face. He complained of disfigurement of the upper lip and lip skin scarring. Cheiloplasty was performed by excision of the scarred lip skin, upper lip bordering, and superficial temporal artery island flap for total moustache reconstruction. Aftercare included scar control and care of the donor site following complete healing. At 8 months the follow-up examination demonstrated the end result of male cheiloplasty in post-burn deformed lips and good patient satisfaction (*Figs. 17, 18*).

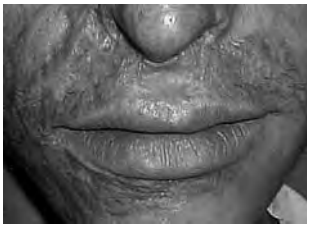

Fig. 17 - Pre-operative view.

Fig. 18 - Eight-month post-operative view.

Case 5

A 21-yr-old male presented 19 months after healing from a flame burn in the face. His complaint was disfigurement of the upper lip and partial alopecia of the moustache. Cheiloplasty was performed by upper lip bordering and superficial temporal artery island flap for moustache reconstruction. Aftercare including scar control and care of the donor site following complete healing. A 2-year follow-up examination demonstrated the end result of male cheiloplasty in post-burn deformed lips (*Figs. 19-22*).

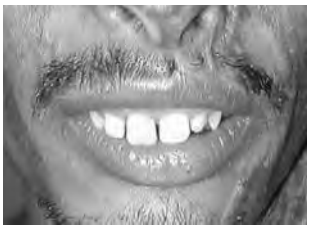

Fig. 19 - Pre-operative view.

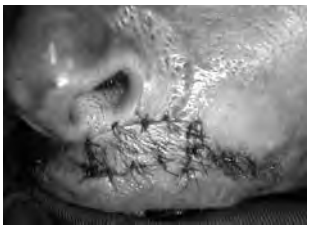

Fig. 20 - Immediate post-operative result.

Fig. 21 - Early post-operative view.

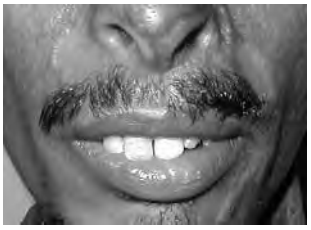

Fig. 22 - Late post-operative result.

Results

Forty-six cheiloplasty procedures were performed in 46 patients (34 females and 12 males) with post-burn deformed lips. Their ages ranged between 17 and 37 yr. Four of them presented after other primary surgery performed previously after trials to correct their deformities. Twenty-eight patients presented early, before maturation of their scars, and these were put on our scar control programme; 18 patients presented late after maturation of their scars; and 12 patients were unfit for anaesthesia and treatment was postponed in order to check their general condition.

Fourteen females (30.4%) underwent surgery for the resurfacing of geographic facial areas, the release of contractures, and aesthetic lip line reconstruction; 20 females (43.5%) had surgery only for cheiloplasty; 8 male patients (17.4%) had operations for the release of contractures and cheiloplasty; and 4 male patients (8.7%) were subjected to cheiloplasty alone.

Upper lip cheiloplasty in females was performed by upper lip Cupid's bow bordering and lip vermilion lifting. Lower lip cheiloplasty in females was performed by vermilion lifting and bordering by full-thickness skin graft.

Upper lip cheiloplasty in males was performed by Cupid's bow lip bordering and partial or complete moustache reconstruction, using a superficial temporal artery island flap.

Two cases (4.3%) that were complicated by minor spotty partial loss of the full-thickness skin graft required frequent dressing until complete healing by secondary intention, followed by additional scar control for the scarred spots. In one case (2.2%) complicated by superficial necrosis of the superficial temporal artery island flap, dressing was carried out until healing occurred with no additional scars. A secondary procedure for additional refinement for the purpose of debulking the graft was performed in two male patients (4.3%). The total infection rate was 0%. Donor site morbidity for the full-thickness skin graft was minimal and controlled by local care after 12 months.

All patients attended for scheduled post-operative follow-up visits in the aftercare program. This programme was conducted for 6 to 12 months and included detailed scar control, as follows: pressure garments for the grafted chin area, silicone sheets, silicone-containing creams and gels, topical corticosteroid-containing creams, and intralesional injection of corticosteroids. After scar control, residual hyperpigmentation was controlled by topical bleaching agents for 3 months

After 12 months' follow-up the end result was assessed by patient satisfaction, which was fairly good in 41 cases (89.1%).

Discussion

Burn scars in the lips and disfigured lip aesthetics are commonly treated with psychological assurance and training for perfect camouflaging, especially with regard to female burn victims. Some cases with major deformities that go beyond simply aesthetic considerations are treated surgically either by release of contractures and by local flaps for reconstruction of lip defects or by commisuroplasty.

Partial- and full-thickness skin grafts are commonly used for resurfacing scarred perioral regions, including lip borders and lines, as also for reconstructing post-burn deformed lower lips and, above all, for releasing contracted and everted lips. Skin graft losses are higher in the case of full-thickness skin grafts around the mouth opening because of contamination by food and fluids.

Camouflaging as a solution for deformed lips, using lip bordering and lip liners as either a permanent or a temporary measure, cannot not hide the scar from the patient. Even if a woman tattoos her lip line to treat a scar, she will continue to search for aesthetic surgery to line her lips as a natural acceptable solution for a delicate human being.

This work is the first to present a detailed surgical plan for the correction of post-burn deformed lip aesthetics that does not add more scars to the perioral area with the application of local dermocutaneous flaps. We used cheiloplasty to restore upper and lower aesthetic lip linings, borders, and volume. A description of deformities and the normal aesthetic anatomy of the lips was not the target of this work. We have not focused on the prevention of deformities or on post-operative care as these topics are discussed in detail in other published clinical studies (see below):

- Vandenbussche F. et al., 1980, described and discussed lip burns; he also attempted to clearly define the polymorphic nature of lip burn sequelae by introducing a simple classification of the affection. He added that a correct understanding of the processes involved in scar formation was essential for the development of a rational plan for surgical repair.[19]
- Lew D. et al., 1987, reconstructed severely burned lips in two patients cases, using a bi-pedicled lip flap to transfer both bulk and vermilion from the relatively normal donor lip to the atrophic burned lip. The result was an increase both in tissue bulk and in the size of the vermilion.[20]
- Lyons G.B. et al., 1989, performed upper lip reconstruction using the free superficial temporal artery hair-bearing flap in male patients.[21]
- Achauer B.M., 1992, discussed the priorities, timing, techniques, and philosophies of reconstruction of the burned face. He analysed each disfigured anatomic area and described the appropriate procedure. However, he did not mention any procedure for the correction of lip aesthetics.[22]
- Felman G., 1993, discussed direct upper-lip lifting in thin and tightly pursed lips as a more effective and successful approach for enhancing the shape of the upper lip.[23]
- Maloney B.P., 1996, analysed the characteristics of the attraction of lips shaped like a Cupid's bow, the relative length of the upper lip, and the projection or bulk of the lips. He presented aesthetic guidelines for each of these characteristics, which - when understood by the surgeon - will help the surgeon to formulate an operative plan.[24]
- Gatti J.E., 1999. discussed serial fat grafting for permanent lip vermilion augmentation in thin atrophic lips.[25]
- Constantinidis J. et al., 1999, described the functional and aesthetic objectives of the reconstruction of lip defects. They divided the lips into aesthetic subunits in order to benefit from the design of lip reconstruction procedures and they differentiated between vermilion defects on the one hand and partial- and full-thickness lip defects on the other.[26]
- Niechajev I., in 2000, using a new instrument that he himself originally designed, the dermis-fat graft passer, speeded up and facilitated execution of the dermis-fat graft as one of the surgical techniques he used for lip augmentation. He also used V-Y plasty, lip lifting by buffalo horn excision, lip lengthening by frenulum plasty, and lip reduction by wavy tangential excision.[27]
- Foyatier J.L. et al., 2001, presented many examples of burn scar treatment. They reconstructed the anatomical units and applied certain aesthetic techniques (such as rhinoplasty, lifting, tattooing, and autologous fat injections) that made equal contributions to the improvement of the quality of results.[28]
- Garson S., 2002, discussed the aspect of the effect of prevention, which in the lip aesthetics of perioral burns reduces the incidence of disfigurement due to inadequate or inappropriate treatment of this kind of burn, which is most commonly part of face or body burns. However, he added that in deep burns deformity could be inevitable despite good initial treatment, local care of burned lips, and aftercare of healed scars. He judged that the progress made in burns management in the last 40 years had contributed to the improvement of functional and aesthetic prognosis. He stated that early surgical intervention had been modified as a conservative approach.[6]
- Hafezi F. et al., 2002, used a bitemporal artery hair-

bearing flap in nine cases to reconstruct the moustache and beard area as a substitute for facial deformed skin.[29]

- Trepsat F. et al., 2002, described the aesthetics of the lips and reported some balanced and harmonious results in lip improvement in a facial rejuvenation programme.[30]
- Morand B., 2002, in his repair of the upper lip, carried over logic derived from this region's morphological and structural specificity.[31]
- Danino A. et al., 2002, revised the reconstructive procedures of lower lip skin and presented the various possibilities of classic surgical reconstruction in relation to the size of the defect, including the use of full-thickness skin grafts.[32]
- Simon E. et al., 2002, reviewed and applied multiple techniques for local flaps that have been proposed using the same lip, the jugal mucosa, and the tongue for reconstruction of red lip defects.[33]
- Demir Z. et al., 2003, reported the successful use of a hair-bearing submental island flap for moustache and beard reconstruction in 11 male patients. This had the same characteristics as the facial area, consisting of thin, pliable, hair-bearing tissue with a good colour match.[34]
- Kim J.C. et al., 2001, used a hair-bearing temporoparietal fascial flap for reconstruction of upper lip and scalp defects.[35]
- Kaufman A.J., 2006, used a bilateral vermilion rotation flap in lip reconstruction. His technique permitted repair within cosmetic subunits, with skin possessing identical surface characteristics, and avoided surgery in adjacent cutaneous or muscular portions of the lip.[36]
- Egeland B. et al., 2008, achieved successful reconstruction through a comprehensive approach involving many advanced techniques, with an emphasis on preserving function and balancing intricate aesthetic requirements in difficult paediatric facial burns.[37]

The technique we have introduced for cheiloplasty in post-burn deformed lip aesthetics creates natural lip lines and natural lip red substance, restoring the beauty of the lips and the self-confidence that female burn victims have lost. This technique, specially designed for the aesthetic reconstruction of lip aesthetic borders and volume in females, involves the use of local tissue having the same characteristics and colours as those that were damaged in the burn accident. We recommend the technique in selected cases presenting a deformed Cupid's bow of the upper lip, a lazy U border of the lower lip, and a deformed vermilion border in either condition. We advise certain precautions when using the technique: it is not to be used unless there is complete control of any active scar in the lip area and there must be a certain expectation of good healing capacity in any proposed post-burn patient who is debilitated.

Conclusion

Our technique has several advantages: it is easy to design; it is a one-stage reconstruction of lip aesthetics; operating time is short with good pre-operative marking; it is a reliable technique because it uses local tissues, without any aggressive undermining and without adding any more scars; there is no need of post-operative occlusive dressings as dryness is the rule here; the technique can be widely used in place of permanent tattooing and lining; there is minimal need of post-operative physiotherapy as normal movement of the lips will be spontaneous; and morbidity can be easily treated.

The technique's disadvantages are as follows: full-thickness skin grafts have a certain percentage of morbidity in the form of partial loss, which may alter the aesthetic results; the possibility of contamination is inevitable in some patients with bad eating habits that could affect such a delicate surgical procedure; the long-term aftercare programme may be tedious for irritable patients seeking immediate results; and the possible need of secondary refinement procedures in male patients with a bulky superficial temporal artery island flap for moustache reconstruction.

RÉSUMÉ. La lèvre est une partie du visage fréquemment atteinte de lésions dues aux brûlures. Souvent les séquelles cicatricielles post-brûlure localisées dans cette région du corps procurent aux victimes des défigurations cosmétiques et des désordres psychologiques, particulièrement dans le cas des jeunes adultes du sexe féminin. La brûlure détruit les traits esthétiques et les lignes de la lèvre. La chirurgie plastique et reconstructrice du visage vante une longue histoire, et divers types de lambeaux locaux et régionaux ont été utilisés pour la reconstruction des défauts chirurgicaux ou traumatiques. Depuis plusieurs siècles il existe des procédures pour améliorer l'aspect cosmétique des lèvres. Néanmoins, la technique de la chéiloplastie pour l'augmentation des lèvres est devenue commune seulement depuis 25 ans. Pendant cette période de nombreuses techniques ont été perfectionnées. Moyennant la reconstruction des lèvres l'Auteur se propose d'obtenir des résultats esthétiques en utilisant des matériaux plastiques ayant les mêmes propriétés de la région atteinte. Il présente une série de situations cliniques pertinentes.

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This paper was received on 6 April 2009.

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