Technique for the Reconstruction of Oral Commissure: Review of Literature and Description of a Novel Approach

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I. INTRODUCTION

Lips help to perform unique actions such a drinking, eating, speech and sound production and blowing by their unique sphincter action. On top of that, they are an important component for facial esthetics. Its functions can be jeopardized by different factors which produce lip defects. Lip tumors that produce lip defects are either congenital such as vascular malformations and hemangiomas or acquired such as basal cell carcinoma, squamous cell carcinoma and leukoplakia.

In addition to this, solar radiation injury also affects the lower vermillion. Lip trauma also plays a major role in producing defects. Trauma can be due to road traffic accidents, violence , war trauma.etc Whatever the reason of the defect may be, the main goal for a maxillo-facial surgeon is to restore the function in the form of restoring competence and adequate articulation, esthetics in the form of restoring symmetry of lips in repose, adequate stomal diameter and avoidance of conspicuous scar as far as possible thus restoring patient's self-confidence.

Depending upon the size and location of the defect, age and gender of the patient various reconstructive procedures have been developed.

Commissure reconstruction-

Various reconstructive procedures have been developed for the commissure reconstruction like mentioned below.

For commissures the Estlander flap(figure 1) , with the pedicle located medially, is rotated into the defect as a single staged procedure([2]). Blunting or rounding of the commissure can be expected along with the violation of the upper lip making secondary commissuroplasties often neccessary([2]). With the drawback of the facial scar and blunting of the commissure this procedure was not opted for the reconstructive procedure.

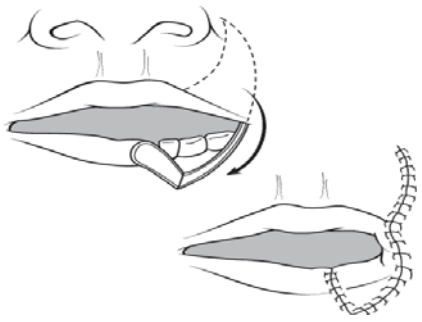

Figure 1([17]) - ESTLANDER FLAP([4-17]) :-
"v" shaped incision diagrammed around lower lip lesion, and lesion is removed, proposed flap designed in upper lip and is designed with height 1-2mm greater than the defect.([4])

Abbe flap (figure 2) has aslo been utilized for the reconstruction of the lateral aspect of the lower lip involving the commissure, however this procedure requires the outline to be placed on the upper lip to the half the size of the defect([2]). This leads to the shortening of upper and lower lips by the equal amounts, thereby carrying the risk of relative microstomia([2]). Esthetic drawbacks

include pin-cushioning and possible vermilion border malalignment. ([2])Also, this procedure requires manipulation of larger area thereby increasing the invasion and it also lead to the visible facial scar .Thus, due to the disadvantages related to this reconstructive procedure, Abbe flap was also not considered in our treatment plan.

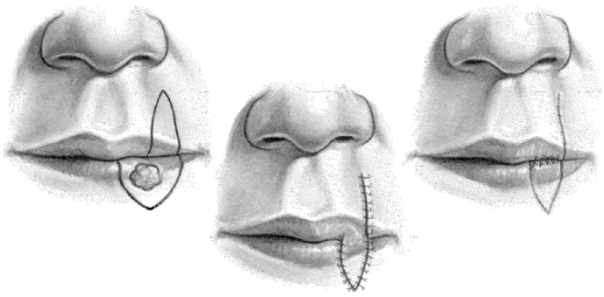

Figure 2([4])- ABBE FLAP:-
"V" shaped incision marked around the lesion and the lesion is removed this is followed by flap design which is of equal height as defect but 50% of width, resulting in equal width reduction of both upper and lower lips.([4])

Reconstruction of both the lips involving the commissure can be accomplished by means of primary reconstruction (figure 3) using a horizontal incision in the cheek and de-epithelisation of two triangular areas([1]) . But with this technique there are also chances of some degree of gaping of the commissure, thus requiring correction by commissuroplaty([1]). Though this technique is lesser invasive than the rest of the reconstructive procedure, it do results into the visible facial scar, which was not acceptable by the patient and thus this procedure was also not opted.

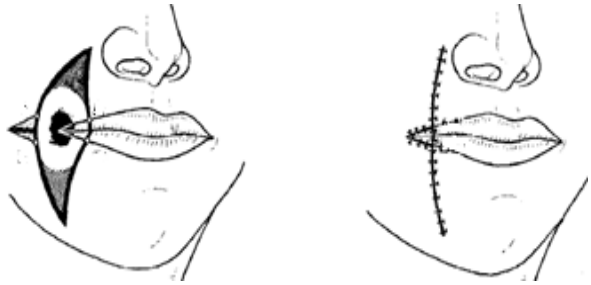

Figure 3[1]- PRIMARY RECONSTRUCTION:-
Crescent shaped excision of the tumour, horizontal incision of equal height as of incised defect is made along the lateral of the flap of the triangle. The areas above and below the horizontal incision are de-epithelised and the defect is closed by merging the margins. ([1])

Reconstruction of the labial commissure by primary reconstruction using sliding U-shaped cheek flap([14])(figure 4) :-
This procedure is more invasive than the defect itself .This technique requires a square or rectangular tumor gap. With our case the defect was not of square of rectangular shaped. This procedure also carries the risk of facial scars and so this procedure was also not opted for the same reason of esthetics.

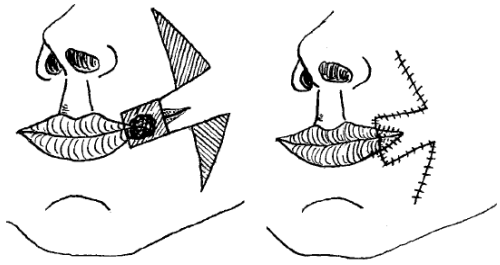

Figure 4([14])- PRIMARY RECONSTRUCTION:-
Incision is carried out along the lesion in a way that the defect produced is rectangular or square. Triangular flaps are designed in cheek both above and below the defect and are advanced to cover the defect and sutured([14]).

Masseter muscles as split muscle flaps have been used as a restorative procedure (Lexer 1867[6]) . However this procedure , inspite of producing acceptable results, always has a chance of injuring the marginal mandibular branch of the facial nerve([6]). Moreover, this procedure would be inappropriate for small commissure defects as it would require manipulation of a larger donor area. This procedure requires more invasion and also yields scar formation and so was not opted .

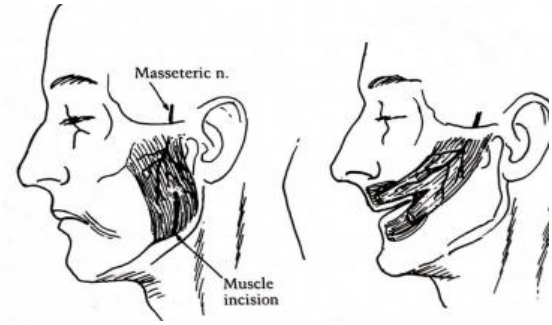

Figure 5- MASSETER MUSCLE SPLIT FLAP([6]):-
This procedure involves two stages. In stage one Fascia lata graft is placed periorally, which reinforces the oral commissure and provides and attachment site for the masseter muscle. Second stage involves the splitting of the middle third of the masseter muscle and is imbricated to the incorporated fascia lata.([6])

Orbicularis Oris muscle has also been taken into consideration for the reconstruction of lip commissure([3]), but they bear the disadvantage that parts of the orbicularis muscle have to be transsected and transported causing disorientation and denervation of the muscle fibres([3]). Despite reinnervation of the trassected orbicularis muscle in most techniques, the muscle fibres remain disoriented and lip movement is often asymmetrical. Moreover there can be loss of sensibility to the lower lip([3]). There is also a certain tendency for blunting of the oral commissures([3]) . In addition to being invasive procedure , it also results in an unacceptable scar formation and thus was not selected as an treatment option.

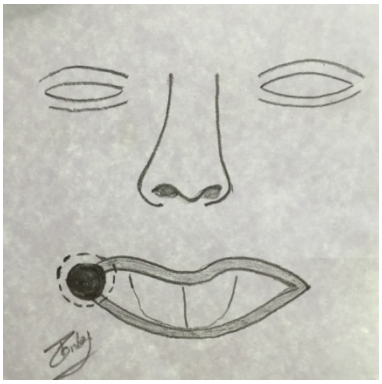

Figure- A

Figure- B

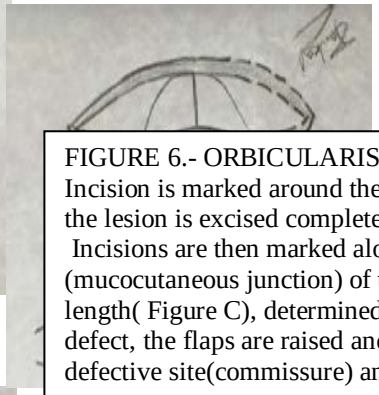

FIGURE 6.- ORBICULARIS ORIS FLAP:-
Incision is marked around the lesion (Figure A) and the lesion is excised completely(Figure B).([3])
Incisions are then marked along the white line (mucocutaneous junction) of the lips upto the desired length(Figure C), determined by the size of the defect, the flaps are raised and stretched to the defective site(commissure) and sutured (Figure D).([3])

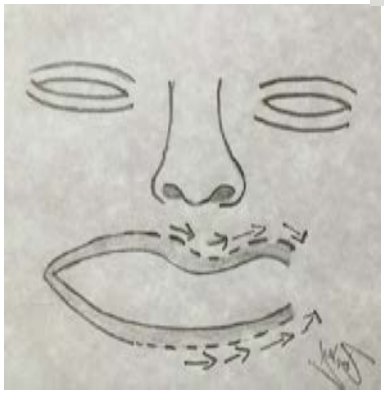

Figure- C

Figure- D

Application of nasolabial flap in the oral commissure reconstruction has also been described. The main advantage is that its donor site lies adjacent to the defect, thereby reducing distant donor site morbidity([5]), it also serves a good esthetic purpose cause of its color and texture similarity to the defect site([16]). Moreover it can be used in cases with facial skin laxity([5]). Since the defect is small in size this technique brings about the best results by providing sufficient bulk and also by hiding the suture line along the natural skin crease it prevents visible scar([16]). The adequate blood supply increases the viability of this flap thereby making it one of the best available options. Intraoral reconstruction with the nasolabial flap is a simple and fast procedure and minimizes the morbidity relating to speech

and swallowing impairment to a g ideal for more elderly patients with systemic disorders, amongst whom we can avoid a higher morbi

Thus, due to its high esthetic a l flap was selected as an treatment option .

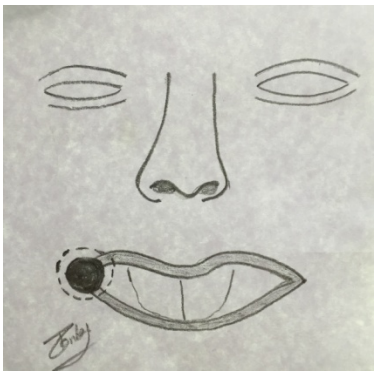

FIGURE- D

FIGURE-E

FIGURE 7- NASOLABIAL FLAP:-
Incision marking around the lesion (Figure- D) followed by excision of the entire lesion which leads to the commissural defect (figure- E).
Flap designing(Figure - F), Flap is raised, tunnel is made near to the defect and the part of the flap that will be tunneled is de-epithelialised (Figure-G)
Flap is passed through the tunnel and sutured to reconstruct the defect (Figure- H)

Figure- F

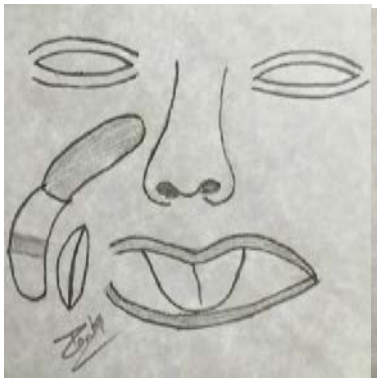

FIGURE-G

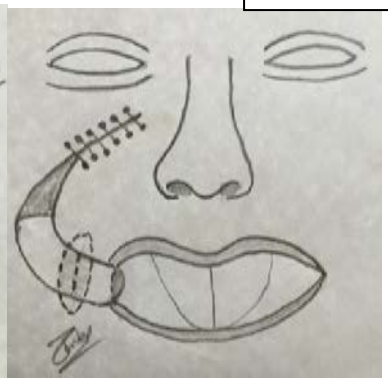

FIGURE-H

II. CASE REPORT-

A 52 years old male patient was referred to department of Oral And Maxillofacial Surgery,D.D.U. Nadiad on 1st July 2014 for a non-healing ulcerative growth on right commissure of lip (figure 8) extending inwards to involve the underlying part of the buccal mucosa. An excision biopsy was taken and sent for histopathological examination. Diagnosis of squamous cell carcinoma was established histologically. Ct scan revealed mucosal thickening with enhancement seen along right buccal mucosa and orbicularis oris muscle with bilateral subcentimeter size level Ib and II lymph nodes.

FIGURE 8-
Lesion involving the right commissure of the mouth and the buccal mucosa

All preoperative investigations were done and patient was operated under general anaesthesia. Wide local excision of the lesion was performed along with modified neck dissection-II followed by the reconstruction of the defect with the Nasolabial fold. The entire procedure was performed with utmost aseptic care. Specimens were sent for the histological examination which revealed squamous cell carcinoma of the buccal mucosa and tumor category of T_1N_0 . The maximum depth of invasion was 0.2cm, absence of lympho-vascular or perineural invasion. On histopathological examination base of resection, right submandibular salivary gland with muscle tissues and lymph nodes were negative for metastasis.

III. TECHNIQUE :-

Excision of the lesion led to a defect along the right commisure (angle) of the mouth. The main concern was to restore the function , which would have otherwise led to reduced function of the oral sphincter resulting in an inability to hold the water or blow, along with esthetics(as patient was overtly concerned of his appearance).

Depending upon the conditions, we opted for the nasolabial flap for reconstructing the defect as it had the advantages of better esthetics, color and texture similarities to the tissues adjacent to the defect and restoration of functions and minimum morbidity to the donor site.

IV. FLAP DESIGN:-

A fusiform shaped flap of 1.5cm width and 5cm length (figure 9) was marked with its mesial border along the nasolabial groove and superior border below the medial canthus along the nasofacial junction. Inferior border was marked above the commissure.

Incision was carried out through the skin, subcutaneous fat to the level underlying musculature. An inferiorly based single staged nasolabial flap was designed and a pedicled musculcuatneous flap was raised

FIGURE 9-
Flap design

A tunnel was prepared (figure-10),by placing an incision just lateral to the defect. The tunneled segment of the flap was de-epithelialised. The flap was then passed through the tunnel into the defect (figure-2), the superior aspect of the flap was rolled upon itself to form the inner and outer aspect of the commissure and sutured with vicryl-3.0 with superior margin (figure-11). The donor site was properly irrigated and closed in layers with vicryl-3.0 sutures for deep dermal closure and ethylon 5.0 for approximating the skin edges.

FIGURE 10-
Tunneling of the flap into the defect.

FIGURE 11 -
Tension free suturing of the flap.

V. REVIEW OF LITERATURE.

The first evidence of lip reconstruction is seen as far back as 1000bc in Sushruta Samhita. In the western world Celsius was credited as first to describe the closure of a lip defect on the first century A.D. Dieffenbach(1845), Bernard(1851), Fries(1971) described the reconstruction of subtotal or total defects of the lower lip by transposition flaps from the lower cheek([10]). Abbe cross lip flap involving tissue borrowing from the opposing lip was first describe by Sabattini 1838 (lipreconstruction)([4]). Lower lip can be reconstructed using local flap - cheek advancement flaps (Von Burrow,..1855; webster et al .., 1960)([11]), or rotating the flap using the residual flap (Karapandzic. 1974; McGregor, 1983)([11-12]) or nasolabial tissue (Nakajima et al.., 1984([11,12]); Fujimori .., 1980([11])..) a regional pedicled(Baker et al.., 1995; Converse and converse, 1977; Bakamjian, 1971)([11]) or free flaps (Krol and Evans, 2000; Koshima et al... 2000; Wei et al, 2001)([11]) or lip switch flaps (Estlander, 1872 Abbe, 1898 ([12]). Esser in 1918 first described the biloped platysma myocutaneous flap for total lower lip reconstruction and nasal tip reconstruction ([11]) . Converse (1959) and kazanjian (1974) stressed the importance of local flaps of the cheek, the nasolabial area or of lower lip to be used preferred for the repair of lateral defects of the upper lip before distant flaps of the forehead, scalp or neck are utilized([10]) . Koshima et al (2004) first described the application of superficial circumflex illiac artery perforator flap for the reconstruction of complex lower lip defect. ([13])

Estlander(1872) ,Converse (1976) described the reconstruction of lateral defect using triangular rotation flap from the opposite lip pedicled on the labial artery, however it required a second procedure to reconstruct the shape of the lip and the elongation of the oral commissure. ([10])

Reconstruction for not unduly large commissure defects Brusati 1976 described a U- shaped cheek flap.([14])

Application of nasolabial flap in the reconstruction dates back in 600 B.C. in Sushruta Samhita([4,8,15]). Theirsch first described the application of this flap for the reconstruction of the oral defects([15]). Esser reported the application of a cutaneous nasolabial flap transferred in two stages to increase its stability([15]). Wallace and Rose later reported modification of this basic flap, allowing for single stage transfer([15]).

VI. DISCUSSION

Reconstruction of lip and its commissure depends upon the size and extent of the defect, patient's general health condition and the surgical skill of the operating surgeon.

Various reconstructive procedures have been developed like Karapandzic, Abbe, Fan flaps and mobilization of cervical. These procedures have a drawback of significant microstomia and neccessity of a second stage. Microvascular free flaps such as the radial forearm or the anterolateral thigh have also became an acceptable reconstructive procedure. However, these techniques require trained personnel, microsurgical setup and are usually associated with an increased operative time and a longer hospital stay.

The main advantages of this flap were its sufficient surface area, adequate blood supply and esthetic results. We were able to completely cover up the defect with the available flap due to its bulk provided by the facial musculature. Its adequate blood supply ensured the flap's viability by preventing its breakdown and fistula formation. As per the patient's request we were able to achieve his expectations in terms of esthetics, as the scar lines rested under the natural crease of the face. Moreover , it did not cause speech impairment and since it was easily accessible from the same surgical field , it was quick to harvest and thus was not overly time-consuming.

In summary, the nasolabial flap is a secure and reliable reconstructive option which produced satisfactory aesthetic and functional results.

FIGURE 12-
POSTOPERATIVE PHOTOGRAPH:-
SATISFACTORY RESULTS ACHEIVED IN TERMS OF ESTHETICS AND ORAL COMPETENCE.

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