Facial artery perforator flaps in oral submucosal fibrosis

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Abstract:
This is a retrospective study to evaluate the usefulness and effectiveness of facial artery perforator flaps in treating oral submucous fibrosis. The study compares the other procedures used for treating oral submucous fibrosis. The merits and de-merits of this procedure compared to the earlier procedures are discussed. Oral submucous fibrosis being a common condition in south India, newer more effective methods of treatment should be identified and evaluated. The results of the facial artery perforator flaps with regarding to flap survival, recurrence and tolerance to food are discussed here.

Keyword: facial artery perforator, nasolabial flap, oral submucosal fibrosis, perforator flaps

Aim:
To study the outcomes of these flaps to ascertain the usefulness of these flaps in planning reconstructive surgery. Surgical anatomy: The facial artery, one of the external carotid artery branches, arise opposite to the occipital artery and superior to the greater horn of the hyoid bone. It is the principle artery of the skin of the facial region and has an average diameter of 2.1 mm at its origin. The facial artery also supplies the tonsils, submandibular gland, and many of the muscles of the facial region. It courses deep to the posterior belly of the digastric muscle and through the submandibular triangle, where the artery reaches the caudal border of the mandible and pierces the fascia over the masseter close to its anterior border. At this point it sends a submental artery branch to the neck. Also at this point it gives off a premasseteric branch, which ascends along the anterior border of the masseter to anastomose with the transverse facial artery superiorly. The superior and inferior labial artery arise from the main trunk of the facial artery near the angle of the mouth.
Between the angle of the mouth and the medial canthus, the facial artery traverses superficial to, deep to, or through the levator labii superioris and the levator labii superioris alaque nasi muscle. As the facial artery approaches the medial canthus, it becomes the angular artery and sends lateral nasal branches to the nose. Finally, the angular artery anastamoses with the multiple branches of the ophthalmic and infra orbital artery (Fig 1).

The region of the cheek lying lateral to the alar base is involved in all these flaps and the skin of the nasolabial fold has three sources: 1) The lower part is supplied by the direct branches of the facial artery, 2) The middle part is supplied by terminal branches of infraorbital and transverse facial artery, 3) The uppermost part is supplied by the branches of the angular artery. The facial artery perforators are found in the perforator triangle and is bounded by: Cranially - zygomaticus muscle, Caudally and inferiorly - risorius Posteriorly - facial vein. The perforators arise either from facial artery or its continuation angular artery or from superior labial artery.

Materials and methods:
This is retrospective study. A total of 20 cases were assessed. Mouth opening was compared before and after procedures and the effectiveness of the procedure is analyzed. Inclusion criteria: 1) Patients with submucosal fibrosis leading to restricted mouth opening and intolerance to heat and spicy food. 2) Patients who failed conservative management with inter incisor distance less than 2 cms. Exclusion criteria: 1) Submucosal fibrosis with adequate mouth opening, 2) Patients who had evidence of malignancy, 3) Patients not willing to quit arecanut chewing.

Surgical technique: Hand held Doppler, angiogram or invasive studies are not used to locate the perforators from the facial artery prior to the surgery. Mouth opening prior to surgery is recorded (Fig 2, 2A).
All patients were treated under general anaesthesia through nasoendotracheal tube intubation. All surgeries were performed with 2.5x magnification. Intra oral bilateral infiltration of 1:2,00,000 epinephrine given along the planned line of incision. Incisions made on the buccal mucosa at the level of the occlusal plane. Incisions extended from the corner of the mouth anteriorly to the anterior pillar of the fauces, soft palate, and/or pterygomandibular raphe posteriorly depending on the extent of the fibrous band felt by palpation. Blunt dissection and undermining was done until no restrictions were felt. Using Ferguson’s mouth gag, mouth was forcefully opened to an acceptable range of 40-45mm. Out of these 20 patients, 11 patients in whom inter incisor mouth opening was less than 30 mm with incising fibrous bands were treated with coronoidectomy.

Bilateral elliptical nasolabial flaps were marked. First the anterior incision is made, dissection is performed towards the perforator triangle and perforators are identified. Single best perforator was identified using trial clamping method. After identifying the single best perforator the other perforators are ligated. Then the incision is completed and flaps raised in the plane of superficial musculoaponeurotic system from both ends (Fig 3,4).

The raw area after excision is measured (Fig 2B,2C). An adequate sized nasolabial perforator flap is marked to give a tension free inset.
A trans buccal tunnel was created near the region of the modiolus caudal to the sensory branch of trigeminal nerve (Fig 5).

The flap is then transposed intra orally in a tension free manner and inset given (Fig 6,6A). Generous undermining of the donor site is done in subcutaneous plane and the donor site is closed primarily. Mouth opening achieved at the end of procedure is recorded (Fig 7).

After 48 hours post-operatively physiotherapy is started. Mouth opening exercises and placing mouth prop intermolarly are done. After tenth post-operative day, intensive physiotherapy is started. Heister's mouth gag is used during daytime and at bed time plastic prop is used.

Results: The inter incisor distance measured during follow up and recorded. The tolerance to food is also documented at the end of follow up. The results are presented in the table below

At the end of follow up 57.5% patients had a stable mucosa with tolerance to food at the end of 6 months of follow up (Fig 8,9,10).
The donor region scar is well hidden in the nasolabial groove. Over a period of time the becomes less obvious. (Fig 11, 12, 13, 14, 15).

<table>
<thead>
<tr>
<th></th>
<th>Minimum value</th>
<th>Maximum value</th>
<th>mean</th>
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<tr>
<td>Pre-operative mouth opening</td>
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<td>1.555 cms</td>
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<tr>
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<td>4.2 cms</td>
<td>4.6 cms</td>
<td>4.432 cms</td>
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<td>3.441 cms</td>
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<tr>
<td>3 month post-operative mouth opening</td>
<td>4.2 cms</td>
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Discussion:
In the Indian sub-continent, oral submucosal fibrosis is a pre-cancerous condition with a high prevalence rate. Various conservative treatments are tried. But the results are inconclusive. Surgical therapy is beneficial in cases presenting severe trismus and which are not responding to conservative line of treatment. Previously excision of fibrous band with split thickness grafting was done. The results are not good due to graft shrinkage and contracture. Palatal flaps, tongue flaps and application of amniotic fluid application are also tried earlier. The results are not satisfactory as tongue and palatal tissues are may also be involved. Amniotic fluid application is also less beneficial. Micro-vascular free tissue transfer was also tried. These flaps are bulky and mostly hair bearing.

The nasolabial perforator flap provides stable and supple cover which get mucosalised within a period of six weeks. This method provides good masticatory efficiency. In our follow up no recurrence is reported.

Bibliography:


Reviewer Comments:
Need more photos of the donor area p.o and next want to know this flap is ade-quate for the recreated raw area. COR-RECTIONS MADE:
Post-operative donor area photos imme-diate, after 3 months and after 18 months added – Fig – 11,12,13,14,15The resulting raw area is shown Fig 2B,2C. An adequate sized flap is planned and elevated to give a tension free inset Fig 6,6A.