The submental island flap

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SUMMARY. The submental island flap is a reliable source of skin of excellent colour, contour and texture match for facial resurfacing and leaves a well hidden donor site. The flap is safe, rapid and simple to raise. We report on its use in 12 cases of facial or intraoral reconstruction. Complications were few. However, there was one case of complete flap loss following its use in a reverse flow manner, due to the presence of an unreported, but constant, valve in the venous system of the face. We believe this flap to be a worthwhile addition to the existing surgical armamentarium.

A variety of flaps are available that utilise the skin of the anterior neck in facial reconstruction. These include random pattern flaps\(^1\), platysma flaps\(^2,3\) and supraclavicular neurovascular flaps.\(^4\) All of these flaps provide a good colour match for facial skin but each has inherent disadvantages, including limited mobility, poor donor site and unpredictability.\(^5,7\)

The submental island flap,\(^6\) an axial pattern flap first introduced by Martin et al. in 1993, is relatively free from these limitations and as such provides a reliable source of well matched skin for facial resurfacing. We report on its use in facial and intraoral reconstruction.

Anatomy

The submental artery, an average of 2 mm in diameter at its origin, arises from the facial artery deep to the submandibular gland (Fig. 1). It runs, in a gentle curve, forwards and medially on the mylohyoid muscle giving off 1 to 4 cutaneous perforators which pierce the overlying platysma muscle before forming a subdermal plexus which anastomoses extensively with the contralateral branches. The submental artery ends behind the mandibular symphysis just lateral to the midline, from where it sends branches to the lower lip and the sublingual gland.\(^9\)

The flap is drained by the submental vein, which in turn drains into the common facial vein on the surface of the submandibular gland.

Surgical technique

Planning the flap

The flap can be raised under local or general anaesthetic. The patient is placed supine with the head and neck moderately extended. The surface marking of the origin of the submental artery is a point 5.5 (4–7) cm anterior to the angle of the mandible and 7 (3–15) mm from the mandibular border. The surface marking of its termination is a point 8 (2–12) mm behind the mandibular border and 6 (4–8) mm lateral to the midline.

The flap is planned as shown (Fig. 2). Firstly, the upper limit of the flap is drawn within the mandibular margin, taking care not to encroach too far anteriorly, which would produce a visible scar. This incision can be extended posteriorly on the ipsilateral side to enable further dissection of the vascular pedicle if required. The maximum paddle width consistent with a direct closure can be determined using a simple pinch test and the lower border of the flap is drawn.

Raising the flap

The first stage when raising the flap is to identify and preserve the marginal mandibular branch of the facial nerve just deep to platysma and overlying the facial artery. The flap pedicle can then be dissected, though in most flaps this step may be deemed unnecessary as a widely based pedicle may be sufficient to allow tension-free flap placement. The facial artery is traced proximally and, as it disappears behind the submandibular gland, downwards retraction on the gland will reveal the submental artery. The submental vein can be identified as it lies on the surface of the gland draining into the common facial vein.
The margins of the flap are incised and the flap is raised commencing on the contralateral side, dissecting all tissues off the mylohyoid and digastric muscles, and working towards the pedicle which can be completely skeletonised. This produces a large skin paddle with a reliable, sturdy pedicle which can be tunnelled to its recipient site.

The donor site often closes directly without additional dissection but if skin mobilisation is required it should be done only on the cervical side to prevent eversion of the lower lip. If skin mobilisation is necessary, the cervical skin should be sutured to the hyoid bone to maintain the cervicomental angle.

**Elongating the pedicle**

The method described above produces a long reliable pedicle but it is possible to increase the length of the pedicle by additional dissection in one of three ways:

1. Division of the facial vessels distal to the origin of the submental artery (Fig. 3) provides an additional 1–2 cm of pedicle length. The vein, however, soon becomes taut and limits any further advancement.

2. Following Step 1, the taut submental or common facial vein can be divided and anastomosed to a suitable vein close to the recipient site (Fig. 4).

3. Martin et al. suggested that even further pedicle advancement can be achieved by dividing the facial vessels proximal to the origin of the facial artery and raising the entire flap in a reverse flow manner (Fig. 5), and in this way it is claimed that the forehead can be reached.

**Case reports**

**Case 1: Intraoral flap (Fig. 6)**

A 70-year-old woman presented with a T2 squamous cell carcinoma of the anterior floor of mouth, which extended onto the ventral surface of her tongue. She underwent a lower dental clearance, wide tumour resection (including a substantial bulk of her tongue) and submental island flap reconstruction. This flap offered a simple reconstruction of the floor of mouth and provided sufficient bulk to restore tongue volume whilst keeping the tongue tip freely mobile for speech and swallowing.
The submental island flap

Case 2: Facial flap (Fig. 7)

A 72-year-old man was referred from a dermatologist with a twice recurrent squamous cell carcinoma of his right pre-auricular region. On examination, he had a diffuse tumour, 6 x 4 cm, with no associated lymphadenopathy. The lesion was widely excised down to the zygomatic arch and the defect repaired using a submental island flap. He made an uneventful postoperative recovery and was discharged home on the 5th postoperative day.

Discussion

The total flap loss occurred in the only patient to receive a reverse flow flap in the manner proposed by Martin (Fig. 5). The flap was initially well perfused but there was progressive venous congestion over the following 12 hours and the flap eventually died. The valvular anatomy of the facial vein appears to be undocumented but, in unpublished cadaveric studies, Knight has shown there is a consistent valve in the facial vein toward the lower border of the mandible. We believe this valve prevented retrograde venous drainage and was therefore responsible for flap failure. We would therefore recommend that when this flap is raised in a reverse flow manner a separate venous anastomosis should always be performed (Fig. 8).

The use of the flap for reconstruction following excision of intraoral malignancy should be carefully considered. The main concern is that potentially involved lymph nodes may be left in the flap or its

Results

The submental island flap was used in 12 patients (Table 1), mean age 72 years, the elderly being most suited to this flap as they have an abundance of lax submental tissue. The maximum paddle width was 15 x 6 cm. The mean duration of flap raising and inseting, without additional pedicle dissection, was 30 minutes. The mean postoperative stay was 9 days. All donor sites healed well with no dysaesthesia or restricted neck movement.

The major morbidity associated with this flap was marginal mandibular nerve palsy in 2 patients (16%). This complication should be avoided by first identifying and preserving the marginal mandibular nerve prior to raising the flap. There was one haematoma (at the recipient site) which required evacuation, one partial flap loss (<5%) and one complete flap loss.
Figure 7—(A) Squamous cell carcinoma of the right preauricular skin. (B) The proposed excision margins and flap marked out. (C) Following excision, the flap is shown raised on its vascular pedicle with no additional pedicle dissection being necessary in this case. (D) Early postoperative appearance at 3 months.

Table 1 Patient summary

<table>
<thead>
<tr>
<th>No.</th>
<th>Age(years)</th>
<th>Sex</th>
<th>Pathology</th>
<th>Site</th>
<th>Paddle size (cm)</th>
<th>Postoperative stay (days)</th>
<th>Complications</th>
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<tbody>
<tr>
<td>1</td>
<td>88</td>
<td>F</td>
<td>Pleomorphic adenoma</td>
<td>Parotid</td>
<td>10 × 5</td>
<td>6</td>
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<tr>
<td>2</td>
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<td>Pleomorphic adenoma</td>
<td>Parotid</td>
<td>10 × 4</td>
<td>6</td>
<td>None</td>
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<tr>
<td>3</td>
<td>77</td>
<td>M</td>
<td>BCC</td>
<td>Cheek</td>
<td>15 × 6</td>
<td>3</td>
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<tr>
<td>4</td>
<td>63</td>
<td>M</td>
<td>Parotid adenocarcinoma</td>
<td>Cheek</td>
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<td>13</td>
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</tr>
<tr>
<td>5</td>
<td>79</td>
<td>M</td>
<td>SCC</td>
<td>Cheek</td>
<td>9 × 6</td>
<td>5</td>
<td>Total flap loss</td>
</tr>
<tr>
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<td>Romberg’s disease</td>
<td>Cheek</td>
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<tr>
<td>7</td>
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<td>F</td>
<td>Granulomatous panniculitis</td>
<td>Cheek</td>
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<td>4</td>
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<td>Floor of mouth</td>
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<td>F</td>
<td>Adenoid cystic carcinoma</td>
<td>Floor of mouth</td>
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<td>14</td>
<td>None</td>
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</tbody>
</table>

We would not recommend the use of this flap in cases with established nodal disease in the neck. However, it is simple to perform a prophylactic clearance of lymph nodes in the submental and submandibular triangles of the neck when raising the flap. We have found the flap a simple, rapid and effective alternative to the radial forearm flap for parotid and cheek defects and also for floor of mouth reconstruction.

Another potential disadvantage of this flap is its hair-bearing nature in males, though in some instances this characteristic could be usefully employed, for example in the reconstruction of the hair-bearing upper lip or beard-bearing area of the
male burn victim as this flap provides natural 'beard type' hair.

There already exists a wide choice of flaps for resurfacing the face or for intraoral reconstruction, but we believe the submental island flap is an important addition to the existing surgical armamentarium. It is reliable, rapid and simple to raise and produces an excellent colour, contour and texture match for facial skin. Unlike most other local flaps, it leaves a well hidden donor site and on these grounds we recommend its use.

Acknowledgements

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References

10. Knight S. Personal communication.

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Figure 8 Anastomosis of submental vein to allow orthograde venous return. The position of the constant valve in the facial vein is marked with a V.