



Case Report

Novel case examples of the submental island flap in pediatric head and neck reconstruction



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ABSTRACT

The submental island flap was first described as a tool for facial reconstruction after tumor resection. It is now widely used for reconstructing numerous structures in the head and neck region of adults. Pediatric surgical reconstruction is a challenging task that continues to evolve over time. We describe two novel uses of this flap in the pediatric population. The submental island flap is an excellent option for reconstruction in pediatrics given its ease of elevation, excellent cosmetic outcomes, and low donor site morbidity.

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1. Introduction

The submental island flap was first described in 1993 as a tool for facial reconstruction after tumor resection [1]. Since then it has been used in reconstruction of the oral cavity, maxilla, temporal bone, pharynx (including pharyngocutaneous fistula), larynx, and esophagus [2–9]. Furthermore, it has been utilized by neurosurgeons to reconstruct the prevertebral space and cover hardware during spine surgery [2,10], and by dermatologists for beard and mustache reconstruction [11].

The majority of the applications of the submental island flap are in the adult population. In this paper, we present novel uses of the submental island flap in two pediatric patients: (1) a patient with a postnatally diagnosed teratoma with skull base involvement and (2) a patient with a fourth branchial cleft sinus that was resected that subsequently required partial pharyngectomy. To the best of our knowledge, this is the first reporting of the pedicled submental island flap in the pediatric population.

1.1. Technique

The patient is positioned in the supine position with head extension. The flap is outlined in the submental region with a marking pen. The flap is elevated in a subplatysmal plane starting from the side opposite the pedicle and continuing towards the midline. The submental artery is identified and isolated just medial to the anterior belly of the digastric muscle. The use of a Doppler confirms its position. The submental artery and vein are traced as they travel between the submandibular gland and the mandible, thus maximizing pedicle length. The flap is then rotated and attached to the defect. The donor site is closed in layers.

2. Case series

2.1. Patient #1 - skull base teratoma

A 1-day-old female was admitted in respiratory distress with stridor and labored breathing. Physical exam revealed fullness of the left face and imaging was obtained. Head and neck computed tomography (CT) and magnetic resonance imaging (MRI) revealed a heterogeneous (solid/cystic) infratemporal mass extending

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superiorly through the skull base with significant mass effect on the left lobe of the brain [Fig. 1]. The extracranial mass occupied most of the left infratemporal, parapharyngeal and retromandibular spaces. The intraoral exam revealed significant oral and hypopharyngeal effacement [Fig. 2]. An incisional biopsy confirmed the initial suspicions of a teratoma.

The otolaryngology team performed complete resection of the mass at six weeks of age. During resection, which consisted of a transparotid/transcervical approach to the parapharyngeal space, complete resection was performed and a 2.5cm skull base defect created by the tumor was encountered. The decision was made to perform a pedicled submental island flap. Following dissection of the pedicle from a distal to proximal fashion and mobilization, the flap was deepithelialized [Fig. 3]. The remaining tissue was rotated superiorly and posteriorly into the skull base defect. This was placed deep to the dissected facial nerve. Tissue glue was placed around the pedicled flap. No cerebrospinal fluid was appreciated leaking through the repaired defect. The remaining incisions were closed routinely. Post-operative MRI confirmed ideal placement of the submental island flap immediately and at 3 months covering the skull base defect [Fig. 4]. Upon 1, 2, 8 and 11 month follow up, the patient's facial movement was consistent with a House-Brackmann score of 3/6 and she had no post-operative complications, including cerebrospinal fluid leak.

2.2. Patient #2 - fourth branchial cleft sinus

An otherwise healthy 8-year-old Caucasian female with history of recurrent left neck infections presented to our institution for evaluation of a neck mass. Since age 4, she had four incision and drainage procedures for recurrent abscesses of the left neck. Direct laryngoscopy identified a 1-cm tract in the apex of the left pyriform sinus. It was cannulated and cauterized using a bugbee catheter. Unfortunately, two months following this procedure the patient was re-admitted for a recurrent left neck abscess. Contrast-enhanced computed tomography revealed an inflamed cystic fluid collection with air, suggesting a fistula or sinus tract [Fig. 5].

Incision and drainage was again performed and direct laryngoscopy revealed purulent fluid emanating from the pyriform sinus tract [Fig. 6]. After one month to allow for resolution of acute inflammation, neck exploration was performed. At this time, no

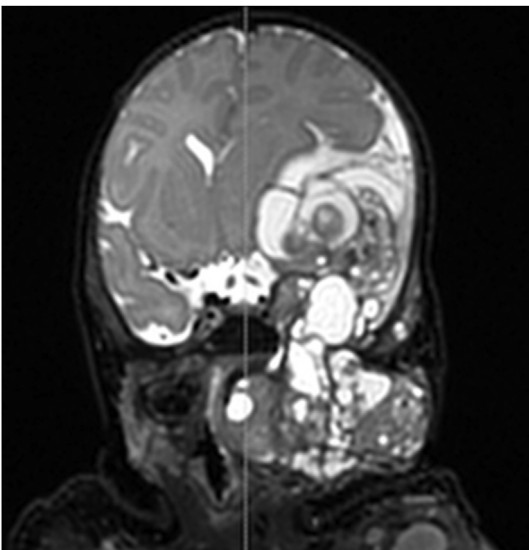


Fig. 1. T2 weighted MRI - coronal image of the giant cranio-cervicofacial teratoma on day three of life.



Fig. 2. Endoscopic view of hypopharyngeal mass effect of the cervical portion of the teratoma.

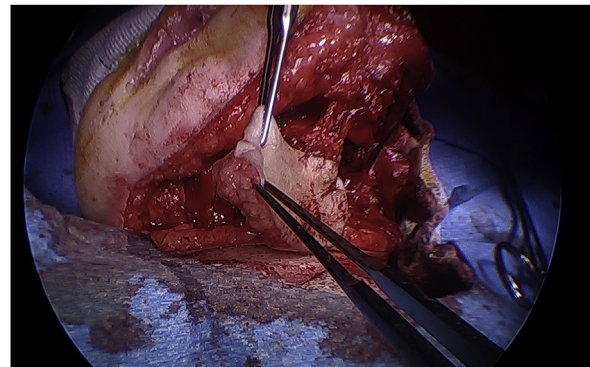


Fig. 3. Isolation of submental island flap and its pedicle before the epithelium is removed. The lips can be seen at the top of the figure for orientation.

distinct tract was found coursing into the neck, even with application of methylene blue. The cystic contents present at that time were mobilized onto a tract that appeared to be pedicled to the thyrohyoid membrane and removed.

After another infection, a more definitive left neck exploration was performed. Surgery began with a left thyroid lobectomy and the recurrent laryngeal nerve was identified and preserved, as was the external branch of the superior laryngeal nerve. The inferior constrictor muscle was released from the lateral aspect of the thyroid cartilage and the tract into the pyriform sinus was positively identified. This was cannulated with a lacrimal probe, demonstrating an obvious tract coursing inferiorly with the superior laryngeal nerve. The tract was deep to the nerve and appeared to stop superior to the cricothyroid joint. A partial pharyngectomy, which included a large portion of the left pyriform sinus, was then performed.

Primary closure of the pharyngectomy wound was attempted but could not be reliably performed due to the poor quality of the tissue after repeated procedures and infections. The decision was then made to harvest a pedicled submental island flap. This was then deepithelialized and partially inset into the mucosal defect. The remainder of the flap was used to bolster the repair. Post-operatively, the patient had normal swallowing function after one week and is without evidence of recurrence 60 months after surgery.

3. Discussion

The submental island flap is an axial patterned flap based on the submental branch of the facial artery. This vessel travels either

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