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RECONSTRUCTIVE TECHNIQUE FOR CENTRAL MANDIBULECTOMY DEFECT USING PECTORALIS MAJOR OSTEOMYOCUTANEOUS FLAP

Oncology

Jayasree Babu Sri Manakula Vinayagar Medical College and Hospital, Department of Otorhinolaryngology, Pondicherry, India. ORCID:0009-0007-5380-8141

Vigneshwaran Balasubiramaniyan * Sri Manakula Vinayagar Medical College and Hospital, Department of Oncosurgery Pondicherry, India. *Corresponding Author

Vaithiswaran Arikrishnan Sri Manakula Vinayagar Medical College and Hospital, Department of Plastic Surgery, Pondicherry, India. ORCID: 0009-0009-9340-7742

Boddupalli Saaketh Assistant Professor, Department of ENT, Sri Manakula Vinayagar Medical College and Hospital Puducherry - 605107. ORCID Id :0000-0001-9108-8092

ABSTRACT

A 70-year-old male with well-differentiated squamous cell carcinoma of the floor of the mouth underwent wide local excision with central segmental mandibulectomy and immediate reconstruction using a pectoralis major osteomyocutaneous (PMOMC) flap incorporating the sixth rib. The surgical approach has successfully restored mandibular continuity and oral function. Post-operative recovery was uncomplicated, with satisfactory cosmetic results and preserved swallowing, speech, and mastication functions. The PMOMC flap has well demonstrated minimal donor site morbidity while eliminating the need for microvascular surgery. This case demonstrates the efficacy of PMOMC flap reconstruction in elderly patients with comorbidities, offering benefits including reduced operative complexity, preservation of natural mandibular anatomy, and favourable functional outcomes compared to free tissue transfer techniques. The technique represents a viable alternative for mandibular reconstruction in appropriately selected patients.

KEYWORDS

Pectoralis major osteomyocutaneous flap; oral squamous cell carcinoma; segmental mandibulectomy

INTRODUCTION

According to GLOBOCAN 2022 statistics, oral cavity carcinoma represents the second most common head and neck malignancy, with 143,759 new cases annually and a cumulative risk of 1.1% [1]. Floor of mouth carcinoma constitutes the second most frequent oral cavity malignancy, often presenting at advanced stages requiring mandibulectomy, thereby necessitating sophisticated reconstruction techniques that have evolved since the 1980s. Inadequate reconstruction of central segmental mandibular defects results in significant functional impairment and aesthetic deformity, given the critical role of these structures in maintaining lower facial height, contour, and muscular attachments.

Successful mandibular reconstruction must achieve three fundamental objectives: restoration of mandibular continuity, preservation of dental arch configuration, and maintenance of facial aesthetics [2]. Surgical management of advanced head and neck malignancies frequently demands extensive reconstruction requiring substantial tissue volumes and robust flap coverage. The pectoralis major myocutaneous flap has emerged as a reliable reconstructive option for complex head and neck defects, particularly in advanced carcinomas [3].

Ariyan first described the clinical application of pectoralis myocutaneous flaps in head and neck reconstruction, demonstrating successful outcomes with pedicled myocutaneous tissue transfer [4]. The vascular architecture of myocutaneous flaps derives from perforating vessels traversing the underlying muscle, enabling reliable perfusion of overlying skin islands during rotation and transposition [4].

Incorporation of osseous components with myocutaneous flaps facilitates reconstruction of composite defects following segmental or hemimandibulectomy. However, non-vascularized bone grafts demonstrate poor success rates in mandibular reconstruction following oncologic resection due to compromised healing environments [5]. This report presents our clinical experience utilizing immediate mandibular reconstruction with pectoralis major osteomyocutaneous flap and evaluates its clinical advantages.

Case Report

A 70-year-old male, with a medical history significant for hypertension, tobacco use, and alcohol consumption presented with a two-month history of a painful 3×2 cm ulcerative lesion located in the floor of the mouth. Physical examination revealed an ulcero-proliferative mass involving the midline floor of mouth with proximity to the mandible. Histopathologic analysis confirmed well-differentiated squamous cell carcinoma. Magnetic resonance imaging demonstrated lesion extension to the ventral tongue surface without mandibular involvement.

The patient underwent composite resection including wide local excision, central segmental mandibulectomy, and bilateral selective neck dissection. A lower lip-splitting incision with chin preservation was performed, followed by apron neck incision and elevation of bilateral cheek flaps. Selective neck dissections encompassed levels IA and IB bilaterally. Following lesion marking , wide local excision was performed maintaining 1 cm margins. Mandibular osteotomies were completed at the first premolar regions bilaterally, creating a 5 cm central defect (Fig. 1).

Flap harvest commenced with appropriate skin incision design. The pectoralis major osteomyocutaneous flap was elevated while preserving the deltopectoral vascular territory overlying the fifth and sixth ribs. Complete mobilization of the pectoralis major muscle included division of sternal and lateral attachments while preserving the underlying pectoralis minor. The sixth rib was selected based on optimal muscle-rib attachment strength and adequate pedicle length. Careful subperiosteal dissection isolated a 5 cm rib segment with preservation of pleural integrity. A minor pleural injury was identified and repaired primarily. The composite flap was transposed through a subcutaneous tunnel to the neck region(Fig. 2). The cutaneous paddle provided intraoral lining for floor of mouth reconstruction. Mandibular continuity was restored using titanium plate osteosynthesis with supplemental wire fixation (Fig. 3). Adequate rib perfusion was confirmed by periosteal bleeding.

Histopathologic examination revealed T1N0Mx well-differentiated squamous cell carcinoma with negative margins and no mandibular involvement. Adjuvant therapy was not indicated. Post-operative recovery proceeded without complications, and the patient was discharged with acceptable cosmetic results and preserved deglutition, articulation, and mastication.

DISCUSSION

Management of oral squamous cell carcinoma frequently results in

segmental mandibular defects requiring complex reconstruction. Optimal mandibular reconstruction should restore anatomic continuity with the maxilla for proper occlusion while preserving essential functions including deglutition, speech, and mastication.

Contemporary reconstruction options include titanium reconstruction plates with or without soft tissue coverage, non-vascularized bone grafts, pedicled osteomyocutaneous flaps, and free vascularized bone transfers. The fibular osteocutaneous free flap has become the gold standard for mandibular reconstruction due to its reliable vascular anatomy and structural properties. However, reconstruction plates remain the most commonly employed technique, while vascularized bone transfers are typically reserved for complex revision cases or extensive defects.

The utilization of rib grafts remains controversial due to documented high resorption rates. Conversely, several studies have demonstrated that pedicled pectoralis major osteomyocutaneous flaps exhibit minimal bone resorption compared to non-vascularized grafts.[6] Shunyu et al. reported successful mandibular reconstruction using fifth rib PMOMC flaps without evidence of resorption or fracture, consistent with our clinical experience.[7] Even in cases where rib resorption occurs, functional and aesthetic outcomes remain acceptable.[8]

Our patient demonstrated no donor site complications, representing a significant advantage compared to alternative reconstructive techniques such as radial forearm free flaps, which carry substantial donor site morbidity.[9] The primary complication associated with PMOMC flaps involves pulmonary complications secondary to pleural injury during rib harvest, as documented in previous literature.[10]

CONCLUSION

The pectoralis major osteomyocutaneous flap offers several clinical advantages including reduced donor site morbidity, abbreviated learning curve, decreased operative duration, reliable vascularity, and elimination of microvascular anastomoses. The natural rib curvature approximates mandibular anatomy, reducing the need for complex osteotomies while minimizing procedure-related complications. Technical familiarity minimizes failure rates without requiring specialized microvascular expertise or additional surgical teams. This approach particularly benefits elderly patients with significant comorbidities and advanced malignancies.

The primary limitation involves inability to support osseointegrated dental rehabilitation, a constraint shared with most reconstruction techniques except vascularized fibular transfers. However, few patients pursue or qualify for osseointegrated implant therapy. Mandibular reconstruction remains essential for patient physical, psychological, and social well-being, significantly enhancing quality of life regardless of prosthetic limitations.

Figure 1: Intraoperative photographs showing *Post-resection defect following central segmental mandibulectomy. The cut mandibular ends are marked with asterisk (*).*

Figure 2: Intraoral placement of the cutaneous paddle (asterisk) for floor of mouth reconstruction following flap transposition.

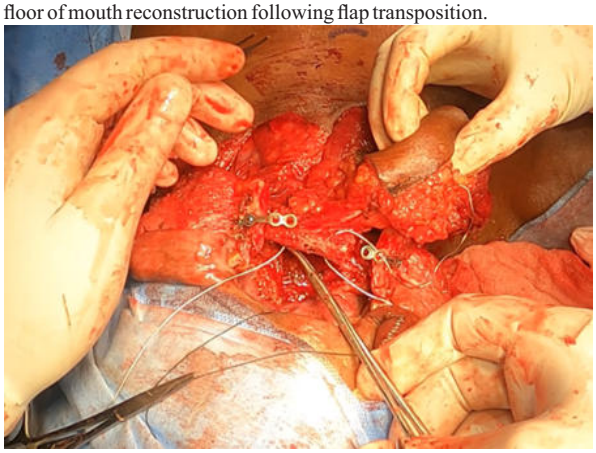

Figure 3: Intraoperative photograph showing the grafted Rib secured to mandible with plates, screws and SS wires

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