CASE REPORT

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Discovering the abstruse: reverse marginal mandibulectomy

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Abstract (J Korean Assoc Oral Maxillofac Surg 2026;52:155-159)

Tumours involving the bones of maxillofacial region requires elaborate surgical skills and experience for managing the complexity. Treatment planning majorly depends on the extent of bone involvement, type of erosion and involvement of para mandibular soft tissue. Pertaining to mandible in this paper, marginal and segmental mandibulectomies are the predominant options which are oncologically safe practices done by surgeons. Here we report a case of a patient, who was treated with technique of reverse marginal mandibulectomy. He had a unique presentation of tumour abutting the lower border of mandible with the erosion limited to the outer cortex along with a huge extra nodal growth. This sparsely used technique was performed post neoadjuvant chemotherapy followed by microvascular reconstruction. We intend to draw attention to this hermetic technique as an oncological safe and reliable alternative for a specific group of patients.

Key words: Types of marginal mandibulectomy, Reverse marginal mandibulectomy, Mandibular erosion, Extra-nodal involvement, Technique

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I. Introduction

According to National Cancer Registry Programme (NCRP) of Indian Council of Medical Research, commonest cancer is in the region of head and neck in Indian males. Of these, oral cancers constitute 40%-70%[1]. It is attributed to the increased use of tobacco in several forms. The protocol for treating oral cancer includes surgery, radiotherapy and chemotherapy. Combined treatment modalities are considered in advanced oral cancers, as it increases the survival rates while early cases are treated with single modality (surgery/radiotherapy)[2].

The treatment planning for tumour resection differs from patient to patient and depends on the type of anatomical structures involved. Various surgical techniques have been documented and gained oncological validity with time for oral cancers. Wherein some techniques are only practiced and very sparse literature is available over them, usually gained as a hierarchical asset. Procedure of reverse marginal mandibulectomy is one of them and we would like to bring enlightenment on how this procedure can be of importance in select cases providing adequate oncological safety and adding an archive in literature.

II. Case Report

A 43-year-old male patient, reported to our department with an ulcer over the left lower lip involving the angle of mouth measuring about (10×9×2 mm) and an ill-defined soft tissue mass (83×48×85 mm) arising from the submental region since 8 months. An incisional biopsy report was suggestive of well differentiated squamous cell carcinoma of lower lip. Upon investigations, contrast-enhanced computed tomography scan report revealed that lesion over the lower lip is extending into subcutaneous tissue. There was a nodal mass lesion in the submental region, involving the skin & bilateral anterior belly of digastric. This case presented with an unusual superficial erosion of the lower border, of the outer cortex of mandible, from canine to canine region.(Fig. 1) Left

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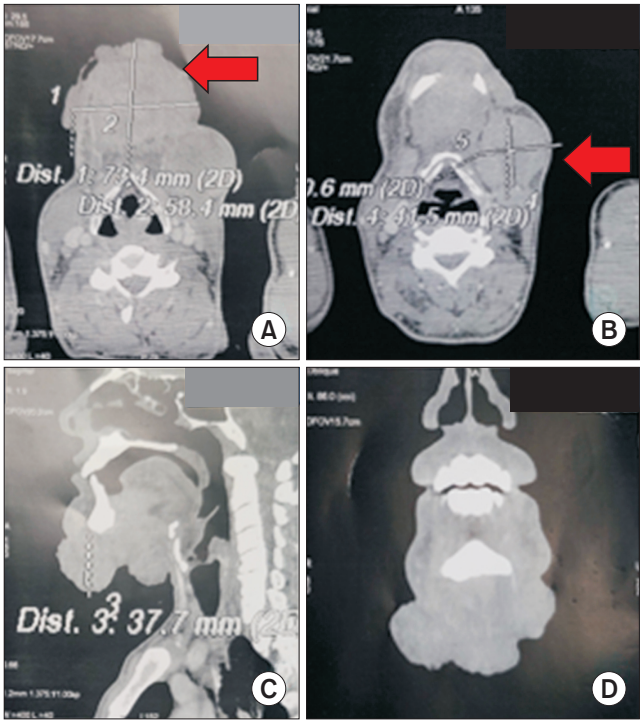


Fig. 1. Preoperative evaluation of the tumour over computed tomography scan. A. Axial section of scan, arrow pointing to the extranodal growth at submental region. B. Axial section of scan, arrow pointing to the lymphnode at level IB. C. Sagittal section representing the tumour in superior inferior extent. D. Coronal section representing the tumour in medio lateral extent.
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Fig. 2. Post Chemotherapy response evaluation scan. A. Axial section of scan, arrow pointing to the shrunken extranodal growth at submental region. B. Axial section of scan, arrow pointing to the shrunken node at level IB. C. Three-dimensional representation of mandible arrow pointing to the erosion of lower border of mandible. D. Clinical image showing the shruken extranodal mass.
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level Ib (40×41×48 mm) and right level II nodes (20×12 mm) were noted. Clinical staging was cT2aN3bM0.

Upon multidisciplinary team discussion, patient with an advanced lesion and huge nodal mass was planned with neoadjuvant chemotherapy (NACT) with cisplatin (60 mg), docetaxel (100 mg) and methotrexate (50 mg), 3 cycles. Response evaluation was done, positron emission tomography-CT and magnetic resonance imaging fusion, revealed that lower lip skin lesion measured (7×2 mm) and the nodal mass measured (32×28×26 mm) in the submental region, (previously 83×48×85 mm). Bony erosion was limited to the outer cortex superficially and did not involve the medullary portion of mandible. Lymph nodes at left level Ib (27×20×22 mm), were adherent to the submandibular gland, platysma extending to the overlying skin. No extension of lesion to the other sites of the oral cavity or distant metastasis was found. Right

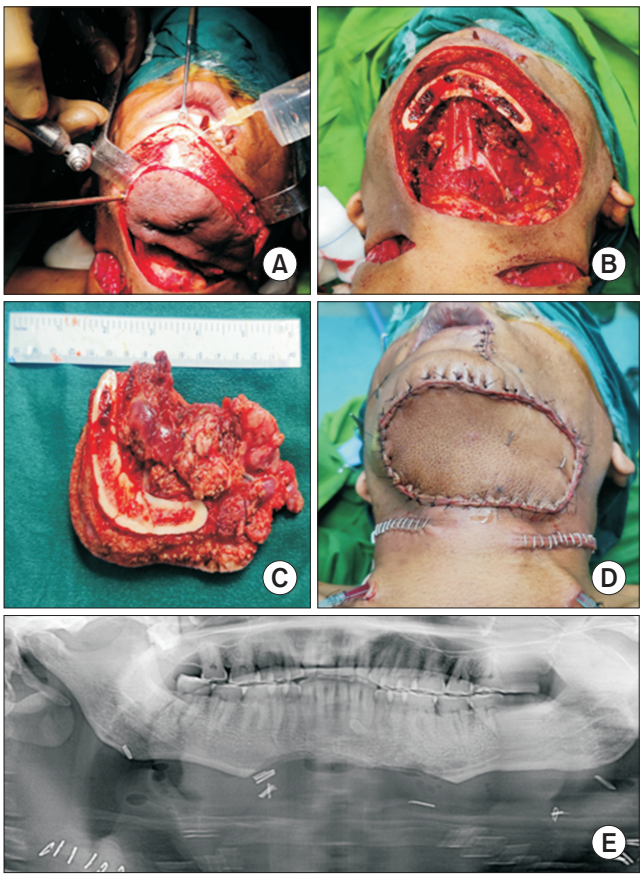


Fig. 3. Intraoperative images. A. Performing reverse marginal mandibulectomy with oscillating saw under saline irrigation. B. Cut end of the mandible. C. Resected mandible with nodal mass. D. Primary closure at lower lip and free radial artery forearm flap reconstruction. E. Immediate postoperative orthopantomogram to assess the residual mandible height.
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level Ib, bilateral level II and III neck nodes were reactive. (Fig. 2)

Since there was good clinical response with decrease in the nodal mass (asymmetrical reduction in size) and no further progression of disease noted, surgical intervention was planned. Wide excision of the lower lip lesion with adequate margins along with overlying skin with primary closure of lower lip and bilateral extended supra omohyoid neck dissection (levels I to IV) with reverse marginal mandibulectomy and reconstruction with microvascular surgery free radial artery forearm flap with or a segmental mandibulectomy and reconstruction with an osteomyocutaneous fibula flap was planned.

After the bilateral neck dissection, a reverse marginal mandibulectomy was planned along with the removal of the residual tumour mass around the chin region. The tumour was outlined which was irregularly shrunk after the chemotherapy. Following the contours of the tumour extent, dissection was performed and a plane was created along, way to access the genium of the mandible. Mylohyoid was sacrificed while carefully conserving the geniohyhoid and genioglossus. With the help of an oscillating saw the mandible was osteotomized under copious irrigation. Describing the osteotomy, 1 cm bony margins all around were planned from the point of erosion of mandible following the contour and measures were taken to keep the cut ends smooth for better flap adaptability and to avoid undue areas of pain and infection for the patient in the healing phase. The accessibility obtained to perform the marginal mandibulectomy was sufficient enough because the anterior mandibular height of the patient's jaw able to compensate for the loss.(Fig. 3)

Bone marrow samples from the cut end of the lower mandible was also sent for evaluation, to confirm if the clinical extent of the mandibulectomy was sufficient or if a segmental mandibulectomy would be required keeping in mind the molecular spread of tumour. The results were negative for any bony invasion into the medullary portion. Also, the frozen section margins of the tumour mass and primary lesion results were negative thus supporting the treatment plan.

Final histopathological report suggested no residual invasive squamous cell carcinoma in lower lip. Extra nodal extension was present at levels Ia and left Ib lymph nodes. Reverse marginal mandibulectomy specimen was involved by carcinoma but not extending to margins (pTxN3bM0). Patient was followed up and upon evaluation, this surgical technique enabled both organ (mandible) preservation, oncological safety and added cosmesis for the patient.(Fig. 4)

III. Discussion

Involvement of the mandible in oral cancers is a major concern for the surgeon. Review of literature suggests that the incidence of mandibular invasion in oral carcinomas ranges from 12% to 56%[3]. Pattern of tumour invasion to the mandible in dentate patients is from the alveolar ridge into the medullary portion and the alternative route of tumour entry to mandible is at the point of tumour abutment to the bone interface[4,5].

The surgical techniques used for these tumours involving the mandible comprise of largely marginal and segmental mandibulectomy. Marginal mandibulectomy is indicated when superficial erosion of the alveolar process is present or when there is no para mandibular soft tissue involvement with minimal cortical erosion. It is classified further into

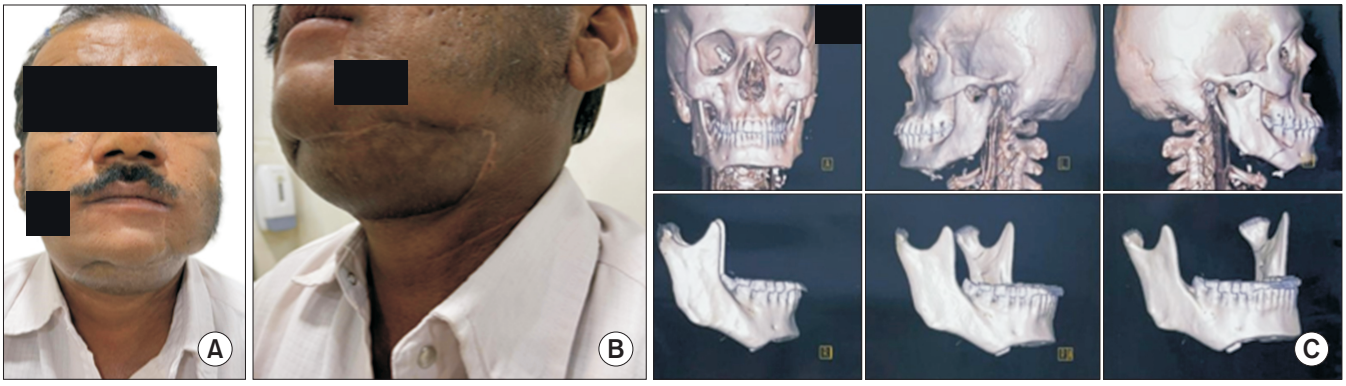


Fig. 4. Postoperative 6-months follow-up. A. Profile view picture revealing an acceptable scar and lip competency. B. Lateral view revealing the settled free radial artery forearm flap reconstruction. C. Three-dimensional reconstruction representing the reverse marginal mandibulectomy in profile and lateral views.

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horizontal, oblique, vertical and reverse marginal mandibulectomy[6]. Series of cases reported on marginal mandibulectomies with a follow up ranging upto 1 to 9 years, revealed that not only does it provide good oncologic results but also improved postoperative function and cosmesis[7].

While segmental resection is opted, when tumour has grossly eroded the mandible or if mandible is previously irradiated or if there is gross para mandibular soft tissue involvement[8,9]. On comparing these two techniques, meta-analysis conducted at different time spans, in 2018 and 2023 concluded that the type of mandibulectomy won't affect the local control rate, overall survival period nor the disease-free survival but the disease extension, location and ability to get free margins, would influence the modality of resection[10,11].

To confirm this hypothesis about the role of disease and its location influencing the outcomes, a 11-year institutional review of marginal mandibulectomies revealed that the procedure performed for buccal, tongue or floor of mouth carcinomas yielded results favourable to buccal cancers with good local control on comparison with floor of mouth cancers[12]. It helps us understand the importance of primary tumour site in the overall prognosis of the patient rather than surgical technique alone.

According to Indian data set about marginal mandibulectomies performed, 26 cases out of 125 cases enrolled were advanced oral cavity cancers, which underwent NACT followed by marginal mandibulectomy which otherwise would have required segmental mandibulectomies. The 3-year overall survival was 72.9% and disease-free period was 87.7% for advanced stage tumors[13]. Although many literature studies have discussed about the practice of marginal mandibulectomies, they have rarely included the cases of reverse marginal mandibulectomies and hardly any data is available on their long- term effects.

Nonetheless practiced (reverse marginal mandibulectomy) this procedure lacks documented evidence of oncological safety and utility guidance in specific case-based scenarios[14]. In our case the tumor abutment region was succumbed to an unusual pattern of mandible (lower border) erosion. Wherein the superficial erosion at the mandible was limited only till the outer cortical portion and did not involve the intra medullary portion.

This infrequent type of erosion required a different approach for preserving the mandible in continuity with adequate oncological clearance, minimal sacrifice of anatomical structures for maintenance of masticatory, speech and deglutition functions and also providing superior aesthetic outcomes. For which we performed the reverse marginal mandibulectomy type of resection of the lower border of mandible with clear margins, and ensured to avoid creating any stress points over the mandible leading to fractures in future. All of these properties can be advantageous to the patient but only when treated in select cases, which can be the limitation of the procedure.

The purpose of this article is to document the surgical technique of reverse marginal mandibulectomy as an oncologically acceptable procedure in selected patients where there is superficial erosion of lower margin of mandible due to nodal mass. Awareness and knowledge of this technique would be a part of a surgeon's armamentarium enabling the next-gen surgeons to use it as an alternative approach in select cases.

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Authors' Contributions

P.E. conceived the idea, drafted the manuscript, and performed editing. R.B. was responsible for study design and data collection. A.S. contributed to study design and manuscript editing. A.M.A. participated in study design and manuscript editing. R.T. provided supervision and manuscript editing.

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Ethics Approval and Consent to Participate

All procedures were performed in accordance with pro-

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Consent for Publishing Photographs

Written informed consent was obtained from the patient for publication of this article and accompanying images.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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