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Jaw Restoration using a Vascularized Fibular Flap: A Case Report

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Abstract: The mandible plays a critical role in shaping the human facial structure and significantly supports orofacial functions by serving as the foundation for the dentition. When reconstructing a discontinuity defect of the mandible, surgeons bear the important task of not only restoring function and aesthetics but also maintaining the patient's overall quality of life by reestablishing the ability to chew, speak, and achieve a natural appearance. Various donor sites, such as the iliac crest, radius, scapula, and fibula, have been utilized to accomplish these reconstructions.

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I. INTRODUCTION

A 38-year-old female patient diagnosed with squamous cell carcinoma of the left side of the mandible underwent surgical intervention, which included a middle mandibulectomy followed by reconstruction using a fibular free flap. The tumour involved the outer cortex of the mandible in the left Para midline region and had caused erosion of the inner cortex of the mandibular body. Preoperative assessment included a colour Doppler study of the left leg to evaluate vascular integrity. The donor and recipient sites were carefully marked, and a fibular flap of appropriate size was harvested for reconstruction. Microvascular anastomosis was performed, connecting the fibular flap vessels to the right facial artery and the right anterior jugular vein. The fibula bone was contoured to mimic the shape of the mandible and secured in place using titanium plates, followed by soft tissue closure. The postoperative course was uneventful, with the flap demonstrating good viability and integration.

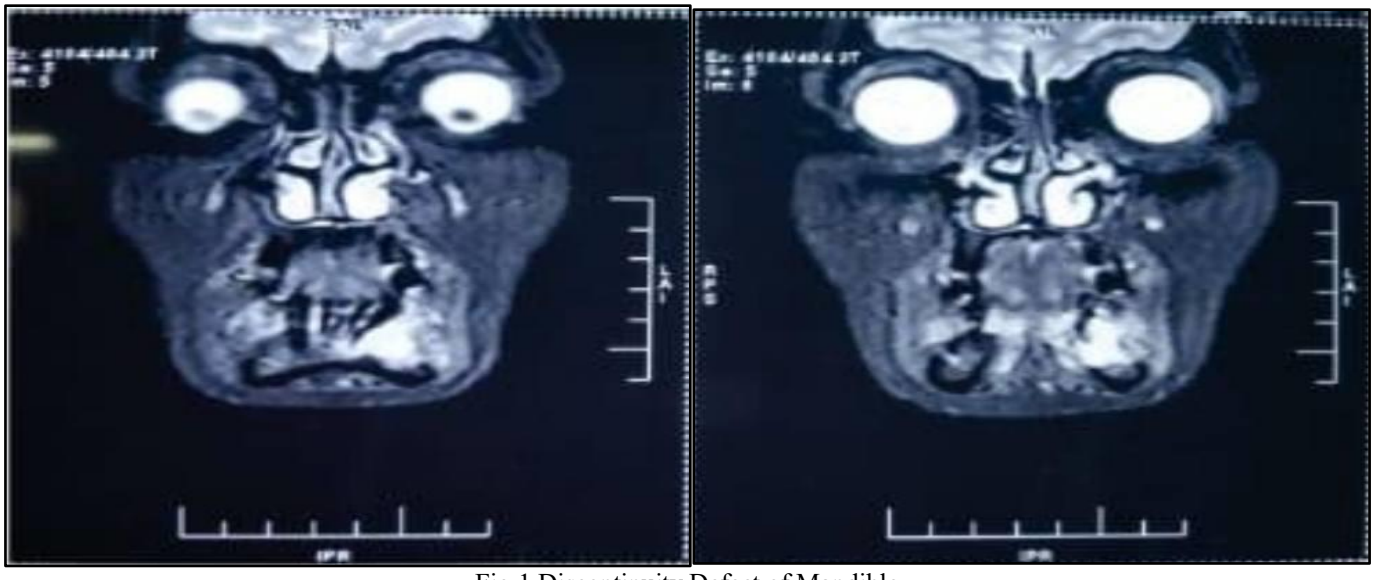

Fig 1 Discontinuity Defect of Mandible

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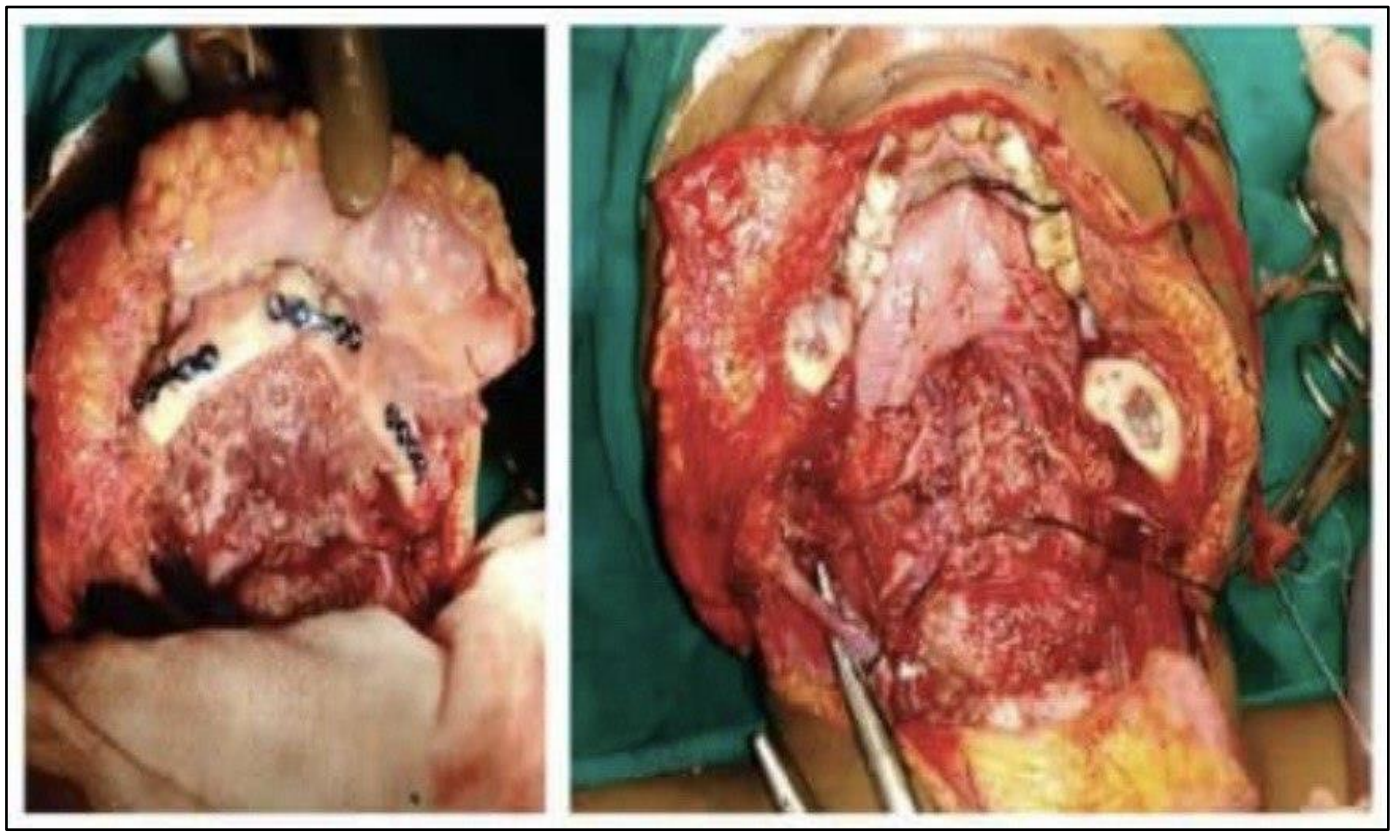

Fig 2 Reconstruction of a Discontinuity Defect of the Mandible

II. DISCUSSION

The use of free vascularized flaps, particularly with the fibula as the donor site, is widely regarded as one of the most effective treatments for mandibular discontinuity defects. Azuma et al. demonstrated that using plates prebent to patient-specific 3D-printed models improves mandibular reconstruction outcomes [1]. This method enhances surgical accuracy, reduces operative time, and achieves better aesthetic results, helping to minimize contour deformities. Poojary et al. (2025) highlighted that while incidental complications can occur during free fibula flap reconstruction of the mandible, careful planning and multidisciplinary teamwork lead to successful outcomes and valuable surgical learning [2]. Urlaub et al. (2019) showed that radiation impairs bone healing in nonvascularized grafts, highlighting the difficulty of reconstructing irradiated mandibles and the need for better strategies [3]. Cohen et al. (2024) found that patients undergoing posterolateral mandible reconstruction with bony flaps reported better functional and aesthetic outcomes compared to those with soft tissue flaps [4]. Sobti et al. (2022) performed a systematic review and meta-analysis to compare the outcomes of mini-plate (MP) fixation and reconstruction bar (RB) fixation in mandibular reconstructions using free fibula flaps [5]. The analysis of 16 studies involving 1,513 patients revealed that MP fixation was linked to a higher incidence of plate-related complications compared to RB fixation. These results suggest that RB fixation may have a more favorable complication profile for oncologic mandibular reconstructions.

The fibula offers several advantages, including sufficient bone length, availability of associated soft tissue, favorable anatomical dimensions, compatibility with bicortical implants, and minimal donor site morbidity. Moreover, lower limb function typically returns to normal within a few months postoperatively. Masticatory function can be effectively restored through the use of appropriate dental prostheses. However, a notable limitation of fibular flap reconstruction is the need for advanced microvascular anastomosis skills.

III. CONCLUSION

The free fibular flap remains one of the most reliable options for reconstructing mandibular discontinuity defects, effectively restoring both function and aesthetics while causing minimal impact on donor limb function.

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