

Dental Implant Rehabilitation in Fibula Free Flap Reconstructed Jaws

Viet DV,^{1,2} Ngoc DM,³ Rokaya D,^{4,5} Anh TH^{1,2}

¹Department of Implantology,
Hanoi National Hospital of Odonto-Stomatology,
Ha Noi, Viet Nam.

²Faculty of Dentistry,
University of Medicine and Pharmacy,
Vietnam National University,
Ha Noi, Viet Nam.

³Foreign Language Specialized School,
Vietnam National University,
Ha Noi, Viet Nam.

⁴Clinical Sciences Department,
College of Dentistry,
Ajman University,
Ajman, United Arab Emirates.

⁵Center of Medical and Bio-Allied Health Sciences
Research,
Ajman University,
Ajman, United Arab Emirates.

Corresponding Author

Trinh Hai Anh
Department of Implantology,
Hanoi National Hospital of Odonto-Stomatology,
Ha Noi, Viet Nam.
E-mail: trinhhaianh88@mail.ru

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ABSTRACT

The fibula free flap (FFF) is widely used for maxillofacial reconstruction due to its excellent vascularity, cortical bone quality, and ability to support endosseous implants. Rehabilitation with dental implants allows restoration of oral function and esthetics. The objective of this case series is to present a case series of four patients who underwent jaw reconstruction with fibula free flaps followed by dental implant placement, with emphasis on clinical and functional outcomes. Three patients (two males, one female) underwent reconstruction with fibula free flaps and subsequent implant placement. Clinical records and radiological imaging were used to evaluate flap survival, implant outcomes, prosthetic rehabilitation, and patient-reported functional improvement. All fibula flaps survived. A total of 10 implants were placed across four patients. Implant survival was 100% during follow-up. Functional rehabilitation outcomes included restored mastication, improved speech intelligibility, and satisfactory esthetics. Minor soft tissue inflammation was observed in one patient and managed conservatively. Implant placement in fibula free flap reconstructed jaws provides a reliable solution for oral rehabilitation, with predictable survival and significant functional improvement.

KEY WORDS

Dental implants, Fibula free flap, Jaw reconstruction, Oral rehabilitation

INTRODUCTION

Maxillofacial defect arises from trauma, the resection of benign/malignant tumors and cysts, and congenital causes.¹ Reconstruction of maxillofacial defects following tumor resection or trauma remains one of the greatest challenges in oral and maxillofacial surgery.^{1,2} The fibula free flap (FFF) has become the gold standard due to its long bicortical bone segment, reliable vascular pedicle, and capacity for both functional and esthetic reconstruction.³⁻⁵ Placement of osseointegrated implants within the fibula graft permits fixed prosthetic rehabilitation, restoring mastication, phonetics, and esthetics. Previous studies report high implant survival rates (90-100%), with outcomes comparable to implants in native bone.⁶⁻⁸ However, successful rehabilitation requires careful planning, surgical precision, and management of peri-implant soft tissue. This article presents four cases of jaw reconstruction with fibula free flaps followed by dental implant rehabilitation,

highlighting clinical outcomes and patient functional improvements.

CASE REPORT

This case series included three patients (2 males, one female; mean age: 34.5 years; range: 27–51 years) who underwent jaw reconstruction with fibula free flaps followed by implant placement at our institution. Two were mandibular and maxillary defects. The reconstruction with a fibula free flap with implant-supported prostheses after flap integration.

Fibula Surgical Reconstruction

Fibula flaps were harvested and microvascularized for mandibular or maxillary reconstruction. After healing, endosseous implants were placed under standard

protocols. Prosthetic rehabilitation was carried out with fixed implant-supported prostheses.

The outcomes measured were (a) flap survival, (b) implant survival and success (absence of pain, infection, mobility, or radiographic bone loss > 1.5 mm in the first year), (c) functional outcomes: diet, mastication, speech, esthetics, and oral competence, and (d) complications.

Case 1 (33 years) (Fig. 1): Underwent mandibular resection and reconstruction with fibula free flap. Four implants were placed and restored with a fixed prosthesis. The patient achieved stable occlusion, improved chewing efficiency, and esthetic satisfaction.

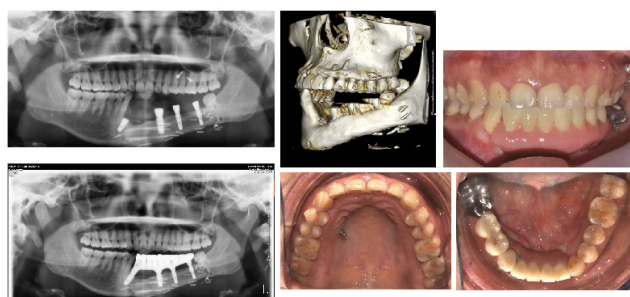


Figure 1. Case 1, who underwent mandibular resection and reconstruction with a fibula free flap. Four implants were placed and restored with a fixed prosthesis. The patient achieved stable occlusion, improved chewing efficiency, and esthetic satisfaction.

Case 2 (27 years) (Fig. 2): Mandibular defect reconstructed with fibula flap. Three implants were inserted and successfully osseointegrated. Post-rehabilitation, the patient reported improved dietary consistency and functional recovery.

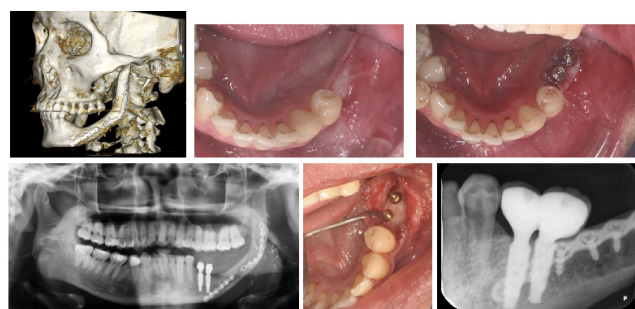


Figure 2. Case 2 with mandibular defect reconstructed with fibula flap. Three implants were inserted and successfully osseointegrated. Post-rehabilitation, the patient reported improved dietary consistency and functional recovery.

Case 3 (27 years) (Fig. 3): Maxillary reconstruction with fibula flap. Four implants were placed. Functional results included restoration of esthetics, improved speech intelligibility, and a stable prosthesis with satisfactory occlusion.

Clinical Outcome

Flap survival: All four fibula flaps survived (100%).

Implant survival: 13 implants placed; all achieved osseointegration (100% survival).

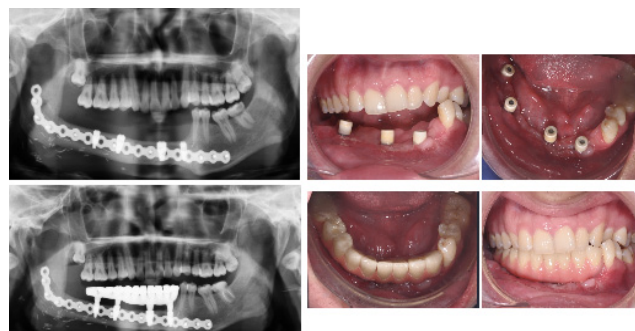


Figure 3. Case 3 with maxillary reconstruction with fibula flap. Four implants were placed. Functional results included restoration of esthetics, improved speech intelligibility, and a stable prosthesis with satisfactory occlusion.

Functional outcomes:

- Diet/mastication: Three patients resumed a normal diet; one required a soft diet.
- Speech: Improved intelligibility in two patients; maintained in two.
- Esthetics: All patients reported satisfactory appearance.

Oral competence: Preserved in 2/3 patients; mild drooling reported in one.

Complications: One patient developed peri-implant mucositis, which resolved with local care. No implant failures occurred.

DISCUSSION

The fibula bone provides sufficient volume and density for implant placement. Implant-supported prostheses enhance oral rehabilitation significantly compared to removable dentures. Guided surgical protocols and multidisciplinary collaboration improve predictability. Implants placed in vascularized bone grafts are a safe and reliable opportunity to rehabilitate patients following mandibular resection. It shows that most studies report a successful outcome and results of this series demonstrate a high survival rate for implants placed in reconstructed mandibles with an improvement in the quality of life.^{9,10} All our cases confirm the reliability of fibula free flaps for jaw reconstruction and implant-supported rehabilitation. Dental implants in free fibula grafts present favorable success rates, with minimal bone resorption, manageable probing depths, and limited bleeding on probing.¹¹ Implant success is influenced by factors such as smoking and irradiated bone.

Our 100% implant survival in all cases is in agreement with Ariga et al., who reported similar outcomes in fibula-based implant prostheses.⁶ Similarly, long-term studies by Chiapasco et al. and Iizuka et al. reported high implant survival outcomes in fibula free flap reconstructions, with Chiapasco et al. observing survival rates exceeding 90%, supporting the reliability of implant-supported prostheses in these reconstructions.^{7,8}

Functionally, our patients demonstrated significant improvements in mastication and esthetics, echoing findings from Leung et al. who highlighted quality-of-life benefits of implant prostheses in reconstructed jaws.¹² Speech improvements were also comparable to results by Roumanas et al., who demonstrated better intelligibility and oral competence after implant-supported prostheses.¹³

Soft tissue management remains a challenge. In line with Jaquiéry et al., we observed mucosal complications in one patient due to the limited keratinized gingiva around fibula grafts.¹⁴ Proper prosthetic design and rigorous hygiene protocols are essential for long-term stability.

The literature identifies several factors that may compromise the success of dental rehabilitation following jaw reconstruction, including microstomia, unfavorable maxillomandibular relationships, and failure of dental implants.¹⁵ The inability to complete dental rehabilitation was most frequently related to necrosis of the fibula free flap after implant placement, followed by recurrence of the primary malignancy. Although these events are relatively

uncommon, they represent a severe and devastating complication when they occur. Importantly, there remains a paucity of data addressing the true incidence, underlying mechanisms, and contributing risk factors for fibula free flap necrosis, particularly in patients who have received adjuvant radiotherapy. This lack of evidence underscores the need for further investigation into prevention, early detection, and optimal management strategies.

Finally, some limitations are that this case series is a small sample size. Short to medium-term follow-up. Lack of standardized patient-reported outcome measures. Future studies with larger patient cohorts, standardized PROMs, and longer follow-up are required.

Implant rehabilitation in fibula free flap reconstructed jaws is a safe and predictable treatment with high survival rates and substantial functional improvement. Despite soft tissue challenges, implant-supported prostheses significantly enhance patient quality of life after major jaw reconstruction.

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