

Dental Implants Placement Following Free Flap Surgery: A Scoping Review of Randomized Controlled Trials

Abdulaziz Abdullah Alabood^{1*}, Mohammed Ibrahim Almahmoud¹

¹College of Dentistry, King Saud University, Riyadh, Saudi Arabia

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*Corresponding author: Abdulaziz Abdullah Alabood
College of Dentistry, King Saud University, Riyadh, Saudi Arabia

Abstract

The free fibula flap has emerged as the preferred option for reconstructing defects in the mandible and maxilla. The method of implanting a fibula flap is nearly identical to that used on the original jawbone, but accessing the bone during surgery is the most challenging part. Previous reports discussed the use of dental implants following free flap tissue transfer. This review aims to discuss all the relevant trials discussing dental implants following free flap surgery.

Keywords: Dental implants, free flaps, free fibula flap.

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INTRODUCTION

Over the years, head and neck reconstruction has greatly improved due to microvascular surgery and the use of free tissue flaps from distant donor sites. Recently, the free fibula flap has emerged as the preferred option for reconstructing defects in the mandible and maxilla. This is because the fibular bone is well-suited to match the structure and length of the jaw and can be harvested as a single flap for effective bone and soft tissue replacement. The free fibula flap is widely used and is considered to have a high success rate for the reconstruction of the mandible [1]. For small defects, surgeons often use local grafts from a source other than the patient's body. However, for bigger defects that involve dural and osseous structures, surgeons use vascularized tissue transplants instead. The specific kind of free flap used in the transplant depends on the defect's location, size, and tissue type [2]. The method of implanting a fibula flap is nearly identical to that used on the original jawbone, but accessing the bone during surgery is the most challenging part [3].

METHODOLOGY

The procedure for this review is explained in the following section.

The researchers searched for information on the free flap, survival rate, and dental implants by looking at articles published in various databases including PubMed, Web of Science, Cochrane Library, and Google Scholar.

Eligibility Criteria

The researchers eliminated duplicates and irrelevant articles by reading titles and abstracts. They appraised the quality of selected papers, keeping only those that met at least 60% of the assessment criteria. Additionally, randomized control trials were included, while unpublished and grey literature was excluded.

Quality Assessment

A table was used to formulate the different components used to assess the quality of each published observational study. The studies were assessed using various components such as QE (Quality of Evidence), AO (Assessment of outcome), and FUDS (Follow-up duration sufficiency for outcomes to occur).

The PRISMA flow diagram is shown in Figure 1.

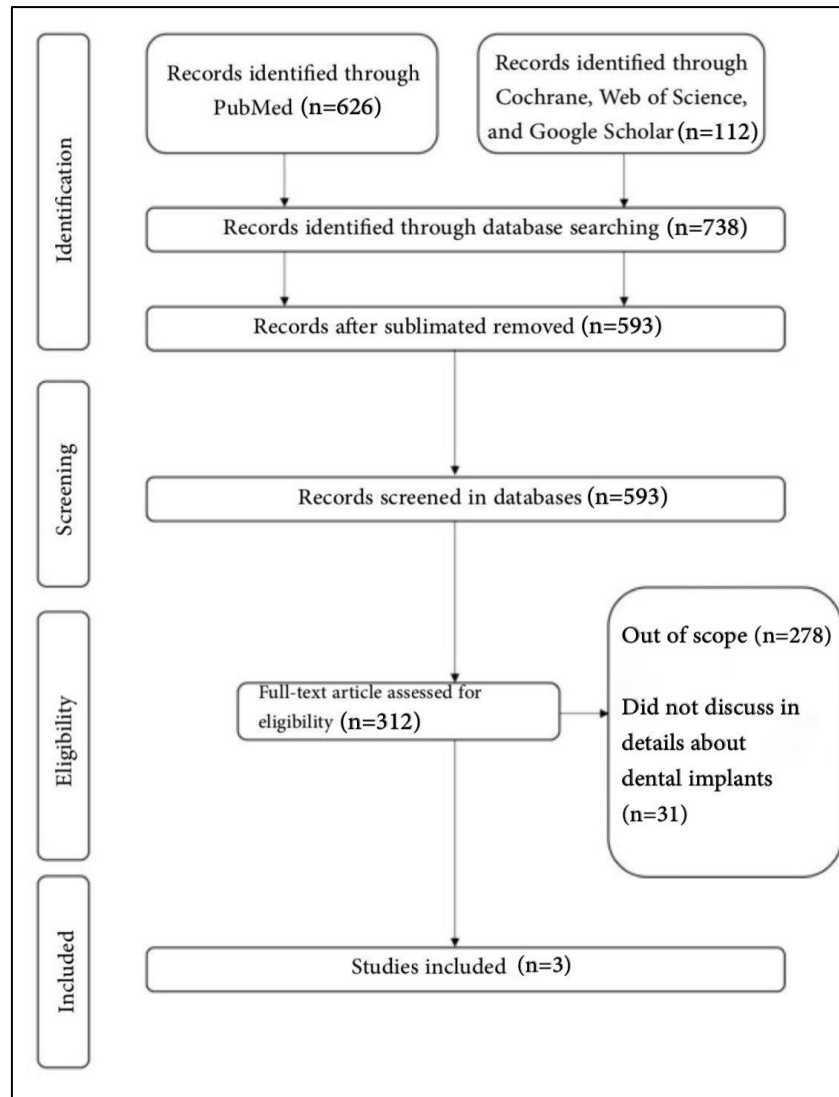


Fig. 1: Study Flow Chart.

RESULTS

A study by Kumar *et al* in 2016 aimed to evaluate the variation in achievement rates of implants while using two or four implant-supported overdentures after segmental mandibular reconstruction with the fibula-free flap technique. The Patients with 4-implant-supported-overdentures experienced less marginal bone loss than those with only 2 implants. However, there were no major differences found in peri-implant soft tissue factors for patients with either 2 or 4 implants. Hyperplastic peri-implant tissues are common in the early implant-loading phase but can be managed effectively over time [4]. Moreover, a study by Kumar *et al* examined the variation in the quality of life among patients who undergo dental rehabilitation with either two or four implant-supported overdentures after reconstructing a segmental mandibulectomy defect with a fibula-free flap. The author concluded that Patients who have had their mandibles reconstructed can experience an improvement in their quality of life through the use of implant-supported removable

overdentures. Additionally, whether a patient has two or four implant-supported removable prostheses does not seem to make a significant difference in their quality of life outcomes [5]. Brandão *et al* assessed if acrylic resin-based surgical guides, used both inside and outside the mouth, can enhance the results of dental prosthetic rehabilitation using a microvascular-free fibula flap in terms of anatomy, function, aesthetics, and quality of life. The proposed guides have a direct impact on improving mandibular reconstruction. They also have the potential to improve functional aspects such as intermaxillary relationships and posterior dental rehabilitation. However, the success of these functional improvements depends on the quality of the reconstruction of the soft tissue. Therefore, it is important to evaluate the soft tissue before proceeding with dental rehabilitation [6].

A table summarizing the control trial is demonstrated in Figure 2.

Author	Year of publication	Objective	Conclusion
Kumar <i>et al</i>	2016	Evaluate the variation in achievement rates of implants while using two or four implant-supported overdentures after segmental mandibular reconstruction with the fibula free flap technique.	Patients with 4-implant-supported-overdentures experienced less marginal bone loss than those with only 2 implants. However, there were no major differences found in peri-implant soft tissue factors for patients with either 2 or 4 implants. Hyperplastic peri-implant tissues are common in the early implant-loading phase but can be managed effectively over time.
Kumar <i>et al</i>	2016	Examine the variation in quality of life among patients who undergo dental rehabilitation with either two or four implant-supported overdentures after reconstructing a segmental mandibulectomy defect with a fibula free flap.	Patients who have had their mandibles reconstructed can experience an improvement in their quality of life through the use of implant-supported removable overdentures. Additionally, whether a patient has two or four implant-supported removable prostheses does not seem to make a significant difference in their quality of life outcomes.
Brandão <i>et al</i>	2016	Assess if acrylic resin-based surgical guides, used both inside and outside the mouth, can enhance the results of dental prosthetic rehabilitation using a microvascular-free fibula flap in terms of anatomy, function, aesthetics, and quality of life.	The proposed guides have a direct impact on improving mandibular reconstruction. They also have the potential to improve functional aspects such as intermaxillary relationships and posterior dental rehabilitation. However, the success of these functional improvements depends on the quality of the reconstruction of the soft tissue. Therefore, it is important to evaluate the soft tissue before proceeding with dental rehabilitation.

Fig. 2: Summarization of Control Trials.

DISCUSSION

Before starting the implantation, it is important to assess patients who are motivated and responsible in maintaining their oral hygiene and following instructions carefully. Any dental issues such as dental caries, reduced mouth opening, or periodontal disease should be reported. Additionally, factors including the presence or absence of vestibular sulcus, the thickness of intraoral soft tissues, mobility of the tongue, oral functions, and efficiency of lip closure should be checked. The bicortical bone of the free fibula flap allows for excellent dental implant facilities with high implant survival rates ranging from 93-99%. These prostheses notably improve mastication, swallowing, and speech, and dental implants are part of the standard rehabilitation plan for free fibula flap [1]. Thoroughly selecting the appropriate patient, planning, executing, and maintaining good communication between the medical team is crucial for achieving the best long-term results [7]. The detailed knowledge of anatomy has allowed for significant progress in facial reconstruction, enabling the transfer of tissue from local or distant areas [8]. The usual practice is to insert the fibula-free flap into the defect, followed by secondary placement of dental implants, and the final prosthetic rehabilitation often occurs more than a year after ablative surgery [9]. Delaying the insertion of osseointegrated dental implants several months after mandibular reconstruction using vascularized composite bone grafts has successfully achieved mastication and complete oral

rehabilitation. Theoretically, placing the implants directly into the new mandible could provide better bone access, make interdental relationships easier to determine, and allow for faster oral rehabilitation [10]. Kumar *et al* illustrated that the Patients with 4-implant-supported-overdentures experienced less marginal bone loss than those with only 2 implants. However, there were no major differences found in peri-implant soft tissue factors for patients with either 2 or 4 implants. Hyperplastic peri-implant tissues are common in the early implant-loading phase but can be managed effectively over time [4]. Moreover, Kumar *et al* concluded that Patients who have had their mandibles reconstructed can experience an improvement in their quality of life through the use of implant-supported removable overdentures. Additionally, whether a patient has two or four implant-supported removable prostheses does not seem to make a significant difference in their quality of life outcomes [5]. Brandão *et al* showed that the proposed guides have a direct impact on improving mandibular reconstruction. They also have the potential to improve functional aspects such as intermaxillary relationships and posterior dental rehabilitation. However, the success of these functional improvements depends on the quality of the reconstruction of the soft tissue. Therefore, it is important to evaluate the soft tissue before proceeding with dental rehabilitation [6].

CONCLUSION

Properly selecting the candidate patient, planning, executing, and maintaining good communication between the medical team is crucial for achieving the best long-term results for dental implants after free flap surgery. No major differences were reported in peri-implant soft tissue factors for patients with either 2 or 4 implants after segmental mandibular reconstruction with the fibula-free flap technique. Patients who have had their mandibles reconstructed can experience an improvement in their quality of life through the use of implant-supported removable overdentures. Moreover, it is important to evaluate the soft tissue before proceeding with dental rehabilitation.

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