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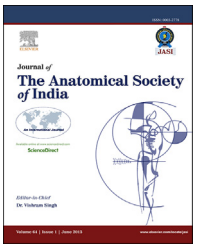

Original Article

Morphometric analysis of fibular graft dimensions for placement of dental implants

Jasbir Kaur [a], *Dhirendra Srivasatava* [b,*]

[a] *Assistant Professor, Department of Anatomy, ESIC Dental College, Rohini, New Delhi, India*
[b] *Oral and Maxillofacial Surgeon, Dean, ESIC Dental College, Rohini, New Delhi, India*

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ABSTRACT

Introduction: Surgical resections in the maxilla and mandible due to varied etiologies may lead to significant facial deformities, altered oral functions and subsequent psychological problems, raising the need for advanced reconstruction techniques. The goal of reconstruction being establishment of mandibular continuity with acceptable cosmetic result, establishment of osseous alveolar base for further dental rehabilitation and correction of soft tissue defect.

The present study was aimed for observing the length of the fibular graft with maximum height and width along which the implants with bigger diameter and maximum height can be fitted.

Methods: The study was conducted on thirty dry human fibula bones. The mean length of fibular bone extending from the styloid process to the lateral malleollus was calculated. The mean width at the midpoint was recorded. The mean width of the medial, lateral and posterior surfaces was assessed for compatibility of different standard commercially available dental implant systems.

Results: The study recorded the mean length of the fibula (X–Y) as 35.58 cm, ranging between 32 and 40 cm. Mean length of the bone available for graft (W–Z) is recorded as 16.72 cm. The mean width at the midpoint (A) being 12.83 mm.

Discussion: The maximum width and height of the fibula existed from a point 30 mm proximal to the mid point and 20 mm distal to the mid point and fibular graft if procured between these two points will provide us with maximum width and height. This knowledge would help the maxillofacial surgeons to procure the vascularised graft.

1. Introduction

Major ablative surgeries in head and neck oncology patients lead to significant defects in orofacial region, the latter raising the need for advanced reconstruction techniques. The reconstruction is aimed at restoring function and facial contour resulting in continuous improvement of oral rehabilitation. Various methods of immediate reconstruction are

* *Corresponding author*. Tel.: +91 9312284822 (mobile).
E-mail address: dsmaxfax@yahoo.com (D. Srivasatava).

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implemented by different oral and maxillofacial surgeons from time to time including autogenous non vascular bone graft, allogenic bone graft, autofrozen mandible or reconstruction plates, each having its own merits and demerits. The non vascularised bone grafts completely rely on the recipient bed for revascularization and healing. Vascularised grafts on the other hand provide a good bulk of bone to place implants and satisfactory contour. They have considerably reduced the adverse effects of tumor surgery on the patients' oral function thus revolutionizing the reconstruction in the head and neck region. Lack of vitality as a result of vascular occlusion either arterial or venous might result in graft necrosis, bone resorption and poor bone healing. Though these vascularised bone grafts for mandibular reconstruction can be achieved from radius, metatarsus, thoracic rib and scapula, iliac crest and fibula, fibular graft however has demonstrated high adaptability and reliability for reconstruction. Fibular graft was first used for the reconstruction of lower limb.[1] Later the same was used for the reconstruction of mandible.[2] The primary advantages of the graft being length of the bone (upto 25 cm), trigonal diameter, long vascular pedicle and ability to get osteotomised to provide a favorable facial contour. Implant rehabilitation along with these grafts result in improved facial appearance, function, restoration of speech and mastication.

The present study was aimed for observing the length of the fibular graft with maximum height and width along which the implants with bigger diameter and maximum height can be fitted and give better results both functionally and aesthetically.

2. Materials and methods

The study included 30 dry fibular bones procured from the Department of Anatomy, ESIC Dental College, Rohini, Delhi. The different measurements included:

1. The length of the fibular bone (X–Y) was measured extending from the head at the superior end and the styloid process at the inferior end (Figs. 5 and 6).
2. Two points, W and Z were marked, W at a distance of seven cm distal to the proximal end of the bone, Z at the beginning of the distal third of the bone (Figs. 5 and 6).
3. Mid point of the length W–Z was taken (A). At the regular intervals of 10 mm, points B1,C1,D1,E1 and F1 were marked proximal and points B2,C2,D2,E2,F2 were marked distal to mark A (Figs. 5 and 6).
4. With reference to the mid point (A), surface landmarks p, q, r, s were taken on anterior, medial, posterior borders and medial crest respectively.
5. Corresponding to p, points – p1,p2,p3,p4,p5,p6,p7,p8,p9 were marked at different intervals (B1,C1,D1,E1, B2,C2,D2,E2,F2 respectively) from the mid point A.
6. Corresponding to q, points – q1,q2,q3,q4,q5,q6,q7,q8,q9 were marked at different intervals (B1,C1,D1,E1,B2,C2,-D2,E2,F2 respectively) from the mid point A.
7. Corresponding to r, points – r1,r2,r3,r4,r5,r6,r7,r8,r9 were marked at different intervals (B1,C1,D1,E1,B2,C2,D2,E2,F2 respectively) from the mid point A.

Fig. 1 – Front view photograph, right side hemimandible constructed with vascularised fibular graft.

8. Corresponding to s, other points – s1,s2,s3,s4,s5,s6,s7,s8,s9 were marked at different levels (B1,C1,D1,E1 and B2,C2,D2,E2,F2 respectively) from the mid point A.
9. The four points p,q,r,s were joined with each other and the width of the bone at the mid point A was calculated as (p–q) + (q–r) + (r–s) + (s–p). Similarly the width of the bone was taken at different intervals as follows:

B1 (p1–q1) + (q1–r1) + (r1–s1) + (s1–p1)

C1 (p2–q2) + (q2–r2) + (r2–s2) + (s2–p2)

D1 (p3–q3) + (q3–r3) + (r3–s3) + (s3–p3)

E1 (p4–q4) + (q4–r4) + (r4–s4) + (s4–p4)

B2 (p5–q5) + (q5–r5) + (r5–s5) + (s5–p5)

C2 (p6–q6) + (q6–r6) + (r6–s6) + (s6–p6)

D2 (p7–q7) + (q7–r7) + (r7–s7) + (s7–p7)

E2 (p8–q8) + (q8–r8) + (r8–s8) + (s8–p8)

Fig. 2 – Intraoral view of reconstructed mandible.