Surgical Rehabilitation of Free Fibula Graft Fracture Under Local Anesthesia with Posteriorly Directed Vertical Alveolar Distractor

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Abstract Reconstruction of the mandible with a free fibular graft is one of the most common treatment choices following tumor resection. But as the graft is often vertically deficient, pathological fracture may occur because of occlusal forces after prosthetic rehabilitation. Distraction osteogenesis can be a good choice for the repair of the fibular flap. In this report, a case of fractured fibula flap after 7 years, rehabilitated with a posteriorly directed vertical distractor, will be presented.

Keywords Distraction osteogenesis · Free fibula graft · Fracture · Vertical distractor

Introduction

With long-term use of a free fibula flap after resections, many complications such as fracture or defects may occur because of the mastication forces [1]. Bony repair in these kinds of complications becomes harder because of the soft tissue scar especially in irradiated patients [2]. Distraction osteogenesis can be a good choice for the repair of the

fibular flap. In this report, a case of fractured fibula graft after 7 years, rehabilitated with posteriorly directed transport distraction osteogenesis, will be presented.

Case Report

A 53-year-old woman was operated on 7 years ago with a diagnosis of ameloblastoma at the right side of her mandible. Hemimandibulectomy and reconstruction with free fibular flap was performed, and radiotherapy was applied to the right side of the effected mandible in another center. Today, radiotherapy is not used after resection in routine unicystic and multicystic ameloblastoma treatments. Unresectable lesions have been treated with radiation or combined radiation and chemotherapy in early ameloblastoma treatments like in this case. Following the operation, she wore a partial prosthesis.

She presented to our Süleyman Demirel University Faculty of Dentistry, Oral and Maxillofacial Surgery Clinic, with a complaint of movement during mandibular function in the operated site in the 7th postoperative year. Clinical and radiographical examination revealed a fracture site and a small defect due to resorption on the fibular graft filled with fibrous tissue. Movement in this fibrous area and facial asymmetry were also detected (Fig. 1).

Posteriorly directed transport distraction osteogenesis was planned to lengthen the fibular flap for the reduction of fragments under local anesthesia. Osteotomies were performed on the unaffected healthy mandible above the right canine and lateral incisor at the fibular graft–mandible union (Fig. 2) as the unaffected mandibular part had better blood supply than

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Fig. 1 Radiographic image showing the fracture

the fibula graft. The fibrous tissue was removed (Fig. 2), and a bone fragment from the fibula–mandible union was activated by transport distraction osteogenesis with a posteriorly directed alveolar horizontal distractor (Modus ARS 1.5; Medartis, Basel, Switzerland) (Fig. 3). The vertical and horizontal osteotomies were enlarged to allow movement of the segment. The distraction protocol included 7 days of latency period after surgery and distraction rate of 0.5 mm per 12 h, using a frequency of 1 mm distraction every day. The bone was distracted about 11 days, and the distractor was opened 11 mm. After consolidation, edges of the transported bone and the remnant fibular graft were freshened, and then, the horizontal and vertical fragments were reduced and fixated with miniplates. For prosthodontic rehabilitation, guide plane prosthesis was applied to keep the bone segments together and also prevent the mandible from sliding to the right when functioning (Fig. 3). Panoramic radiographs were repeated at 6-monthly intervals, and she has now been free of fracture for more than 5 years (Fig. 4).

Discussion

The mandible plays an important role in the structural architecture of the orofacial complex; therefore, reconstruction after tumor resection becomes cardinal for rehabilitation of the structural, functional, and esthetic outcomes [3].

Fig. 2 An extraoral alveolar distractor was used for activation of bone segments

Fig. 3 The guide plane of the mandibular removable partial denture prevents the mandible from sliding to the right and keeps the dental arches functioning

Strong mastication forces may cause rapid resorption, pathological fractures, and defects during the long-term use of the partial dentures as seen in the presented case [4].

In the presented case, because of the radiotherapy treatment, oral and facial tissues were fibrotic and contractility of the muscles was decreased. Distraction osteogenesis is a popular and useful technique for repairing the bone defects. So distraction osteogenesis treatment was selected for both soft and hard tissue elongation. This is an important advantage especially in previously operated and radiotherapy-treated patients, because of the poor tissue supply as in our case [5].

The main limitation of the fibula is the insufficient bone height for the reconstruction of both the skeletal base and the alveolar ridge so fractures may occur because of the excessive occlusal forces. In the literature, vertical distractors were used in many cases of the free fibula-grafted mandibles to achieve enough vertical bone for inserting the dental implants [6, 7]. In these cases, vertical distraction osteogenesis of the fibular bone is a good solution for the problem [8]. In the presented case, the vertical distractor was placed posteriorly variously from the literature to lengthen the healthy mandible, and the fracture was reduced when enough bone was achieved.

Fig. 4 Panoramic radiograph taken 5 years from the operation. She has now been free of fracture

Reconstruction of the mandible after partial or subtotal resection by means of a free vascularized osseous or osteocutaneous fibula flap has become one of the most popular options for carrying out these procedures. At the same time, distraction osteogenesis can be useful in patients who have poor functional outcomes following mandibular reconstruction due to poor interarch alignment from scar formation, fracture, or radiotherapy. As a result, posteriorly directed vertical alveolar distractors might be a good treatment choice for previously operated or irradiated patients.

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