



CASE REPORT

Tibial stress fracture as a complication of free-fibula vascularised graft for mandibular reconstruction

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Received 18 December 2002; accepted 5 August 2003

KEYWORDS

Free-fibula graft;
Complications; Stress
fracture; Radiology

Summary The free vascularised fibula graft is used for a variety of reconstructive procedures and is frequently associated with donor site morbidity. Non-traumatic stress fracture to the tibia following a vascularised free-fibula graft is an uncommon but important complication. The diagnosis may be missed if radiological "stress views" of a possible fracture site are not performed, which may result in its underreporting. The authors report a case in which the aetiology, diagnosis and management recommendations are presented for discussion.

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Introduction

The use of a free vascularised fibula graft has become popular since Taylor first described it in 1975¹ and is now used for a variety of reconstructive procedures.² Donor site morbidity is not uncommon, with 30% of patients experiencing a complication in one series.² Frequently reported donor site complications include: numbness of the lateral side of the lower leg and dorsum of the foot, gait problems, restrictions in ankle and toe movement, wound morbidity and hammer toe.²⁻⁶

Stress fractures of the tibia are usually related to intensive, repeated exercise, commonly in athletes or military recruits.^{7,8} Stress fractures of the tibia following the harvesting of a free fibula graft are rare, with seven cases reported in the literature,⁹⁻¹¹ none of which have appeared in plastic and reconstructive surgical journals. We report a patient who sustained a stress fracture to the ipsilateral tibia following a vascularised free-fibula flap harvested for mandibular reconstruction.

Case report

A 46-year-old man underwent a right-sided partial

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glossectomy for a T2 squamous cell carcinoma of the tongue in 1993. Subsequently, he underwent further surgery and radiotherapy for recurrence, but four years later presented with chronic tooth infection following extraction. After appropriate referral and investigation, he was found to have osteoradionecrosis of the right side of the mandible, as a result of the previous radiotherapy. He underwent excision of the involved bone with reconstruction using a vascularised free fibula graft and radial forearm free flap. A preoperative angiogram showed three patent vessels to the ankle (Fig. 1). During the operation, 25 cm of the right fibula was harvested with a $15 \times 5 \text{ cm}^2$ skin flap, leaving over 10 cm of fibula distally.

Two months following the surgery the patient reported a one-week history of pain and swelling over the right ankle, after walking up a long hill. There was no history of trauma. Radiological investigation initially revealed no fracture. A transverse stress fracture to the distal tibia was only visible after stress views were taken (Fig. 2). The patient was managed conservatively in a non-weight bearing plaster of Paris, following a manipulation under anaesthesia. The fracture healed, although with a slight valgus deformity, and the patient is now fully mobile and pain-free.



Fig. 1 Pre-operative angiogram showing three patent vessels.



Fig. 2 Tibial fracture demonstrated on stress views.

Discussion

The free fibula as a source of vascularised bone in reconstructive surgery is widely used.² Most complications of the donor site are reported as mild or temporary.^{2,3} Very few cases of tibial stress fracture following the harvesting of a fibular flap have been reported in the literature.⁹⁻¹¹ The patients in those reported have often been more active than usual before the onset of pain,⁹ or complain of activity-related pain.^{10,11} The range of onset of symptoms in the three published studies is from six weeks to 16 months post-operatively. There may be a degree of under-reporting of similar cases, as these fractures typically heal spontaneously and pain reported by patients most likely has been considered to be due to trauma to the soft tissue at the donor site. Only one previously reported case was associated with reconstruction of the mandible.

Stress fractures occur in normal or abnormal bone as a result of repeated cyclic loading. They are most frequent in the metatarsals of soldiers (March fractures) and in the lower extremities of athletes and dancers.^{7,8} Clinically the picture is of activity-related pain, relieved by rest. Radiographically, linear or circular cortical radiolucent areas may be seen at the diaphysis, often associated with periosteal and cortical thickening.

Examining tibial strain following fibula resection, it has been found that the fibula is subjected to one sixth of the weight-bearing forces. Following the fibula resection, the pattern of load bearing in the tibia changes from anterior and lateral, to the

lateral aspect of the tibial diaphysis alone.¹² The contribution of the interosseus membrane is debatable,¹² but 50-100% of weight bearing was found to be dependent on the intactness of the membrane in one study.¹³ Nevertheless it would appear that discontinuity of the fibula increases the load on the tibia and alters the distribution of strain. The aetiology of tibial stress fracture following free fibula flap harvest may have arisen from a combination of altered loading and distal diaphyseal ischaemia following ligation of the peroneal artery. Conservative management of such fractures in a nonweight bearing plaster, after appropriate reduction, is recommended.

Conclusion

This is an unusual but important complication—to date no similar cases have been reported in plastic and reconstructive surgical literature. We recommend that a patient, who complains of persistent or recurrent pain in the leg after free fibula flap harvest, should be evaluated for stress fracture of the tibia. Radiological investigations should include stress views in cases where no fractures are visible on routine antero-posterior and lateral views, i.e. the ankle should be stressed into valgus or varus to 'open up' the suspected fracture site. Finally, it would also seem prudent to recommend a gradual increase in the intensity of activity in the post-operative period, rather than immediately resuming pre-operative levels.

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