SHORT REPORT

A Novel Approach to the Management of the Diabetic Foot: Metatarsal Excision in the Treatment of Osteomyelitis

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Objective. To describe the procedure and outcomes of metatarsal excision in seven patients treated for osteomyelitis in the diabetic foot.

Results. Average age was 60.6 (48–83) years. The mean length of hospital stay was 33.5 (3–50) days (excluding one patient who died from hospital acquired pneumonia). All remaining patients had negative wound cultures after a mean 7.4 (0–20) days of antibiotic treatment after procedure and were discharged from hospital 16.9 (2–48) days after surgery. Two patients developed wound infections after discharge. Pre-operative levels of mobility were achieved within a mean of 12.6 days (range 2–40).

Conclusions. In diabetic patients, metatarsal excision may be better than transmetatarsal amputation.

Keywords: Metatarsal filleting; Diabetic; Osteomyelitis.

Introduction

Osteomyelitis is a serious complication that can arise from infected foot ulceration in diabetic patients. Early surgical intervention reduces morbidity and long-term complications. Transmetatarsal amputation (TMA) is the surgical procedure of choice in patients with metatarsal osteomyelitis. A healed TMA can give good mobility, but healing time is often lengthy and failure to heal results in higher (more proximal) amputation, deformity and infection. Another important complication of this procedure is the onset of gangrene of an adjoining toe, which may be the direct result of severing the dorsal metatarsal artery, its bifurcation, or the digital branch to the adjacent toe. We have assembled a case series of seven patients with diabetes who have undergone a total of ten metatarsal excisions to treat metatarsal osteomyelitis.

Patients and Methods

To allow the best chance of healing, metatarsal excision is only suitable for neuropathic diabetic feet with either adequate ‘native’ circulation or in those who have undergone revascularisation. Seven patients fulfilled the inclusion criteria of having diabetes, radiographic evidence of metatarsal osteomyelitis with or without an abscess. All patients had palpable foot pulses with no gangrenous toes or obvious macrovascular disease. One patient required four procedures involving both feet over four separate hospital admissions.

If the second, third or fourth metatarsal is involved, dorsal and ventral incisions were made over the infected bone, followed by its removal (Fig. 1). Involvement of the first or fifth metatarsal only usually required only one incision. The metatarsophalangeal joint and base of the proximal phalanx from the foot often are involved and also were excised if necessary. Such an approach allows significant preservation of the normal anatomy, therefore preventing complications such as iatrogenic gangrene in adjacent digits arising from damaged blood supply, more proximal...
amputation, reduced deformity, and maintenance of normal bipedal gait. The digit is left ‘floppy’ and intact. One patient has undergone multiple procedures involving both feet, shown in Fig. 1D–F.

We collated data on duration of hospitalisation from procedure to discharge; organisms cultured; duration of antibiotic treatment following surgery; and time taken to mobilise following surgery.

**Results**

The mean age of the 7 patients was 60.6 (48–83) years with a M:F ratio of 6:1. All patients had Grade III lesions, classified using the Wagner classification system. Excluding re-admissions and one patient who died post-operatively from pneumonia, there was a mean hospital stay of 33.5 (3–50) days as shown in the summary table (Table 1). All patients had infected wounds requiring antibiotic treatment peri-operatively, with negative wound swabs obtained after a mean of 7.4 (0–20) days treatment with appropriate antibiotics after the procedure. The longest stay was complicated by a post-operative wound infection that persisted despite appropriate antibiotic treatment, which delayed mobilisation. Surviving patients were discharged from hospital 16.9 (2–48) days after surgery when the wound was considered manageable in the community by district nurses. Further hospital admissions were necessary in two patients following the development of wound infections in the community. Five patients achieved pre-operative levels of mobility within a mean of 12.6 days (range 2–40). One remained in her wheelchair due to prior above knee amputation. One patient has undergone four procedures, with a recurrence of metatarsal osteomyelitis and abscess on each occasion.

Fig. 1. (A and B) Ventral and dorsal incisions are made over the osteomyelitic metatarsal and if an abscess is present this is drained and the infected bone is then removed. The wound is washed out with Betadine and in this case the dorsal incision has been sutured. The ventral incision was allowed to heal by secondary intention (C). One patient has under a total of four procedures, two to each foot and here both of the healed feet are shown (D–F). The forth and fifth metatarsals have been removed on the right foot and the third and fourth on the left foot.
but has avoided the need for TMA. To date (follow-up period now up to 2 years), no patient has required neither the individual treated toe(s) to be amputated nor more proximal amputation.

**Discussion**

This is a small cohort of patients and therefore no direct comparisons can be made with TMA. However, a recent study has shown that TMA is associated with significant morbidity and even mortality post-operatively. In this study, 490 diabetic patients with a mean age of 64.3 (39–86) years underwent a total of 101 procedures, with 2.1 years of follow-up. A healed stump was achieved in 58 cases (57.4%), but 88 cases (87.1%) experienced post-surgical complications and two patients died within 30 days of the procedure. Complications included stump infection, more proximal amputation, post-operative infection, chronic stump ulceration and deformity.

Another study of 41 patients has also shown that TMA is associated with high morbidity and mortality. Peri-operative mortality was 17%, with only 46% of patients achieving a healed stump, and 43% of patients mobilising independently or with sticks. All non-healed survivors required more proximal amputation. All of our surviving patients have achieved complete healing of their wound, none of them required further amputation, and all patients achieved pre-operative levels of mobility. Further work clearly needs to be done on identifying a better alternative to TMA and a direct comparison with metatarsal excision in a bigger study would be extremely useful.

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**References**


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