Salvage of the lower limb after a full thickness burn with loss of the knee extensor mechanism: a case report

Khaled M Sarraf,1 Duncan D Atherton,2 Asantha R Jayaweera,2 Charles E Gibbons,1 Isabel Jones2
1 Department of Orthopaedic Surgery, Chelsea and Westminster Hospital, London, United Kingdom
2 Chelsea and Westminster Burns Unit, Chelsea and Westminster Hospital, London, United Kingdom

ABSTRACT

We report on a 79-year-old woman who underwent salvage of the knee and lower leg using a Whichita Fusion Nail for knee arthrodesis, combined with a medial gastrocnemius muscle flap for a 3% contact burn that resulted in loss of the extensor mechanism. This provided an alternative to above-knee amputation when extensor mechanism reconstruction was not feasible.

CASE REPORT

In May 2008, a 79-year-old woman presented with a 3% full thickness contact burn of the left anterior thigh (Fig. 1) following a collapse and loss of consciousness secondary to a hypoglycaemic episode on an electric heater for approximately 2 hours. Salvage of the knee and lower leg was performed by a multidisciplinary team. The burn extended to the quadriceps fascia; portions of which were excised up to healthy tissue margins. A vacuum-assisted closure dressing was applied to the wound bed. 48 hours later, the patient underwent a second debridement, and turbid fluid was drained from the knee joint. The insertion of the quadriceps tendon to the patellar was completely necrotic. The aspirate was sent for microscopy and culture; polymorphs were noted but no organisms grown. Culture grew

INTRODUCTION

Full thickness burns around the knee can affect the extensor mechanism. We report on a 79-year-old woman who underwent salvage of the knee and lower leg using a Whichita Fusion Nail for knee arthrodesis, combined with a medial gastrocnemius muscle flap for a 3% contact burn that resulted in loss of the extensor mechanism. This provided an alternative to above-knee amputation when extensor mechanism reconstruction was not feasible.
scanty enterococcus, as the fluid was an inflammatory exudate resulting from necrotic tissues, rather than a septic effusion/exudate. There was no biochemical evidence of an infection; the white cell count was 7.3 x10^9/l (normal range, 4.5–10 x10^9/l) and the C-reactive protein level was 8 mg/l (normal range, 0–10 mg/l). Nonetheless, after discussion with the microbiology team, the patient was placed on prophylactic amoxicillin (to which the enterococcus was sensitive) and repeat swabs were taken to confirm eradication of the organism. After excision of the necrotic tissue, there was an open knee joint and a large defect in the anterolateral portion of the quadriceps insertion (Fig. 2). The wound was washed and debrided again on days 7 and 11. In conjunction with the orthopaedic surgeons, the remaining patella, patella tendon, and quadriceps tendon were excised owing to the lack of utility.

Compared to an above-knee amputation, primary arthrodesis using the Wichita Fusion Nail (Stryker, Mahwah [NJ], USA) was considered the only practical alternative that offered an acceptable functional outcome. This nail enabled intramedullary compression after placement of cross-locking screws in the femur and tibia (Fig. 3). A proximally based medial gastrocnemius flap was used to cover the exposed joint and metal work (Fig. 4), and a 8/1000th split thickness skin graft, meshed 1:1.5 was applied over this. The fascia overlying the muscle belly was scored to increase its reach.

Figure 1  Full thickness burn of the left knee and anterior thigh.

Figure 2  The deficient extensor mechanism and open knee joint following initial debridement.

Figure 3  Increased soft-tissue density of the gastrocnemius flap over the arthrodesis at week 4.

Figure 4  Healing of the thigh wound covered with a split thickness skin graft and the knee wound covered with a medial gastrocnemius flap at week 4.
The patient made a good and complete functional recovery and returned to full independence after rehabilitation.

DISCUSSION

The gastrocnemius flap has been used for wound coverage of an open knee joint and knee soft-tissue reconstruction since 1970. Alternatives include the vastus lateralis, medialis and sartorius flap, the saphenous flap, and perforator flaps (such as the medial sural artery perforator island flap and islanded posterior calf perforator flap), but many of these are unsuitable for larger defects.

Full thickness burns around the knee can affect the extensor mechanism and cause subsequent rupture. The gastrocnemius flap has been used to cover a medial knee defect with an exposed joint cavity following a burn and in post-burn contracture release around the knee. It has also been used to reconstruct the extensor mechanism, but this was not considered in our patient owing to her age, co-morbidities, and the likely difficulties with rehabilitation.

Wichita nail fusion of the knee is primarily indicated for failed total knee arthroplasty. It enables intramedullary stabilisation with compression at the arthrodesis site so as to stimulate bone union, and has up to 100% fusion rates and low complication rates.

The combination of knee arthrodesis with soft-tissue reconstruction using a gastrocnemius flap enabled limb salvage, avoided the need for an above-knee amputation, and achieved a satisfactory functional outcome.

DISCLOSURE

No conflicts of interest were declared by the authors.

REFERENCES