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Case Report Open Access

Salvage of a Lesser Toe Osteomyelitis when Complicated by a Broken Screw: A Case Study

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Abstract

Orthopedic screw removal has proven itself to be a challenge. Access to a Screw Removal Set (TM Synthes) is essential. But what options are available when it cannot remove a broken screw in a lesser toe on a background of osteomyelitis of a lesser toe?

A young healthy patient had undergone a 2nd and 3rd toe proximal interphalangeal joint (PIPJ) and distal interphalangeal joint (DIPJ) fusion using a cannulated dual threaded compression screw in 2006. She had had a successful fusion but eight years later, she developed osteomyelitis in the 2nd toe. An attempt was made to manage this conservatively with antibiotic therapy but a further flair up occurred following treatment. At surgery, the screw head broke while trying to remove it leaving just the smooth shaft of the screw, deep within the proximal phalanx. The Screw Removal Set was not useful and it was removed by making a gutter dorsally.

Introduction

Osteomyelitis is a challenging disease and is considered one of the oldest diseases known. The oldest known evidence of osteomyelitis lies in the fractured spine of a dimetrodon Permian reptile, which was in existence 291 to 250 million years ago [1]. The incidence of foot and toes osteomyelitis is 9/10,000 patients per year according to the Nationwide Inpatient Sample database in the United States. Diabetes Mellitus is present in 80% of the patients. According to the same database, 23% underwent a digit amputation [2].

As a principle, the metal work should be removed when complicated by infection to help aiding its eradication. In this case, the patient presented with osteomyelitis of the second toe on a background of a successful fusion of the proximal and distal interphalangeal joints of the 2nd toe, which has failed the conservative management. While attempting removal of the screw from the toe, the screw broke at the junction between the screw head and the shaft. In this case, we are presenting the surgical management and how to deal with intra-operative complication.

Case

A 31 years old, healthy lady, had a successful fusion of her PIPJ and DIPJ of the left 2nd and 3rd toes in 2006 using dual threaded compression screws. Eight years later she developed cellulitis and a pus discharge coming out of the tip of the left 2nd toe. These symptoms lasted a week. She denied any history of a systemic infection or trauma. She was given a course of oral antibiotics (Flucloxacillin 500 mg four times a day) for 10 days in an attempt to treat the cellulitis, by her GP but this did not settle the problem. She was referred to the foot and ankle unit with a possibility of deep seated infection of her left 2nd toe. Clinically, she was well in herself with a small discharging sinus at the tip of the 2nd toe.

The toe was red and inflammed. Her x rays demonstrated signs of osteolysis around the screw threads proximally and distally with some irregularities of the tip of the distal phalanx as shown in (Figure 1). The X-rays radiographs before the problem started are shown in (Figure 2). A diagnosis of osteomyelitis of the left 2nd toe was made. Following discussion with the patient, a decision was made to take the screw out and debride the infection. A straightforward screw removal was anticipated due to the bony changes around the screw. However, at surgery, the screw was very well fixed and the screw head came off the shaft. An initial attempt was started using the Screw Removal Set but was abandoned because of the potential damage to the phalanges. The intra-op images are shown in (Figure 3).

Figure 1: AP and oblique radiographs showing osteolysis around the screw threads on the 2nd toe.

Figure 2: AP and oblique radiographs showing very well fixed screws with normal surrounding bone.

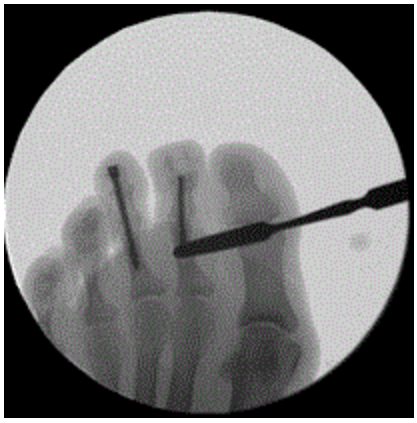

Figure 3: Intra-op image showing a broken screw head.

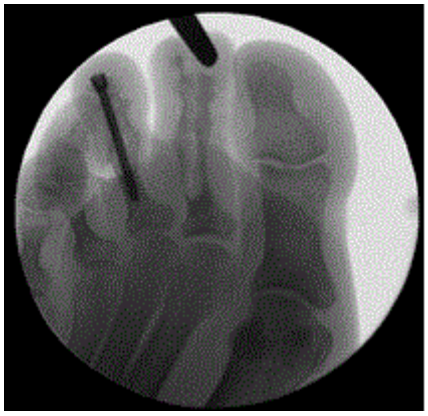

Figure 4: Intra-op image showing complete removal of screw.

A longitudinal dorsal incision was therefore made over the toe. The bone exposed and the screw end marked using an image intensifier. A small 2 mm burr was used to create a dorsal gutter. A small 1 mm k wire in a wire driver was used to clear the screw threads from the bone. Finally the screw was removed easily without causing a fracture. This permitted a better debridement and clearing of infected bone at the apex of the cannulated screw (Figure 4). Deep tissue samples were sent for culture which came positive for *Staphylococcus aureus* infection sensitive to Flucloxacillin. The patient symptoms improved after surgery. The wounds healed completely and the discharge stopped. She had a course of intravenous antibiotics (Teicoplanin 800 mg once a day) for 2 week in the community based on the microbiologist advice followed by oral antibiotics (Flucloxacillin 500 mg four times a day) for another 4 weeks.

Discussion

Complete removal of an implant aids treatment of infection. This stainless steel screw had been in situ for eight years. Infection had tracked down the centre of the screw causing some bony changes proximally but the threads had osseointegrated. Moreover, the screw was lacking a reverse tap, which added on the difficulty of the screw removal. The guttering technique, under X-ray control and using a small high speed burr with a fine K wire to drill between the individual threads, proved a useful technique to ensure screw removal with an intact bone. Most of the literature [3-5] mentions techniques involving damaged screw head and how to deal with it. There is a technique used to remove cannulated screws using a 19 G spinal needle to pass through bony ingrowth and act as a screw head locator [6]. This technique would not be possible in this case as the screw head came off and the screw shaft is not visible. The guttering technique is not new to orthopedic infections. It was described by Winnett Orr (1877–1956) before the era of antibiotics. He advocated incisions which were large enough to expose the whole diseased areas of the bone. All necrotic bone was to be removed with "saucerisation" of the resulting cavity [7]. However, there is nothing in the literature about the use of the this technique in the toes.

Conclusion

A guttering technique is relatively easy provided that the right resources and instruments are available. The availability of a high speed burr and the use of a fine K wire to drill out the threads allowed for easy removal. However, planning and preparation for Osseo integration of a dual threaded cannulated screw from a small bone is very important and improves the consent process with the patient and allocation of appropriate theatre resources. In the presence of infection, guttering improves debridement with greater exposure for the medullary cavity and better drainage for the infection.

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