Review Article

To Risk or not to Risk? The Case of Removing Metalwork (or not)

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Orthopaedics has always been interconnected with implantation of fixation devices for the operative treatment of fractures; the indications have changed over the decades and orthopaedic surgeons tend, nowadays, to be more aggressive, favouring surgery to conservative treatment. In general, there exists a consensus in relation to the need for “putting in” the devices; however, their routine removal after fracture healing has always been -and remains- a debatable issue [1].

Implant removal is one of the most common elective orthopaedic procedures and consumes a large amount of hospital resources. It may be as high as 30% of all planned orthopaedic operations or 15% of all operations in an orthopaedic department [2].

Pain, palpable material, irritation of soft tissues, the resumption of strenuous activities or contact sports after fracture healing and the patient's demand are the most significant indications for implant removal in adults. Local symptoms and complaints often resolve following the procedure. There is a need, however, for a second surgical procedure in scarred tissue, carrying a risk for nerve damage and refractures. Children’s skeleton is a different story altogether: it may be necessary to remove implants early to avoid any growing disturbances, to prevent bony overgrowth that may make later removal technically difficult or impossible, and to allow for planned reconstructive surgery after skeletal maturation (e.g., in case of hip dysplasia) [3, 4].

Local pain is often completely alleviated or gets better, although it may even worsen after implant removal: the weighted success rate (i.e., a complete or marked reduction of pain) of implant removal can be estimated at 78%. On the other hand, increase in pain and discomfort may be noted by up to 7% of all patients with, and up to 20% of all patients without pre-operative symptoms: the weighted failure rate (including subjects with worsening pain) is about 1 in 5 patients [5].

In the past, stainless steel implants were linked to corrosion, systemic release of nickel, chromium and cobalt, with a presumed toxic, allergic or even carcinogenic potential. However, so far there has been no convincing clinical evidence of these adverse effects. By contrast, titanium alloy are thought to be less susceptible to degradation and safe to be retained in situ but titanium and aluminum had been traced in serum and hair of some patients after spinal instrumentation as well [6-8].

There are absolute (e.g., cartilage damage by intra-articular screws, skin and soft tissue irritation by prominent material) and relative indications for implant removal (e.g., artifact reduction with planned MRI and CT imaging), the discrepancy between physical findings, imaging results and complaints may be remarkable.

Surgeons would fairly readily recommend the regular removal of paediatric elastic titanium nails [12, 13], and cerclage wires after fixation of fractures of the patella and the elbow, whereas plates at the humeral shaft are deemed to have the lowest priority for removal. Up to 60% of all surgeons do not agree in a routine removal policy in asymptomatic subjects mainly fearing complications like intra- and post-operative screw breakages, irremovable implants and re-fractures; they feel that the patient’s request is the less important reason for material removal [1]. The problem is that there are no controlled trials that would allow for a valid comparison of the benefits and drawbacks of these procedures.
Undeniably, there are potential risks involving the removal operation. Plate removal at the forearm is notorious: the overall incidence of complications ranges from 12 to 40%, iatrogenic nerve injuries are noted in 2 to 29%, refractures in 2 to 26% (Figs 1-5), and wound infections in 5 to 12% [1, 5, 9 - 11].

The following figures present the case of a 26-year-old gentleman who suffered a comminuted fracture-dislocation of his left elbow (Fig. 1) which was urgently dealt with open reduction and
internal fixation (Fig. 2). The patient recovered extremely well with bony union and full range of elbow motion by the 6th postoperative week; figure 3 shows the forearm some 2 years after the injury. The metalwork was removed (Fig. 4) and, 4 months later, a re-fracture occurred (Fig. 5) following a fall whilst the patient was busy playing in a football match. The patient went on to have an uneventful recovery after the repeat fracture fixation.

Controversy still exists as to the need for routine implant removal. Given the frequency of the procedure in orthopaedic departments worldwide, there is a serious need to: 1) study the biological mechanisms and clinical determinants of symptomatic implants, 2) conduct a large randomised trial that would compare removal to retention and determine the efficacy and effectiveness of implant removal, and 3) develop clinical decision rules that may allow for identifying patients who will benefit most from implant removal [1].

References