

Surgical Extraction of Orthopaedic Implants: 7 Clinical Tips for Avoiding Complications and Improving Outcomes

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Fracture fixation with various types of implants is one of the most common procedures in Orthopaedic practice. This is intended for osteosynthesis and improvement in function after musculoskeletal injury is diagnosed. Internal fixation of fractures is often regarded as a balance between the biology of the injured tissue and the mechanical properties of the device used for fixation [1]. It is therefore a common practice to consider removal of the implants after fracture union must have been achieved, as retention of the implant is not known to confer additional benefits once healing of the fracture is complete [2].

In the past, surgical extraction of Orthopaedic implants was considered routine after complete fracture healing, but current literature appears not to be in favour of routine extraction due to significant complications that could be associated with the procedure [3-5]. In addition to the well documented complications like wound healing problems, bone infection, neurovascular injury, and re-fracture, there are several intra-operative difficulties like stripping of the screw heads, cold-welding of locking screws to the plate, stuck nails, ingression of bone into the crevices of the implant, outright bony overgrowth, and inability to completely extract the implant [6,7]. These problems, sometimes unforeseen pre-operatively, make implant extraction riskier than leaving the implant in-situ.

Despite the known complications, many patients still express desire to get the implants extracted owing to customs, beliefs or simply an unfounded anxiety about leaving the implants in-situ. This has put lots of pressure on the Orthopaedic surgeons to continue to perform the procedures. Studies have however shown that routine implant extraction constitute unnecessary workload on busy surgeons and consume lots of hospital resources that otherwise could have been channeled to better use [4,5,7,8]. Furthermore, patient-centered outcomes after the procedures have been variable especially in asymptomatic patients; while some appear to be satisfied, others have been left disappointed having suffered unforeseen complications, which may include the dreaded psychological trauma of an unsuccessful procedure.

In the era of evidence-based practice, and the possibility of litigation that may arise from development of complications, patient insistence alone should no longer be a deciding factor. It is imperative that surgeons develop guidelines for patient selection. When the surgeon eventually decides to proceed with implant extraction, the clinical indication should be clear and acceptable to both the surgeon and the patient. The following clinical tips, based on the author's experience, have helped to guide clinical decision to proceed with implant extraction or not, and thus avoid unnecessary surgical procedure and associated complications.

1. The Duration of Implantation.

Although the timing of implant extraction depends on the time taken for the fracture to heal, it is believed that the longer the implant stays in the body, the more difficult and destructive is the extraction. Based on AO guidelines for implant removal after uncomplicated fracture healing, the maximum duration of implantation is 36 months in femur fractures, and less than 24 months for other fractures [2]. Additional factors to consider include the experience of the surgeon, and biocompatibility of the implant. In general, extraction of implants within 3 years confers less risk and minimal destruction to the bone.

2. Reason for Seeking Extraction.

Though an important consideration for the surgeon is to always weigh the benefit of removal versus leaving the implant in-situ, the reason for undertaking implant extraction must be clinical. The surgeon must therefore convince himself of the reason for removal by carefully evaluating the patient's complaints. Clinically justifiable reasons include infection, loose implant, pain with associated functional impairment, or failure of osteosynthesis [2,9,10]. Chronic pain and discomfort not directly related to the implant may not resolve even after extraction and the surgeon must educate the patient about this.

3. Knowledge of Antecedents.

In the author's experience, patients most often seek implant extraction from surgeons other than their primary surgeons. So, before obliging the patient, the surgeon must be armed with ample information regarding the first procedure. If possible, information about where and who performed the initial fixation must be sought. Operation notes from the initial surgery when available, can help in decision making as well. Inheriting another surgeon's patient for implant extraction without adequate information of what had transpired initially is a recipe for frustration and may be a disaster in waiting.

4. Familiar Instrumentation.

During the initial evaluation, the surgeon must scrutinize the radiographs in a bid to know the implant type and all its components. Locking or conventional plate, plate size and thickness, the screw type (locking or non-locking), the screw head recess geometry (hexagonal, star or cruciform) must all be ascertained. Intramedullary nails are unique in having a design specific to the manufacturer, which could be deduced from the nail geometry and locking screw type. The surgeon must be familiar with the implant in-situ before embarking on its extraction.

5. Availability of Appropriate Extraction Equipment.

Without appropriate instruments, implant extraction remains a tough task. In addition to basic instruments, the surgeon must be prepared for difficult circumstances and arm himself with alternative instruments that could be used if the procedure gets complicated. All components of broken screw set must be available, as well as implant-specific instruments for nail extraction. Occasionally, it may be necessary to cut a stuck implant in-situ with metal burr to facilitate extraction.

6. Location Anatomy.

Complications often depend on the specific anatomic location of the implant, and the surgeon must bear this in mind. The same principles of meticulous soft tissue dissection employed during fixation must also apply during extraction. All vital structures must be protected to avoid iatrogenic injury and prevent morbidity.

7. Patient Characteristics.

Only a few studies have paid attention to the psychological effects of implant retention in patients [11]. The psychological make-up of the patients could be a pointer to whether implant extraction will yield the desired effects or not. Patients with non-specific complaints about an implanted device are less likely to be satisfied after its extraction. Occasionally, only a component of the implant is symptomatic, and only this should be addressed to avoid overtreatment and complications.

In conclusion, surgical extraction of implants is still a common procedure in Orthopaedics, and the economic and work-time cost are enormous. When extraction is done for clinically justifiable reason, patient satisfaction can be expected despite complications. However, in the author's opinion, not all patients seeking implant extraction should have the procedure. Many patients can be reassured when symptoms are mild or not directly related to the implant. Patient selection based on certain criteria will go a long way to reduce complications and morbidity that could be associated with surgical extraction of implants. Surgeons should develop appropriate guidelines for these procedures to minimize complications and maximize use of scarce resources.

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