Key Clinical Benefits of Inion® Bioabsorbable Implants for Healthcare Providers

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Introduction

Bioabsorbable implants have transformed fracture fixation and orthopaedic treatment by offering a viable alternative to permanent metal hardware. The application of bioabsorbable implants has broadened across various surgical fields, including trauma, sports medicine, and craniomaxillofacial surgery. These implants support healing while naturally degrading, which helps eliminate the long-term complications often associated with metal implants.

Here, we present the key clinical benefits of Inion® bioabsorbable implants for healthcare providers. These include the elimination of permanent implants, reduced need for revision surgeries, preservation of standard recovery timelines, more efficient allocation of healthcare resources, and measurable cost savings for healthcare systems.

No Permanent Implant for the Patients

Metallic implants provide stable fixation but usually remain in a patient's body permanently unless they are surgically removed. While they are beneficial during the healing process, once the bone has healed, these implants do not offer any advantages. In fact, retained hardware may cause further issues, such as irritation and infection. The most common complications associated with metallic implants include palpability, pain, infection, temperature sensitivity, corrosion, and osteopenia of the bone due to stress shielding (Gogolewski 2000, Vaccaro et al. 2003). Metallic implants can also interfere with tendon gliding and may disrupt natural joint movement and function (Waris et al. 2002, Rhee et al. 2004). These complications often make it necessary to remove the metallic implant.

Bioabsorbable implants are designed to maintain sufficient mechanical strength during the healing phase and to absorb in a controlled manner afterward, thereby eliminating the need for routine removal. Clinical evidence supports their safety and effectiveness across various medical specialties. In a comparative study by Noh et al. (2012), patients treated for unstable ankle fractures with bioabsorbable implants had similar clinical and radiological outcomes to those treated with metal implants.

Bioabsorbable Inion CompressOn™ headless compression screw for orthopaedic fixations

Reduction in Revision and Removal Surgeries

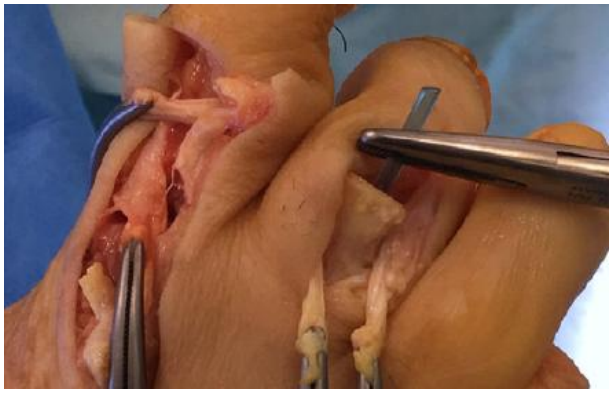
Bioabsorbable implants were initially developed to avoid the need for implant removal in orthopedic surgery (Middleton & Tipton 2000). Secondary removal surgery places a significant strain on healthcare systems and exposes patients to additional recovery time and procedural risks. According to clinical reviews, complication rates for routine hardware removal can reach 20%, including infection, nerve injury, bleeding, and incomplete extraction (Fenelon et al. 2019, Partio et al. 2020).

Bioabsorbable implants significantly reduce the need for revision or removal surgery. The Inion Freedom™ system, for example, has demonstrated low implant removal rates of only 2% in the treatment of ankle fractures (Noh et al. 2012). In contrast, conventional metallic fixation methods often have removal rates around 30%, and in some cases, implant removal rates can rise to as high as over 70% (Noh et al. 2012, Jung et al. 2016).

No Additional Recovery Time

Recovery time plays a crucial role in surgical planning. One significant clinical advantage of Inion® bioabsorbable implants is that, unlike metallic implants, which often require a secondary surgery for removal, bioabsorbable implants allow patients to complete their recovery without additional surgical procedures.

A recent study by Kim et al. (2024) found that children and adolescents with distal tibial physeal fractures who were treated with bioabsorbable screws experienced healing and functional outcomes similar to those treated with metal screws. However, the patients who received bioabsorbable screws did not have to deal with the complications related to hardware retention or removal (Kim et al. 2024). Similarly, research on hand and foot surgeries indicates that outcomes in terms of union and function are comparable for both bioabsorbable and metallic fixation, without the need for further interventions (Kosugi et al. 2020, Koivu & Koski 2023).



Introduction of bioabsorbable Inion FreedomPin™ in lesser toe interphalangeal joint arthrodesis (Koivu & Koski 2023)

Resources Redirected to Primary Surgeries

Implant removal constitutes one of the most frequent elective orthopaedic procedures globally. According to Shrestha et al. (2013), implant removals accounted for 7.8% of all trauma surgeries at Kathmandu University Hospital. The paper by Partio et al. (2020) indicates that in Finland, 27% patients who underwent open reduction and internal fixation (ORIF) for ankle fractures, eventually required hardware removal. This equated to over 18,000 procedures between 1997 and 2016, with a notable 8% of removals occurring more than three years post-operatively, highlighting the persistent resource demand well beyond the initial treatment phase (Partio et al. 2020).

By reducing the need for routine hardware removals, bioabsorbable implants free up operating room time, surgical personnel, and recovery beds for primary surgical care, which improves the overall efficiency of healthcare delivery (Figueiredo et al. 2021, Fenelon et al. 2019).

Cost Savings for Healthcare System

Implant removals include both direct and indirect costs. Between 2001 and 2016, the annual costs for the Finnish healthcare system from metal implant removals ranged from €472,000 to €994,000 for ankle fractures alone, not including indirect costs such as lost productivity or post-surgical care (Partio et al. 2020).

In Finland, the Diagnosis-Related Group (DRG) based hospital pricing system indicates that the average direct cost for a single hardware removal procedure is €797. This figure excludes indirect costs such as outpatient follow-up, medication, and lost work time. (Partio et al. 2020). In comparison, the cost of removing a syndesmosis screw in the United States ranges from $287 to $9,981, with an average operating room cost of $3,579 per patient (Lalli et al. 2015). Additionally, reports from Ireland suggest that the average cost for hardware removal is approximately €1,113 per patient (Fenelon et al. 2019).

These numbers indicate that the economic burden associated with metal implant removal is significant. Thus, a wider adoption of bioabsorbable implants is one way to reduce financial pressure on public healthcare system.

Conclusions

Inion® bioabsorbable implants offer a clinically effective and cost-effective alternative to metallic fixation. The controlled resorption of bioabsorbable implants promotes natural healing, minimizes long-term complications, and removes the necessity for routine hardware removal. This results in fewer revision surgeries, maintained recovery timelines, more efficient surgical workflows, and significant cost savings.

In addition to direct clinical benefits, higher patient satisfaction and reduced downtime enhance overall healthcare efficiency. Together, this evidence strongly supports the adoption of bioabsorbable implant systems as a modern standard in fracture management.

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