Non-metallic Fixation of Patella Fractures: A Paradigm Shift

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Learning Point of the Article:

Fractures of the patella are traditionally treated with metallic implants. Despite good outcomes, these metallic implants are usually associated with various complications and additional surgeries are required for the removal of metal implants. To overcome the complications of metallic implants, different non-metallic suture materials have been used as an alternative to metallic implants for patella fracture fixation. Comparable functional and radiological outcome is reported by fixing patella fractures with non-metallic sutures without significant complications.

Introduction

Fractures of the patella account for about 1% of all the fractures. The vast majority of patella fractures are closed and 70–90% are transverse fractures involving middle third of the patella [1, 2]. The incidence of patella fracture is more in females of 60–80 years of age than males possibly due to osteoporosis [3]. Improper treatment of patella fractures can result in loss of knee extension, stiffness and patellofemoral arthritis. [4]. Surgery is indicated when fracture is displaced, articular step off is more than 2 mm, and active knee extension is lost [5]. The optimum surgical treatment for patella fractures, however, has not yet been decided [6]. Although there are many surgical techniques and metallic implants to fix patella fractures, modified tension band wiring is the most commonly used traditional technique for the fixation of patella fractures. In this technique, an 18 gauge stainless steel wire (cerclage wire) is looped around longitudinal Kirschner wires (or screws) in figure-of-eight fashion on the anterior surface of patella. This technique neutralizes the tension forces of the extensor apparatus and converts them to compressive forces which facilitates fracture healing [7]. Good outcome results are achieved with tension band wiring but painful soft-tissue irritation, formation of sinus, wire breakage, loosening, and wire migration necessitate implant removal and the second surgery has been reported in 30–60% of cases [8]. Moreover, 3.2% infection rate has been reported in patients with tension band wiring [9]. The cost of treatment as well as risks to the patients are hence significantly increased in patients treated with tension band technique [10]. Owing to the complications of the tension band technique, various metallic plates have been designed over the years to achieve optimum fixation, particularly in comminuted and osteoporotic patella fractures. These include hook plate, basket plate, mesh plate, mini plate, star plate, arrow plate, variable angle locking patella plating system, and fixed angle pre-contoured locking plate. Plating of the patella is, however, costly and technically demanding and has been associated with symptomatic implants, loss of fracture reduction, implant failure, non-union, and resurgery for removal of implants variable frequencies [11, 12].

To overcome the complications of metallic implants, many researchers have utilized non-metallic fixation materials such as non-absorbable sutures for patella fracture fixation. These sutures proved to be viable and effective substitutes for metallic

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implants. These include non-absorbable high-strength suture materials such as Fiber Wire®, Fiber Tape®, Ticron®, Ultrabraid® Ti-Cron, and Ethibond®. These sutures can be applied in different configurations such as figure-of-eight, transosseous, circumferential, and basket configuration depending on the fracture personality. All types of fractures including comminuted patella fractures and distal pole patella fractures can be treated effectively with suture fixation [13]. These sutures provide optimum stability comparable to stainless steel and can withstand excessive loading thus ensuring early post-operative rehabilitation and weight bearing [14].

When we searched the literature, we found that minimizing the complications of metallic implants, avoiding additional surgery for removal, reducing risk to the patients, and increasing patient satisfaction are the predominant factors for this paradigm shift in the management of patella fractures. Sutures fixation of patella fractures yields excellent clinical outcomes with significantly reduced complications and resurgery rate [15]. There are several advantages of fracture fixation with sutures. The suture is easy to handle and applying knot resulting in less operative time and shorter tourniquet time [16]. Optimal tension can be applied to the suture tap and knots per operatively with the help of tensioning device which ensures maximum compression at the fracture site. Fracture reduction is better visualized and confirmed due to radiolucency of suture materials intraoperatively with image intensifier [17]. Patients with suture fixation have reduced hospital stay and reduced post-operative complications such as prominent knots or suture causing soft-tissue irritation and pain [15]. Fracture union rates and time of union with suture material are comparable to those with metallic implants with the added advantage of less complications and no need of additional surgery for implant removal in cases of suture fixation [18]. Satisfactory clinical outcome has also been achieved with "Double Fixing Technique" using tension polyester sutures and bioabsorbable cannulated screws [19].

Patella fractures in patients with high risk for infection will probably be treated with antibiotic-coated sutures in the future to overcome the phenomenon of biofilm associated with metallic implants which are associated with persistent infection [20] while the efficacy of self-tightening suture material (DYNACORD) for patella fracture fixation has yet to be investigated [21].

Conclusion

Non-metallic suture fixation of patella fractures is a viable and effective substitute for metallic implants. Orthopedic surgeons can choose non-metallic suture material as an alternative to metallic fixation for patella fractures by incorporating it in routine practice to avoid additional surgeries for the removal of metallic implants.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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