

Evacuation Per Arthroscopy of Wire Migration Following of Broken Patella Cerclage Wire: A Case Report

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ABSTRACT

Background: Patellar fractures account for roughly 1% of all bone injuries and are often treated surgically in cases of displacement or articular incongruity. Cerclage wiring is a prevalent fixation method because to its straightforwardness and efficacy in attaining fracture stability. Nonetheless, problems including hardware loosening, fracture, and migration have been documented, especially in long-term assessments. Intra-articular wire migration is an uncommon although potentially severe consequence that may result in joint discomfort, mechanical symptoms, and cartilage destruction. Arthroscopic extraction of displaced wires has become a minimally invasive and secure alternative to open surgeries.

Case Presentation: We present the case of a 56-year-old male with a history of a right patellar fracture, which was managed with open reduction and internal fixation utilising cerclage wiring two years ago. The patient had growing anterior knee pain for one

month, worsened by walking and ascending stairs. The physical examination indicated localised pain over the anterior patella, absent of oedema or deformity. Radiographic imaging revealed wire loosening, and intraoperative fluoroscopy verified the migration of a wire piece into the intra-articular area. The patient successfully had arthroscopic wire removal, with no injury to the articular cartilage seen. The postoperative recovery was unremarkable, and early mobilisation with physiotherapy led to substantial functional enhancement.

Discussion: This case exemplifies the postponed manifestation of intra-articular wire migration, a rare yet clinically pertinent consequence of cerclage fixation. Prior research has highlighted the significance of diligent monitoring and the evaluation of elective implant removal to avert such occurrences. Arthroscopy provides a precise and minimally invasive method for implant retrieval, yielding favourable results.

Conclusion: Orthopaedic surgeons must remain vigilant for hardware migration in patients exhibiting late-onset joint problems after fixation. Timely intervention with arthroscopic methods guarantees superior results with reduced morbidity.

Keywords: Patellar fracture, cerclage wire, hardware migration, arthroscopy, knee joint, implant failure.

INTRODUCTION

Patellar fractures, while infrequent, comprising about 0.5% to 1.5% of all skeletal injuries, present a considerable barrier in orthopedic practice due to the patella's essential function in the knee's extensor mechanism.¹ Surgical surgery is typically warranted for displaced fractures, extensor mechanism disturbance, or comminuted fractures affecting the articular surface.² Among numerous fixation procedures, open reduction and internal fixation (ORIF) utilizing tension band wire or cerclage wiring has been extensively utilized due to its capacity to restore joint congruity and facilitate early mobilization.³ Cerclage wiring, commonly preferred for its simplicity and cost-efficiency, entails the circumferential application of stainless steel wire to ensure fracture stability. This technique often produces positive results; nevertheless, hardware-related issues are well-documented. Potential complications may encompass symptomatic hardware prominence, dermal irritation, wire fatigue and fracture, infection, and, in rare cases, migration of the wire to neighboring or distant anatomical regions.⁴ The migration of orthopedic implants, especially metallic wires, is a rare yet potentially severe consequence seen in multiple anatomical locations, including the thorax, abdomen, and joints. Wire fracture subsequent to ORIF is frequently asymptomatic and may be undetected in patients who achieve adequate function.⁵ Nevertheless, migration into intra-articular areas may result in mechanical discomfort, synovial inflammation, cartilage destruction, or

functional impairment. The clinical identification of wire migration can be difficult, as initial indicators may be nonspecific and standard radiographs may not consistently demonstrate the actual location of the migrated component. Advanced imaging or intraoperative fluoroscopy may be required to verify the diagnosis.⁶

The arthroscopy technique has become an important method for diagnosing and treating intra-articular conditions, including the removal of foreign bodies.⁷ Arthroscopy presents numerous advantages over conventional open procedures, including diminished soft tissue dissection, decreased infection risk, enhanced imaging of intra-articular structures, and expedited postoperative recovery.⁸

This report details an uncommon instance of intra-articular migration of a fractured cerclage wire two years post-ORIF for a patellar fracture. The patient exhibited new-onset anterior knee pain without prior trauma, and intraoperative fluoroscopy unexpectedly identified a wire fragment within the knee joint. The portion was excised arthroscopically without problems. This case highlights the necessity of clinical attention in patients with retained orthopedic hardware and illustrates the effectiveness of arthroscopy as a minimally invasive approach for hardware-related problems in the knee joint.

CASE PRESENTATION

A 56-year-old male went to the orthopedic outpatient clinic with complaints of persistent right knee pain lasting roughly one month. The pain was persistent and had steadily intensified over the past week, especially with weight-bearing activities like walking and ascending stairs. The discomfort was characterized as dull and confined to the anterior region of the knee. The patient's medical history revealed a right patellar fracture incurred two years ago, which was treated surgically with open reduction and internal fixation (ORIF) employing cerclage wiring. The

postoperative course was unremarkable, and the patient remained asymptomatic and functionally independent until the recent emergence of symptoms.

The physical examination revealed no signs of edema, ecchymosis, or deformity in the right knee. Localized soreness was observed across the anterior aspect of the patella. The vascular examination was normal, featuring a palpable dorsalis pedis artery and an adequate capillary refill time. The active range of motion of the knee was restricted due to discomfort. Distal motor function was preserved, with ankle dorsiflexion and plantarflexion recorded at 20° and 50°, respectively. Movement at the metatarsophalangeal (MTP) and interphalangeal (IP) joints was within normal parameters (0°–90°). Based on the patient's clinical history and examination results, prolonged implant-related discomfort or potential nonunion was first hypothesized. The radiographic assessment indicated the loosening of the cerclage wire. Intraoperative fluoroscopy (C-arm)

conducted during surgical planning revealed the migration of a K-wire into the intra-articular space of the knee joint, an anomaly not previously identified through clinical or conventional radiography assessment.

A diagnosis of symptomatic implant failure with intra-articular migration was made, and the patient underwent arthroscopic removal of the implant. Intraoperative observations indicated a displaced K-wire extending into the joint cavity. The wire was effectively removed utilizing arthroscopy instruments. No chondral injury or intra-articular loose bodies were detected during the surgery. Postoperatively, the patient received intravenous antibiotics and analgesics and was meticulously examined for indications of infection and wound-related problems. Early mobilization and organized physiotherapy were commenced to promote the restoration of knee joint function. The patient had positive surgical recovery, showing gradual enhancement in mobility and absence of early problems.

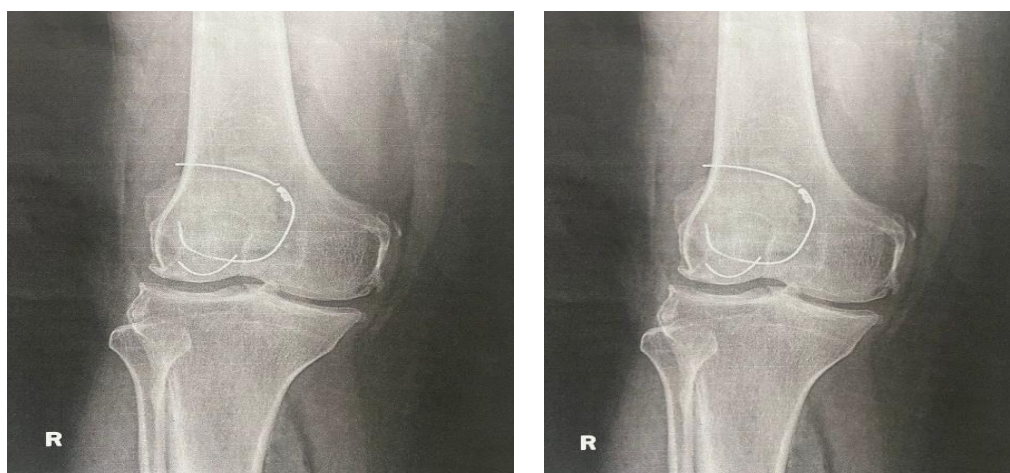


Figure 1. Radiograph of right knee showing the broken patella cerclage wire with a migrated fragment posteromedially.



Figure 2. Intra-operative C-arm exploration and cerclage wire showing sign of migration in lateral view



Figure 3. Intra-operative C-arm exploration and cerclage wire showing sign of migration in AP view



Figure 4. Intra-operative implant evacuation using arthroscopy

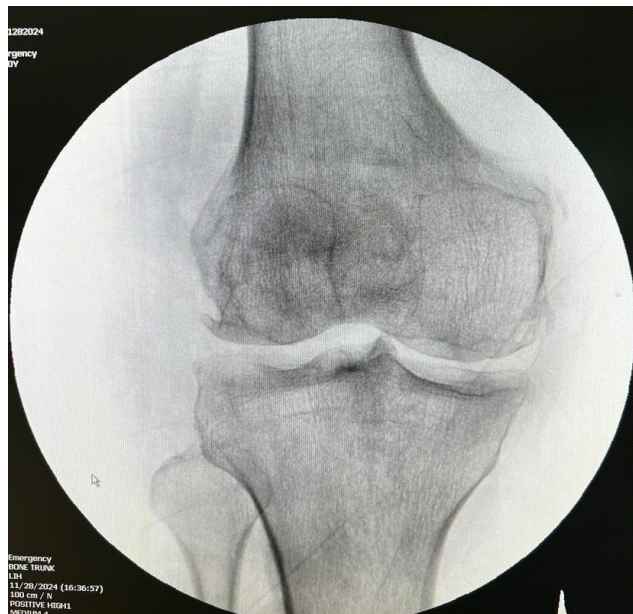


Figure 5. Intra-operative C-arm confirm the complete removal of broken patella cerclage wire



Figure 6. Implant manifestation after evacuation

DISCUSSION

Patellar fractures constitute a rare type of musculoskeletal injury, comprising around 1% of all skeletal traumas, however they hold clinical importance due to the patella's essential function in the knee's extensor mechanism.⁹ Surgical surgery, especially for displaced fractures, seeks to restore articular congruity and facilitate knee extension by suitable internal fixation.¹⁰ Among the diverse fixation methods, open reduction and internal fixation (ORIF) utilizing metallic apparatuses such as tension band wiring (TBW) or cerclage wire has

historically been regarded as a cornerstone of treatment. Although efficient, these treatments entail problems, especially with the long-term retention of metallic implants.¹¹

Cerclage wiring is extensively utilized owing to its economic efficiency and relative ease of deployment, particularly in resource-constrained settings.¹² It is well-documented in orthopedic literature that metallic implants, particularly wires, are prone to mechanical fatigue, corrosion, and ultimately fracture.¹³ Hardware failure may often be asymptomatic; nevertheless, when

wire pieces infiltrate adjacent tissues or compartments, considerable morbidity might ensue. In a retrospective cohort study involving 72 patients treated with modified tension band wiring for displaced transverse patellar fractures, fixation failure occurred in 4 patients (5.6%), and the study emphasized that proper K-wire positioning and fixation technique are important for reducing fixation-related complications.¹⁴ Wire migration, especially into the intra-articular area, is an uncommon yet potentially grave problem. Migration may result from recurrent mechanical stress, micromotion at the fracture location, or insufficient soft tissue coverage and stabilization. Intra-articular migration may manifest with nonspecific symptoms including progressive knee discomfort, diminished range of motion, mechanical locking, or effusion.¹⁵ The patient remained asymptomatic for nearly two years after successful ORIF with cerclage wiring, before experiencing new-onset anterior knee pain. The gradual emergence of symptoms exemplifies the covert character of wire migration and underscores the necessity for prolonged monitoring in patients with retained metallic implants.¹⁶

Numerous case reports and small series in the literature have recorded the migration of orthopedic wires into intra-articular or extra-articular sites.¹⁷ Pushpasekaran et al. reported migration of broken patellar tension-band wires to the popliteal fossa, with retrieval performed arthroscopically through posterior knee portals.¹⁸ Choi et al. previously reported symptomatic migration of broken K-wires and wires from patellar fixation to the popliteal fossa, with surgical retrieval required.¹⁹ These findings highlight the risk of considerable intra-articular or extra-articular complications if such problems are not swiftly recognized and addressed.

Diagnosing intra-articular wire migration might be difficult. Conventional radiographs may insufficiently identify the exact position of small metallic particles, especially if they are situated in the coronal

or axial plane, or masked by osseous structures.²⁰ In our instance, although standard radiographs indicated hardware loosening, the occurrence of intra-articular migration was conclusively verified only with intraoperative fluoroscopy.²¹ This corroborates the findings of previous study, who proposed that fluoroscopy and computed tomography (CT) offer enhanced diagnosis of hardware issues compared to radiography alone, particularly in intricate joint anatomies.²²

The management of migrating hardware has conventionally entailed open arthrotomy. Arthroscopy has become the favored minimally invasive method for extracting intra-articular foreign bodies, providing numerous distinct benefits.²³ Arthroscopy facilitates accurate identification and extraction of foreign materials with little soft tissue damage, enhanced imaging of joint surfaces, and the ability to evaluate and address concurrent intra-articular conditions such as cartilage abnormalities, synovitis, or loose bodies. Arthroscopic removal of intra-articular metallic foreign bodies can provide direct visualization of the joint, minimize soft-tissue dissection, and facilitate accurate retrieval.²⁴

In our case, arthroscopy facilitated the effective extraction of the wire piece without difficulties and demonstrated no further intra-articular injury. This instance highlights the ongoing discourse around the necessity and timing of hardware removal following fracture healing. Some writers contend that asymptomatic hardware should remain in situ, while others advocate for the choice removal of cerclage or tension band wires due to the established risk of late problems. One of research conducted a study involving 154 patients with patellar ORIF, revealing that those who retained wires for over 18 months faced a markedly elevated risk of wire breakage and migration. The findings indicate that a customized method must be implemented, considering the patient's age, activity level, symptomatology, and the type and stability of the fixation construct.

CONCLUSION

This case report adds to the existing research on the risk for delayed wire migration after patellar cerclage fixing. Intra-articular migration of hardware, however uncommon, might result in considerable morbidity if not swiftly managed. Clinicians must uphold a heightened level of skepticism in patients exhibiting new-onset knee problems following previous internal fixation, regardless of trauma history. This example further substantiates the application of arthroscopy as a secure and efficient method for diagnosing and managing intra-articular foreign body problems.

Declaration by Authors

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