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CASE REPORT

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An unusual complication of knee arthroscopy: an extra-articular migrated asymptomatic broken probe from the knee joint

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Abstract In large knee arthroscopy series, the complication rate has been reported to be between 2% and 8%. Although preventable in most cases, the incidence of instrument breakage remains approximately 3%. Despite this relatively frequent occurrence, few case reports have been published regarding these complications. In this case report, a patient carried a broken probe tip in her popliteal muscle belly for 5 years without symptoms. During arthroscopy, when the C-arm was temporarily not available, a probe tip had broken off and was left behind in the knee joint. It migrated through a popliteal hiatus into the popliteal fossa, and lodged in the medial head of the gastrocnemius muscle. When knee pain occurred 5 years later, the piece was located with fluoroscopy and was recovered without complications. This is the first such case reported in the English medical literature.

Keywords Knee arthroscopy · Complication in knee arthroscopy · Instrument breakage · Broken arthroscopic probe

Introduction

Various complications of knee arthroscopy include septic arthritis, tourniquet paralysis, Sudeck's atrophy, deep vein thrombosis, cartilage damage, arthrofibrosis, and wrong-knee arthroscopy [2, 3, 4, 5, 6, 7]. Sometimes instruments such as punches and knives are broken in the tight joints, and suture needles are sometimes left behind [2]. More frequently, the arthroscope itself is bent or broken in the knee joint. These complications are usually preventable; some of them may be due to the surgeon's lack of experience [4]. According to Small, 2.9% of knee arthroscopy complications involve instrument breakage. Instrument breakage was more common during the early days of arthroscopic surgery [7]. This happens more frequently in the early part of the learning curve, and more often in the lateral compartment because of wrong portal placement or joint tightness [6]. The very few reports of irretrievable broken parts of arthroscopic instruments include none such as the asymptomatic patient in this case [2, 5].

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Case report

An 18-year-old woman was referred to our clinic by the physiotherapy unit because of a persistent left anterior knee pain, which did not subside with medication, cold packs, or a quadriceps exercise program. She gave no history of recent trauma, swelling, locking, clicking, or giving-way. The pain worsened during standing up after squatting and while climbing stairs.

On physical examination, she had mild lower extremity obesity with minimally valgus knees, tenderness under the lateral patellar facets bilaterally, and a tight lateral retinaculum of her left knee. No marked instability was demonstrated, and meniscal tests were normal. Her left knee was pain-free with flexion between 0° and 130°. Lateral, AP, and oblique X-rays were normal. When the MRI showed a suspicious lateral meniscal tear and a grade II lateral patellar facet chondromalacia, we decided to perform diagnostic arthroscopy.

Under general anesthesia and with pneumatic tourniquet control, we performed the diagnostic arthroscopy through anteroinferomedial and anteroinferolateral portals. Grade II patellar chondromalacia in the lateral facet was found and debrided. The medial compartment was normal. No lateral patellar subluxation could be

demonstrated, and we did not perform an arthroscopic lateral release. While driving the arthroscope and the probe through the lateral compartment in the 'figure four' position with an incautious movement, the probe felt like it had broken. The procedure and irrigation were stopped immediately. Neither a magnetic retriever nor a C-arm fluoroscope was available. When all attempts to locate the broken piece arthroscopically failed, we performed a medial arthrotomy. From a medial oblique incision, we were unable to find the probe tip within tourniquet time limits, and we closed the wound in routine fashion. On the following day, the patient was notified about the complication, and patient and family refused re-operation to find the broken probe. The postoperative period was uneventful, and we mobilised and discharged the patient with crutches.

Five years after the initial operation, the patient presented to her family doctor with recurrent anterior left knee pain. The physician ordered an MRI (even though this is a probable diagnostic mismanagement), and the patient remembers a strange feeling in the back of her knee while the MRI was being performed. She was sent to our clinic when the foreign body was seen. On physical exam, knee motion was without pain, range of motion was normal, and no instability was present. Meniscal tests were normal. Tenderness was present over the lateral aspect of the patella, and we thought that the probe tip was not responsible for her clinical symptoms. On plain films, grade I degenerative osteoarthritic changes were seen in the anterior tibial spine, and a 2-cm-long foreign body was detected in the medial head of gastrocnemius muscle (Fig. 1). In this area, only mild tenderness could be elicited with deep palpation. MRI was uninterpretable because of the metallic artifact.

The patient requested removal of the foreign body. Under general anesthesia and while in the prone position, we used a pneumatic tourniquet and C-arm X-ray for foreign-body localization. Through a slightly curved longitudinal incision over the medial head of the gastrocnemius muscle, the foreign body was detected and retrieved (Fig. 2). Macroscopic examination of the probe tip revealed breakage from metal fatigue.

Fig. 1 AP and lateral views of the left knee

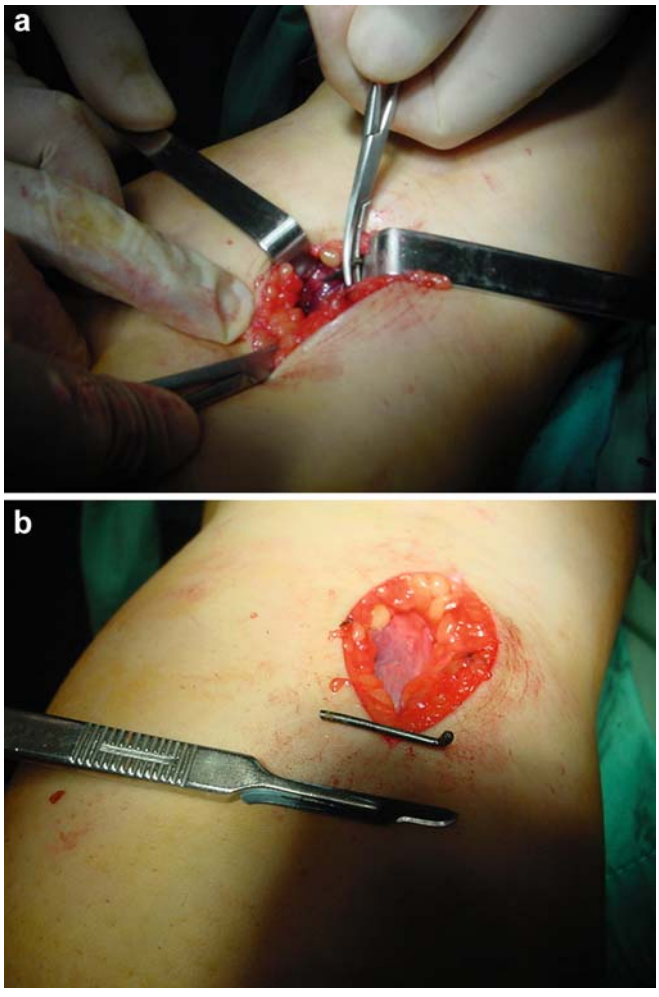

Fig. 2 a The broken probe has come to rest in the medial head of the gastrocnemius muscle. **b** Foreign-body removal from the medial head of the gastrocnemius muscle under fluoroscopic control

The wound was closed routinely, no vascular or neurological complications occurred, and she was mobilized and discharged from the hospital.

Discussion

Instrument breakage of the many types of hand instruments used in arthroscopy is a widely known potential complication of which every orthopedic surgeon is aware. Gambarjella and Tibone reported the removal of a broken scissor blade from the knee joint and a broken knife blade from the popliteal fossa [2]. Even power instruments can fail, and pieces must be removed from the knee [6]. Broken pieces of hand-held arthroscopic tools usually migrate to the popliteal fossa during surgery [2, 3, 6]. The reason for this migration could be the positive inflow pressure in the joint and momentary

panic, which may result in unwanted movement of the joint or instruments. In order to prevent those complications, driving the instruments under arthroscopic control, using modernly designed more powerful instruments, respecting the arthroscopic principles, and having a C-arm in the operating room are very essential.

In a case of instrument breakage during arthroscopy, one is encouraged to stop the current procedure and perform a systematic arthroscopic examination without changing the knee flexion angle [2, 6, 7]. If necessary, continue with posterior compartment visualization via posteromedial and posterolateral portals. If this fails, the surgeon must use X-ray localization and a magnetic retriever. The latter might not be able to recover large pieces though. Arthrotomy as a final effort is generally ineffective, because the popliteal fossa cannot be reached through an anterior arthrotomy.

In the few reported cases of foreign-body removal, all of the broken pieces were recovered from the popliteal fossa, with or without using a magnetic retriever [2]. The most remarkable point in our patient was finding the broken piece in an extra-articular location. We have to assume that its migration through the popliteal hiatus into the popliteal fossa was facilitated by repetitive knee motion. The large volume of the popliteal fossa could be the reason why the metallic body remained symptom-free for such a long period. After further migration into the popliteal muscle belly, the metallic piece lay in parallel orientation with the popliteal muscle fibres. This allowed almost full range of motion of the knee without any effusion and pain. Finally, it came to rest closer to the skin in the gastrocnemius muscle.

The magnetic energy of an MRI is known to cause movement of some metallic implants, such as vascular clips, heart valves, dental materials and some ear implants. Thus, it is relatively contraindicated as a diagnostic tool, unless the patient's hardware is made of titanium [1]. However, MRI causes no deflection of stainless steel or a K-wire at 1.5 Tesla power [1]. Nevertheless, we did not obtain a history or find any surgical evidence of sudden movement of the probe piece during MRI. The strange feeling of the patient in her knee while undergoing MRI just before the foreign-body removal was probably from the heating up of the probe piece by the magnetic field.

Although all attempts must be made to remove any broken instrument pieces, including posterior compartment arthroscopy , sometimes they cannot be recovered. In such situations, the literature recommends leaving broken pieces in the joint [3, 5, 7]. As in our patient, even a 2-cm-long metallic foreign body can remain completely asymptomatic for a long period.

Arthroscopy is not a trivial procedure: of the over 50,000 knee arthroscopic procedures performed in our country last year, up to 4,000 major or minor complications may have occurred [5]. Of these, almost 100 may involve instrument breakage. In order to prevent instrument breakage in the joint, we need more modernly designed instruments which have extra-articular breakaway points [7].

On such occasions, we recommend: stop the operation, stay calm, perform a systematic arthroscopic examination of all compartments with a magnetic retriever and under X-ray control. Multiple irrigation efforts and suctioning of the joint also may bring pieces out of hiding. If, despite all efforts, the fragment remains lost, we recommend carefully re-exploration with arthroscopy rather than performing an arthrotomy.

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