A Broken Scalpel Blade Tip
An Unusual Complication of Knee Arthroscopy

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Abstract
The case of a patient is presented in whom a No. 11 scalpel blade was inadvertently broken and embedded within the lateral femoral condyle during initial arthroscopic portal creation. After a thorough diagnostic arthroscopy and synovectomy to expose the distal femoral articular surface was unsuccessful, fluoroscopy was performed to localize the blade fragment in orthogonal planes. The blade tip was eventually retrieved from its position below the surface of the cartilage. The details of the loss and recovery of the blade fragment reinforce that exceptional care must be taken and attention given during the creation of portals, particularly when resistance is encountered. Additionally, all instruments, especially scalpel blades, should be examined carefully when removed from the knee joint.

Case Report
A 50-year-old male presented for evaluation of medial-sided knee pain following a twisting injury while playing tennis. After a period of nonoperative management, the patient opted for an arthroscopic meniscectomy for a torn medial meniscus, demonstrated on MRI. After sterile preparation and draping of the left lower extremity, the standard arthroscopic portals were marked on the skin. No tourniquet was insufflated during this case. The No. 11 blade was introduced through the anterolateral portal in the direction of the intercondylar notch. Some resistance was encountered while the portal was extended proximally. When the scalpel was returned to the scrub technician, it was noted that the very distal portion of the blade was missing. The anteromedial and superomedial portals were created and the compartments of the knee were thoroughly inspected with a 30° arthroscope. A synovectomy was performed to examine the surface of the distal femur for defects that may have resulted from blade penetration. A lower than usual pump pressure was utilized to prevent forcing the fragment deeper into the knee if it was indeed free-floating.
After approximately 30 min of searching in vain, the mini-fluoroscopy unit was brought into the room and standard AP (anterior-posterior) and lateral images were taken. The operating surgeon was able to stand back from the knee while maintaining the arthroscope within the knee joint. A probe was used to triangulate the knife fragment under serial imaging (Fig. 1), and a subtle cartilage flap was identified anterolaterally from the roof of the intercondylar notch. Upon elevating the flap, a hint of a metallic object was seen; the entire knife blade fragment was subsequently unroofed and retrieved with a grasper (Fig. 2). The flap was stabilized using the motorized shaver and a partial medial meniscectomy was performed without any further complications. No arthrotomy was required for removal of the fragment, which ultimately measured approximately 5 mm in length (Fig. 3). The entire duration of the case was 65 min. The patient had a benign postoperative course and an uneventful recovery from his surgery.

**Discussion**

Despite increased use of arthroscopy for the evaluation and treatment of intra-articular knee pathology and the advanced procedures that are being performed through the arthroscope, the incidence of instrument breakage has remained low.\(^5\) This may be attributed to improved instrument design and stricter adherence to arthroscopic principles. However, the potential morbidity of retained hardware cannot be disregarded. Cases of blade detachment during knee arthroscopy consist only of isolated reports in the literature. Gambardella and Tibone reported on the complete detachment of a No. 11 blade during the enlargement of an arthroscopic portal.\(^6\) A formal posterior arthrotomy was required for removal, and the patient suffered no adverse sequelae. Sochart and coworkers reported on two cases of the disengagement of a No. 15 blade from its handle during portal creation, both of which were successfully extracted from the knee joint without further complication.\(^7\) No arthrotomy was required in either instance, and the authors recommended routine use of No. 11 blade scalpels for portal creation. In all of these cases, the procedure time was prolonged, and the risk of further intra-articular damage was increased.

In some cases, however, detection of the retained instrument is made only in following up persistent patient complaints of knee pain or swelling.\(^1-4,8\) Astonishingly, the delay between instrument breakage and discovery has even been reported on the order of several years.\(^1-4,8\) Rajadhyaksha and associates presented a patient who underwent surgery to remove a complete scalpel blade from her knee ten years after a partial medial meniscectomy.\(^8\) One potential, early indication of a problem was her lack of symptomatic improvement after the procedure, despite months of therapy. A work-up, including arthrocentesis and plain radiographs, might be considered initially to determine the source of persistent pain in a patient who has exhausted nonoperative modalities.

Despite surgeon precaution, the breakage of scalpels
and other instruments will occur and requires a systematic approach to their successful extraction. Immediate recognition of the problem in our case likely played a role in the successful outcome. The significance of this case is the fact that only a small portion of the blade broke off, rather than a complete detachment occurring, and the tip was not free-floating within the joint.

It is imperative for the surgeon to minimize knee motion and prevent driving the fragment deeper into the joint. A diagnostic arthroscopy should be performed to rule out obvious positioning of the blade. We recommend reducing pump pressure during the diagnostic procedure to minimize intra-articular fluid motion. In the current case, following diagnostic arthroscopy and synovectomy, low dose fluoroscopy determined that the blade fragment was stationary and subchondral. Access to fluoroscopy is essential in those instances where the retained blade fragment is small in size, buried below the cartilage or within the soft tissue, or cannot be located following diagnostic arthroscopy. Fortunately, a formal arthrotomy was avoided although its use may be necessary when arthroscopic retrieval is unsuccessful. Additionally, the use of posterior arthroscopic portals was not required in our case although familiarity with their placement may be assistive in these situations.

Though the occurrence of blade or blade-scalpel complications during arthroscopic knee surgery remains low, its prompt recognition may improve the surgeon’s ability to deal with this potentially devastating problem. Remaining calm and instituting a systematic protocol for blade localization and retrieval usually results in successful outcomes. Knee arthrotomy should be considered in chronic cases or in those instances when arthroscopic retrieval proves impossible. Finally, all instruments should be carefully inspected at the completion of the procedure by all members of the surgical staff.

**Disclosure Statement**

None of the authors have a financial or proprietary interest in the subject matter or materials discussed, including, but not limited to, employment, consultancies, stock ownership, honoraria, and paid expert testimony.

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