

Synovial Fistula After Tension Band Plating for Genu Valgum Correction

Amit Momaya, MD, Peter Ray, MD, and Joseph Khoury, MD

Abstract

Tension band plating is a commonly performed procedure to address angular deformities about the knee in children. We present a case of a synovial fistula formation after tension band plate removal, an unreported complication in the literature. An 11-year-old girl underwent tension band plating for genu valgum. After removal of the plate, she developed a synovial fistula that was confirmed by magnetic resonance imaging. Her knee was immobilized in extension, which allowed the synovial fistula to heal. The unique capsular anatomy in the knee provides a possible etiology. Physicians performing tension band plating should be aware of this complication and consider a brief period of immobilization of 3 to 5 days after hardware removal to allow the capsular rent to heal.

Children often present to orthopedic surgeons with angular deformities about the knee. Temporary hemiepiphysiodesis, which is a frequently performed procedure to address such deformities, is safe and reversible. Specifically, tension band plating has become one of the most commonly performed techniques, especially given its low complication rates and minimally invasive nature.¹⁻⁴ Complications reported with this method include mechanical hardware failure,⁵ implant migration,⁴ and recurvatum.³

We present an unreported complication of a synovial fistula formation after the removal of a tension band plate in a child who had achieved appropriate correction of her genu valgum. The patient and her family provided written informed consent for print and electronic publication of this case report.

Case Report

An 11-year-old girl presented to the pediatric orthopedics clinic with concern for genu valgum of the right lower extremity. She underwent a right proximal tibia medial hemiepiphysiodesis via tension band plating technique. Her clinic visit 4 weeks after surgery showed well-healed incisions and no signs of infection. She achieved appropriate correction and underwent hardware removal approximately 6 months after her initial surgery.

One month after hardware removal, the patient began to notice increased swelling and erythema around her incision site with associated pain. No fluid or drainage was seen at that time. She underwent irrigation and débridement shortly thereafter, and the wound was left open for wet-to-dry dressing changes (Figure 1). Intraoperative cultures were negative, but the patient received empiric antibiotic therapy. She continued to have difficulty with wound healing for the next month and was referred to plastic surgery. She underwent repeat irrigation and débridement, followed by coverage with a split-thickness skin graft by the plastic surgery service. Intraoperative cultures were again negative. During both irrigation and débridement procedures, care was taken to remain superficial and not violate the knee capsule.

At her 2-week postoperative check, the bolster covering the split thickness skin graft was removed, which revealed a 2×2-mm area of clear erosion near the central portion of her wound with synovial fluid drainage (Figure 2). Because of concern for a synovial fistula, magnetic resonance imaging (MRI) of the right knee was obtained, which confirmed the synovial fistula (Figures 3A, 3B). The coronal cut on MRI clearly showed the fistula with synovial fluid tracking into the epiphyseal screw tract through the breached capsule and to the level of the skin. She was immobilized in a long leg cast with the knee in extension for 6 weeks. Upon return, her fistula had closed, and she has not had any more wound issues.

Figure 1. Right proximal tibia wound left open for wet-to-dry dressing changes.



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Figure 2. The wound has been covered by a split thickness skin graft but now clearly shows a central erosive area with synovial drainage representing a synovial fistula.

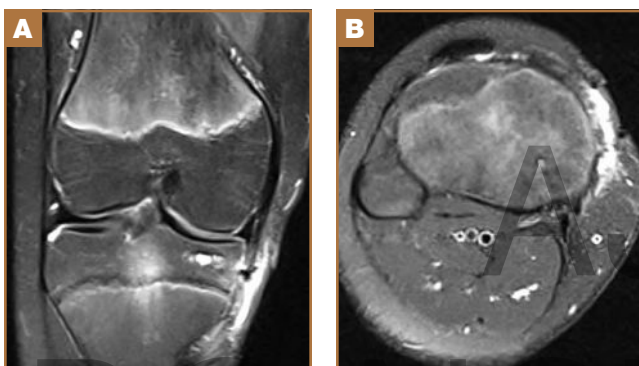


Figure 3. (A) Coronal and (B) axial fat-saturated proton-density weighted magnetic resonance imaging of the operative knee 3 months after removal of hardware, showing the area of synovial fistula formation. Synovial fluid can be seen tracking into the epiphyseal screw tract and protruding through the capsular rent to the level of the skin.

Discussion

To our knowledge, this is the first report of a synovial fistula after temporary hemiepiphysiodesis performed via tension band plating. Capsular knee anatomy may explain the etiology of the synovial fistula after hardware removal. The medial knee capsule composition and attachment sites have been extensively studied.⁶ In contrast to other joints, such as the shoulder, elbow, ankle, and hip, the metaphysis of the knee lies outside the capsule because the capsule inserts proximal at the level of the physis.⁷ During tension band plating, the epiphyseal screw breaches the capsule but serves as a plug while in place, which prevents the formation of a synovial fistula. When the screw is removed, the capsular rent spontaneously closes in almost all cases. However, the opportunity exists for a synovial fistula to form while the capsule heals, as evidenced by the current case. Such an issue does not apply to the metaphyseal screw because it is inserted outside the capsule.

Although it is possible that the synovial fistula was inadvertently created during one of the irrigation and débridement

procedures, this is very unlikely. The surgeons who performed these washout procedures are knowledgeable and familiar with knee anatomy. Both irrigation and débridement procedures were superficial, and care was taken not to violate the knee capsule.

A synovial fistula after knee surgery is rare. Larsen⁸ described the fistula as a phenomenon that develops when excessive synovial fluid forces its way through a synovial incision with knee flexion and muscle contraction. Such a complication is most routinely described after knee arthroscopy. Proffer and colleagues⁹ reported an incidence of 6.1 per 1000 after knee arthroscopies. The average number of days until fistula diagnosis was 6 days (range, 3-10 days). All fistulae were treated with immobilization and closed after an average of 9 days (range, 7-14 days). There were no associated infections, although prophylactic antibiotics were given. A national survey found that knee fistulae accounted for only 3.2% of all complications of knee arthroscopy.¹⁰

The treatment for a synovial fistula is largely nonoperative. Most will resolve with a brief period of immobilization, which allows the fistula to close.⁹⁻¹⁰ Literature addressing fistulae that fail to heal with nonoperative treatment is limited. Excision and direct closure of the fistula, especially when chronic, often proves futile and leads to a high recurrence rate.¹¹ An alternative but more extensive treatment involves excision and coverage with a myofascial flap.¹²

Complications reported after tension band plating are uncommon. Two studies reported no complications regarding the use of the tension band plate.¹⁻² Burghardt and colleagues,⁵ in reporting the results of a multicenter survey, found that 15% of surgeons who had used tension band plating had seen a total of 65 cases of mechanical failure. In all cases, the screws, not the plate, failed. Another study reported implant migration in 1 patient but attributed the complication to a technical error from placing the distal screw too close to the physis.⁴ A third study documented that 2 patients developed clinically significant recurvatum, most likely because of anterior placement of the plate.³ It is important to identify a synovial fistula postoperatively because it provides a direct route for pathogens from the external environment to enter the intra-articular space and the opportunity for a septic joint to develop. Infection should always be ruled out and, if present, appropriately treated.

Conclusion

Physicians performing tension band plating in the knee should be aware of the possible complication of a synovial fistula, which has traditionally been reported only in relation to knee arthroscopy. Given the proposed etiology of the synovial fistula, we recommend a brief period of immobilization of 3 to 5 days after tension band plate removal, allowing the capsular rent to heal and minimizing the risk of a synovial fistula.

Dr. Momaya is PGY-IV Orthopedic Resident, Dr. Ray is Assistant Professor of Plastic Surgery, and Dr. Khoury is Assistant Professor of Orthopedic Surgery, University of Alabama at Birmingham, Birmingham, Alabama.

Address correspondence to: Joseph Khoury, MD, University of Alabama at Birmingham, 1600 7th Ave South, Suite 316, Lowder Building, Birmingham, AL 35233 (tel, 205-638-9540; e-mail, jkhoury@uabmc.edu).

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