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Endoscopic Treatment of Stump Infection of the Residual Synovial Cavity After Through-the-Knee Amputation

A Case Report

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Investigation performed at Department of Orthopedic Surgery, Balgrist University Hospital, University of Zurich, Zurich, Switzerland

Abstract

Case: We report the case of a 35-year-old patient who presented with a septic residual synovial cavity infection 8 weeks after a through-the-knee amputation because of a parosteal sarcoma. An endoscopic evacuation of the turbid fluid and synovial debridement through parapatellar portals as in a standard knee arthroscopy was performed, in conjunction with appropriate antibiotic therapy. One year postoperatively, there were no signs of residual infection.

Conclusion: Endoscopic treatment of a septic stump infection of the residual synovial cavity after through-the-knee amputation is feasible. In our case, this approach resulted in rapid wound healing and early prosthesis mobility.

Septic arthritis is a relatively rare condition with an incidence between 2 and 10 per 100,000 patients per year¹. The most frequent joint to be affected is the knee, and after securing the diagnosis, a rapid combination of antibiotic therapy and removal of intra-articular pus by surgical evacuation is paramount¹. Postoperative infection after a through-the-knee amputation (TKA) is a common problem, with superficial cellulitis in 13% and soft-tissue infection in 4%, yet no infection of the synovial cavity is specifically described in the literature up to date². Although the TKA stump is anatomically not a knee joint anymore, the biological behavior of a residual synovial cavity in the case of infection may be comparable¹. For nonamputated persons, arthroscopy has the advantage of shorter hospital stay and lower complication rate such as a lower rate of reinfection, making arthroscopic irrigation superior to open surgery^{3,4}. Arthroscopic techniques also lead to smaller wounds and smaller scarring, which is paramount for patients with amputated lower extremities and especially in the case of an end weight-bearing stump such as a TKA.

We report a surgical technique for residual knee endoscopy for through-the-knee amputees as the surgical management in the case of a stump infection of the residual synovial cavity. This strategy might combine the abovementioned advantages of arthroscopic management with quicker return to prosthetic use.

The patient was informed that data concerning the case would be submitted for publication, and he provided consent.

Case Report

A 35-year-old man was diagnosed with a low-grade parosteal sarcoma of the proximal tibia in 2016. His case was guided through the local sarcoma board of the University of Zurich where all treatment steps were discussed by an interdisciplinary board consisting of oncologists, radiologists, pathologists, and an orthopaedic surgeon specialized in tumor orthopaedics. After primary surgical resection, sarcoma recurrence led to surgical reresection 1 year later. A second recurrence in 2020 required a TKA. There was no evidence of metastasis at any time point. The immediate postoperative course was unremarkable with regular wound healing, apart from phantom pain. Early compression

All procedures performed in studies involving human participants were in accordance with the ethical standards of the Institutional and National Research Committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Disclosure: The **Disclosure of Potential Conflicts of Interest** forms are provided with the online version of the article (<http://links.lww.com/JBJS/CC/B971>).

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Keywords stump infection; infection after amputation; arthroscopy after through knee amputation; endoscopic eradication of infection

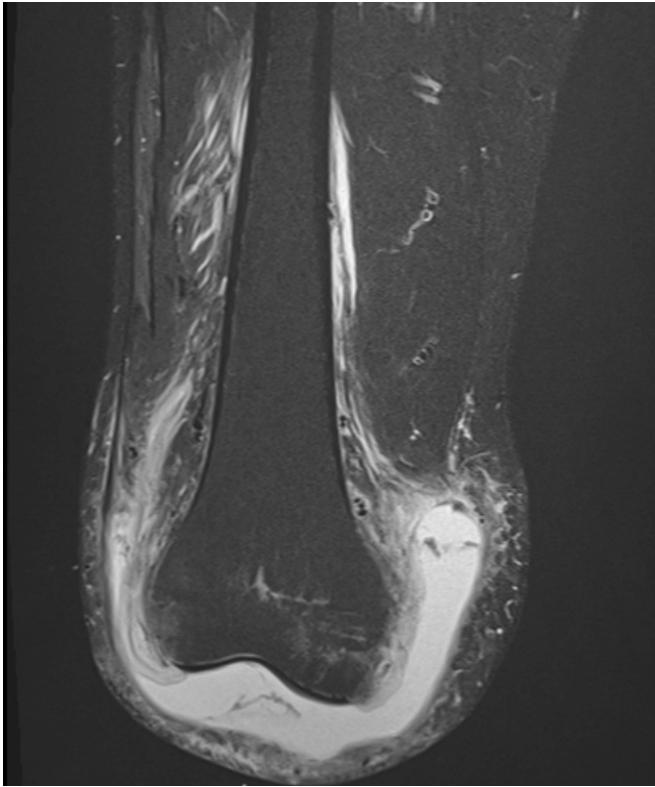


Fig. 1
Magnetic resonance imaging scan of the remaining joint capsule, showing a large fluid collection and a swelling of the surrounding tissue.

therapy of the stump enabled prosthetic fitting (trial socket, with a microprocessor knee [C-Leg] and prosthetic foot [Taleo], both Otto Bock; liner: Icross Seal-In XTE, Össur) within 4 weeks, delayed only by an initially restricted tolerance of both the liner and the prosthesis because of phantom pain. The patient was discharged 4 weeks after surgery to a specialized musculoskeletal rehabilitation clinic.

Eight weeks after surgery, shortly before discharge from the rehabilitation clinic, the patient developed fever, an elevated leukocyte count of 10.84 G/L, and an elevated CRP of 158.9 mg/L

(normal range at our institution: <5 mg/L). Knee magnetic resonance imaging showed a reactive fluid in the remaining joint capsule without evidence of osteomyelitis. The puncture of the fluid revealed over 66,000 white blood cells in its count with 80% polymorphonuclear leukocytes (Fig. 1). Septic arthritis of the residual knee was diagnosed, and after microbiological sampling, intravenous broad-spectrum antibiotics were started and the patient was prepared for surgery.

Endoscopic stump treatment for evacuation of the joint fluid with debridement was planned. The 2 standard parapatellar portals, anterolateral and anteromedial, were addressed. As in a regular arthroscopy, the skin incision of the anterolateral portal was made first and the trocar was inserted, followed by drainage of over 400 mL of turbid, highly viscous joint fluid (Fig. 2).

Intra-articularly, a strongly swollen synovial membrane and partially detached cartilage was visible, which corresponded to a Gächter stage II⁵ (Fig. 3). A debridement and partial synovectomy was performed, and unstable cartilage fragments were resected; thorough irrigation was performed with a total of 21 L of irrigation fluid.

Intraoperative samples demonstrated a multisensitive *Staphylococcus aureus* (2 of 2 samples), and the initial therapy with intravenous amoxicillin-clavulanic acid was changed to oral clindamycin after 7 days. Antibiotic therapy was supervised and prescribed by a specialist in musculoskeletal infectious diseases. Postoperatively, the patient's condition steadily improved and the elevated inflammation parameters in the blood normalized rapidly.

Antibiotic therapy was continued for 6 weeks without any signs of reinfection at any time point during the observation period. Wound healing of the arthroscopic portals occurred within 2 weeks. Use of the prosthesis was discontinued for 2 weeks. The patient was ambulatory without any problems once the use of the prosthesis was started again. One year postoperatively, the patient was in a good condition and without any signs of infection.

Discussion

Septic arthritis of the knee is an orthopaedic emergency that requires a combination of antibiotic therapy and prompt

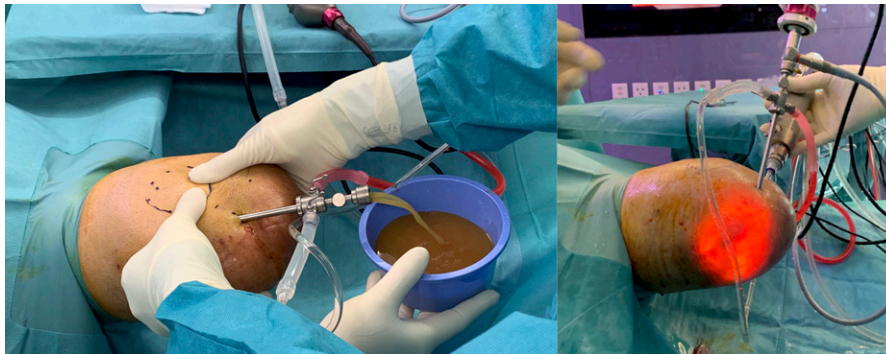


Fig. 2
Left: Setup of the arthroscopy and drainage of the turbid fluid through the anterolateral portal. Right: Debridement through the second anteromedial working portal.

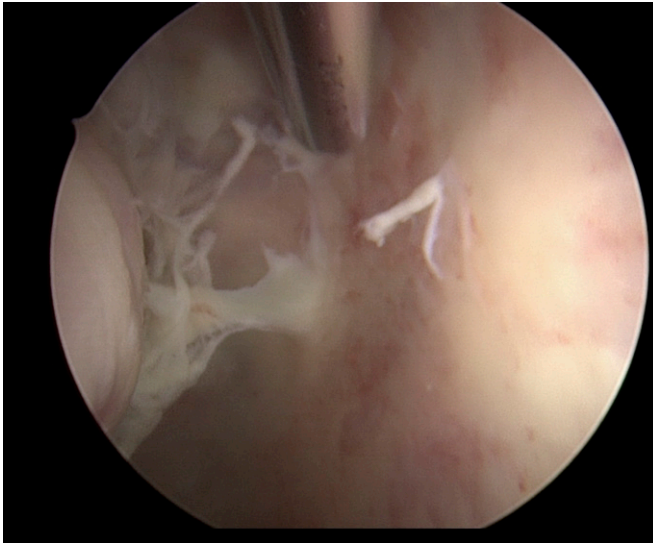


Fig. 3
Clear signs of synovitis with hyperemic capsule and reactive villi.

and rigorous surgical evacuation of pus. This can either be performed using an open technique, with a joint arthrotomy, or be performed arthroscopically. The literature has demonstrated equal effectiveness of arthroscopy and arthrotomy concerning eradication of infection, with the latter being inferior regarding adverse events, such as bleeding requiring transfusion, and requiring longer hospitalization times and finally time to post-surgical reduction of inflammation^{3,4,6}. In our case, we wanted to use these advantages to treat the residual stump infection of the synovial cavity of a patient with an amputated limb because, for these patients, soft-tissue conditioning is paramount. In the case of TKA, early achievement of a dry wound, reduction of inflammation, and achievement of a stable circumference of the amputation stump are important to resume prosthetic use and regain mobility. The feasibility of the arthroscopic technique

seemed to be given in our case because there is easy accessibility to the residual large, fluid filled synovial cavity.

Prymka et al. described a successful outcome using a similar endoscopic technique in a Syme amputee suffering from septic arthritis of his residual ankle⁷. Considering that postoperative problems with wound healing and flap ischemia are common in TKA and as the body of literature reports an enhanced risk of adverse events in arthrotomy, we feared further soft-tissue compromise and ultimately conversion to an above-knee amputation if we had opted for open surgery^{8,9}. Because TKA compared with above-knee amputation has major advantages for ambulation, usage of energy, and the load-bearing capacity of the stump compared with an above-knee amputation, we decided to perform endoscopic treatment^{2,10,11}. Another consideration was that an arthrotomy would most likely have left the patient bound to crutches without his prosthesis for at least 2 to 4 further weeks and would have jeopardized the soft tissue significantly.

The authors conclude that endoscopic treatment of the residual knee is a feasible and valid surgical option in patients with a TKA suffering from septic arthritis. It is technically feasible through the standard parapatellar portals, and with its minimal invasive nature, complete infection eradication is achieved, with smaller postoperative wounds and scar size compared with open surgery. Early return to prosthetic use within 3 weeks is possible. ■

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