



Case report

Arthroscopic debridement for infection after fracture fixation (IAFF) of the ankle: A case report

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ABSTRACT

Introduction and importance: Infection after fracture fixation (IAFF) is one of the most challenging issues for the lower-middle class socioeconomic. It is also related to unsatisfactory outcome of the treatment. Arthroscopy usually used to treat joint disease, but the evidence of arthroscopic management in IAFF is still limited.

Case presentation: We present a case of 54-year-old female with IAFF of the ankle. An arthroscopic debridement and soft tissue release procedure were performed in this patient in one stage because the irrigation and debridement were sufficient. It showed a good result good functional outcome.

Clinical discussion: The aims of IAFF treatment are to eradicate the infection, promote healing of soft tissue, prevent osteomyelitis, restore the joint function, and fracture consolidation. Arthroscopy in IAFF has been found to be safe and effective. In this case, arthroscopy was done in one stage because the debridement and irrigation were sufficient while the delay of the release would result in further pain and morbidity for the patient.

Conclusion: Arthroscopic debridement with simultaneous release of impingement and stiffness is a novel, safe, and promising option in to eliminate both IAFF and its further complications of the ankle region.

1. Introduction

Skeletal fracture operative fixation frequently leads to limb-threatening and life-threatening condition. Infection after fracture fixation (IAFF) is one of the most challenging issues for the lower-middle class socioeconomic [1]. It can lead to delayed union, non-union, high morbidity rate, or amputation of the limb [1,2].

Over the past decades, there has been a steady reduction in overall incidence of these cases. Yet, one of the persistent problems is unsatisfactory outcome of the treatment, suggesting some improvement should still be done in the near future. Infection after fracture fixation was found in about 1% after a closed fracture, and ranging from 15% to 55% after an open fracture [3]. The treatment of IAFF mostly adopted from the treatment of the prosthetic joint infection (PJI) algorithms. The most important factors in the treatment for IAFF are mechanical stability, the time between infection and fixation, and bone union [2,4].

Arthroscopy is a minimal invasive surgical procedure that usually used to treat joint disease. Arthroscopic approach can offer quick recovery, short length of hospital-stay and less complication compared to open surgical [5]. Arthroscopy irrigation and debridement may offer a

promising result in early stage of septic arthritis, though the evidence of arthroscopic management in IAFF is still limited [5–7].

In this case report, we conducted an arthroscopic debridement to the infected ankle of the patient whom diagnosed with infection of the osteosynthesis after fracture fixation. We performed the procedure in the academic hospital of Sanglah General Hospital, Denpasar, Bali. The purpose of this case report is to show that one-stage debridement of the IAFF via arthroscopic debridement is a safe and solid option to achieve the expected good functional outcome. This case report has been reported in line with the SCARE criteria and the PROCESS criteria [8].

2. Case presentation

A 54-year-old female presented to the Orthopedic Clinic two months after an open reduction internal fixation (ORIF) was performed in another hospital. The Patient did not feel any pain after the surgery, but she experienced the ankle pain that persisted since the last week. She denied any history of prolonged fever, diabetes mellitus, smoking, nor steroid use.

Clinical examination revealed dehiscence on both of the medial and

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lateral sides of the previous surgical scar with purulent discharge, and warmth over her left ankle. The ankle range of motion was very limited due to pain, while her sensory is still intact and there was no vascular abnormality. Laboratory tests indicated an elevated erythrocyte sedimentation rate (ESR) (26.8 mm/h) with normal C-reactive protein (CRP) of 2.76 mg/L. Acceptable reduction and fixation with plate and screws were seen on the plain radiographs (Fig. 1).

The patient was then admitted to hospital and underwent superficial debridement at the wound site, and arthroscopic debridement of the ankle. Wound swab from the infected tissue was retrieved for microbiology culture before preoperative intravenous antibiotic prophylaxis using 1 g loading dose of intravenous ceftriaxone. The leg was then exsanguinated and a calf tourniquet was applied and inflated to 250 mm Hg. Anteromedial and anterolateral portal were then used to facilitate the arthroscopic debridement with 2.7-mm 30° short arthroscope, gravity irrigation system, and basic small arthroscopic instruments. Pus was immediately found; therefore, the joint was firstly irrigated with 3 L of normal saline before adequate visualization for the joint could be established. The medial joint line and the anterior cartilage were still intact. But lateral impingement and stiffness was found, as well as severe tissue inflammation and scar tissues. Release was then done, followed with irrigation using 6 L of normal saline and 160 mg of Gentamycin through the arthroscope (Fig. 2). Afterward, superficial surgical debridement was carried on the dehiscence tissues at both previous surgical scars.

Postoperatively, 1 g of intravenous ceftriaxone was administered every 8 h for 7 days, followed by 500 mg oral levofloxacin once daily for 2 months, because no organism growth was found from the microbiological culture. At 1-month postoperative follow up, she was pain-free and already able to walk with minimum stiffness at her left ankle. No recurrent wound, stiffness, nor pain was felt at 12-month postoperative follow up.

3. Clinical discussion

The management of IAFF requires comprehensive treatment strategy. Infection after fracture related infection was defined by Metsemakers [1]. The classification available for IAFF was based on the onset of the symptoms which divided into early (less than 2 weeks), delayed (2–10 weeks), and late onset (more than 10 weeks) infection. In this case, the patient's onset of symptoms could be categorized as early onset which presented with pain, local redness, local swelling, increased local

temperature, and delayed wound healing and fever. During this phase, the bacteria already formed a biofilm. *Staphylococcus aureus* is the most frequent causative agents in early infection phase. In early IAFF, consolidation can still be achieved despite the presence of an infection, as long as the osteosynthesis construct remains stable. If stability is not granted and the implant cannot be debrided properly, hardware exchange should be considered [1,2,4].

The aims of IAFF treatment are eradication of infection, soft tissue healing, prevention of chronic osteomyelitis, restore the function, and fracture consolidation [4]. Arthroscopy in IAFF has been found to be safe and effective. The conventional paradigm is to delay the release of joint stiffness when an uncontrolled infection in a synovial joint with relatively preserved cartilage is present [4,9].

In the present case, arthroscopic debridement and release were done in one stage because the debridement and irrigation were sufficient while the delay of the release would result in further pain and morbidity for the patient. With the implant retained and not being exposed, there would be no further disruption to the bone healing mechanism, and the risk of exposed implant due to soft tissue infection and breakdown is as well minimized. Also, there is low success rate in implant-exchange procedure in such infection [10]. Retention of the implant can be considered in early phase of IAFF by debridement of the implant on surgical site, stable osteosynthesis, and antibiotic therapy [11].

The most common pathogen in IAFF is gram positive, namely *Staphylococcus aureus*, *Staphylococcus epidermis* [12]. Therefore, the patient was treated with 1 g of intravenous ceftriaxone (Cefxon®), three times a day for one week followed by 500 mg of oral levofloxacin (Cravit®) once daily for 2 months in accordance with the antibiotic protocol in our hospital. Achilles tendinopathy or rupture was a well-established risk in fluoroquinolones administration, but with post-operative immediate mobilization of her ankle joint, such adverse outcome is not found in our patient until her final follow up at 1 year [13].

4. Conclusion

Arthroscopic debridement with simultaneous release of impingement and stiffness is a novel, safe, and promising option in the early time frame after fracture fixation to eliminate both IAFF and its further complications of the ankle region. Further studies are needed to firmly establish the procedure in broader clinical practice.

Provenance and peer review

Not commissioned, externally peer-reviewed.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Ethical approval

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Fig. 1. Anteroposterior and lateral radiological picture of the left ankle.

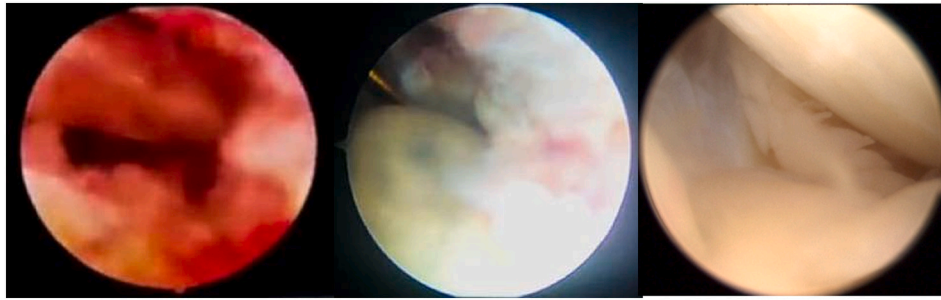


Fig. 2. Intraoperative picture during arthroscopic debridement and soft tissue release.

Authorship contribution

All authors were involved in drafting the article or revising it critically for content, and all authors approved the final version. I Gede Eka Wiratnaya, Hans Kristian Nugraha and I Wayan Subawa done the surgery. Analysis and interpretation of the case: I Gede Eka Wiratnaya, Hans Kristian Nugraha, I Ketut Siki Kawiyana, and Andrew Sutheno.

Declaration of competing interest

None.

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