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## Modified open arthroscopy in the treatment of septic arthritis of the hip

**Key words:** arthroscopy of the hip, open arthroscopy, septic arthritis of the hip

### SUMMARY

**Background.** The aim of the study was to present the results of fenestration arthroscopy in five patients with primary septic arthritis of the hip.

**Material and methods.** The mean follow-up period was 52 months. Gram staining and the leukocyte count of the preoperative joint fluid and the systemic CRP level were of particular importance in confirming the diagnosis. In all five cases, the causative germ was a gram-positive coccus. The operative procedure and postoperative treatment were the same. A mini-arthrotomy was performed through a modified Watson-Jones approach. Following fenestration of the anterior tense capsule, arthroscopic inspection of the joint took place with continuous irrigation.

**Results.** Postoperative recovery was rapid in all patients. The antibiotic treatment was continued for four weeks post-intervention. No complications occurred. At follow-up all patients were asymptomatic and had no restriction in the function of the affected hip.

**Conclusions.** Taking the discussed contraindications into account, fenestration arthroscopy represents a useful alternative to the established open procedure in septic arthritis of the hip. Important determinants of successful treatment are absence of involvement of the bone and cartilage and intervention as soon as possible.

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## BACKGROUND

Septic arthritis of the hip requires urgent joint decompression and eradication of the pathogenic germs. Diagnosis and surgical intervention must be done on an emergency basis because of the time-related destruction of the articular structures with subsequent osteomyelitis, septic dislocation, severe deformity and loss of function. Furthermore, mortality rates of up to 16% have been reported [1].

Adult patients with septic arthritis of the hip not related to a surgical hip procedure represent less than 0.00001% of total acute admissions [2]. The clinical signs can be occult and variable. The progress of the disease ultimately leads to inability to walk and holding the joint in abduction, flexion and external rotation. At the early stage of the septic arthritis plain radiographs show no bony abnormality [3]. Ultrasound scanning shows nonspecific intraarticular fluid. Preoperative aspiration of the joint fluid can confirm the diagnosis [4,5]. The time from onset of symptoms to diagnosis and operative treatment respectively ranges from about 24 hours to longer than 4 weeks [2,6,7].

Arthroscopic procedures in the treatment of pyarthrosis have been used successfully in the knee joint. Compared with open arthrotomy, equivalent treatment success was achieved in this region [8, 9] without the morbidity associated with open procedures [10]. However, the anatomical features of the hip joint make the use of arthroscopy more difficult. The problems result from the deep location of a highly constrained joint with a thick soft tissue envelope that encases many important local neurovascular structures. For these reasons, arthroscopic proce-

dures on the hip joint are usually performed only in centres specialising in this technique. In the past there were only few reports of arthroscopic treatment of septic arthritis of the hip [3, 4, 7, 11]. The patient numbers are small, from descriptions of single cases [3] up to a group of ten patients [7]. Elective arthroscopy of the hip joint proves to have few complications in experienced hands [7]. There is no detailed information about the complications of hip arthroscopy under emergency conditions, which include septic arthritis.

We report a modified treatment concept of fenestration arthroscopy and examine the extent to which maximum treatment success and maintenance of function can be achieved with reduced tissue trauma.

## MATERIAL AND METHODS

Between March 2000 and September 2002 five patients with primary septic arthritis of the hip were treated by fenestration arthroscopy (Table 1). Patients with secondary septic arthritis after previous invasive procedures on the hip, and implant related infections were not included in the study. There were four male and one female patient. The average age was 29.4 years (range 19-40 years). In all five patients only one joint was affected. Haematogenous infection after i.v. drug injection with concomitant hepatitis C can be assumed in two patients. In the other three patients without concomitant disease the genesis of the infection could not be determined with certainty. One patient had a known history of chronic maxillary sinusitis but this was not active at the time of hospitalisation.

Tab. 1. Summary of patients

Patient ID	Age (yr)	Sex	Duration of symptoms	preoperative laboratory tests		Culture result	Comorbidity
				CRP (mg/dl)	leukocyte count (/uL)		
1	19	M	1 week	3.0	<11.000	Staph. haemolyticus	(maxillary sinusitis)
2	34	M	about 24 h	39.1	13.800	Staph. aureus	Hepatitis C, i.v. drugs
3	40	F	2 days	12.7	11.600	Streptococcus intermedius	none
4	26	M	4 days	6.9	<11.000	Staph. aureus	Hepatitis C, i.v. drugs
5	28	M	3 days	15.7	12.400	Staph. aureus	none

Besides the physical and ultrasound examinations, the preoperative investigations in each patient consisted of radiography of the affected joint in two planes. The preoperative laboratory tests in each patient consisted of measurement of the CRP level and leukocyte count. Joint fluid was obtained from each patient preoperatively by aspiration under fluoroscopic control. In the aspirated joint fluid the leukocyte count was measured and gram staining was performed. Fenestration arthroscopy was indicated when the patient was symptomatic and there were systemic signs of infection, a raised leukocyte count in the joint fluid and absence of signs of bone destruction on diagnostic imaging. In all cases the operation was regarded as urgently indicated. Each patient underwent operative treatment within 6 hours after hospitalisation.

The operative procedure and postoperative treatment were uniform. The operations were always performed by one and the same surgeon from the septic department.

The patients were placed in a supine position on a fracture table. The anterolateral approach to the hip joint was selected. The incision was made just distal to the greater trochanter over a length of approx. 5 cm. After splitting the iliotibial tract, the junction of the gluteus medius and the vastus lateralis was exposed. The anterior joint capsule was approached by elevating the gluteal muscles. The arthroscopy was performed with the 5-mm 30° arthroscope after a short incision of the anterior capsule. The hip was positioned under traction in slight abduction and internal rotation. Joint fluid was removed for microbiological examination. The arthroscopy was carried out with 10 l of irrigation fluid. Local antibiotics were not used. Each operation was ended with insertion of a suction drain. The drain was removed 48 h after surgery.

Until the conclusion of wound healing and normalisation of the laboratory inflammation parameters, a first-generation cephalosporin was given by infusion. The antibiotic therapy was then continued per os with clindamycin. The antibiotic sensitivity was taken into account. The total duration of antibiotic treatment in each case amounted to 4 weeks post intervention.

On the first postoperative day, active and passive physiotherapy exercises commenced. For the affected limb, for two weeks postoperatively partial weight-bearing with the aid of forearm crutches was permitted.

Each patient had regular follow-up six weeks, six and twelve months after discharge from hospital. The final follow-up examinations took place in October or November 2005. The patients were followed up for a mean of 52 months (range 37-69 months).

## RESULTS

The time from onset of symptoms to presentation in our clinic ranged in our patients from about 24 h to 7 days. Four of the five patients were referred to us from other hospitals.

At the time of admission all patients had painful limitation of motion of the affected hip in all directions. Two patients were unable to walk because of their symptoms. Local clinical signs of inflammation in the form of erythema or increased heat in the region of the hip were not observed in any patient.

At the time of admission the CRP was 15.5 mg/dl on average, ranging from 3 mg/dl to 39.1 mg/dl. The white cell count was elevated at 11.160 /uL on average, ranging from 9.000 /uL to 13.800 /uL. The mean body temperature was raised in only two patients to 38.2° and 38.6° respectively. Two of the five patients had previously been treated with clindamycin by the referring institution. These two patients had normal white cell counts and an increased CRP of < 10 mg/dl (3 mg/dl and 6.9 mg/dl respectively). The three remaining patients who had not received prior antibiotics had an increased CRP of > 10 mg/dl and a raised leucocyte count of > 11.000 /uL. The leukocyte count of the joint fluid aspirated preoperatively was > 30.000 /uL in each patient and the result of gram staining showed gram-positive cocci in every case. The intraoperative joint fluid culture yielded a positive result with identification of the germ in each patient. In all the infections the causative germs were gram-positive cocci. Four cases were due to infection with a staphylococcus (3 cases of *Staph. aureus* and one of *Staph. haemolyticus*), and one case to *Streptococcus intermedius* (*viridans*) infection.

In all five patients the native radiographic investigation of the hip joint in two planes was entirely normal. No signs of arthritis were evident. In all patients, intra-articular fluid was found on ultrasound examination.

The operation lasted an average of 54 minutes (range 42-62 min). Sufficient visualization was obtained in all cases. Two patients presented a macroscopic stage III infection at the time of surgery, while three patients were treated at stage II infection according to Gächter's classification [12] (Table 2). We saw no case of chondrolysis or bone erosion. Where there were adhesions dividing the joint into separate pouches, the arthroscopic technique was able to eliminate these separate spaces. No intra- or postoperative complications occurred in our series. No patient needed a blood transfusion. Postoperative recovery was rapid in all patients. The patients were discharged from hospital to ambulant treatment after

Tab. 2. Macroscopic stages of septic arthritis according to Gächter [12]

Stage	Macroscopic findings
I	cloudy effusion, synovial hyperaemia
II	purulent fluid, hypertrophy of synovial tissue
III	villous synovitis, adhesions
IV	chondrolysis, bony erosion

an average of 16.4 days (range: 12-22). At the time of discharge, the leucocyte count and CRP level were normal in each patient. All the patients reported regression of the pain.

From the time of follow-up six months after the operation onwards and also in the following period, all patients had a completely normal ROM of the affected hip. No patient had radiological signs of arthritis at the time of follow-up. All of the patients were entirely asymptomatic. All of the patients were subjectively satisfied with the treatment. None of the patients required further procedures on the hip during follow-up.

## DISCUSSION

Fenestration arthroscopy proved among our patients to be an effective method in the treatment of primary septic arthritis of the hip joint. The early postoperative course was characterised by a complication-free rapid recovery, and in the medium term of over four years, preservation of function of the affected joint was guaranteed. A major advantage of fenestration arthroscopy is its simplicity. The anterolateral approach to the hip joint is extremely common. Rapid and safe decompression of the joint is achieved by opening the capsule. The joint fluid is removed without dilutional effects and sent for bacteriological examination. Adequate visualisation and debridement of the decompressed joint are possible using irrigation fluid. Compared to conventional arthroscopy, the pressure produced in the tissues is lower with the described procedure and spread of the germs into the adjacent tissue is not promoted. The invasiveness of the joint exposure is reduced compared with the well-established open arthrotomy [4, 13]. Fenestration of the joint capsule does not destabilise the integrity of the soft tissues, which counteracts dislocation of the affected joint. Nevertheless, conversion to the classical open procedure is readily possible if necessary. The procedure can also be employed in centres not specialised in hip arthroscopy. Patients can be treated adequately without the necessity of delaying therapy by transfer to a centre.

However, foregoing open arthrotomy in favour of the arthroscopic component is bound up with a few preconditions. We regard spread of the infection beyond the synovial matrix as a contraindication to the arthroscopic procedure. If the bone and/or cartilage structures are involved in the destructive process, as in Gächter stage IV [12], conversion to the open procedure with full radical elimination of the infectious focus is required. In these cases, we regard primary resection arthroplasty and secondary joint replacement as indicated.

The duration of the disease represents another requirement. Chronic infections or acute infections not identified for prolonged periods do not appear to be amenable to the arthroscopic procedure [4,14]. Blitzer attributes the failure of treatment in his study to the late time of diagnosis [4]. In contrast, Kim et al. obtained outstanding treatment results with arthroscopic therapy in all ten patients whose duration of symptoms before surgery was a maximum of five days [7].

Confirmation of the diagnosis of septic arthritis of the hip can be difficult. Two uncharacteristic quantities proved to be present constantly in our patients: the pain in the affected hip and the raised CRP (c-reactive protein). The significance of the CRP in the early diagnosis of joint infections has been pointed out repeatedly in the literature [15,16]. The leukocyte count can also act as a signpost but did not assist in the diagnosis in two of our patients. In these two patients, antibiotic therapy had already been commenced by the referring institution. Plain radiographs of the hip did not yield any specific findings in our study. Aspiration of the affected joint to obtain joint fluid provides a simple method for confirming the diagnosis. The purulent appearance of the fluid and also gram staining can deliver initial valuable information. The leukocyte count in the aspirate is able to differentiate between inflammation and a joint infection [5]. Leukocyte counts of over 30.000 / $\mu$ l in the joint fluid are characteristic of infection [5]. An MRI scan can underpin the suspicion of septic arthritis but should not delay operative intervention.

## CONCLUSIONS

1. Taking the discussed contraindications into account, fenestration arthroscopy represents a useful alternative to the established open procedure in septic arthritis of the hip.
2. Important determinants of successful treatment are absence of involvement of the bone and cartilage and intervention as soon as possible.

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