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Total hip arthroplasty following illicit drug abuse

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Abstract

Background The role of illicit drug abuse in total joint arthroplasty is largely unknown and is likely underestimated. Patients with drug addictions often suffer from septic osteoarthritis or a necrosis of the femoral head. Purpose of the study was to evaluate the operative management and clinical outcome of total hip replacement in patients with a history of intravenous drug abuse.

Methods This retrospective study included 15 patients with a history of intravenous drug abuse who underwent total hip arthroplasty. A total of 6 females and 9 males with an average age of 34.3 years were identified. Ten patients presented an acute bacterial coxitis (Coxitis-group) and five an aseptic osteonecrosis of the femoral head (Osteonecrosis-group).

Results Ten patients with a bacterial coxitis underwent a two-staged total hip arthroplasty (THA), with temporary insertion of a drug-eluting spacer. Five patients with a necrosis of the femoral head were primarily treated with THA. All patients developed multiple re-infections after insertion of a drug-eluting spacer or THA. Only two patients finally achieved a THA without infection in the period of 3.9 years follow-up. The other 13 patients underwent a Girdlestone arthroplasty (7 patients) or total joint replacement with a chronic fistula (6 patients).

Conclusion THA in patients with illicit drug abuse shows a low success rate. Following septic osteoarthritis or osteonecrosis in drug-addicted patients, we recommend a two-stage procedure with temporary insertion of a drug-eluting spacer. THA might follow only under strict premises.

Keywords Total hip arthroplasty · Illicit drug abuse · Intravenous drug abuse · Periprosthetic joint infection · Septic osteoarthritis · Girdlestone arthroplasty

Introduction

The role of illicit drug abuse in total joint arthroplasty is largely unknown and underestimated. With a prevalence of 2.5/1000 in Europe, there are approximately 1 million drug-addicted patients with active intravenous abuse [8].

In addition to life-threatening diseases, such as necrotizing fasciitis or acute drug intoxication, many patients suffer from acute or chronic infections of the weight bearing joints (Fig. 1) [10, 17, 18]. Septic osteoarthritis of the hip joint can be caused by acute or chronic bacteremia or it can result from a direct transmission originating from an inguinal abscess or from an intra-articular misguided injection [9, 12]. The treatment consists of stage-adjusted surgical procedures and calculated systemic antibiotic therapy [13]. Besides arthroscopic and minimal invasive debridement, early open revision to preserve the joint integrity, is recommended [41].

Besides the septic osteoarthritis, many drug-addicted patients often suffer from a necrosis of the femoral head which can result from a bacterial infection or an antiviral therapy [9].

The total hip arthroplasty (THA) is a highly effective intervention for addressing pain and functional deficits in these patients with progressive osteoarthritis [1, 2, 19]. The success and outcome are significantly dependent on the health status of the patient and associated risk factors.

The number of patients with the history of illicit drug abuse that received a THA is mostly unknown. Because of several well-known concomitant diseases associated with

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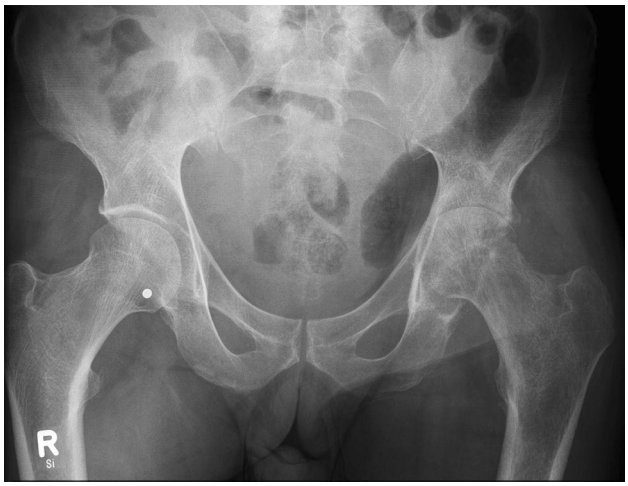

Fig. 1 Image of an acute infection of the left hip joint. A nearly vanished joint space without other radiographic findings for osteoarthritis as osteophytes or sclerosis

intravenous drug abuse and an estimated low compliance, a THA in these patients is supposed to be risky with an assumed high rate of failure and complications.

Purpose of the study was to evaluate the operative management, complications and clinical outcome of patients with an illicit intravenous drug abuse that underwent total hip arthroplasty.

Methods

This retrospective study was performed among all patients who were diagnosed with septic osteoarthritis of the hip or femoral head necrosis and admitted to the hospital during 2000 to 2014. Only patients with a history of intravenous drug abuse were included. All clinical records and radiographic data were retrospectively evaluated. Out of a total of 15 identified patients 6 (40.0%) were female and 9 (60.0%) male. The patients were subdivided into two groups. Ten (66.7%) patients presented an auto-injection-related acute bacterial coxitis with an acute empyema of the hip (Coxitis-group) and five (33.3%) patients had an aseptic osteonecrosis of the femoral head (Osteonecrosis-group). Those five patients were admitted to the hospital because of progressive pain and a loss of function of the hip joint.

Demographic data and intravenous drug abuse history were determined.

All patients showed associated chronic viral infections such as HIV (1 patient) and chronic Hepatitis C (15 patients). Other comorbidities were diabetes mellitus (1 patient) and spondylodiscitis (1 patient). Initial operative treatment and antibiotic therapy were evaluated.

Five microbiologic soft tissue biopsies were taken within every operative procedure. An infection was defined by one positive microbiological culture by cannulation or soft tissue biopsy. We further analyzed the time point of THA and differentiated staged procedures with temporary insertion of a drug-eluting cemented spacer, from primary treatment with THA. If staged procedure was performed, we chose a drug-eluting spacer coated with gentamycin and vancomycin. Cannulation of the hip joint was performed in every patient at the time of initial admission as well as previously to the scheduled total hip arthroplasty. THA only followed if cannulation and blood samples showed no evidence for an ongoing infection after 14 days of microbiologic culturing. If a two-staged procedure was proposed, cannulation of the hip was performed at least 2 weeks before scheduled THA. The antibiotic therapy was stopped at least 2 weeks before the cannulation. If an ongoing infection was present, exchange of the drug eluted cemented spacer followed. A definitive Girdlestone arthroplasty was anticipated as a salvage procedure for patients with an ongoing not treatable infection. Patients were followed on a regular basis with clinical and radiographic examinations as well as laboratory tests for infections in our department. All patients with staged procedure received an antibiotic therapy adapted to their bacterial resistance profile adapted to their initial microbiologic findings for at least 6 weeks following the insertion of a spacer or total hip arthroplasty.

We evaluated complications such as operative revision and reinfection rates as well as clinical outcomes and compliance for patients who received a THA primarily and after staged procedures to determine the success rate of THA in patients with intravenous drug abuse.

Results

The mean age of the included patients was 34.3 years (range: 27–43 years). The patients had a mean intravenous drug history of 4–22 years (average: 7.6 years). Nine patients had a drug substitution treatment with methadone. Average follow-up was 3.9 years (range 1–10 years).

The Coxitis-group consists of 10 patients with an acute bacterial infection of the hip joint (Table 1). Within this group the preoperatively cannulation of the hip joint showed in 7 cases a bacterial contamination, but all of the soft tissue biopsies identified the responsible pathogen. All patients in this group were treated with a resection of the femoral head and insertion of a drug-eluting cemented spacer with the aim of performing a total hip arthroplasty after eradication of the infection.

All patients received a calculated long-term systemic antibiotic therapy for average of 7 weeks (range 6–10) after initial resection arthroplasty.

Table 1 Patients with an acute infection of the hip joint (Coxitis-group)

No.	Gender	Age	Initial treatment	Pathogen	Number of operations	Concomitant disease	Outcome
1	Female	33	Spacer	MRSA	7	HIV, HCV	THA without infection
2	Male	38	Spacer	Staph. aureus	3	HCV, spondylodiscitis	Girdlestone arthroplasty
3	Female	27	Spacer	MRSA	9	HCV, diabetes	Girdlestone arthroplasty
4	Female	38	Spacer	MRSA	5	HCV	THA with fistula
5	Male	43	Spacer	Staph. aureus	3	HCV	THA without infection
6	Male	31	Spacer	Staph. aureus	5	HCV	THA with fistula
7	Male	32	Spacer	Staph. aureus	4	HCV	THA with fistula
8	Female	36	Spacer	Staph. aureus	4	HCV	Girdlestone arthroplasty
9	Male	39	Spacer	Enterobacteriaceae	3	HCV	THA with fistula
10	Female	33	Spacer	MRSA	4	HCV	Girdlestone arthroplasty

Staph aureus Staphylococcus aureus, HCV hepatitis C, *THA* total hip arthroplasty

THA only followed if the cannulation of the hip joint and the clinical examination showed no evidence for an ongoing infection after a minimum time interval of at least 6 weeks following the resection of the femoral head. If the preoperative puncture of the hip joint detected a bacterial contamination, a subsequent surgical debridement with exchange of the spacer was performed. Every patient needed at least one exchange before implantation of a THA due to an ongoing infection detected by cannulation.

All patients in the Coxitis-group received a THA after an average of 2 spacer-exchanges. The mean duration from the first insertion of a cemented spacer to THA was 17 weeks (range 14–29 weeks). As THA was performed the cannulation as well as the soft tissue biopsies showed no evidence for an ongoing infection. Eight of them had an infection of the THA within 12 weeks after its implementation. The postoperative infection was diagnosed by clinical findings and purulent cannulation. Surgical treatment immediately followed. In the case of reinfection, the pathogen was identified only within soft tissue biopsy.

On final follow-up two (20%) patients had a THA without evidence of ongoing infection, four (40%) patients had a THA with a chronic fistula and in four patients (40%) a Girdlestone arthroplasty was performed for definitive treatment (Table 1).

The Osteonecrosis-group consists of 5 patients with initially aseptic osteonecrosis of the femoral head. All five patients denied an ongoing intravenous drug abuse at the time of admission to the hospital. Of these five patients who were primarily treated with THA, four showed a bacterial contamination detected within their intra-operatively taken soft tissue biopsy, even though preoperative cannulation of the hip showed no evidence for an infection. An appropriate long-term antibiotic therapy (estimated 6 weeks) was initiated in these four patients. All 5 patients primarily treated with a total hip arthroplasty developed a postoperative deep infection after an average time of 14 weeks (range 4–25 weeks) postoperatively and immediately underwent surgical treatment. In all cases an explantation of the prosthesis was performed, and a drug-eluting cemented spacer was inserted.

These patients required a mean of 3 (range 2–4) operative revisions with exchange of the spacer and wound irrigation and debridement. On final follow-up, two patients had a THA with a chronic fistula and in three a Girdlestone arthroplasty was performed for definitive treatment (Table 2).

Besides the surgical complications, every patient in our study had an ongoing illicit drug abuse despite substitution

Table 2 Patients with an osteonecrosis of the hip joint (Osteonecrosis-group)

No.	Gender	Age	Initial treatment	Subsequently identified pathogen	Number of revision surgery operations	Concomitant disease	Outcome
11	Male	32	THA	Staph. aureus	3	HCV	THA with fistula
12	Male	27	THA	Staph. aureus	4	HCV	Girdlestone arthroplasty
13	Female	36	THA	Streptococcus	4	HCV	Girdlestone arthroplasty
14	Male	31	THA	Staph. aureus	4	HCV	Girdlestone arthroplasty
15	Male	38	THA	None identified	3	HCV	THA with fistula

Staph aureus Staphylococcus aureus, HCV hepatitis C, *THA* total hip arthroplasty

treatment with methadone and showed a low compliance with follow-up, although every patient denied an illicit drug abuse at the time of THA.

Discussion

Illicit intravenous drug abuse is an increasing problem for society and the healthcare system in western countries. Young people are especially addicted and suffer from social decline and associated diseases, such as chronic viral infections, and a suppressed immune system [16]. Infections of the weight-bearing joints, especially the hip joints, are common complications of a long-term intravenous drug abuse.

Total hip arthroplasty (THA) is the best procedure for redressing pain following septic or aseptic osteonecrosis of the hip joint; but the outcome of THA in patients with an illicit drug abuse is largely unknown and unattended [19].

In our study population a total of 15 patients with a history of illicit drug abuse, were treated with THA after an acute coxitis or femoral head necrosis. Treatment was performed primarily or staged depending on the evidence of the infection in each patient. All patients had undergone multiple operative revisions. After an average follow-up of 3.9 years only two patients still had their THA and showed no signs for an infection.

The high rate of periprosthetic infections and the poor outcome is supposed to be the result of an ongoing drug abuse and the self-induced bacteremia which is the main challenge following THA in drug-addicted patients [6, 20–22]. Every patient in our study had an ongoing drug abuse despite drug substitution treatment with methadone [34]. It is obvious that perfect compliance is essential for good functional rehabilitation and satisfactory mobility [30, 33]. The treatment of hip joint infections in patients with drug addiction is difficult and should be carefully considered to reduce the failure rate following total joint arthroplasty [11, 29]. Patients with an acute infection must undergo surgery as soon as possible. Puncturing the joint to isolate a pathogen only results in the passage of more time, and in the majority of cases, identification of the responsible bacteria in the examined joint fluid is often not possible [36, 42]. Radical debridement is the only effective option. In these cases, minimally invasive strategies are ineffective. The most commonly recommended treatment option of a periprosthetic infection or a septic osteoarthritis is a two-staged procedure with resection of the femoral head or exchange of the prosthesis with the temporary implementation of a drug-eluting cemented spacer followed by a antibiotic therapy (Fig. 2) [23, 24]. Patients who lack risk factors benefit from a short period of antibiotic therapy, usually 2 weeks, before re-implementation of a total joint arthroplasty [39]; whereas, patients with risk factors and highly resistant pathogens are

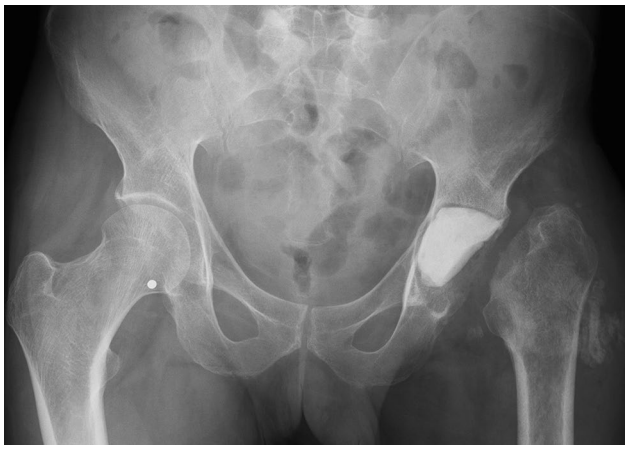

Fig. 2 Status after resection of the femoral head and insertion of a drug-eluting spacer

recommended to undergo a sequence of 6–8 weeks of antibiotic therapy [43]. The success and outcome are significantly dependent on the health status and associated risk factors [5, 7, 25]. Most studies regarding periprosthetic joint infections have used poor study designs, included a low number of cases and cannot be compared because the health status of the included patients was not adequately considered [26].

Therefore, the incidence and outcome vary depending on the particular study. Overall, eradication of a hip joint infection is achievable with a two-stage surgical procedure, which has a good clinical outcome in patients without risk factors or an ongoing drug abuse as in the examined study group [27, 35].

Because of the poor outcome in our study and the high rate of an intra-operative positive bacterial contamination in the soft tissue biopsies, we recommend a two-staged procedure in patients with an alleged aseptic osteoarthritis and history of illicit drug abuse anyway. Because of a lack of preoperative pathogen identification and resistogram data, we advise the insertion of a drug-eluting spacer coated with gentamycin and vancomycin to address multi-resistant *S. aureus* species, followed by an antibiotic therapy that covers the most common Gram-positive and Gram-negative pathogens [14, 28, 37, 38]. After sanitation of the joint infection, the next surgical procedure should be considered carefully because of the high failure rate as shown in our study. Patients with drug addictions have a low appreciation for their physical and mental health status [31], and the mentioned required preconditions for successful THA are not preexisting [32].

The limitation of the study is the low number of patients, but the previous results in patients with illicit drug abuse are clear and obvious. In the literature there is another study from the year 2012 dealing with a similar topic [11]. This study showed a high failure rate under 27 patients with a

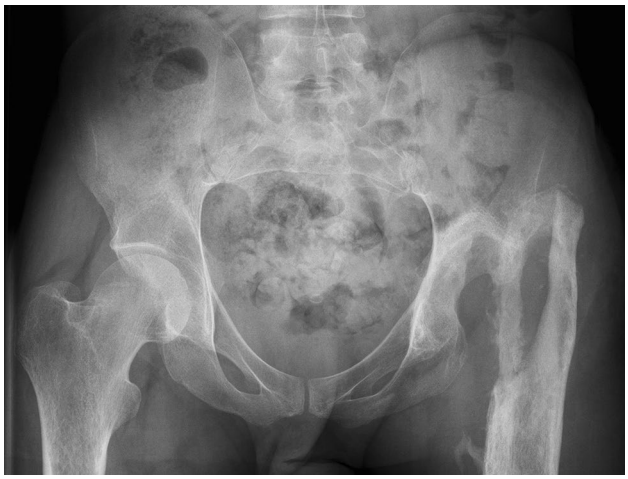

Fig. 3 Girdlestone arthroplasty of the left hip joint following septic osteoarthritis

history of illicit drug abuse that underwent THA due to an aseptic osteoarthritis. The 5- and 10-year implant survival rates with failure for septic reasons was up to 70.6% and confirms the results of our study. As a conclusion we suggest a total joint arthroplasty only under strict premises, including absolute sobriety from any drugs and a re-integration into social life to increase compliance [40].

In any other patients, a definitive Girdlestone resection, i.e., the permanent resection of the hip joint without any replacement, can be used as a salvage procedure to minimize the risk of re-infection and the associated mortality of any subsequent surgical procedures (Fig. 3) [15].

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