



Arthroplasty in patients with rare conditions

Hip arthroplasty for osteonecrosis of the femoral head secondary to alcohol abuse

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ABSTRACT

Although the challenges of hip arthroplasty for avascular necrosis (AVN) are known, limited data exist to describe patient demographics and outcomes in the setting of AVN attributed to alcoholism. We retrospectively identified 43 patients (62 hips) who underwent primary hip arthroplasty between 1999 and 2016 for a diagnosis of AVN of the femoral head with a concomitant diagnosis of alcohol abuse and minimum follow-up of 2 years (mean, 8.6 years). The mean age was 51 years, predominantly male (88%), with a high rate of comorbidities. History of cigarette smoking was prevalent (65%). Mean length of stay was 5.3 days, which is prolonged due to a high prevalence of acute postoperative alcohol withdrawal (14.5% of cases). There were 5 early (≤ 2 years) reoperations (8% of hips) for instability, periprosthetic acetabular fracture and component loosening, heterotopic ossification, superficial infection, and acute periprosthetic infection. There were no additional radiographic failures. The mean postoperative Hip dysfunction and Osteoarthritis Outcome Score for Joint Replacement was 97.8 ± 7.8 , indicative of excellent outcomes at final follow-up of 2 to 18 years. Early risks associated with hip replacement surgery must be communicated to the predominantly young male subgroup of patients with AVN attributed to alcoholism, but these patients may achieve excellent mid- to long-term outcomes.

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Introduction

Although the most common indication for hip arthroplasty is a diagnosis of osteoarthritis, approximately 5%–18% are performed in the setting of avascular necrosis (AVN) of the femoral head, whereas joint sparing procedures are becoming less common [1–3]. AVN can be idiopathic in nature or attributed to a number of potential etiologies, including alcohol abuse, steroid use, organ transplant, autoimmune disease, sickle cell disease, systemic lupus erythematosus, irradiation, and hematologic diseases (leukemia, lymphoma). In the United States, there is an incidence of 20,000 cases per year [4].

Considering the various etiologies of AVN, patients undergoing hip arthroplasty are often medically challenging despite being relatively young with reported mean ages of 37 to 45 years [1,5–7]. Most studies report on hip arthroplasty for all-cause AVN and have

found increased rates of infection, myocardial infarction, mortality, blood transfusion, readmission, revision, and prolonged hospital stays [1,8–11]. However, few studies have evaluated the subset of patients with AVN secondary to excessive alcohol use. Alcohol abuse is one of the most common risk factors for atraumatic AVN in patients younger than 40 years of age, particularly males [1,12]. Yuan et al. [13] reported that 7 of 24 total hips (29.2%) in the setting of alcohol-induced AVN were revised at a mean 6.7 years with 10-year implant survivorship free of revision of 64%.

Although there is an abundance of literature on hip arthroplasty in the setting of AVN, limited data exist to describe the subgroup of patients with AVN attributed to excessive alcohol use. The aim of this study was to report the patient demographics and outcomes of hip arthroplasty in patients with AVN of the femoral head in the setting of excessive alcohol use.

Case series

The present study, which was performed with institutional review board approval, is a retrospective case series of 43 patients (62 hips)

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Table 1
Patient demographics.

Demographics	Values
Patients	43 (62 hips)
Age, y \pm SD (range)	51.2 \pm 12.3 (26–81)
Male, n (%)	38 (88.4)
BMI, kg/m ² \pm SD (range)	28.5 \pm 5.1 (16.8–39.5)
Right, n (%)	33 (53.2)
Bilateral simultaneous, n (%)	9 (20.9)
CCI, mean \pm SD	2.4 \pm 2.7
Positive smoking history	28 (65.1)

BMI, body mass index; SD, standard deviation; CCI, Charlson Comorbidity Index.

who underwent primary hip arthroplasty (total hip arthroplasty [THA], n = 60; hip resurfacing arthroplasty, n = 2) between 1999 and 2016 for a diagnosis of AVN of the femoral head with a concomitant diagnosis of alcohol abuse. Inclusion required a minimum of 2-year follow-up. Patients were identified through our institutional hip arthroplasty database and by diagnostic codes, including The International Classification of Diseases, Ninth Revision codes for AVN (733.42) and alcohol abuse diagnoses (291.0, 291.4, 291.81, 303.00, 303.01, 303.02, 303.03, 303.9, 303.90, 303.91, 303.92, 303.93, 305.0, 305.00, 305.01, 305.02, and 305.03). Alcohol abuse at the time of surgery was confirmed by chart review through the history provided by the patient for inclusion in the study. Hip arthroplasty was performed by 19 surgeons, all using a posterior approach, with the exception of 3 cases that used a direct anterior approach. Cement was used on the femoral side in 18 cases.

Demographic data were collected by chart review, including age, sex, body mass index, comorbidities, and cigarette smoking status. Operative notes and in-hospital progress notes were reviewed to extract length of stay (LOS), deep vein thrombosis prophylaxis, blood transfusion status, and in-hospital complications. In-hospital complications identified included systemic and local complications such as fever, alcohol withdrawal requiring treatment (presenting as anxiety, tachycardia, tremors, delirium), symptomatic acute blood loss anemia requiring blood transfusion, COPD exacerbation, abnormal metabolic laboratory values requiring treatment (hypokalemia or hyponatremia), wound drainage, and dislocation. Reoperations were also recorded. Immediate postoperative and final follow-up radiographs were reviewed to identify any interval change consistent with mechanical complication of the implants. In January 2018, patients were contacted by telephone to obtain Hip dysfunction and Osteoarthritis Outcome Score for Joint Replacement (HOOS, JR.), patient-reported outcomes, and revision surgery status. Follow-up duration was an average of 8.6 \pm 5.0 years (range, 2–18.4 years).

Demographic data are summarized in Table 1. The mean age of our cohort was 51.2 \pm 12.3 years, and patients were predominantly male (88.4%). Despite being relatively young, there was a high rate of comorbidities (mean Charlson Comorbidity Index 2.4 \pm 2.7). Current or prior history of cigarette smoking was also prevalent (n = 28, 65.1%). Mean LOS after surgery was 5.3 \pm 3.0 days (2–16 days), which is often prolonged because of acute alcohol withdrawal in 14.5% of cases (n = 9).

Outcome measures are summarized in Table 2. In-hospital systemic complications included alcohol withdrawal requiring treatment (9 cases, 14.5%), fever (6 patients, 14%), hyponatremia (3 patients, 4.8%), symptomatic acute blood loss anemia requiring blood transfusion (3 patients, 7%), hypokalemia (1 patient, 1.6%), and COPD exacerbation (1 patient, 1.6%). In-hospital local complications included wound drainage (16 hips, 25.8%) and dislocation (1 hip, 1.6%). The dislocation occurred on postoperative day 5 and was revised to a constrained liner during the same hospital stay. There were no mortalities.

Five hips (8.1%) required reoperations, all early (\leq 2 years), for the following indications: (1) dislocation (5 days postoperatively),

Table 2
Outcomes.

Outcomes	Values
LOS, d \pm SD (range)	5.3 \pm 3.0 (2–16)
Alcohol withdrawal, n (%)	9 (14.5)
Wound drainage, n (%)	16 (25.8)
Infection, n (%)	2 (3.2)
Dislocation, n (%)	1 (1.6)
Reoperation, n (%)	5 (8.1)
Revision, n (%)	2 (3.2)
Early discontinuation of office follow-up, n (%)	18 (41.9)
Postoperative HOOS, JR., mean \pm SD (range)	97.8 \pm 7.8 (64.7–100)

(2) periprosthetic acetabular fracture secondary to fall (1 year), (3) heterotopic ossification (2 years), (4) superficial infection (6 months), and (5) acute periprosthetic infection (2.5 weeks). Two of these hips (3.2% of cohort) required revision of implants. The case of instability was revised to a constrained liner. The case of periprosthetic acetabular fracture resulted in component loosening and migration and was revised to a cup-cage construct. The infections were managed with irrigation and debridement. There were no additional radiographic failures at last follow-up.

Eighteen of 43 patients (41.9%) did not return to the office for follow-up at 1 year or beyond. However, 39 of 43 patients (90.7%) were contacted in January 2018 to obtain postoperative HOOS, JR., patient-reported outcomes and revision surgery status at final follow-up of 2 to 18 years. The mean postoperative HOOS, JR. score was 97.8 \pm 7.8. Three patients did not achieve a score of 100 points. The 1 patient with a poor outcome (HOOS, JR., 64.7) was aged 93 years and reported extreme bilateral hip pain 11 years after bilateral THA. No additional revision surgeries were reported.

Discussion

Although there is an abundance of literature on hip arthroplasty in the setting of AVN, limited data exist to describe the subgroup of patients with AVN attributed to excessive alcohol use. The aim of this study was to report the patient demographics and outcomes of hip arthroplasty in patients with AVN of the femoral head in the setting of excessive alcohol use. We found that hip arthroplasty for alcohol-induced AVN predominantly affects a relatively young, male population and is associated with a high rate of comorbidities, concomitant positive smoking history, and poor clinic follow-up. There was a high rate of alcohol withdrawal during the acute phase of recovery and an 8% rate of early (\leq 2 years) reoperation. Patient-reported outcomes at final follow-up were excellent.

In the United States, the incidence of alcohol abuse approaches 5%, and screen-positive alcohol dependence among patients indicated for surgery is approximately 23% [14]. Patients who consume alcohol on a frequent basis may have a significantly increased risk for postoperative complications after arthroplasty [15]. Using the Alcohol Use Disorders Identification Test–Consumption questionnaire on 9176 male United States veterans who underwent major noncardiac surgery, Bradley et al. [16] determined that the incidence of SSI and other postoperative infections was significantly associated with excessive alcohol use. Our cohort included 25.8% with in-hospital wound drainage, and 2 patients were diagnosed with infection. Alcohol abuse is also associated with an increased risk of postoperative complications including delirium, cognitive decline, pneumonia, and death [15–19]. Yu et al. [20] reported a 46% incidence of acute postoperative substance withdrawal delirium and psychosis after THA in a small cohort. The present study is the first to examine the prevalence of alcohol withdrawal symptoms in patients with AVN attributed to alcohol abuse (14.5%). A large

database study reported that alcohol misusers were 9 times more likely to leave against medical advice, had longer hospital stays, and had higher odds of complications after total knee and hip arthroplasty [17]. We also found a high rate of prolonged LOS related to treatment of alcohol withdrawal and a high rate of early discontinuation of clinic follow-up (<1 year). Yuan et al. [13] reported that 7 of 24 total hips (29.2%) in the setting of alcohol-induced AVN were revised at a mean 6.7 years with 10-year implant survivorship free of revision of 64%. Johannson et al. [7] stratified THA revision rates by AVN-associated diagnoses and found higher revision rates only in sickle cell disease, Gaucher disease, and renal failure and/or transplant patients. Revision rates of THA for AVN performed in more recent years were similar to those for all hips in national joint registries compared with that of arthroplasty performed before 1990 [7]. The authors concluded that AVN itself, or when associated with common diagnoses including alcohol abuse, is not associated with poor THA outcomes [7]. In our cohort, only 2 patients underwent revision surgery, and patient-reported outcomes were excellent at final follow-up of 2 to 18 years. Although early perioperative risks are undoubtedly elevated in this patient population and are a cause for concern, a good final outcome can be achieved.

The preoperative period serves as an opportunity to identify patients who abuse alcohol. Yu et al. [20] suggested that because patients with substance abuse disorders had unexpected perioperative psychotic episodes, poor compliance, a tendency not to follow medical advice after surgery, and showed early discontinuation of follow-up, surgeons should be cautious when performing THA in such patients. Reduction of postoperative morbidity in alcohol abusers may include preoperative alcohol abstinence to improve organ function, immune suppression, and the exaggerated response to surgical stress or perioperative alcohol administration to avoid the abstinence response [19]. The efficacy and optimal period of cessation of alcohol consumption is unknown for arthroplasty patients, but at least 4 weeks of abstinence may be necessary to reverse physiologic abnormalities that place patients at increased risk of postoperative morbidity [18,19]. It may be prudent to delay elective arthroplasty in alcoholic patients until alcohol consumption has been reduced. However, in alcohol-dependent patients with AVN in whom THA is indicated for severe physical disability, this may not be realistic. These patients are likely to benefit from multimodal intervention with a focus on early rehabilitation and discharge to home. The unique risks in this otherwise young patient population must be discussed at length. Concomitant modifiable risk factors such as cigarette smoking and malnutrition should also be addressed.

This study is limited by its design as a small case series with no comparative group. It is however valuable to isolate this patient population as most studies address all-cause AVN. Importantly, we highlight specific concerns for this patient population during the early postoperative course after hip replacement surgery. Further studies are necessary to elucidate the optimal perioperative protocols to minimize early risks of surgery. Despite this, at final follow-up, patient-reported outcome scores were excellent. This outcome measure is limited by the lack of preoperative scores for comparison. In addition, although telephone follow-up has been shown to be valuable in general [21], this specific population may be susceptible to confabulation, and their high scores need to be validated. In the setting of telephone-administered patient-reported outcomes due to poor follow-up, it may be appropriate to administer a confabulation instrument [22].

Current controversies and future considerations

In conclusion, the subgroup of patients with AVN attributed to alcoholism is relatively young, predominantly male, carries a high

rate of comorbidities and concomitant smoking history, and demonstrates poor follow-up. Suggestions to avoid hip arthroplasty or require cessation of alcohol consumption in this population when surgery is indicated for severe physical disability may not be realistic. However, it is ethical and appropriate to discuss alcohol use and offer recovery services and consultation preoperatively. We support the use of institutional perioperative protocols that are designed for early identification and treatment of alcohol withdrawal. Future study should evaluate such protocols to determine their efficacy in mitigating risk for early complications in the alcoholic arthroplasty population. Fast-track recovery pathways may also promote early discharge to home and decreased rates of alcohol withdrawal. Our cohort had a high prevalence of complications, particularly alcohol withdrawal in the acute phase of recovery after hip replacement surgery and an 8% rate of early reoperation. Early risks associated with hip replacement surgery must be communicated to patients with AVN attributed to alcoholism, but these patients may achieve excellent mid- to long-term outcomes.

Summary

Early risks associated with hip replacement surgery must be communicated to the predominantly young male subgroup of patients with AVN attributed to alcoholism, but these patients may ultimately achieve excellent mid- to long-term outcomes. It is appropriate to discuss alcohol use and offer recovery services and consultation preoperatively, and to optimize modifiable risk factors. Poor clinical follow-up may be expected in this population, so further studies are indicated to confirm our findings.

KEY POINTS

- The subgroup of patients with AVN attributed to alcoholism is relatively young, predominantly male, carries a high rate of comorbidities and concomitant smoking history, and demonstrates poor clinic follow-up.
- It is appropriate to discuss alcohol use and offer recovery services and consultation preoperatively.
- Alcohol abuse is associated with an increased risk of postoperative complications including delirium, cognitive decline, pneumonia, and death [15-19]. Our cohort demonstrated a high prevalence of postoperative alcohol withdrawal in the acute phase of recovery (14.5% of cases).
- Johannson et al. [7] found that revision rates of THA for AVN performed in more recent years were similar to those for all hips in national joint registries compared to arthroplasty performed before 1990. The authors concluded that AVN itself, or when associated with common diagnoses including alcohol abuse, is not associated with poor THA outcomes [7]. All reoperations in our cohort (8% of hips) were early (≤ 2 years) for instability, acetabular fracture, heterotopic ossification, superficial infection, and acute periprosthetic infection.
- Risks associated with hip replacement surgery must be communicated to patients, and surgeons should consult medicine colleagues to establish a care plan to minimize the perioperative risks related to alcohol abuse and concomitant risk factors such as cigarette smoking and malnutrition in this patient population.

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