

Air Embolism Immediately Following Air Arthrogram in Hip Arthroscopy: A Case Report

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Abstract

Case

We describe the case of a 26-year-old man with femoroacetabular impingement (FAI) who sustained an air embolism due to an air arthrogram performed at the beginning of arthroscopic treatment. Immediately after injection of the air, the patient experienced a notable drop in end-tidal CO₂ and hemodynamic instability. The patient was promptly stabilized with additional fluids and pressors. The instability was transient, and following stabilization the surgery was able to proceed to completion.

Keyword: Mumps;Submandibular gland;viral infection

Introduction

Hip arthroscopy has become an increasingly popular surgical solution to a variety of hip pathologies. To perform hip arthroscopy safely and effectively, traction is necessary to separate the femoral head from the acetabulum to provide space for the arthroscope and surgical instruments, often accomplished with the use of an air arthrogram. In addition to allowing sufficient working space, the use of an air arthrogram is also associated with decreased intra-operative traction and post-operative narcotic pain medication requirements^{1,2}. While many causes of complications related to hip arthroscopy are well documented^{3,4}, to our knowledge there have not been any previously reported complications associated with the use of an air arthrogram. Therefore, we report a case in which the injected air from an air arthrogram caused an air embolism.

Case report

We present an obese 26-year-old male with a nine-month history of right hip pain. He is an active-duty soldier and reports onset of his pain after he was lifting fuel tanks. His pain was localized to the anterior and lateral aspect of the right hip and worsened with deep flexion and ambulation. At the time of presentation, he had failed conservative management including

activity modification, physical therapy, and intra-articular steroid injection. Physical exam was notable for impingement maneuvers eliciting significant pain. Imaging demonstrated a cross-over sign on the pelvic and decreased head-neck offset on the lateral hip radiographs and can be seen in Figure 1 and Figure 3. MRI of the right hip was significant for a posterior/superior labral tear with subcortical cysts demonstrated in Figure 2. Due to the patient's continued pain despite conservative modalities, the patient elected to proceed with hip arthroscopy, femoroplasty, acetabuloplasty and labral repair vs debridement.

At the time of surgery, anesthesia induction was uneventful. Shortly after, the patient had a abrupt drop in end tidal CO₂ to a value of 10, indicating poor perfusion. Cefazolin and rocuronium had recently been given, and, notably, the air arthrogram also had just been performed. After discussion with the anesthesia team, this was felt unlikely to be an allergic reaction as there was no rash appreciated, airway pressures did not increase, and there was no wheezing. The patient was stabilized with fluids and pressors including epinephrine 10 mcg IV. When vitals were stable, surgery was delayed about 10 minutes to ensure vasopressors were metabolized. The procedure was then resumed, and no additional intra-operative complications occurred. Post operatively, tryptase levels were drawn and values resulted as within normal limits ruling out possible allergic reaction as a cause of his episode.

Discussion

The use of air arthrography is a described technique to aid in distraction of the hip joint. It is likely that by breaking the suction seal of the hip joint with positive pressure, the hip distracts more easily and requires less force on the soft tissue and surrounding musculature¹. Due to this, Hodaxet all demonstrated that using an air arthrogram can produce the effects of decreased immediate postoperative pain and narcotic requirements because of the reduced force needed on the leg to achieve adequate joint distraction². To date, all prior reported cases of arthrography complicated by air arthrograms have been reported in children⁵⁻⁶. Air embolism led to the onset of transient respiratory disorders in all these cases, except in 1 case, in which a temporary cardiac arrest occurred with approximately 2-3 mL of air⁶.

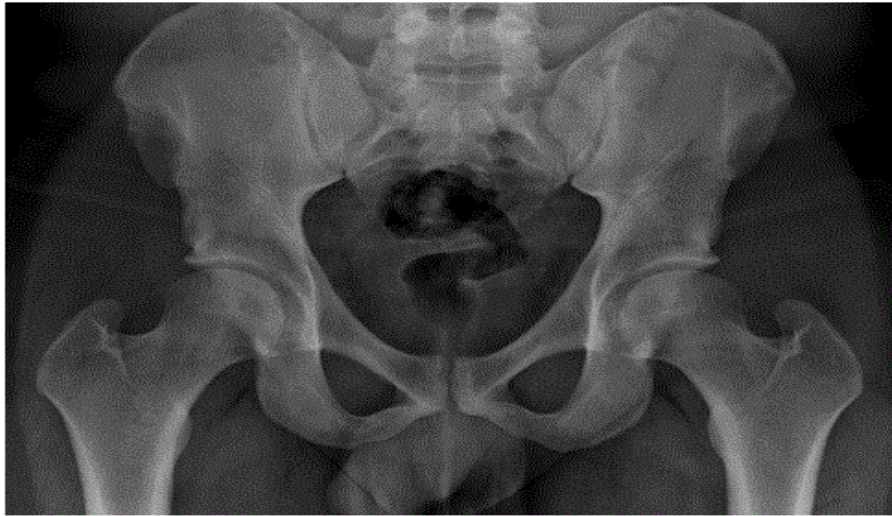


Figure 1a: Anteroposterior (AP) pelvis radiograph demonstrating a crossover sign indicative of acetabular retroversion associated with a Pincer lesion



Figure 1b: Lateral hip radiograph demonstrating a decreased head-neck offset ratio of approximately 0.11 consistent with a CAM deformity



Figure 2: T1 Fat Saturated Coronal MRI of the right hip demonstrating posterior/superior labral tear

Several surgical techniques have been used to perform air arthrograms⁷⁻⁸. The technique used in our case is as follows. After sterile preparation and draping, the hip capsule was entered anteriorly through an anterolateral portal with a sterile spinal needle under fluoroscopic guidance. Entry is directed away from the labrum and weight bearing articular cartilage to avoid iatrogenic injuries to these structures. After localization, 25 mL of air was injected into the hip with a sterile syringe to provide positive pressure and to break the negative suction seal of the hip joint Figure 4 and Figure 5. Fluoroscopy is used to confirm the intra-articular position by identifying an appropriate air arthrogram site, after which the syringe was removed from the needle, allowing pressure neutralization or “venting” to occur. Fine traction is then applied to the hip².

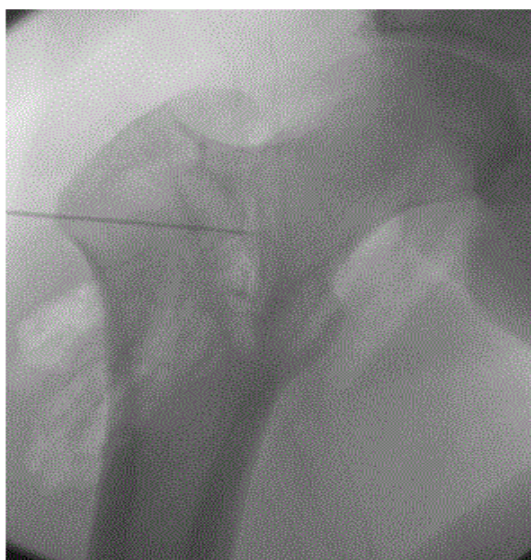


Figure 4: Intra-operative anteroposterior (AP) view after air arthrogram performed showing extra-capsular injection of air

Air embolism is a potentially life-threatening medical condition that occurs when air or gas enters a patient's bloodstream and leads to blockage in the blood vessels. It can occur through various means such as surgery, injections, medical procedures, or lung or chest trauma. The severity of the air embolism depends on the amount of air that enters the bloodstream and where it lodges in the body. Symptoms can range from mild to severe, including shortness of breath, chest pain, confusion, seizures, and even cardiac arrest. Because associated symptoms can be managed successfully with quick recognition, it is important to notify the anesthesia team at the time of performing the arthrogram.

Patients undergoing hip arthroscopic surgery with air arthrography and venting used to aid in distraction have less self-reported postoperative pain and require a lower dose of opioids during their PACU stay². This is a rare case of air embolism as the result of hip air arthrogram to aid in distraction for hip arthroscopy. This case suggests that an air arthrogram does have complications and this risk should be considered when deciding to proceed with hip arthrography.



Figure 5: Intra-operative anteroposterior (AP) view after air arthrogram performed showing introduction of air within the hip capsule and loss of the suction seal with slight distraction of the hip joint

Conclusion

The introduction of air during an air arthrogram during hip arthroscopy may predispose patients to the rare but serious complication of an air embolism.

Statement of Informed Consent

The patient was made aware that data/details involving his case may be submitted for publication. The patient consented to use of any data or facts related to his case in any format necessary for publication of this case report.

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