Title:

The presence of subcutaneous gas on postoperative radiographs following total shoulder arthroplasty does not influence rates of periprosthetic joint infection

Abstract:

Purpose

The purpose of this study is to evaluate the significance of subcutaneous gas on postoperative radiographs following total shoulder arthroplasty (TSA) and assess whether it is associated with the ultimate development of a periprosthetic joint infection (PJI).

Introduction

As the incidence of TSA continues to rise, the associated complications must also be evaluated. Although rare, PJI remains one of the most devastating complications following TSA with significant consequences on patient outcomes. Early diagnosis of shoulder PJI remains elusive, and many previously identified biomarkers have poor sensitivity and specificity. Additionally, non-virulent organisms comprise a majority of shoulder PJIs, adding to the complexity of diagnosis. Radiographs are standard of care following TSA and are often the first imaging modality to assess for PJI. Many patients have subcutaneous gas present on postoperative and follow up radiographs following TSA, the significance of which remains unknown, though the presence of which has raised concern for PJI.

Methods

A retrospective review of all TSA's performed at a single academic institution between January 2010- March 2020 was completed. All patients undergoing primary TSA with postoperative radiographs and clinic follow up were included, including all patients with PJI (n=13 infections).

Radiographs were evaluated by two musculoskeletal fellowship-trained radiologists with a Cohen's kappa test for interrater reliability.

Results

Of 582 total patients who underwent TSA, 13 of the 13 (100%) patients who developed PJI and 563 of the 569 (97.7%) patients without PJI had subcutaneous gas on immediate postoperative radiographs ($p= 0.87$). On follow-up radiographs, subcutaneous gas was present on 5 of the 13 (38.5%) patients who developed a PJI and 190 of 559 (34.0%) patients who did not develop a PJI ($p= 0.771$). Subcutaneous gas was present in a higher percentage of patients who underwent reverse TSA (RTSA) than anatomic TSA at the time of follow-up radiograph (41.8% vs. 22.8%, $p< 0.0001$), and the time to gas resolution was longer in these patients (52.93 vs. 24.79 days, $p= 0.0001$). Time to gas resolution was an average of 34.38 days in the patients that developed PJI and 41.54 days in patients who did not develop a PJI ($p= 0.421$).

Conclusion

The presence of subcutaneous gas on immediate postoperative and subsequent radiographs following TSA, and the duration of time to resolution of the gas, are not correlated with increased risk of shoulder PJI. The current evidence suggests that subcutaneous gas is an expected postoperative finding without any known correlative pathologic sequelae.