Acromial and scapular spine fractures in reverse shoulder arthroplasty-influence of different implant designs.

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INTRODUCTION:
Both patient and implant-related variables have been implicated in the incidence of acromial (ASF) and scapular spine fractures (SSF) following reverse shoulder arthroplasty (RSA); however, previous studies have not characterized nor differentiated risk profiles for different prosthetic designs. This study aims to determine patient-associated and implant design-related risk factors predictive of cumulative ASF/SSF risk.
METHODS:
Over a 15-year period, all patients consecutively receiving RSA between January 2006 and December 2021 from our institution with preoperative diagnoses of cuff tear arthropathy (CTA), primary osteoarthritis (OA), instability arthropathy (IA) posttraumatic (PT), inflammatory arthropathy (IFA), congenital dysplasia (CD), and implant revision (IR) were included in our study. Primary and revision cases were included in the analysis. Patient-related risk factors (female gender, prior surgery, CTA, IA, acromioplasty, trauma) and prosthetic design with distalization shoulder angle (DSA), lateralisation shoulder angle (LSA), critical shoulder angle (CSA), and acromial slope or tilt (AS) were analysed. Prosthetic designs were classified into three groups: distalized-medialized or Grammont design (DM), predominately distalized (PD) and lateralized-distalized(LD).
RESULTS:
Our study cohort comprised 2441 patients with preoperative diagnoses of CTA, OA, PT, RA, or IR with a minimum follow-up of 24 months (range: 24-180). The mean time to fracture was 111 days (range: 40-922). The incidence of cumulative stress fracture was 2.5% (61/2441). The majority of patients with fracture were female (79%). The incidence of stress fracture in the DM design cohort was close to 5%, compared to 3.5% in the PD and 1.4% for the LD cohort. CTA was the diagnosis in 48 patients (78%), being the second most frequent OA and PT, both with 6 patients. Following the Levy classification, 29% were type 1, 48% type 2, and 23% type 3. Approximately 10% of the fractures presented challenges in using the Levy classification, especially those on the edge between type 1 and 2. The majority of Levy type 3 fractures had a DM design, whereas type 2 was mostly in PD designs. A decrease in AS was directly proportional to functional shoulder status, as indicated by a decline in the Constant Score. The treatment option was conservative in 92% of the patients. Only 16 out of 61 (26%) of the fractures consolidated, with the majority resulting in non-union. Of the 8% who underwent surgery, all were treated with a double plate, and two out of five cases were successful in avoiding non-union.
DISCUSSION AND CONCLUSION:
While certain patient groups have an increased risk of stress fractures, Grammont-style or medialized prosthetic designs seem to have an increased risk of producing acromial or scapular spine fractures. Diagnosis of CTA composed the majority of patients. Levy type 2 was the most common fracture type. Non-operative management resulted in a high rate of non-union. Further research is needed to avoid this potential complication after RSA.