



Heterotopic ossification of the long head of the triceps after reverse total shoulder arthroplasty



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Background: Heterotopic ossification (HO) around shoulder arthroplasty is a frequent finding with unclear clinical relevance. This study evaluated the incidence, relevance, and predisposing factors of HO in the long head of the triceps tendon after reverse shoulder arthroplasty.

Methods: Retrospective chart review was conducted to identify patients who had a reverse shoulder arthroplasty performed between 2008 and 2012. Patient demographics, implant types, and diagnoses were noted. Three fellowship-trained shoulder/elbow surgeons independently evaluated postoperative Grashey radiographs using a novel classification system.

Results: Within a 164-patient cohort, the overall HO rate in the long head of the triceps tendon was 61.6%; 23.2% of osteophytes were considered impinging, 14.6% had notching, 14.0% were free-floating, and 3.0% appeared ankylosed. Although not statistically significant, revision surgery had a higher rate of HO (68.3%) compared with primary surgery (59.4%). There was no difference in HO rates between diagnoses or implant types. Male and female HO rates were 74.0% and 56.1%, respectively ($P = .0304$). Between patients with and without HO, forward elevation was 121° compared with 133° ($P = .0087$) and external rotation was 19° compared with 25° ($P = .0266$); however, HO size did not significantly affect motion.

Conclusions: Using our novel classification scheme, HO was a common finding in this series. Men had a higher rate of HO formation, and HO formation was associated with worse postoperative motion. Further study is needed to fully characterize the clinical implications of HO involving the long head of the triceps tendon and to explore potential preventive measures.

Level of evidence: Level IV; Case Series; Treatment Study

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Heterotopic ossification (HO) after shoulder arthroplasty is a relatively common postoperative finding. Studies on anatomic shoulder arthroplasties suggest that the rate of HO formation is between 15% and 45%.^{1,2,6} In these patients, the clinical significance of HO formation remains unclear. Whereas

HO can be a source of motion loss and poor function, Sperling et al noted that there appeared to be little adverse effect on clinical results despite the frequency of this finding.⁶

In reverse total shoulder arthroplasty, HO formation may potentially be more prevalent because of increased tissue damage from extensive capsular releases; traction on the triceps from lengthening of the arm; and increased use in challenging diagnoses, including revision shoulder arthroplasty, fractures, and static anterior superior escape.

Whereas the presence of HO involving the long head of the triceps is a phenomenon that has been described before in the literature,^{3,5} no studies have been conducted to specifically evaluate the frequency of this finding or its implications. HO may have significant implications on clinical function as a possible source of impingement, instability, increased polyethylene wear, and decreased motion.

We are reporting on a consecutive series of patients to evaluate for HO of the triceps after reverse total shoulder arthroplasty to critically evaluate its incidence, predisposing factors, and clinical relevance. In the process of reporting this, we propose a new classification system that can help define the various pathologic changes that occur in the inferior glenoid/axillary pouch region after reverse shoulder arthroplasty.

Materials and methods

A retrospective chart review was undertaken to identify a consecutive series of patients who had a reverse total shoulder

arthroplasty performed by 1 of 5 fellowship-trained shoulder/elbow surgeons between 2008 and 2012. Inclusion criterion was a minimum of 1 year of radiographic and clinical follow-up. Anyone who did not have a minimum of 1 year of radiographic follow-up was excluded. Although the specific implant type varied among the patients, all patients had the surgery performed with a Grammont-style prosthesis. Patient demographics, diagnoses, and implant type were noted.

Radiographic analysis

The most recent postoperative Grashey radiograph was evaluated by 3 fellowship-trained shoulder/elbow surgeons (J.-W.K.K., J.A.A., E.M.B.). Radiographs were graded using our newly proposed grading system demonstrated in Figure 1. The grading system measures the size of any HO within the region of the long head of the triceps (small or large) (Fig. 2). HO was defined as any ossification that extended distal to the lateral or inferior border of the scapular neck near the origin of the long head of the triceps tendon. A type I (small) HO is any osteophyte whose distal extent is proximal to a line parallel to the lateral border of the scapula and intersecting with the medial edge of the humeral tray (Fig. 1). A type II (large) HO is any osteophyte whose distal extent is below this line. In addition, we noted the presence of impingement (A), free-floating HO (B), concurrent notching (C), and the appearance of ankylosis (D). Impingement was defined as any ossification that appeared likely to impinge on the implant with the arm in adduction at a neutral position. Free-floating HOs were ossifications that were not contiguous with the lateral border or neck of the scapula. Notching was defined as any bone erosion within the native glenoid neck and underneath the inferior base-plate; this was reported with or without concurrent HO. Last,

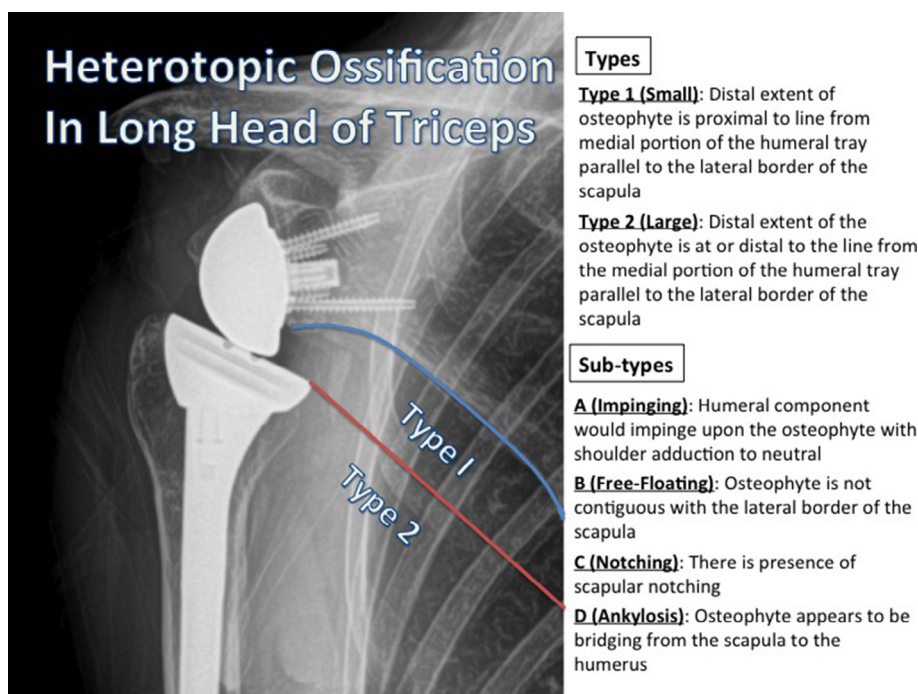


Figure 1 Classification scheme for heterotopic ossification involving the long head of triceps tendon.

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