Medial wear of the polyethylene component associated with heterotopic ossification after reverse shoulder arthroplasty

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Medial wear on the polyethylene component after reverse shoulder arthroplasty (RSA) has been attributed to impingement of the humeral cup on the lateral border of the scapula. We present a case that illustrates that the presence of early heterotopic ossification may exacerbate medial wear of the polyethylene component in cases of RSA.

Case report

We performed an RSA (Anatomical Shoulder (TM) Inverse/Reverse; Zimmer) on a 73-year-old, right-handed man who had radiographic evidence of an irreparable rotator cuff tear and early rotator cuff arthropathy. The patient was immobilized in a sling for 6 weeks postoperatively. The sling was removed 3 times daily for shoulder exercises. At 4 weeks postoperatively, the patient reported good pain relief and demonstrated 90 degrees of active forward elevation and abduction. Early postoperative radiographs showed no evidence of periarticular calcification (Fig. 1).

Eight weeks postoperatively, the patient presented to our clinic with pain after hearing a “crack” in his right shoulder. Radiographs revealed disassociation of the glenoid head from the glenoid fixation and the development of significant periarticular heterotopic ossification inferior and medial to the glenoid (Fig. 2).

We performed revision surgery, which included removal of the humeral cup to reconnect the glenoid head. The humeral cup inlay contained significant wear of the polyethylene medially. Intraoperative trial reduction with a new inlay revealed that, although the implant was well clear of the glenoid neck and the lateral border of the scapula when the arm was adducted, the humeral cup was rubbing medi-
against the large, inferior mass of hetero-
topic ossification. We therefore carefully
resected most of the ossification mass,
then copiously irrigated the wound and
closed it in standard fashion over a suc-
tion drain. Three months after the re-
vision procedure, the patient showed no
signs of further complication, and radi-
ographs revealed no further evidence of
heterotopic ossification.

Discussion
Polyethylene wear on retrieved implants
has been observed in up to 50% of pa-
tients who undergo RSA.1,2 Fluoroscopic
examination attributes this to impinge-
ment of the humeral cup on the scapular
neck, which can also result in scapular
notching.1,2 The notching phenomenon
is of some concern because large or pro-
gressive lesions can negatively affect clin-
ic outcomes and increase the risk of
glenoid loosening.2 Some authors have
suggested that impingement may simply
be the initiating factor, with further oste-
olysis being triggered by polyethylene
particles from cup wear.1,2 In our pa-
tient’s case, revision surgery only 8 weeks
after the initial RSA led us to believe that
heterotopic ossification was the primary
mechanical source of impingement lead-
ing to medial wear of the polyethylene
component.

Conventional total shoulder arthro-
plasty has been known to result in post-
operative heterotopic ossification. Sperling
and colleagues1 found radiographic evi-
dence of heterotopic ossification in 24.1%
of 58 conventional total shoulder arthro-
plasties performed between 1989 and
1992. In most cases, the heterotopic ossi-
ination was present on early radiographs
(1–2 mo postoperatively) and had de-
veloped inferior to the humeral head near
the inferolateral aspect of the glenoid.
Boehm and colleagues3 noted that pa-
tients with a primary diagnosis of cuff tear
arthropathy who underwent total shoul-
der arthroplasty appeared to be at higher
risk for the development of heterotopic
ossification (36.4%) than patients with pri-
mary diagnoses such as osteoarthritis,
avascular necrosis or fracture (< 14.5%).

We are not aware of any reports
specifically documenting the incidence of
heterotopic ossification after RSA. How-
ever, patients who have RSA may be at
higher risk for the development of
heterotopic ossification owing to a com-
bination of factors: primary diagnosis of
rotator cuff arthropathy; the amount of
tissue damage from the surgical ap-
proach, which may include an extensive
anterior and inferior capsular release; and
the need to release the long head of the
triceps from the inferior aspect of the
glenoid to facilitate optimal inferior glen-
oid screw placement.5 The unique pros-
thetic design of RSA implants — an al-
most horizontal orientation of the RSA
humeral cup combined with the absence
of a prosthetic neck on the glenoid
side — can predispose the polyethylene
humeral cup inlay to excessive medial
wear.1 The presence of heterotopic ossifi-
cation inferolateral to the glenoid could
trigger or exacerbate this problem.

We recommend a meticulous surgical
technique to minimize tissue damage
during the surgical approach and copi-
ous irrigation intraoperatively to limit
osteogenic cell contamination that may
contribute to heterotopic ossification.

Although prophylactic nonsteroidal anti-
flammatory drug treatment does not ap-
pear to decrease the incidence of
heterotopic ossification after total shoul-
der arthroplasty,4 no specific study of
prophylaxis after RSA has been per-
formed. Consideration should therefore
be given to empiric nonsteroidal anti-
flammatory drug prophylaxis. We also
suggest close monitoring of post-
operative radiographs for the first
8 weeks to identify any increased inci-
dence of heterotopic ossification.

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