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Case Report

Metallosis following a dual coat porous hydroxyapatite shoulder hemiarthroplasty

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ARTICLE INFO

Article history:
Received 20 January 2015
Accepted 1 February 2015
Available online 12 March 2015

Keywords:
Shoulder hemiarthroplasty
Metallosis
Porous hydroxyapatite

ABSTRACT

We report a case of metallosis following a shoulder hemiarthroplasty with a humeral component resurfacing shoulder replacement.

1. Introduction

Metallosis in arthroplasty has become a topic of increasing relevance with the need for revision procedures particularly seen in hip and knee arthroplasty.[1,2] Metallosis is the infiltration of periprosthetic tissue by metal debris and the subsequent localised inflammatory response with macrophages and giant cells leading to granulation tissue.[3,4] There has been little evidence of shoulder arthroplasty failure due to metallosis in the literature. A case report of metallosis in a total shoulder arthroplasty in an uncemented Nottingham shoulder was reported 2007[5]; however humeral component resurfacing shoulder hemiarthroplasty metallosis has not previously been described. We describe a case of metallosis in a DePuy Global Hemi Cap shoulder hemiarthroplasty with a Duofix surface that was revised due to metallosis failure in a similar manner to the recently recalled DePuy Low Contact Stress Duofix rotating knee prosthesis.[2]

2. Case report

An 84-year-old woman presented after 5 years with right shoulder pain following the implantation of a DePuy Global Cap Resurfacing shoulder hemiarthroplasty for osteoarthritis. The patient has a background of generalised osteoarthritis with multiple large joint replacements including bilateral hips, knees and a left total shoulder replacement. The primary procedure was performed in 2006 to alleviate an intermittently painful and stiff right shoulder which she suffered with over the preceding five years. The DePuy Global Hemi Cap resurfacing shoulder used was manufactured from a cobalt chromium molybdenum (cobalt chrome) alloy with a porous coated bead in growth surface that is further treated with plasma sprayed hydroxyapatite (trade name "DuoFix"[6]).

Her post-operative recovery was satisfactory with physiotherapy reporting gradual improvements in range of

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http://dx.doi.org/10.1016/j.jor.2015.02.005

movement achieving ninety degrees active shoulder flexion and abduction. She continued to experience minor strength deficits and anterior shoulder pain associated with reaching and lifting, for which she was given ongoing strength exercises. Overall the patient reported that she was functionally better than before the procedure.

After five years she was referred for further opinion and management of her right shoulder pain. She reported discomfort and reduced range of movement. Radiographs, a CT scan and blood tests were performed to further investigate the shoulder. These tests revealed superior subluxation of the humeral component with respect to the glenoid and a normal white cell count [Fig. 1].

Revision to a reverse shoulder arthroplasty was carried out in 2013 using the DePuy DELTA Xtend shoulder system. The primary intra-operative finding was tissue staining consistent with significant metallosis. There was surrounding inflammatory and granulomatous tissue. The prosthesis was still fixed. The remainder of the procedure was conducted without complication. The retrieved implant was sent for analysis to the Biomaterial Laboratory at Royal Perth Hospital following standard retrieval protocols.

Evaluation of the device incorporated the following; qualitative macro analysis of the component in terms of degradation mechanisms and metal loading of the intra-operative tissue biopsy sample. Inductively Coupled Plasma – Atomic Emission Spectroscopy[7] was undertaken to determine the metal ion levels, specifically chromium, cobalt, titanium, vanadium and aluminium, as per the standard RPH protocol in the biopsied tissue.

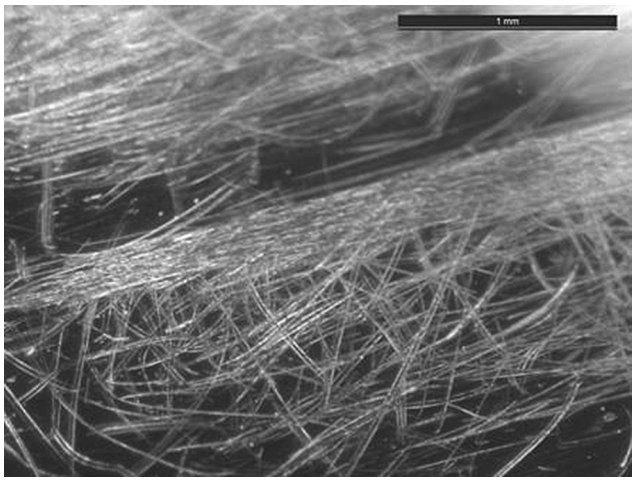

Fig. 2 – DuoFix Shoulder Multidirectional scratching.

Macro analysis using a Leica MZ6 stereomicroscope revealed good bony ingrowth with geometrically diverse spicules of bone; however also noted was metallic stained tissue peripherally. Minor remnant HA coating was observed. The bearing surface showed fine scratching and scouring over most of the surface with a small unworn region towards the edge of the device as shown in Fig. 2.

Assessment of the intra-operative tissue biopsy revealed 835 ppm of cobalt, and 926 ppm of Chromium, which is

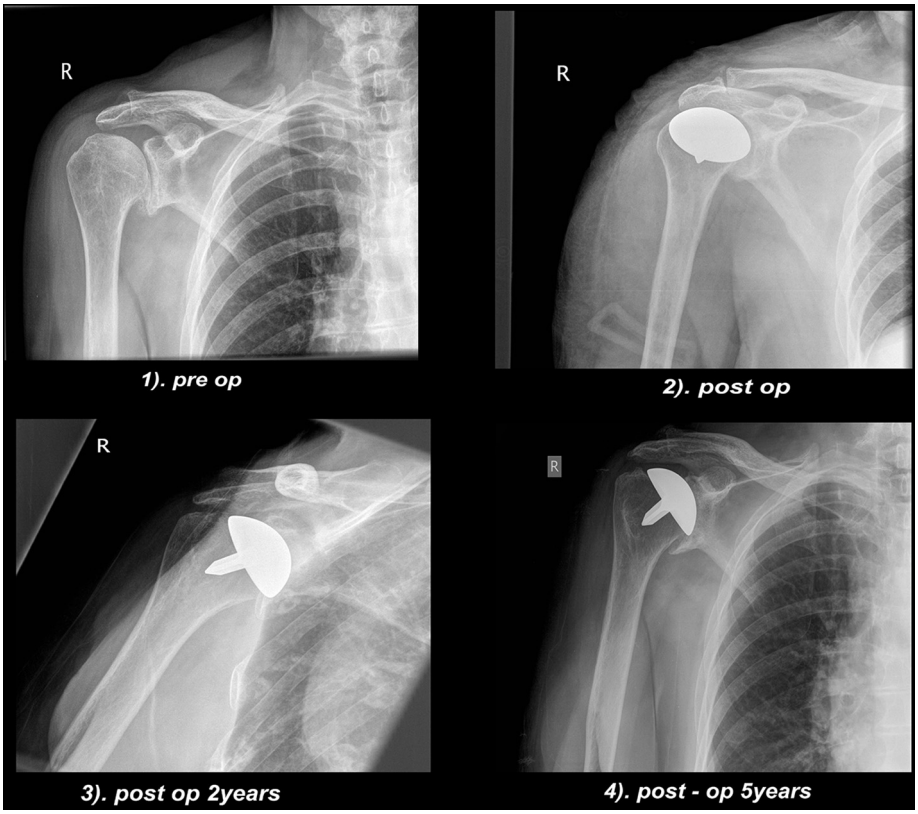

Fig. 1 – X-ray progression.