

# Reconstructive REVIEW

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# Pseudotumor in Metal-on-Polyethylene Total Hip Arthroplasty

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A CASE  
REPORT

## Abstract:

Pseudotumor formation is a rare, but severe potential complication of total hip arthroplasty. Focus has been on metal on metal articular surfaces as the primary cause. Also known as Adverse Local Tissue Reactions (ALTR's), previous reported cases have presented as infections. Prior ALTR's of non-metal on metal articulations have been reported and of cases in which modularity of the neck may have been a factor. We report on a case of a non-modular neck with a metal on polyethylene articulation which presented as an infection, but in which ALTR was the causative factor.

## Introduction

Total hip replacement is a common and highly successful procedure. Foreign body reaction was recognized early in the history of hip arthroplasty and was initially thought to be solely the result of poly-methyl-methacrylate (PMMA). In fact this was termed "cement disease". Later, even in uncemented implants, severe osteolysis and soft tissue damage was observed and clearly polyethylene wear was the causative factor. Polyethylene wear disease leading to osteolysis became such a significant issue that extensive work by many researchers and extensive resource expenditures by industry lead to the development of ceramic-on-ceramic, metal-on-metal and "improved polyethylene".

Case reports and reports of higher than expected failure rates have been reported in some metal-on-metal implants leading to recalls, law suits and a significant downturn in their use.<sup>1,2,3</sup> Most have presumed that the actual metal on metal articulation was the source of elevated ion levels and thus local tissue reactions. There are however, reports of cases of ALTR in non-metal on metal total hips.<sup>4,5,6,7</sup>

Modular necks introduce an additional interface which may contribute to local metal debris and ion

loads.<sup>8,9</sup> A recent case report documents the stem-neck interface as a probable cause of ALTR in a ceramic-on-polyethylene articulation.<sup>10</sup>

We report a case of ALTR in which the head neck junction is a non-modular femoral neck stem with a metal on polyethylene bearing. Surgical findings and photographs show that the metal source was the head-neck articulation.

## Case Report

A 52 year old female underwent total hip arthroplasty in 2007 at another facility, utilizing a Accolade 52mm acetabulum with a Trident X3 standard polyethylene and a metal 32 mm +4 head on a size 2 Accolade TMZF HA stem. (Stryker, Kalamazoo, Michigan) The patient did well until August of 2012 when she experienced increasing pain in the right groin and buttocks region. Ambulation became increasingly difficult. Workup in her home facility including an x-ray which revealed a stable implant, but with evidence

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of osteolysis about the ischium (Figure 1) and a Technetium-three-phase-Bone scan which showed increased uptake about the greater trochanter. Due to increasing pain, an aspirate was performed under fluoroscopic guidance and 1ml of purulent appearing material was obtained. Cultures were sent, but no growth was observed. The patient was advised to return for further follow-up should pain continue.



Figure 1: Note the severe osteolysis about the greater trochanter, calcar region and ischium.

The patient presented to our facility wheel-chair-bound in severe pain. Her temperature was 100.5 F, she denied taking antibiotics but was taking large doses of Hydrocodone/Acetaminophen. She had a palpable and large mass on the lateral aspect of her hip which was felt to be fluctuant. Her ESR was 40 and CRP was 46. A needle aspiration in the office with an 18 gauge needle produced no fluid. The patient was admitted to the hospital and a Jamshidi needle (CareFusion, Chicago, IL) was used. With the large bore needle over a 120 mls of fluid was collected and remarkably a large amount of fluid was lost as it literally shot to the ceiling before the syringe could be attached. The material appeared to be grossly purulent. The fluid however showed only 2000 WBC's.

Although the presentation was somewhat unusual, the patient's pain was so severe and the aspiration so profound we assumed she had a non-standard presentation of an infected total hip. She was taken to the OR for explantation and an antibiotic loaded PMMA implant (PROSTALAC). (Figure 2). Cultures from the aspirate and



Figure 2: PROSTALAC in place. Note thin shell of greater trochanter and fragmentation about abductor attachment points.

also from the surgical specimens were negative, but permanent pathology was typical of ALTR. (Figures 3,4,5).

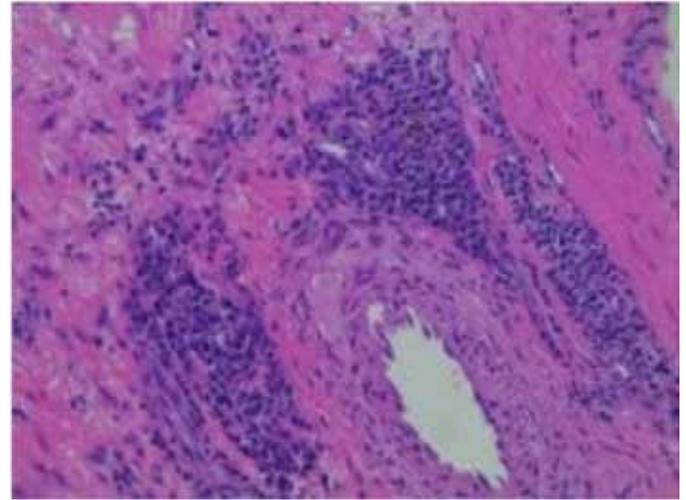


Figure 3: Note chronic inflammation with plasma cells and lymphocytes.

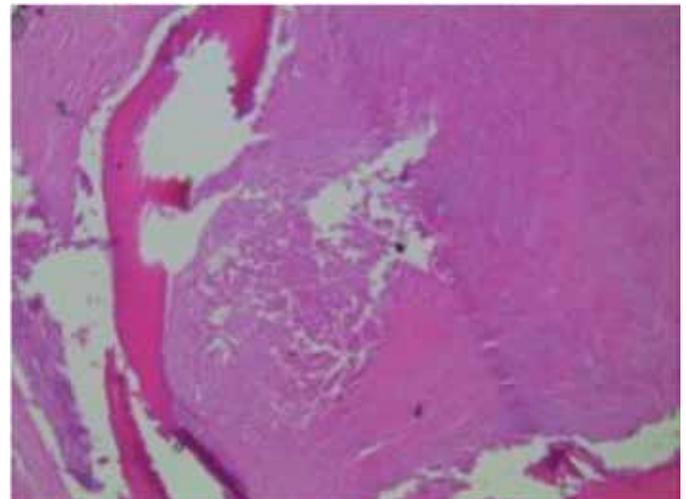


Figure 4: Taken from the backside of the acetabulum with fragments of bone with ischemic necrosis, chronic inflammatory tissue and dense fibrous tissue.

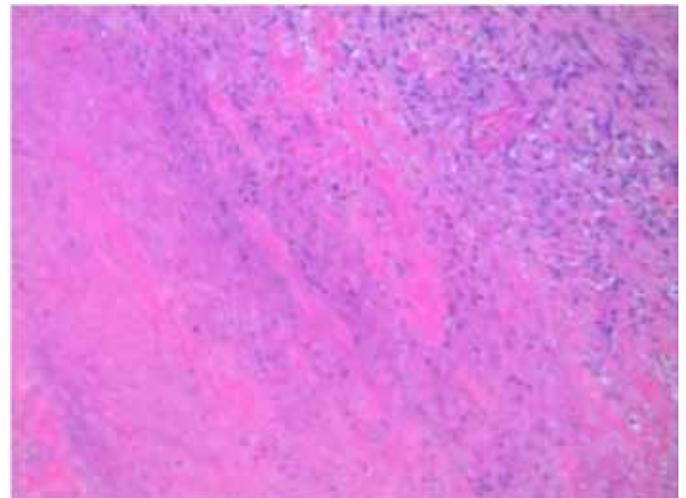


Figure 5: Note primarily chronic inflammatory changes, but with small areas of acute inflammatory change.

Observations at the time of surgery were that the pseudotumor was massive and again under extreme pressure. The lesion was noted to be immediately under the skin and when touched with the #10 scalpel, purulent appearing fluid reached 3 feet above the patient. Figure 6 is taken of the pseudotumor after removal of this fluid. The tissue

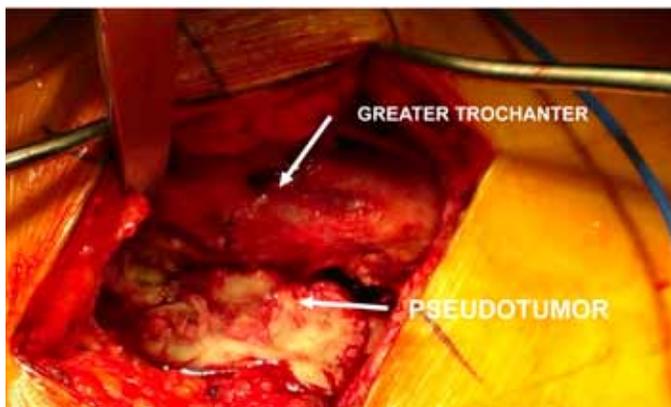


Figure 6: The pseudotumor is seen posterior to the greater trochanter. This photo was taken after at least 200-300 cc of purulent appearing fluid had been removed.

of the pseudotumor appeared to be very aggressive. Significant damage was noted about the abductor attachment to the greater troch, although the tendons remained attached, much of the trochanter was denuded of attachments. The osteolysis had resulted in marked loss of the inner aspect of the greater troch and had eroded around the stem extensively. (Figure 7). There was marked osteolysis about the

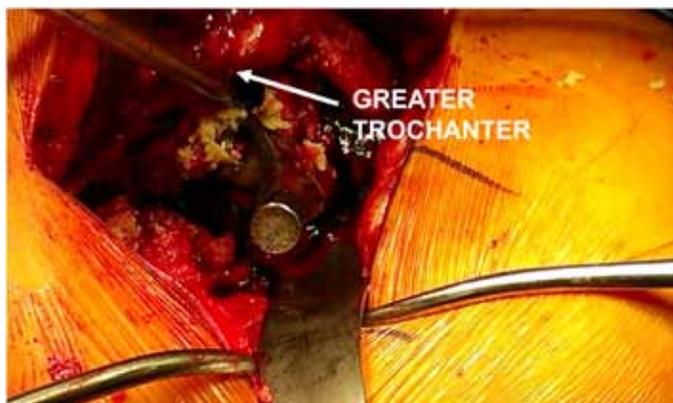


Figure 7: Note the inflammatory tissue about the stem and the marked osteolysis about the entire proximal femur and greater trochanter.

inferior aspect of the acetabulum. There was mild metallic staining of all of the removed tissue. The metallic femoral head was easily removed from the femoral stem. We observed and photographed evidence of metal debris and damage at this interface which would seem to reveal evidence of movement. (Figures 8, 9). The femoral stem did

have areas of osseous integration, but was easily removed without need for an extended trochanteric



Figure 8: Note the metallic staining and obvious fretting about the trunion.



Figure 9: Note the damage inside the head with severe fretting.

osteotomy. The cup was also relatively easily removed with Moreland Acetabular chisels (Innomed, Savannah, GA). The back side did

show small areas of osseous integration, but this was minimal. (Figure 10).

Again, as we presumed this to be an infection case, we chose to place the PROSTALAC and await cultures. All cultures including those for Acid Fast Bacteria and Fungus were negative at



Figure 10: Note the small areas of osseous integration with primarily no or only fibrous ingrowth.

6 weeks. The patient was not treated parenterally other than the first 24 hours of prophylactic antibiotics after the PROSTALAC and ESR and CRP were 3 and 0.34 respectively at the time of reimplantation. At the time of reimplantation of the hip, all tissues had a benign appearance, frozen section revealed "mild" inflammation, but with 1-2

polymorphonucleocytes (PMN's) per high power field (HPF).

We chose to use a ceramic on highly cross-linked poly and we augmented the acetabular fixation with screws. (Figure 11).

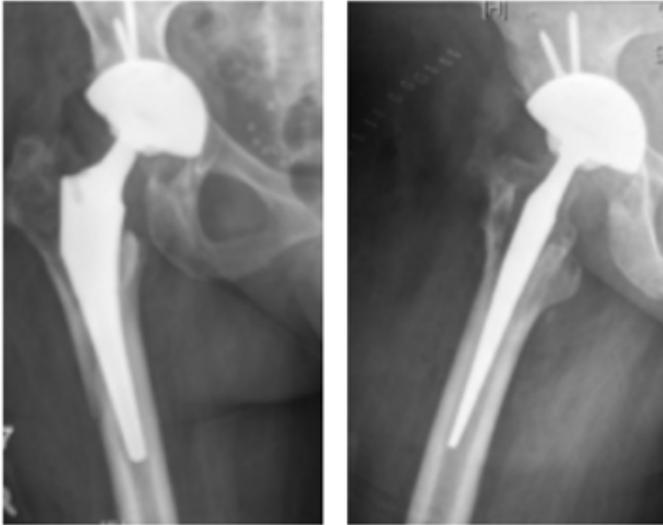


Figure 11: Immediate postop radiographs of reimplanted prosthesis.

## Discussion

Virtually all modern total hip stems incorporate a Morse Taper allowing for adjustability of femoral head diameter, head length and allow for material choices. There is variability of design of the Morse taper. The stem used in this reported case was a V-40 taper. In this case, the head size was not particularly large at 32 mm. Theoretically, as the diameter of the head is increased, and thus the lever arm about the Morse Taper, rotational forces upon the Morse Taper interface may increase. Also in this case, a plus 4 mm head length was used. Theoretically, it is possible that with plus size head lengths, the actual contact area of the Morse Taper interface would be reduced, resulting in less stability, movement and fretting. In this case, the stem was a HA coated stem. The stem appeared to be stable with evidence of bone ingrowth, but there are reports of HA material resulting in adverse local tissue reactions.<sup>11</sup> Although it would be impossible to argue that the HA could not have been a factor in the failure and Pseudotumor formation in this case, the findings about the Morse taper were quite profound and would be most likely the cause of failure. No gross particulate matter was noted in the pathology sections.

In my practice, I recommended a metal-on-metal articulation for the majority of my patients from 1998 until 2011. Due to reports, published data and a generally negative legal environment with regard to metal-on-metal; I have reduced the use of MOM to less than 5% of my cases. I have not performed a revision, and I am not aware of any of my metal-on-metal patients having undergone revision as a result of ALTR. Ironically, the only revision I have done which was done for Pseudotumor and with histological findings of ALTR was in this reported case with a metal-on-polyethylene articulation. Clearly, we must continue to carefully document all failures, study them and report them. We must be cautious to avoid making broad assumptions when failures occur. It is apparent that there are multiple modes of failure and that the metal-on-metal articulation alone is not the sole cause of failure.

## References

1. Pandit H, Glyn-Jones S, McLardy-Smith P, et al. Pseudotumours associated with metal-on-metal hip resurfacings. *J Bone Joint Surg Br.* 2008;90(7):847-851.
2. Campbell P, Ebrahimzadeh E, Nelson S, Takamura K, De Smet K, Amstutz HC. Histological features of pseudotumor-like tissues from metal-on-metal hips. *Clin Orthop Relat Res.* 2010;468(9):2321-2327.
3. De Haan R, Campbell PA, Su EP, De Smet KA. Revision of metal-on-metal resurfacing arthroplasty of the hip: the influence of malpositioning of the components. *J Bone Joint Surg Br.* 2008;90(9):1158-1163.
4. Leigh W, O'Grady P, Lawson EM, Hung NA, Theis JC, Matheson J. Pelvic pseudotumor: an unusual presentation of an extra-articular granuloma in a well-fixed total hip arthroplasty. *J Arthroplasty* 2008; 23(6):934-938.
5. Svensson O, Mathiesen EB, Reinholdt FP, Blomgren G. Formation of a fulminant soft-tissue pseudotumor after uncemented hip arthroplasty. A case report. *J Bone Joint Surg Am.* 1988;70(8):1238-1242.
6. Howie DW, Cain CM, Cornish BL. Pseudo-abscess of the psoas bursa in failed double-cup arthroplasty of the hip. *J Bone Joint Surg Br.* 1991;73(1):29-32.
7. Walsh AJ, Nikolaou VS, Antoniou J. Inflammatory pseudotumor complicating metal on highly cross-linked polyethylene total hip arthroplasty. *J Arthroplasty.* 2012;27(2):324. e5-e8. Epub 2011 Apr 16.
8. Kop AM, Keogh C, Swarts . Proximal Component Modularity in THA- At What Cost?: An Implant Retrieval Study. *Clin Orthop Relat Res.* 2012;470(70):1885-1894.
9. Kop AM, Swarts E. Corrosion of a hip stem with modular neck taper junction: a retrieval study of 16 cases. *J Arthroplasty.* 2009;24(7):1019-1023.
10. Hsu AR, Gross CE, Levine BR. Pseudotumor From Modular Neck Corrosion After Ceramic-on Polyethylene Total Hip Arthroplasty. *Am J Orthop.* 2012;41(9):422-426.
11. Rokkum M, Reigstad A, Johansson CB, Albrechtsson T. Tissue reactions adjacent to well-fixed hydroxyapatite-coated acetabular cups. histopathology of ten specimens retrieved at reoperation after 0.3 to 5.8 years. *J Bone Joint Surg Br.* 2003 Apr; 85(3):440-7.