Risk Stratification and Pain Outcomes Following Revision Total Hip Arthroplasty for Adverse Local Tissue Reaction

Akshay V Daji[1], Kalain Workman[2], Charlie Yoo[3], Clair Smith, Kenneth Urish
[1]Orthopedic Surgery, [2]Upmc-Pinnacle, [3]UPMC Pinnacle

INTRODUCTION:

Revision total hip arthroplasty (THA) for adverse local tissue reaction (ALTR) secondary to head-neck taper corrosion is associated with a high complication rate. Diagnosis of ALTR is based on risk stratification using the patient's history and exam, implant risk, serum metal ion levels, and imaging. The purpose of this study was to determine if stratification using similar risk factors would be able to predict complications and outcomes following revision THA for MoP ALTR.

METHODS:

We performed a retrospective review on 141 patients revised for ALTR due to head neck taper corrosion. Pain outcomes following surgery were analyzed using a generalized linear mixed model. Complications were defined as instability or dislocation, infection, fracture, nerve palsy, leg length discrepancy, or re-operation.

RESULTS:

The overall complication rate was 17.7%. The most common complication was instability or dislocation (12%). The odds of symptomatic patients having their pain resolve was 44% after having surgery (95% CI: 0.32 to 0.952). There was no significant difference in complications based on either increased or decreased head-neck offset (p=0.35). Increased cobalt (p=0.31) and chromium (p=0.08) levels did not predict complications. Based on the trend of increased chromium levels associated with complications, decreased cobalt-chrome ratio was associated with post-operative complications (2.8 vs 3.5; p=0.002). MRI findings of abductor loss, effusion size, and degree of ALTR were non-predictive of complications (p=0.73).

DISCUSSION AND CONCLUSION:

These findings are the first to suggest that patients with ALTR undergoing revision surgery demonstrate significant pain relief. Increasing femoral head offset did not change rates of instability. In clinical scenarios where pre-operative cobalt chrome femoral head offsets were greater than available ceramic head offsets, a mandatory decrease in femoral head offset did not increase rates of dislocation. The degree of ALTR on MRI and increased serum ion levels were non-prognostic of complications.

Table 1: Overall Post-revision Complication Rate

Overall (no. [%])	25/141 (17.7%)
Instability and Dislocation (no. [%])	17 (12%)
Periprosthetic Joint Infection (no. [%])	4 (3%)
Nerve Palsy (no. [%])	1 (1%)
Fracture (no. [%])	0 (0%)
Leg Length Discrepancy (no. [%])	3 (2%)
Re-revision (no. [%])	6 (4%)

*Patients with re-revision also had instability and dislocation

Table 2: Complication Rate Stratified by Patient Demographics and Revision Type

	Total (n=141)	Post-op Complications Present (n=25)	Post-op Complications Absent (n=116)	*P* Value
Female sex *(no. [%])*	67 (48%)	11 (44%)	56 (48%)	0.59
Age at revision surgery *(years)*	63	63	63	0.72
Time to revision surgery from index surgery *(years)*	10	10	10	0.81
BMI *(kg/m^2)*	30	29	30	0.38
Follow up time (mean *years*)	4	4	4	0.77
Symptomatic ALTR (no. [%])	(n=139) 89 (64%)	15 (60%)	74 (65%)	0.64
Revision Type:				
Head & Liner Exchange	72	8 (32%)	65 (55%)	
Head & Liner Exchange to Constrained Liner	17	4 (16%)	13 (11%)	0.11
Head, Stem, & Liner Exchange	52	13 (52%)	39 (34%)	
Post-operative Head Size:	(n=137)			
28 mm	13	2 (8%)	11 (10%)	
32 mm	20	0 (0%)	20 (18%)	0.08
36 mm	97	21 (88%)	76 (67%)	
40 mm	7	1 (4%)	6 (5%)	

Table 3: Complication Rate Stratified by Average Serum Ion Levels

	Total (n=141)	Post-op Complications Present (n=25)	Post-op Complications Absent (n=116)	*P* Value
Cobalt *(µg/L)*	7.6	8.8	7.4	0.31
Chromium *(µg/L)*	3.0	3.9	2.8	0.08
Cobalt/Chromium Ratio (mean)	4.4	2.7	4.8	0.002