Does Cutibacterium Skin Load Impact the Outcome of Ream-and-Run Arthroplasty?

Andrew P. Collins, MD, Grace Gregory, BS, Frederick A. Matsen III, MD, Jason E. Hsu, MD, Corey J. Schiffman, MD

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Introduction

Cutibacterium is commonly found on the skin surface and in sebaceous glands in the dermal layer of the skin. It is the most common bacteria recovered from shoulder prosthetic joint infections (PJI). Prior studies have suggested that patients undergoing ream-and-run arthroplasty are at higher risk for Cutibacterium PJI[2]. The preoperative Cutibacterium load on the skin of the shoulder is predictive of culture positive PJI[2]. Interestingly, ream-and-run arthroplasty patients have been found to have increased skin loads of Cutibacterium compared to patients undergoing other types of arthroplasties[3]. However, to our knowledge, the correlation between Cutibacterium skin load at the time of primary ream-and-run arthroplasty and subsequent patient reported outcome and incidence of PJI has not been investigated. Therefore, the purpose of this study was to correlate the load of Cutibacterium in culture specimens from (a) the unprepared skin surface and (b) the freshly incised dermal wound edge with patient reported outcomes and reoperation rate.

Materials & Methods

Cultures were obtained of the unprepared skin overlying the surgical incision and from the freshly incised dermal wound edge in 119 patients undergoing primary ream-and-run arthroplasty with greater than two -year follow up. We performed a semiquantitative assessment of the load of bacteria in each culture, assigning a value based on the report from the microbiology lab: 0 for "no growth"; 0.1 for "growth of 1 colony only" or for "growth in broth only"; and 1, 2, 3 and 4 for 1+, 2+, 3+ and 4+ growth[1]. Kendall tau rank correlation was used to test the relationship between Cutibacterium value and patient reported outcomes including the Simple Shoulder Test (SST), percent maximal possible improvement (%MPI) and American Shoulder and Elbow Surgeons (ASES) Score. We also correlated the Cutibacterium values with the need for repeat surgery.

Results

Average follow-up was 3.9 ± 1.3 years. The median Cutibacterium value was 1 (0-4) for both the unprepared skin and dermal wound edge. Higher Cutibacterium load of the unprepared skin was statistically associated with higher post-operative SST Scores (Tau, 0.155~~271~~; p=0.048) but the association was weak (Tau <0.200). Cutibacterium load of the unprepared skin was not associated with post-operative ASES score (tau, 0.055~~93~~; p=0.461) or %MPI (tau, 0.149, p=0.052~~149~~). Cutibacterium load of the dermal wound edge was significantly associated with post-operative SST scores (tau, 0.176; p=0.024) and~~,~~ %MPI (tau, 0.175; p=0.023~~), and postoperative satisfaction scores (tau, -0.182, p=0.024~~) but the association was weak (Tau <0.200). Dermal wound edge Cutibacterium load was not associated with post-operative ASES score (tau, 0.027; p=0.566). Twenty-eight (24%) patients underwent manipulation under anesthesia (MUA) for stiffness, but this was not associated with increased skin (tau, 0.027; p=0.711) or dermal Cutibacterium load (tau, -0.054; p=0.561). Two (2%) patients underwent open revision surgeries, one for periprosthetic fracture and one for PJI. The patient who experienced a PJI was found to be culture positive for Cutibacterium at the time of revision surgery and their Cutibacterium load of their unprepared skin was 2 and dermal wound edge was 1 at the time of primary ream-and-run arthroplasty. ~~, but these values were not different than those for patients without PJI.~~

Discussion

Cutibacterium is a commensal bacterium in our skin and is in high population in the shoulder region. While it is the most cultured bacteria during revision surgery for shoulder PJI, its clinical significance remains poorly understood. In this study, Cutibacterium load on the unprepared skin and dermal wound edge was not strongly associated with patient reported outcome or repeat procedures. Because our cohort only included one PJI, longer term follow up is likely necessary to better understand the impact of increased pre-operative Cutibacterium skin load on risk of PJI.

References

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2. Matsen FA, 3rd, Whitson A, Hsu JE. Preoperative Skin Cultures Predict Periprosthetic Infections in Revised Shoulder Arthroplasties: A Preliminary Report. JB JS Open Access 2020;5(4). doi:10.2106/JBJS.OA.20.00095

3. Schiffman CJ, Hsu JE, Khoo KJ, Whitson A, Yao JJ, Wu JC, Matsen FA, 3rd. Association Between Serum

		Unprepared Skin		Dermal Wound Edge	
	Mean ± SD, n (%)	Tau	Univariate P Value	Tau	Univariate P Value
Post-op SST Score	10.6 ± 2.4	**0.155**	0.048	**0.176**	0.024
%MPI	77.5 ± 36.9	0.149	0.052	**0.175**	0.023
Post-op ASES score	83.5 ± 18.8	0.055	0.461	0.113	0.132
MUA	28 (243.5%)	0.027	0.711	-0.054	0.561

student's T-test comparing Cutibacterium load and post-operative variables; boldface indicates Kendall's Tau-b correlation is significant at the 0.05 level

Table 1. Cutibacterium load in the unprepared skin and dermal wound edge versus post-operative variables

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Testosterone Levels and Cutibacterium Skin Load in Patients Undergoing Elective Shoulder Arthroplasty: A Cohort Study. JB JS Open Access 2021;6(4). doi:10.2106/JBJS.OA.21.00030

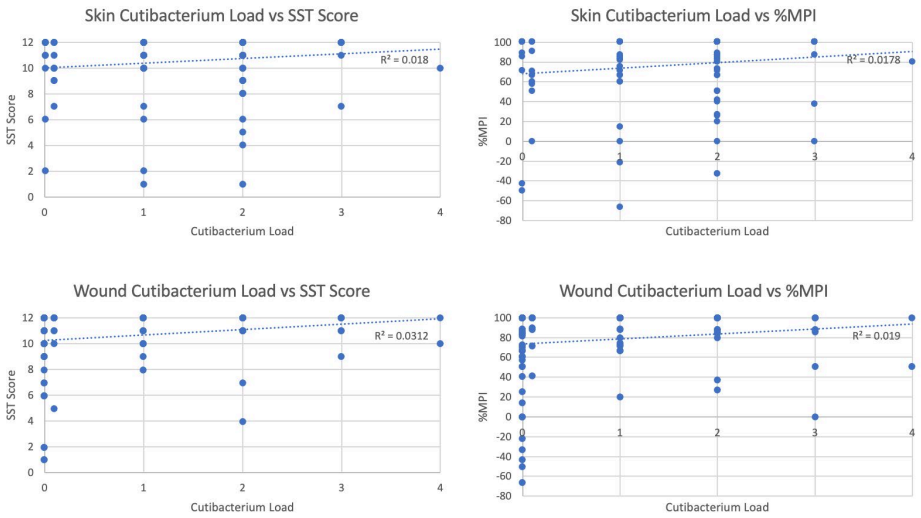

Figure 1: Scatterplot of Cutibacterium Load vs. post-operative variables

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