

Appendix 1. Culturing Methodology and Reporting.

Intra-operative Tissue and Explant Culturing

A standard protocol for obtaining tissue cultures was utilized. Tissue from the collar membrane, humeral canal, and peri-glenoid tissue were sampled using a fresh sterile instrument for each specimen. Specimens are transferred directly into a specimen cup without any additional handling. All explants (humeral head, humeral stem, glenoid components) are similarly transferred directly into a specimen container. These specimens are then transferred to our microbiology lab and cultured on multiple media for 21 days^{6, 14}.

Culturing Methodology and Defining Infection

Our microbiology laboratory reports culture results semi-quantitatively as one colony, broth only, 1+, 2+, 3+ or 4+ which is then converted to the specimen *Cutibacterium* value (SpCuV), a corresponding numerical value of 0.1, 0.2, 1, 2, 3, and 4 as previously described^{6, 19}. The shoulder *Cutibacterium* score (ShCuS) is the sum of all the deep tissue or explant SpCuVs for the shoulder¹⁹⁻²². The average shoulder *Cutibacterium* Score (aShCuS) normalizes the bacterial burden based on the number of tissue specimens taken at the time of surgery (ShCuS / number of cultures taken). The specimen bacterial value (SpBaV) and shoulder Bacterial Score (ShBaS) are similar to the SpCuV and ShCuS, respectively, but take into account all bacterial species that are grown in culture. Given the infrequency of other species, we included all other species into one group. In our practice, a shoulder is treated with an IV antibiotic regimen if two or more specimens grow the same bacterial species.

Appendix 2. Patient demographics, preoperative characteristics, and intraoperative characteristics comparing patients with and without 2 positive intra-operative cultures. BMI = Body Mass Index, ASA = American Society of Anesthesiologist class, VAS = Visual Analogue Scale SST = Simple Shoulder Test. Values are presented as frequencies (percentages) and means \pm standard deviations. Percentages for loosening are taken only from patients who had those components (e.g. hemiarthroplasty patients were not considered for glenoid loosening).

	All	<2 positive cultures <i>N (%) or Mean \pm SD</i>	\geq 2 positive cultures <i>N (%) or Mean \pm SD</i>	p-value
# of patients	175	94	81	-
Age	62.6 \pm 11.6	63.2 \pm 12.6	62.0 \pm 10.4	0.485
Sex				<0.001*
Male	104 (59%)	40 (43%)	64 (79%)	
Female	71 (41%)	54 (67%)	17 (21%)	
BMI	30.7 \pm 6.6	31.0 \pm 6.7	30.4 \pm 6.4	0.555
ASA				0.504
1	8 (5%)	3 (3%)	5 (6%)	
2	94 (54%)	49 (52%)	45 (56%)	
3	73 (42%)	42 (45%)	31 (38%)	
4	0 (0%)	0 (0%)	0 (0%)	
Smoker	16 (9%)	9 (10%)	7 (9%)	0.831
Diabetic	23 (13%)	17 (18%)	6 (7%)	0.037*
Pre-op pain VAS score	6.8 \pm 2.1	6.8 \pm 2.1	6.7 \pm 2.0	0.859
Pre-op SST	2.9 \pm 2.9	2.5 \pm 2.9	3.4 \pm 2.9	0.034*
Prior revision arthroplasty	34 (19%)	16 (17%)	18 (22%)	0.386
Prior infection in same shoulder	18 (10%)	10 (11%)	8 (10%)	0.869
Radiographic glenoid loosening	38 (39%)	24 (46%)	14 (31%)	0.130
Radiographic humeral loosening	20 (12%)	10 (11%)	10 (13%)	0.720
Intra-op glenoid loosening	45 (47%)	26 (50%)	19 (43%)	0.505
Intra-op humeral loosening	38 (22%)	17 (18%)	21 (26%)	0.223
Intra-op cloudy fluid	9 (5%)	4 (4%)	5 (6%)	0.632
Intra-op membrane formation	82 (47%)	36 (38%)	46 (57%)	0.015*
Intra-op glenoid wear	33 (34%)	18 (34%)	15 (35%)	0.925
Explant implant type				
Hemiarthroplasty	83 (57%)	44 (47%)	39 (48%)	
Anatomic Total Shoulder	75 (43%)	40 (43%)	35 (43%)	0.861
Reverse Total Shoulder	13 (7%)	7 (7%)	6 (7%)	
Other	4 (2%)	3 (3%)	1 (1%)	
Surgery type				
Partial Single-Stage Exchange	21 (12%)	15 (16%)	6 (7%)	0.083
Complete Single-Stage Exchange	154 (88%)	79 (84%)	75 (93%)	

p-value: two-sample *t*-test for parametric continuous variables, Mann-Whitney *U* test for nonparametric continuous variables, and Chi-squared for categorical variables.

Appendix 3. Multivariate logistic regression to determine independent predictors of ≥ 2 positive cultures. BMI = Body Mass Index, PJI = Periprosthetic Joint Infection. Odds ratios are presented with 95% confidence intervals (CI) and p-values.

	Odds Ratio (95% CI)	p-value
Age (increase by 1 year)	0.99 (0.96 - 1.02)	0.381
Male sex	7.05 (3.32 - 15.94)	< 0.001*
BMI (increase by 1 kg/m ²)	1.00 (0.94 - 1.05)	0.919
Smoker	0.68 (0.20 - 2.24)	0.528
Diabetic	0.30 (0.09 - 0.90)	0.038*
Prior infection in same shoulder	0.54 (0.14 - 2.04)	0.360
Prior revision arthroplasty	1.87 (0.68 - 5.3)	0.230
Radiographic loosening	0.72 (0.30 - 1.67)	0.447
Intraoperative glenoid loosening	0.68 (0.36 - 1.25)	0.210
Intraoperative humeral loosening	1.16 (0.47 - 2.90)	0.743
Intraoperative cloudy fluid	1.52 (0.29 - 9.23)	0.628
Intraoperative membrane formation	1.90 (0.91 - 4.04)	0.091
Intraoperative glenoid wear	1.09 (0.60 - 1.98)	0.778

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