

Are Patients Who Fail To Follow Up 2 Years After Shoulder Arthroplasty Faring Worse Than Those Who Do Follow Up?

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INTRODUCTION:

Many orthopedic journals require 2 years of follow-up data for clinical studies. This creates significant delay in dissemination of information and creates a much greater administrative burden to achieve high follow up rates at 2 years. This requirement results in a high rate of loss to follow-up, which may lead to biased results. The goal of the present study was to determine if follow-up at 2 years was influenced by early achievement of clinically significant outcomes (CSOs) after anatomic and reverse total shoulder arthroplasty (TSA, RSA respectively).

METHODS:

A prospective, multicenter registry was queried for all patients that underwent shoulder arthroplasty. Patients with preoperative and 6-month postoperative American Shoulder and Elbow Society (ASES) scores were included. CSOs for the ASES score included the minimal clinically important difference (MCID), substantial clinical benefit (SCB), and patient-acceptable symptom state (PASS) as established by Gowd et al.¹. Patients were stratified based on whether or not they followed up at 2 years and their achievement of CSOs at earlier time points (6 months and 1 year, respectively). Pre-operative, and 6-month, 1-year, and 2-year postoperative ASES scores were fitted to a logarithmic model, given their tendency to plateau over time. Multivariate analysis was used to identify predictive variables for 2-year follow-up, including demographic variables, the logarithmic ASES scores, and achievement of CSOs. MANOVA was performed to assess differences in ASES scores between patients who followed up only at 1 year, and those who followed up at 2 years. A p-value less than 0.05 was considered significant.

Reference:

1. Gowd AK, Charles MD, Liu JN, et al. Single Assessment Numeric Evaluation (SANE) is a reliable metric to measure clinically significant improvements following shoulder arthroplasty. *J Shoulder Elb Surg.* 2019;28(11):2238-2246. doi:10.1016/j.jse.2019.04.041

RESULTS:

Overall, 8978 patients were identified, of which 5177 (57.7%) had 1-year follow-up and 3797 (42.3%) had follow-up at 2 years. In the TSA cohort, a total of 3541 patients were identified (39.4%), of which 2391 (67.5%) had 1 year follow-up and 1883 (53.2%) had 2 year follow-up. In the RSA cohort, a total of 5437 patients were identified (60.6%), of which 2786 (51.2%) had 1 year follow-up and 1914 (35.2%) had 2 year follow-up. TSA patients were more likely to follow up at 2 years than RSA patients ($p < 0.001$). A higher ASES score prior to surgery increased the likelihood of 2-year follow-up ($p = 0.028$). Patients that achieved PASS at 6 months postoperatively were less likely to follow up at 2 years ($p = 0.016$). Most variables investigated were not predictive of 2-year follow-up (Table 1). ANOVA of mean ASES scores revealed that patients that only followed up at 1 year had higher preoperative, 6-month postoperative, and 1-year-post-operative ASES scores ($p < 0.001$). ASES scores pre- to post-operatively fit a logarithmic model with an R^2 value of 0.492 indicating that 1-year post-operative ASES scores are good predictors for 2 year post-operative ASES scores ($p < 0.001$).

DISCUSSION AND CONCLUSION:

The present data demonstrate that in patients who undergo shoulder arthroplasty, the likelihood of patient follow-up at 1 or 2 years is generally similar whether they achieved CSOs (MCID, SCB, PASS) at earlier time points. This suggests that patients who do and do not follow up have similar patient reported outcomes. 1-year postoperative ASES scores were highly predictive of 2-year scores. However, patients with lower *preoperative* ASES scores were less likely to follow up at 2 years, which may introduce bias when reporting 2 year outcomes. Further research is needed to understand what, if any, type of biases impact loss to follow-up between 1 and 2 years postoperatively.

Table 1. Multivariate Analysis of Variables Predictive of 2-year Follow-Up

Predictor	Coefficient (β)	Odds Ratio [95% CI]	P-Value
Intercept	-0.918	0.40 [0.08-2.00]	0.26
Age (years)	-0.007	0.99 [0.99-1.00]	0.12
Gender (M vs. F)	-0.089	0.91 [0.79-1.05]	0.22
Reverse vs. Anatomic TSA	-0.314	0.73 [0.63-0.85]	< 0.001
Pre ASES	0.193	1.21 [1.02-1.44]	0.028
6m ASES	0.117	1.12 [0.72-1.76]	0.61
1y ASES	0.319	1.38 [0.91-2.09]	0.13
6m MCID	-0.146	0.86 [0.61-1.22]	0.40
1y MCID	0.054	1.06 [0.73-1.52]	0.77
6m SCB	0.111	1.12 [0.85-1.47]	0.42
1y SCB	-0.023	0.98 [0.73-1.31]	0.88
6m PASS	-0.239	0.79 [0.65-0.96]	0.016
1y PASS	0.099	1.11 [0.90-1.35]	0.33

Table 1

Multivariate analysis to determine variables that predict 2-year follow-up. P-values that were statistically significant are bolded. CSOs were evaluated based on a patients achievement of that CSO using ASES scores at the specified time point, i.e. patients that achieved PASS for ASES at 6 months were less likely to follow up at 2 years. Logarithmic values of ASES were used as the trend of ASES values over time fit a logarithmic model more closely than linear regression. 6m = 6 months, 1y = 1 year.