Prevalence of Shoulder Arthroplasty in the United States and the Increasing Burden of Revision Shoulder Arthroplasty

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INTRODUCTION:
Existing data on the epidemiology of shoulder arthroplasty is limited to future projections of incidence. However, the prevalence of shoulder arthroplasty — the number of individuals with a shoulder arthroplasty alive at a certain time, and its implications for the burden of revision procedures — remains undetermined for the United States. Hence, the purpose of this study was to estimate the prevalence of shoulder arthroplasty in the United States.

METHODS:
The National Inpatient Sample (NIS) was queried to count all patients who underwent total shoulder arthroplasty (TSA, including both anatomic and reverse total shoulder arthroplasty) and hemiarthroplasty (HA) between 1989 and 2017. The counting method was used to calculate the current prevalence of TSA and HA using age and sex specific population and mortality data from the United States Census Bureau.

RESULTS:
The results of this study indicate that as of 2017, an estimated 823,198 patients [95% CI: 809,267-837,129] are living in the United States with a shoulder arthroplasty. This was composed of nearly ~200,000 HA patients (24%) and ~630,000 TSA patients (76%). As of 2017, the prevalence of TSA was 0.197%, or 197/100,000 people, whereas the prevalence of hemiarthroplasty was 0.061%, or 61/100,000 people, and the prevalence for any shoulder replacement was 0.258%, or 258/100,000 people. Stratified by sex, there was a higher prevalence in females (0.294%) than in males (0.221%).

Calculation of historical prevalence demonstrated a recent exponential growth in shoulder arthroplasty prevalence in the United States. For instance, between 1995 and 2017, there was an increase in the prevalence of shoulder arthroplasty (both TSA and HA) from 0.031% to 0.258%, with incremental increases at each time interval analyzed (Figure). The overall prevalence increased with increasing patient age, and the prevalence of any shoulder arthroplasty in individuals ≥80 years old in 2017 was over 2%.

The prevalence of TSA was analyzed with regard to duration since the index operation. We found that the majority of people living with a total shoulder arthroplasty had undergone the procedure within the last 5 years (61.7%) or 10 years (87.4%). This trend was different for hemiarthroplasty, as 79.7% of the individuals had undergone the procedure more than 5 years prior, and 46.2% had undergone the procedure more than 10 years prior.

The incidence of revision shoulder arthroplasty demonstrated a ~350% increase in incidence since 2002, increasing from ~2,000 annual procedures to >10,000 (Figure). Furthermore, the yearly healthcare costs of revision shoulder arthroplasty saw an increase from ~$25,000,000 in 2002 to ~$200,000,000 in 2017.

DISCUSSION AND CONCLUSION:
The prevalence of shoulder arthroplasty in the United States has markedly increased over time. This trend will likely continue given increasing life expectancies and exponentially increasing shoulder arthroplasty incidence rates. Most patients do not have long-term follow up, and revision shoulder arthroplasty rates are increasing—a trend that is projected to continue. The data from our study highlights the enormous public health impact of shoulder replacement, and sheds light on a potentially increasing revision burden.