

Readmission & Adverse Events: *Total Shoulder Versus Hip and Knee Arthroplasty*

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I have no conflicts



Introduction

- Utilization rates of total joint arthroplasty (TJA) are rapidly increasing
 - Annual volume currently exceeds one million cases per year
- Safety of total shoulder arthroplasty (TSA), relative to arthroplasties of the hip (THA) and knee (TKA), remains poorly understood
 - Insights into short-term complication rates of TSA would support
 - Surgeons in preoperative risk stratification and patient counselling
 - Policymakers in optimizing bundled payment structures
- Relative to THA/TKA patients, Fehringer et al. (2010) reported TSA patients experienced
 - Longer operative times
 - Fewer complications
 - Shorter lengths of stay
- Perioperative outcomes have not since been compared between these procedures



Introduction

- **Purpose**

- **Utilize a large national sample (NSQIP) to compare surgical risks & complications associated with TSA versus THA and TKA**
- **Secondary aim**
 - **Evaluate relative procedure trends**

- **Hypothesis**

- **TSA will be associated with**
 - **Lower complication rates**
 - **Shorter lengths of stay**
 - **Longer operative times than THA and TKA**
- **Secondary hypothesis**
 - **TSA utilization will be growing at a faster rate than those of THA and TKA**



Methods

- American College of Surgeons National Surgical Quality Improvement Program (NSQIP) database
 - 2012 – 2020
 - Age: ≥ 18 years old
 - Unilateral, primary TJA
 - Current Procedural Terminology (CPT):
 - TSA: 23472
 - THA: 27130
 - TKA: 27447
 - Baseline demographics
 - Age, gender, race, BMI, diabetes mellitus, smoking, COPD, CHF, hypertension, etc.
 - Outcomes
 - 30-day adverse events
 - Readmission
 - Total operative time
 - Unadjusted and adjusted analyses ($\alpha=0.05$)



Results

- **Baseline Demographics**
 - **Total of 748,153 patients**
 - **TSA: 32,222**
 - **THA: 279,528**
 - **TKA: 436,403**

Compared to THA & TKA patients ($p < 0.001$):

TSA patients were:

- **Older** (mean \pm SD: 69.23 \pm 9.42 TSA, 65.23 \pm 11.26 THA, & 66.91 \pm 9.37 TKA)
- **More frequently White** (83.5% TSA, 72.8% THA, and 72.1% TKA)
- **More often not Hispanic** (83.9% TSA, 78.8% THA, and 77.4% TKA)
- **More frequently ASA class 3 or higher** (56.9% TSA, 44.5% THA, and 50.2% TKA)

Results

- **Unadjusted** analyses of operative characteristics & perioperative complications
 - **Relative to patients undergoing THA or TKA, TSA patients experienced**
 - **Longer operative times**
 - **Shorter hospital stays**
 - **Lower readmission rates**
 - **Lower rates of serious or adverse events**

Comparison of operation times, lengths of stay, and perioperative outcomes between patients receiving total shoulder, hip, or knee arthroplasty.*

	Total N=748,153 (%)	TSA N=32,222 (%)	THA N=279,528 (%)	TKA N=436,403 (%)	P Value†
Total Operative Time	91.32±36.91	109.21±44.62	91.28±38.48	90.02±34.85	<0.001 for all †
Length of Hospital Stay	2.30±3.37	1.65±3.41	2.32±3.61	2.33±3.20	<0.001 THA vs. TSA & TKA vs. TSA†; 0.98 THA vs TKA
Days From Operation to Discharge	2.28±2.49	1.61±2.26	2.26±2.77	2.33±2.30	<0.001 for all †
Any Readmission	23,953 (3.20)	938 (2.91)	9,597 (3.43)	13,418 (3.07)	<0.001†
Serious Adverse Events	30,344 (4.06)	1,196 (3.71)	12,590 (4.50)	16,558 (3.79)	<0.001†
Minor Adverse Events	10,949 (1.46)	302 (0.94)	4,421 (1.58)	6,226 (1.43)	<0.001†

*Data are reported as mean ± SD or No. of patients (%). †P values were calculated using Chi-square tests for categorical variables and one-way ANOVA for continuous variables. ‡Statistically significant ($\alpha = 0.05$). TSA, total shoulder arthroplasty; THA, total hip arthroplasty; TKA, total knee arthroplasty.

Results

- Adjusted analyses of perioperative complications:*
- **Relative to THA & TKA patients, TSA patients had reduced odds of**
 - **30-day readmission**
 - Odds ratio: 0.78 (95% CI: 0.73-0.83, $p < 0.001$)
 - **Serious adverse event (e.g., death, reoperation, DVT, sepsis)**
 - Odds ratio: 0.84 (95% CI: 0.78-0.90, $p < 0.001$)
 - **Minor adverse event (e.g., superficial SSI, UTI, etc.)**
 - Odds ratio: 0.58 (95% CI: 0.51-0.65, $p < 0.001$)

**Controlled for age, sex, race, body mass index, ASA class, smoking status, congestive heart failure, hypertension, diabetes mellitus, and functional status*



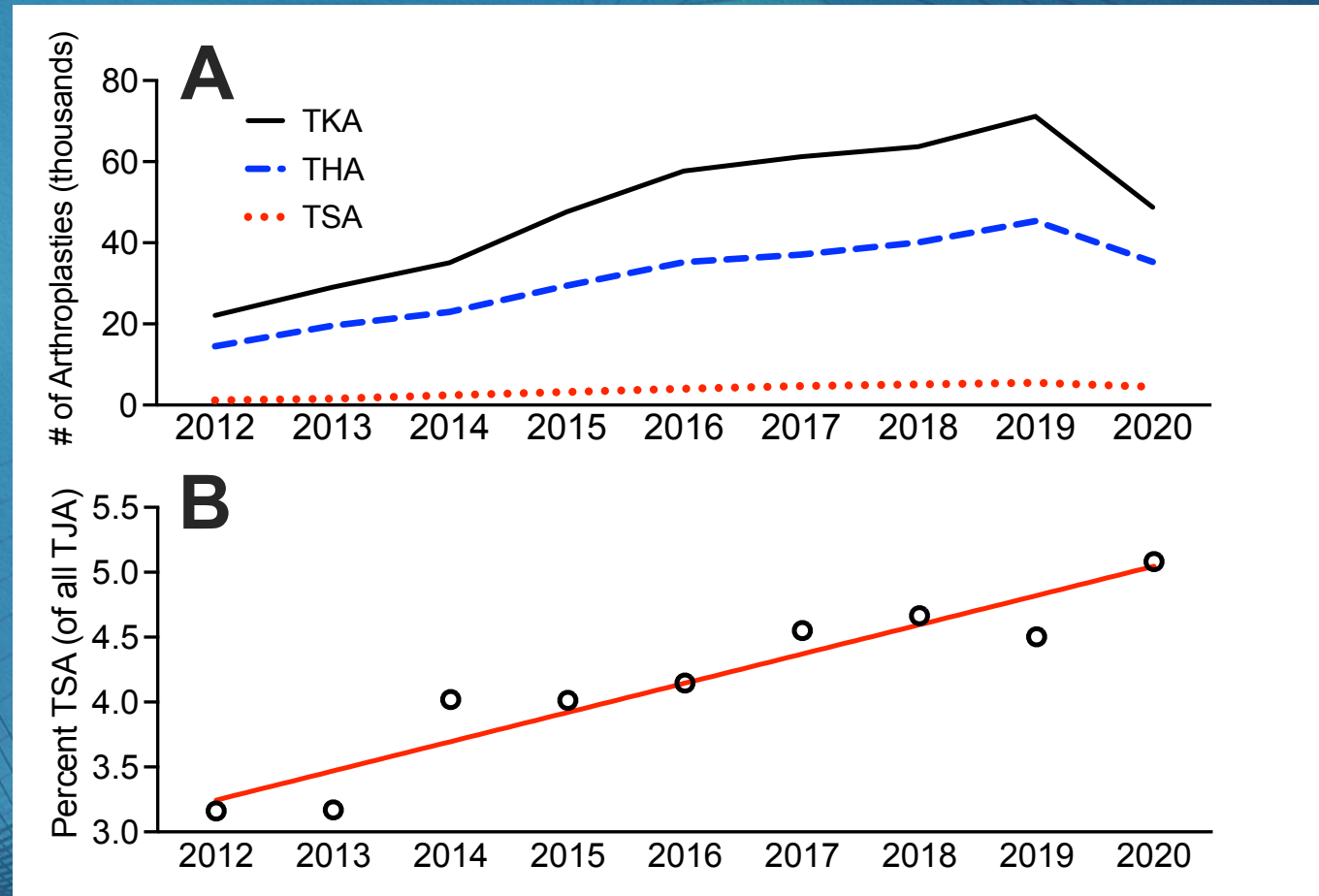
Results

- Utilization trends

- From 2012-2020

- The proportion of TSA increased significantly (3.2 to 5.1%), relative to THA (38.4 to 39.8%) and TKA (58.5 to 55.1%)

- $p_{\text{trend}} < 0.001$



A: Utilization trends for TSA, THA, and TKA from 2012-2020

B: The relative utilization of TSA increased significantly from 2012-2020 (equation: $Y = 0.23x - 449.7$, $R^2 = 0.897$; $p < 0.001$).



Limitations

- **Common limitations of the NSQIP database**
 - **30-day postoperative time period**
 - **Data may not be nationally representative and are subject to coding errors**
 - **Reverse and anatomic TSA**
 - Coded with the same CPT code
 - **Restricted in assessing surgery-specific factors**
 - Surgeon experience
 - Hospital volume
 - Socioeconomic variables
 - Postoperative protocols

Discussion & Conclusion

- Consistent with our hypothesis, TSA was associated with
 - Shorter hospital stays
 - Longer operative times
 - Lower likelihoods of 30-day readmission or adverse events
- Our findings align closely with those from previous studies analyzing roughly 2,000 TSAs from 1994-2006
 - Robust trends may enable surgeons and third-party stakeholders (e.g., hospital systems, insurance providers, etc.) to confidently gauge the risk and complications associated with TSA versus THA/TKA
- Findings corroborate the relative safety of TSA
 - Highlight its increasing utilization in the US
 - Provide stakeholders with the most up-to-date evaluation of perioperative complications following TSA, THA, and TKA



Thank You

Massachusetts General Hospital



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