UTHealth Houston

Two-component Revision Improves Outcomes for Unstable Shoulder Arthroplasty: A Nationwide Database Study

Tyler Gardner MD, Karsten E. Fields, BS, **James M. Gregory, MD**

7 April 2025

Disclosures (JMG)

- Consulting
  - Stryker
  - Arthrex
- Research Support
  - Stryker
  - Arthrex
- Board or Committee Member
  - AAOS
  - ASES

FAIN# R01AR083471

Introduction

- Total shoulder arthroplasty (TSA) utilization has significantly increased, due to utilization in expanding older demographics, more favorable outcomes compared to hemiarthroplasties, and increasing utilization of reverse TSA for its broader range of indications for use [1, 2].
- Revision shoulder arthroplasty rates are also growing, seen by a 392% increase in incidence of revision SAs performed between 2017 and 2023 [3].
- Instability after TSA is a known post-operative complication that has profound effects on patient function and morbidity, and it often necessitates revision SA. At some institutions, the foremost cause of revision surgery is instability, at up to 38% of cases [4].
- In revision of TSA following instability, surgeons may opt to revise either the humeral or glenoid component (one-component revision) or both the humeral and glenoid component simultaneously (two-component revision).
- Surgical approach for management of prosthetic instability remains controversial.
- Few studies have compared these two revision surgical approaches; thus, it remains unknown whether the revision surgical approach chosen affects surgical outcomes and complication rates.

Purpose

To determine if there is a relationship between outcomes and the revision surgical approach chosen to manage prosthetic shoulder instability

Hypothesis

Treatment of prosthetic shoulder instability with two-stage revision will have a lower recurrent instability rate

Methods

- PearlDiver database queried for patients with first-instances of primary shoulder arthroplasties (TSA), excluding patients with inactive records five years later (Box 1.1-1.2, Figure 1).
- Patients with instability following the primary TSA were selected using instability related ICD codes (Box 1.3, Figure 1).
- Primary outcome was any second revision surgery performed for recurrent instability following the first revision surgery.
- Secondary outcomes included post-operative infection, fracture, mechanical complication, and other complications.
- Outcomes were compared between two first revision cohorts based on the revision surgical approach taken (Box 1.4-1.5, Figure 1).
  - One-component revision corresponds to humeral or glenoid component exchange.
  - Two-component revision corresponds to humeral and glenoid component exchange.

Methods – Database Analysis Strategy

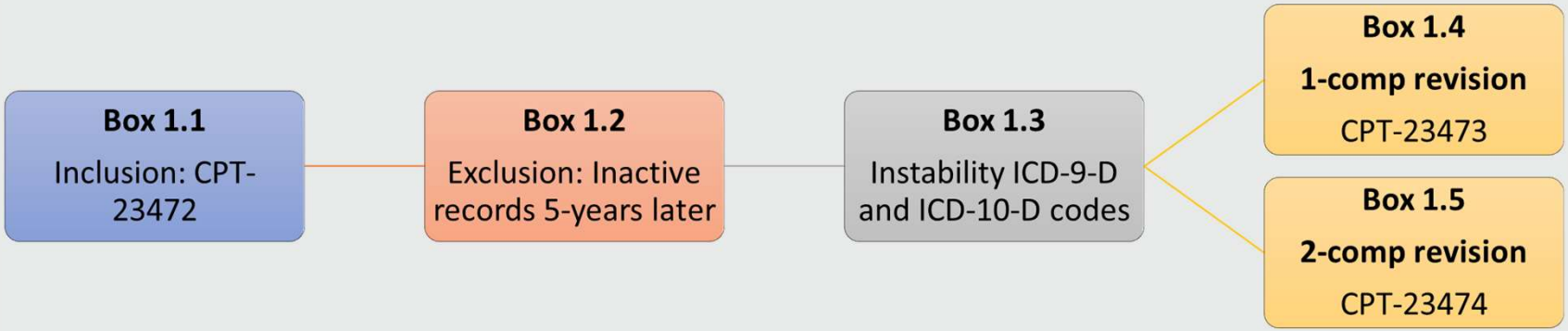

Figure 1

Definitions of Complications

Mechanical Complications

- Broken prosthesis
- Wear of articular bearing surface
- Mechanical loosening
- Periprosthetic osteolysis
- Prosthesis displacement
- Mechanical breakdown

Other Complications

- Fibrosis
- Joint derangement
- Pain related to shoulder prosthesis
- Post-procedural hematoma/seroma/hemorrhage
- Unspecified complication related to shoulder prosthesis

Results

- Greater second revision rate in the one-component revision cohort **(21.1% vs 14.4%, p<0.002).**
- Greater rate of post-operative fracture in the one-component group **(8.8% vs 5%, p<0.007).**
- Greater overall rate of post-operative complications in one-component revision group **(51.8% vs 44.9%, p<0.02).**

	One-Component Revision	Two-Component Revision
Total cohort	n = 521	n = 859
Second Revision Rate	21.1% (n = 110)	14.4% (n = 124)
p-value	p = 0.002	
Infection Rate	22.1% (n = 115)	17.8% (n = 153)
p-value	p = 0.06	
Peri-prosthetic Fracture Rate	8.8% (n = 46)	5% (n = 43)
p-value	p = 0.007	
Mechanical Complications Rate	17.9% (n = 93)	17% (n = 146)
p-value	p = 0.7	
Other Complications Rate	29.9% (n = 156)	27% (n = 232)
p-value	p = 0.3	
Overall Secondary Outcomes Rate [Infection – Other]	51.8% (n = 270)	44.9% (n = 386)
p-value	p = 0.02	

Discussion

- High recurrent instability and complication rates after revision for prosthetic shoulder instability demonstrates that management of these cases remains challenging.
- Two-component revision surgery had lower rates of recurrent instability requiring a second revision surgery, overall complications, and fracture than one-component revision.
- Although database analysis is inherently prone to selection bias and coding inaccuracy, this data mirrors that found in the limited literature published on this topic[5], suggesting that these findings are representative of clinical practice
- Future studies needed to define factors associated with improved outcomes after revision for prosthetic instability

Conclusion

- Choice of revision surgical approach for managing instability following primary shoulder arthroplasty has a meaningful impact on patients' surgical outcomes and complication rates. Both the humeral and glenoid component contribute to prosthetic stability, and failure to address both components during revision may compromise results.

References

1. Schwartz, B. E., Savin, D. D., Youderian, A. R., Mossad, D., & Goldberg, B. A. (2015). National trends and perioperative outcomes in primary and revision total shoulder arthroplasty: Trends in total shoulder arthroplasty. *International orthopaedics*, 39(2), 271–276.
2. Farley, K. X., Wilson, J. M., Kumar, A., Gottschalk, M. B., Daly, C., Sanchez-Sotelo, J., & Wagner, E. R. (2021). Prevalence of Shoulder Arthroplasty in the United States and the Increasing Burden of Revision Shoulder Arthroplasty. *JB & JS open access*, 6(3), e20.00156.
3. Chae, J., Siljander, M., & Wiater, J. M. (2018). Instability in Reverse Total Shoulder Arthroplasty. *The Journal of the American Academy of Orthopaedic Surgeons*, 26(17), 587–596.
4. Boileau P. (2016). Complications and revision of reverse total shoulder arthroplasty. *Orthopaedics & traumatology, surgery & research: OTSR,* 102(1 Suppl), S33–S43.
5. Melbourne, C., Munassi, S. D., Ayala, G., Christmas, K. N., Diaz, M., Simon, P., Mighell, M. A., & Frankle, M. A. (2023). Revision for instability following reverse total shoulder arthroplasty: outcomes and risk factors for failure. *Journal of Shoulder and Elbow Surgery*, 32(6), S46-52.