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Progression to Glenohumeral Arthritis after Arthroscopic Stabilization in a Young and High Demand Population

Ashley B. Anderson, MD

Bobby J. Yow, Zein Aburish, Sean E. Slaven, Patrick K. Mescher, Timothy P. Murphy,
Nora I. Watson, Kelly G. Kilcoyne, Jonathan F. Dickens

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Disclosures

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Anterior Shoulder Instability

- **Limited data evaluating instability associated arthritis**
 - GH arthritis after open stabilization
 - Increase in popularity of arthroscopic (vs open) anterior stabilization
- **Progressing to GH OA following arthroscopic anterior stabilization**
 - 8.7-21.8% of patient population
 - Older patient population >30 years old
 - Multiple recurrent instability events prior to stabilization



Posterior Shoulder Instability

- **Posterior shoulder instability**
 - Accounts for 10% of all shoulder instability cases
 - Acute traumatic posterior dislocation occurring at rates as low as 0.01 per 1000 person-years
- **Limited data evaluating instability associated arthritis**
 - Biomechanical knowledge and epidemiology are more limited
 - Progressing to GH OA following arthroscopic posterior stabilization has yet to be reported in the literature



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Shoulder Instability

- Limited data on progression to arthritis in a young and active population following early stabilization.



Purpose

- The purpose of this study was to assess the rate of progression to, and risk factors for, GH arthritis in a young and high demand population after arthroscopic stabilization.



Methods

- **Retrospective review of 1415 active-duty service members who underwent arthroscopic stabilization for shoulder instability from 2004-2016 in the Military Healthcare System (MHS)**

Inclusion

- ✓ Index surgery in MHS
- ✓ Unidirectional instability
- ✓ Radiographs
- ✓ 4-year follow up

Exclusion

- Multidirectional instability
- History of prior stabilization procedure
- No Radiographs
- Lost to follow-up



- **Cohorts**

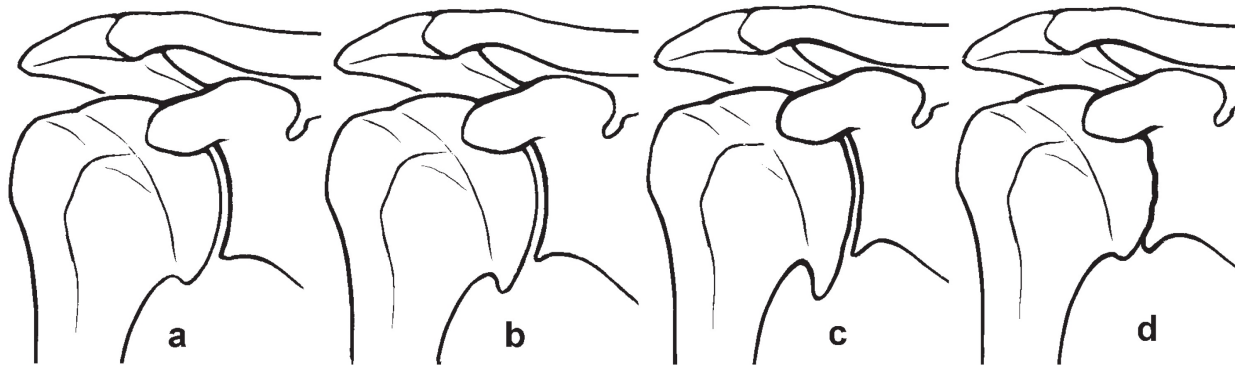
- Anterior Instability
- Posterior Instability

- **Variables**

- Patient demographic characteristics
- Postoperative imaging evaluation
- Index surgery anchor number
- Revision surgery prior to diagnosis with glenohumeral arthritis



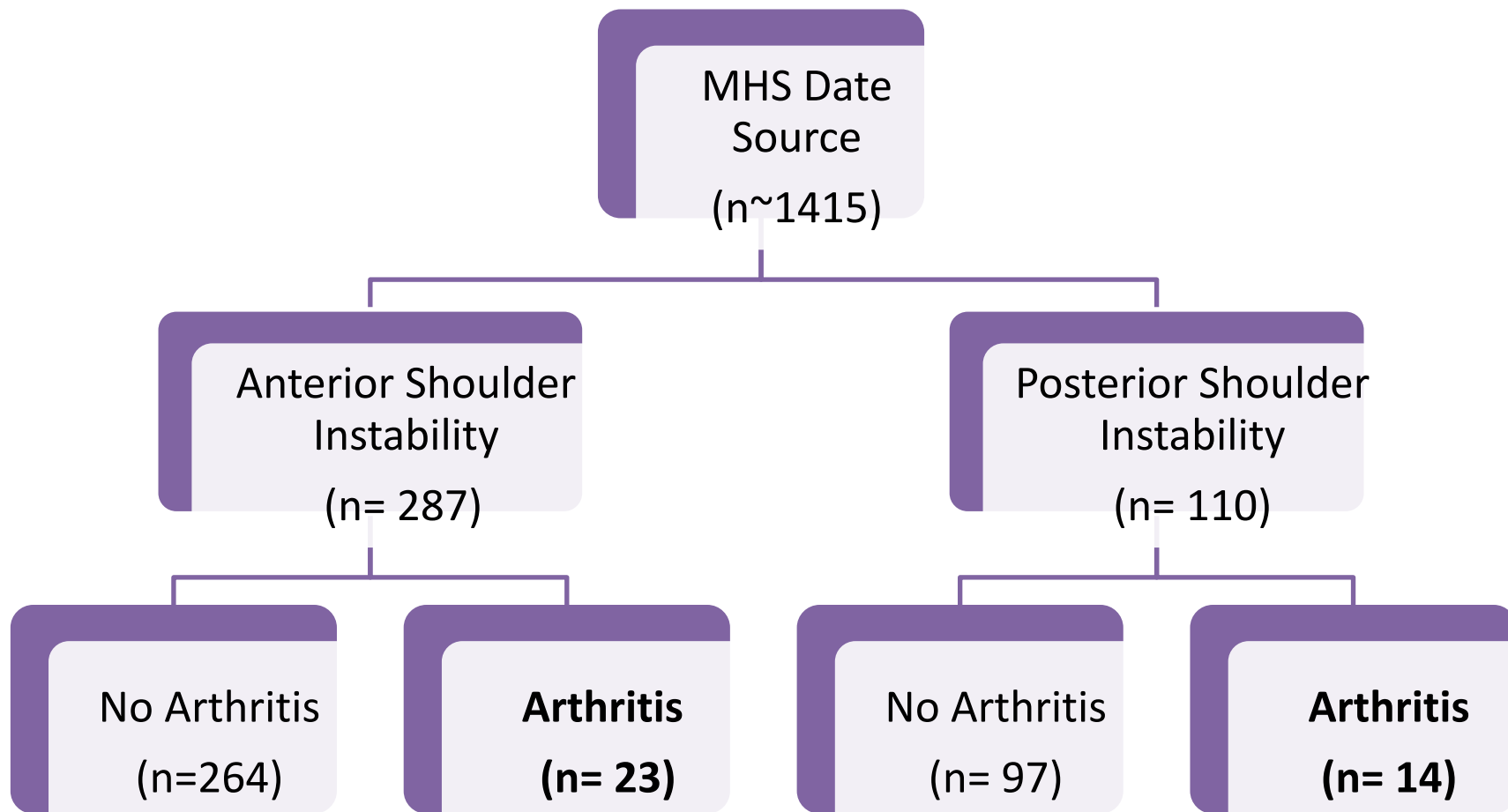
- **Outcome of Interest: Glenohumeral Osteoarthritis (Yes/No)**
 - Grade 1-4 according Samilson and Prieto
 - Final follow-up: time from the index stabilization surgery to the patient's final encounter within the closed healthcare system



* Final follow-up: time from the index stabilization surgery to the patient's final encounter within the closed healthcare system



Cohorts





Statistical Analysis

- **Both Cohorts**

- The incidence rate of glenohumeral arthritis over the follow up period was calculated per 100,000 person-years with the exact 95% confidence interval (CI) based on the Poisson distribution.

- **Anterior Cohort**

- Variables with $P < 0.1$ on univariate analysis were entered into multivariate analyses. Hazard ratios were estimated with their 95% confidence intervals.

- **Posterior Cohort**

- Cox regression models were fit to evaluate the association of each characteristic as the independent variable on time to glenohumeral arthritis as the dependent variable.



- **Progression to glenohumeral arthritis after arthroscopic stabilization in young and high demand populations**
 - 8% of anterior instability patients (median follow-up 8.92 years)
 - 12.7 % of posterior instability patients (median follow-up 8.1 years)



Anterior Results

Characteristic	Arthritis Cases	No. at Risk	Person-Years	Arthritis Rate	Unadjusted RR (95% CI)
Gender					
Female	2	47	376.5	5.3	1.00
Male	21	243	1978.6	10.6	2.00 (0.47, 8.52)
Revision					
No	14	233	1863.8	7.5	1.00
Yes	9	57	491.3	18.3	2.44 (1.06, 5.63)
Age					
<25 years	12	238	1923.3	6.2	1.00
≥25 years	11	52	431.8	25.5	4.08 (1.80, 9.25)
Anchor Number					
<3	6	129	1062.5	5.6	1.00
≥3	17	158	1280.2	13.3	2.35 (0.93, 5.96)
Bone Loss					
<5	10	112	951.4	10.5	1.00
≥5	4	98	797.5	5.1	0.48 (0.15, 1.52)



Anterior Progression to Glenohumeral Arthritis

Characteristic	Cox Hazard Regression Model Hazard Ratio (95% CI)
Scaled Age	1.85 (1.34, 2.55)
Anchor Number	1.54 (1.11, 2.14)
Revision	2.83 (1.15, 6.95)

Risk Factors

- Patient age at index surgery
- # of anchors used at index surgery
- Revision surgery prior to diagnosis of arthritis



Posterior Results

Characteristic	Arthritis Cases	No. at Risk	Person-Years	Arthritis Rate	Unadjusted RR (95% CI)	P value
Gender						
Female	0	3	22.2	0	1.00	
Male	14	107	811.3	17.3	-	0.69
Revision						
No	14	110	833.5	16.8	1.00	
Yes	0	0	-	-	-	-
Laterality						
Right	7	51	387.8	18.1	1.00	
Left	7	57	436.0	16.1	0.89	0.83
Age						
<25 years	10	85	684.8	14.6	1.00	
≥25 years	4	25	148.7	26.9	1.89	0.32
Anchor Number						
<3	10	64	499.2	20.0	1.00	
≥3	4	31	235.3	17.0	0.87	0.81
Bone Loss						
<5	9	63	446.1	20.2	1.00	
≥5	3	28	212.6	14.1	0.72	0.63



Posterior Progression to Glenohumeral Arthritis

Characteristic	Cox Hazard Regression Model Hazard Ratio (95% CI)
Scaled Age	1.45 (0.76, 2..74)
Anchor Number	1.21 (0.75, 1.93)
Bone Loss	0.87 (0.74, 1.03)

Risk Factors

- No risk factors identified



Limitations

- Statistical power was limited by the low incidence of GH arthritis in our cohorts
- Low event rate limited the ability to control for potential confounding.



Anterior

- Patient age and number of anchors used are statistically significant risk factors for progression to arthritis.
- Revision surgery was found to be a risk factor, which has not been previously reported in the literature.
- These results demonstrate decreased rates of arthritis when compared to older populations, which may advocate for early surgical intervention for a young patient presenting with shoulder instability.



Posterior

- No patient characteristics were found statistically associated with risk of GH arthritis
- The potentially clinically relevant effect size for higher risk with increasing age warrants further evaluation in larger cohorts which may help guide clinical decision making and chronicity of treatment.



Conclusion

- This is the largest series looking at glenohumeral arthritis after arthroscopic surgical stabilization for shoulder instability, however both cohorts had low event rates.
- We hope these analyses stimulate further investigation and institutional collaborative efforts to better understand the epidemiology of glenohumeral osteoarthritis.



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Walter Reed National Military Medical Center
ashley.banderson16.mil@mail.mil



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