SLAP Repair Versus Biceps Tenodesis in Patients Younger Than 40 Years

A Cost-Effectiveness Analysis

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Background: The surgical management of type II superior labrum anterior and posterior (SLAP) tears in patients younger than 40 years is controversial, but growing evidence suggests comparable outcomes between primary SLAP repair and primary biceps tenodesis, with lower rates of reoperations after primary biceps tenodesis. Given the relatively similar patient-reported outcomes, cost-effectiveness analyses of direct and indirect costs associated with the two procedures propound a valuable comparative technique.

Hypothesis: In this value-based comparison of SLAP repair versus biceps tenodesis, we hypothesized that biceps tenodesis would be more cost-effective than SLAP repair in patients younger than 40 years.

Study Design: Economic and decision analysis; Level of evidence, 4.

Methods: A 1-month Markov cycle was simulated to reflect 10 years of health outcomes. Health states were selected based on outcomes that are especially important in assessing indirect costs for a younger, active patient population: return-to-sport rates, which demonstrate a return to baseline function, and reoperation rates. Transition state probabilities were obtained through an index systematic review and meta-analysis comparing labral repair and biceps tenodesis for the treatment of type II SLAP lesions in patients younger than 40 years. Health state utility and cost values were obtained from accepted values denoted in existing literature.

Results: Both primary SLAP repair and primary biceps tenodesis yielded an average expected 8.1 quality-adjusted life years over the 10-year period. The average cost (in 2021 US$) was $16,619 for biceps tenodesis and $19,388 for SLAP repair.

Conclusion: In a younger patient population, SLAP repair and biceps tenodesis had comparable quality-adjusted life years and utility in the treatment of type II SLAP tears; however, SLAP repair cost $19,388, while biceps tenodesis cost $16,619, reflecting a 14% cost savings with biceps tenodesis. These findings can be extrapolated to further establish the role for these procedures in treating SLAP tears.

Keywords: shoulder; glenoid labrum; biceps tendon; baseball/softball; military training; economic and decision analysis

The treatment of superior labrum anterior and posterior (SLAP) tears in younger patients has accrued significant controversy in recent years. SLAP lesions, which represent under 10% of all labral tears, are classically managed with labral repair in younger patients and biceps tenodesis in older patients because advanced age is correlated with failed labral repair and the need for revision.1,24 However, there is growing evidence to suggest that outcomes after biceps tenodesis may be comparable or superior to outcomes after SLAP repair, spurring interest in establishing the value of biceps tenodesis as a primary treatment option for SLAP tears in patients regardless of age.2,8,12,23 Additionally, biceps tenodesis as the salvage procedure of choice for failed SLAP repair, coupled with acceptable outcomes in this setting, highlights the value of establishing its role as an index procedure.14,19,27,31

While patient-reported outcomes are critical to consider, the importance of value-based health care benchmarks increases in the setting of similar or unclear procedural superiority. With regard to SLAP repair, a cost-effectiveness analysis in middle-aged patients established biceps tenodesis as the most economic treatment method, with an estimated increased effectiveness of 0.06 quality-adjusted life years (QALYs) and total cost savings of $1766.22 However, Nwachukwu and Verma21 described concerns of high rates of SLAP tear misdiagnoses in older patients as well as variable and nuanced decision-making processes for procedural selection in younger patients;
subsequently, these results may not be entirely translatable to a younger population.

The purpose of this study was to investigate the value and cost-effectiveness of SLAP repair versus biceps tenodesis in a younger patient population that is traditionally treated with SLAP repair. We hypothesized that both biceps tenodesis and SLAP repair would demonstrate acceptable clinical outcomes; however, biceps tenodesis would ultimately represent a more cost-effective treatment than SLAP repair in patients younger than 40 years.

**METHODS**

**Markov Model**

A Markov model was constructed to compare primary SLAP repair to primary biceps tenodesis for the treatment of SLAP lesions in patients younger than 40 years. The Markov cycle length was 1 month and the simulation was run for 120 cycles to represent outcomes over 10 years. Health states included postoperative states, primary outcomes, and reoperation outcomes (Figure 1). Markov model assumptions were that postoperative state costs and QALYs would not differ between treatment methods and that all patients would live through the 10-year period. A willingness to pay of $50,000 per QALY was assumed.

Transition state probabilities were obtained through an index systematic review and meta-analysis of studies comparing labral repair and biceps tenodesis for the treatment of type II SLAP lesions in patients younger than 40 years. Health state utility and cost values were calculated based on methods in the existing literature, with direct costs from Centers for Medicare and Medicaid Services physician fee schedules for 2022 and indirect costs from the following previously published formula: 

$$ \text{Productivity loss} = \frac{\text{Missed work days}}{\text{Expected work days per week}} \times \text{Weekly median income} \times (1 - \text{Unemployment}) $$

Overall, 13 missed days were assigned postoperatively as well as after a major complication. For follow-up, patients were allocated 4 office visits and 12 therapy visits with 1 half-day each as well as 5 full convalescent days. Failure to return to sports or military duty was used as a proxy for prolonged disability, given patients’ failure to return to baseline activity. Disability from long-term failure to return to sports was set at 10% of the median income based on Veterans Affairs disability tables. The cost of a reoperation was obtained from values documented in the existing literature. The Markov cost-benefit analysis was performed in TreeAge Pro (v22.10; TreeAge Software).

**RESULTS**

**Transition Probabilities**

Table 1 shows the probability of transition states based on a meta-analysis of 274 patients (169 after SLAP repair and 105 after biceps tenodesis) younger than 40 years with 1 year of follow-up. In this patient population, 72.6% (45/62) of patients returned to sports after biceps tenodesis compared to 59.2% (71/120) after SLAP repair, with a marginal statistical significance (odds ratio [OR], 0.54 [95% CI, 0.26-1.09]; P = .09). Surgical complications were reported in 1.4% (3/208) of patients, with no significant difference between SLAP repair and biceps tenodesis (OR, 1.17 [95% CI, 0.14-9.90]; P = .88). Reoperations were significantly more common after SLAP repair versus biceps...
from these data, an indirect cost of $2,275 was estimated to be $928 per week, with a 5.7 median income for patients aged 25 to 34 years estimated at $13,458.38.22,26 representing generalized disability. The cost of a reoperation either postoperatively or after major complications was estimated at $2,928 for 12 visits.6 In 2021, the average cost was $16,619 for biceps tenodesis (11.2% of specified revision procedures were biceps tenodeses). With a prior systematic review demonstrating comparable postoperative pain, function, and patient satisfaction between the two procedures as well as lower reoperation rates after biceps tenodesis in patients younger than 40 years, exploring the cost-effectiveness of SLAP repair versus biceps tenodesis offers further value in understanding their utility. Ultimately, cost-effectiveness is critical in comparing primary SLAP repair and primary biceps tenodesis, given that both procedures have relatively similar outcomes, aside from reoperation rates that may be better addressed with future research identifying patients at risk for reoperations.

There is existing evidence suggesting that biceps tenodesis is associated with lower direct costs than SLAP repair for tears in patients irrespective of age. A comparison of arthroscopic SLAP repair with open and arthroscopic biceps tenodesis in patients younger than 50 years indicated that open biceps tenodesis is the most cost-effective procedure, saving $5,664 compared to arthroscopic biceps tenodesis and $2,320 compared to arthroscopic SLAP repair.17 The present investigation demonstrates similar results upon incorporating indirect costs: biceps tenodesis yielded the same utility as SLAP repair with an even greater savings of $2,678, a finding that may be influenced by the lower rates of costly reoperations as well as less disability from failure to return to sports in patients undergoing biceps tenodeses. While net direct costs are significantly lower for open biceps tenodesis, Li et al found no significant difference between the overall costs of arthroscopic biceps tenodesis and SLAP repair, despite significantly shorter operative times seen with both arthroscopic procedures, suggesting that the arthroscopic approach may be the source of cost disparities.

Despite clear differences in direct costs, a comparison of indirect costs offers a more nuanced understanding of the downstream effects of both procedures that are especially important to consider in a younger, presumably more active population. In these patients, return to work and return to

| TABLE 1 | Transition States From Prior Systematic Review and Meta-analysis25a |
|----------------|-------------------------|-------------------------|-------------------------|
| Patient characteristics | SLAP Repair (n = 169) | Biceps Tenodesis (n = 105) | P Value (Cochran Q) |
| Male patients/total, b | 112/136 | 54/72 | — |
| Age, mean ± SD, y | 27.1 ± 2.7 | 26.8 ± 0.9 | — |
| Athletes/total, b | 100/136 | 55/72 | — |
| Overhead athletes/total, b | 58/111 | 28/49 | — |
| Follow-up, mean ± SD, mo | 63.9 ± 16.9 | 51.9 ± 20.5 | — |

| Adverse events | Complications | Reoperations |
|----------------|---------------|--------------|
| 1.2% (n = 2): superficial paresthesia of anterior shoulder partially relieved with gabapentin (n = 1), failed treatment in patient who chose nonoperative management (n = 1) | 1.9% (n = 2): details not reported |
| 1.0% (n = 1): postoperative superficial infection successfully treated with antibiotics |
| 11.2% (n = 11): biceps tenodesis (n = 11), revision SLAP repair (n = 1), arthroscopic debridement (n = 1), capsular release (n = 1) unspecified (n = 5) |

aOR, odds ratio; SLAP, superior labrum anterior and posterior.
bTotals do not equal the overall sample size, as not all studies included the relevant information.

tenodesis (11.2% [19/169] vs 1.9% [2/105], respectively), with 3.94 significantly higher odds of a reoperation after SLAP repair (95% CI, 1.16-13.41; P = .03). In total, 78.6% (11/14) of specified revision procedures were biceps tenodeses.

Costs and Utilities

All costs are presented in 2021 United States dollars in Table 2.27 Physical therapy was estimated to cost $243 per visit.6 Direct medical costs associated with physical therapy either postoperatively or after major complications were estimated to be $2,928 for 12 visits.6 In 2021, the median income for patients aged 25 to 34 years was estimated to be $928 per week, with a 5.7% unemployment rate.28,29 From these data, an indirect cost of $2,275 was calculated for lost productivity based on an assumed 13 missed days postoperatively. Long-term disability estimated at 10% of the median income yielded a loss of $371 per month for those who were unable to return to sports, representing generalized disability. The cost of a reoperation was estimated at $13,458.38.22,26

Both primary SLAP repair and primary biceps tenodesis yielded an average expected 8.1 QALYs over the 10-year period. The average cost was $16,619 for biceps tenodesis and $19,388 for SLAP repair. Biceps tenodesis yielded the same utility with a $2,769 cost savings.

DISCUSSION

The present economic analysis indicates that SLAP repair and biceps tenodesis yielded similarly comparable QALYs and utility for patients; however, biceps tenodesis accrued a 14% lower cost, ultimately totaling $2,769 less per procedure. With a prior systematic review demonstrating comparable postoperative pain, function, and patient satisfaction between the two procedures as well as lower reoperation rates after biceps tenodesis in patients younger than 40 years, exploring the cost-effectiveness of SLAP repair versus biceps tenodesis offers further value in understanding their utility. Ultimately, cost-effectiveness is critical in comparing primary SLAP repair and primary biceps tenodesis, given that both procedures have relatively similar outcomes, aside from reoperation rates that may be better addressed with future research identifying patients at risk for reoperations.

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Costs

| Costs                                                                 | Base Case      | Data Source          |
|---------------------------------------------------------------------|----------------|----------------------|
| Cost of complication preventing return to sports                    | $5202.95       | CMS, VA, BLS, FRB    |
| Cost of minor complication                                          | $837.99        | CMS, BLS            |
| Cost of 1 month of not returning to sports                          | $371.20        | CMS, VA, BLS, FRB   |
| Cost of lost productivity in postoperative month 1                  | $5202.95       | CMS, BLS, FRB       |
| Cost of reoperation                                                  | $13,458.38     | Paoli et al, Taylor  |
| Cost of lost productivity in postoperative month 1 after reoperation | $5202.95       | CMS, BLS, FRB       |

Utilities

| Utilities                                                                 | Probability | Data Source |
|---------------------------------------------------------------------------|------------|-------------|
| QALY of complication preventing return to sports                          | (1/12) × 0.45 | Paoli et al |
| QALY of minor complication                                                | (1/12) × 0.35 | Paoli et al |
| QALY of reoperation                                                       | (1/12) × 0.45 | Paoli et al |
| QALY of 1 month of not returning to sports                                | (1/12) × 0.60 | Paoli et al |
| QALY of postoperative month 1                                             | (1/12) × 0.65 | Paoli et al |
| QALY of postoperative month 1 after reoperation                          | (1/12) × 0.90 | Paoli et al |
| QALY of 1 month after return to sports                                    | (1/12) × 0.90 | Paoli et al |

Transition probabilities

| Biceps tenodesis                                                                 | Probability | Data Source |
|--------------------------------------------------------------------------------|------------|-------------|
| Probability of any postoperative complication                                 | 4.2% (3/72) | Sandler et al |
| Probability of complication requiring reoperation                            | 66.7% (2/3) | Sandler et al |
| Probability of complication after return to sports                             | 0.0% (0/1)  | Sandler et al |
| Probability of return to sports                                               | 72.6% (45/62) | Sandler et al |
| Probability of reoperation after return to sports                              | 0.0% (0/2)  | Sandler et al |

| SLAP repair                                                                 | Probability | Data Source |
|--------------------------------------------------------------------------------|------------|-------------|
| Probability of any postoperative complication                                 | 15.4% (21/136) | Sandler et al |
| Probability of complication requiring reoperation                              | 90.5% (19/21) | Sandler et al |
| Probability of complication after return to sports                             | 9.5% (2/21)  | Sandler et al |
| Probability of return to sports                                               | 63.4% (71/112) | Sandler et al |
| Probability of reoperation after return to sports                              | 93.3% (14/15) | Sandler et al |

All costs are presented in 2021 US$. BLS, Bureau of Labor Statistics; CMS, Centers for Medicare and Medicaid Services; FRB, Federal Reserve Bank; QALY, quality-adjusted life year; SLAP, superior labrum anterior and posterior; VA, Veterans Affairs.

The high rates of athletic activity among the younger patients included in our analysis demonstrate the importance of return to sports and activity in assessing patient quality of life after SLAP tears. With regard to return to sports, there is continued controversy about the role of SLAP repair versus biceps tenodesis in young patients that is even more uncertain with athlete status, especially overhead athletes and baseball pitchers whose sports affiliations confers notably lower rates of return to play. Our index systematic review demonstrated a higher rate of return to sport in patients with biceps tenodesis (72.6%) compared to SLAP repair (59.2%), with a marginally significant increase in the likelihood of return to sport after biceps tenodesis (OR, 1.85 [95% CI, 0.91-3.85]; P = .09). Rates of return to play among baseball pitchers are extremely variable and cited to range from 22% to 64% after SLAP repair, with notably detrimental changes in pitching biomechanics and nonpitching performance statistics. Biceps tenodesis yields similarly disappointing outcomes, with a return to sport rate of 35% in baseball players and 17% in pitchers; however, an investigation of return to pitching after SLAP repair versus biceps tenodesis demonstrated equivalent pitching kinematics and physiological neuromuscular control with both procedures, with more closely maintained prior pitching kinematics, specifically thoracic rotation, after
biceps tenodesis. Our comparison of cost-effectiveness focuses on patients younger than 40 years and is subsequently more broadly applicable than a study unique to baseball players or athletes; however, the high rates of athletic activity among patients with SLAP tears magnify the weight of indirect costs when comparing SLAP repair to biceps tenodesis.

Age is a well-described risk factor for failed SLAP treatment, subsequently, the assessment of reoperations in our index systematic review of younger patients that demonstrated significantly higher rates of reoperations after SLAP repair compared to biceps tenodesis (OR, 3.94 [95% CI, 1.16-13.41]; P = .03) further stresses the importance of evaluating reoperations to understand cost-effectiveness. The societal cost of revision surgery after SLAP repair is substantial: in a study from 2007 to 2014, revision surgery accrued a total of $1 million in direct reimbursements, which averaged $859 per patient. The wide range of revision procedures included (SLAP repair, arthroscopic debridement, arthroscopic biceps tenodesis, open biceps tenodesis, and biceps tenotomy) still generated a comparable cost of repair to the initial procedure, which ranged from $8189 to $9461 over the course of the study for direct costs alone. The indirect costs associated with primary SLAP repair such as missed work, delayed or inability to return to activity, and impacted QALYs are only compounded by the need for a second surgical procedure, especially in a young, active, and working population, thereby augmenting the apparent cost-effectiveness of biceps tenodesis.

Limitations

Limitations of this study stem from two primary sources: our index systematic review and the Markov model. Limitations of our index systematic review that was used to calculate Markov data include limited data availability, lack of standardization among age categories, variable follow-up times, inclusion of a small number of type III and IV SLAP lesions, and incomplete qualitative descriptions of return to sports. The greatest limitation of Markov analysis lies in its nonspecific assessment of postoperative pathways and the consequent gross estimation of recovery benchmarks. The value assessment is further limited by incomplete data with a lack of concrete values for indirect costs, coupled with a wide range of cost estimates. The length of the postoperative course further limits the long-term generalizability of this study.

CONCLUSION

In a younger patient population, SLAP repair and biceps tenodesis had comparable QALYs and utility in the treatment of type II SLAP tears; however, SLAP repair cost $19,388, while biceps tenodesis cost $16,619, reflecting a 14% cost savings with biceps tenodesis. These findings can be extrapolated to further establish the role for these procedures in treating SLAP tears.

REFERENCES

1. Alexeev M, Kercher JS, Levina Y, Duralde XA. Variability of glenoid labral tear patterns: a study of 280 sequential surgical cases. J Shoulder Elbow Surg. 2021;30(12):2762-2766.
2. Brockmeyer M, Tompkins M, Kohn DM, Lorbach O. SLAP lesions: a treatment algorithm. Knee Surg Sports Traumatol Arthrosc. 2016;24(2):447-455.
3. Brox Ji, Skare Ø, Mowinkel P, Brox JS, Reikerås O, Schroder CP. Sick leave and return to work after surgery for type II SLAP lesions of the shoulder: a secondary analysis of a randomised sham-controlled study. BMJ Open. 2020;10(4):e035259.
4. Chalmers PN, Erickson BJ, Verma NN, D’Angelo J, Romeo AA. Incidence and return to play after biceps tenodesis in professional baseball players. Arthroscopy. 2018;34(3):747-751.
5. Chalmers PN, Trombley R, Cip J, et al. Postoperative restoration of upper extremity motion and neuromuscular control during the overhand pitch: evaluation of tenodesis and repair for superior labral anterior-posterior tears. Am J Sports Med. 2014;42(12):2825-2836.
6. CMS (Centers for Medicare and Medicaid Services). Hospital outpatient prospective payment system. 2022. Available at: https://www.cms.gov/Medicare/MedicareFees-for-Service-Payment/HospitalOutpatientPPS/HospitalOutpatient-Regulations-and-Notices.html. Accessed February 28, 2022.
7. Code of Federal Regulations. Title 38: pensions, bonuses, and veterans’ relief. Part 4; schedule for rating disabilities. July 2011. Available at: https://www.govinfo.gov/content/pkg/CFR-2011-title38-vol1/xml/CFR-2011-title38-vol1-part4.xml#seqnum4.10. Accessed February 28, 2022.
8. Denard PJ, Lädermann A, Parsley BK, Burkhart SS. Arthroscopic biceps tenodesis compared with repair of isolated type II SLAP lesions in patients older than 35 years. Orthopedics. 2014;37(3):e292-e297.
9. Dunne KF,KNesek M, Tjong VK, et al. Arthroscopic treatment of type II superior labral anterior-posterior tears in patients older than 35 years. Knee Surg Sports Traumatol Arthrosc. 2021; 29(1):257-265.
10. Erickson J, Lavery K, Monica J, Gatt C, Dhawan A. Surgical treatment of symptomatic superior labrum anterior-posterior tears in patients older than 40 years: a systematic review. Am J Sports Med. 2015;43(5):1274-1282.
11. Fedorow WW, Ramkumar P, McCulloch PC, Lintner DM. Return to play after treatment of superior labral tears in professional baseball players [published correction appears in Am J Sports Med. 2015;43(12):NP48]. Am J Sports Med. 2014;42(5):1155-1160.
12. Hurley ET, Colasanti CA, Lorentz NA, et al. Open subpectoral biceps tenodesis may be an alternative to arthroscopic repair for SLAP tears in patients under 30. Arthroscopy. 2022;38(2):307-312.
13. Katz LM, Hsu S, Miller SL, et al. Poor outcomes after SLAP repair: descriptive analysis and prognosis. Arthroscopy. 2009;25(8):849-855.
14. Kreines A, Pontes M, Ford E, et al. Outcomes of arthroscopic biceps tenodesis for the treatment of failed type II SLAP repair: a minimum 2-year follow-up. Arch Bone Jt Surg. 2020;8(2):154-161.
15. Laughlin WA, Fleisig GS, Scillia AJ, Aune KT, Cain EL Jr, Dugas JR. Deficiencies in pitching biomechanics in baseball players with a history of superior labrum anterior-posterior repair. Am J Sports Med. 2014;42(12):2837-2841.
16. LeVasseur MR, Mancini MR, Hawthorne BC, Romeo AA, Calvo E, Mazzocca AD. SLAP tears and return to sport and work: current concepts. J ISAKOS. 2021;6(4):204-211.
17. Li LT, Chuck C, Bokshan SL, DeFroda SF, Owens BD. Cost comparison of open and arthroscopic treatment options for SLAP tears. Arthrosc Sports Med Rehabil. 2021;3(2):e315-e322.
18. Mather RC 3rd, Koenig L, Acevedo D, et al. The societal and economic value of rotator cuff repair. J Bone Joint Surg Am. 2013;95(22):1993-2000.
19. Nadeem IM, Vancolen S, Homer NS, Leroux T, Alolabi B, Khan M. Management of failed SLAP repair: a systematic review. HSS J. 2020; 16(3):261-271.
20. Nashikkar PS, Rhee SM, Desai CV, Oh JH. Is anatomical healing essential for better clinical outcome in type II SLAP repair? Clinico-radiological outcome after type II SLAP repair. Clin Orthop Surg. 2018;10(3):358-367.
21. Nwachukwu BU, Verma NN. Editorial commentary. Pursuit of value-based care for SLAP lesions: more work to be done. Arthroscopy. 2018;34(7):2030-2031.
22. Paoli AR, Gold HT, Mahure SA, et al. Treatment for symptomatic SLAP tears in middle-aged patients comparing repair, biceps tenodesis, and nonoperative approaches: a cost-effectiveness analysis. Arthroscopy. 2018;34(7):2019-2029.
23. Parnes N, Dunn JC, Czajkowski H, DeFranco MJ, Green CK, Scanaliato JP. Biceps tenodesis as an attractive alternative to superior labral anterior-posterior (SLAP) repair for type II SLAP lesions in active-duty military patients younger than 35 years. Am J Sports Med. 2021;49(14):3945-3951.
24. Provencher MT, McCormick F, Dewing C, McIntire S, Solomon D. A prospective analysis of 179 type 2 superior labrum anterior and posterior repairs: outcomes and factors associated with success and failure. Am J Sports Med. 2013;41(4):880-886.
25. Sandler AB, Scanaliato JP, Baird MD, Dunn JC, Parnes N. Lower reoperation and higher return to sport rates after biceps tenodesis versus SLAP repair in young patients: a systematic review. Arthrosc Sports Med Rehabil. 2022;4(5):e1887-e1895.
26. Taylor SA, Degen RM, White AE, et al. Risk factors for revision surgery after superior labral anterior-posterior repair: a national perspective. Am J Sports Med. 2017;45(7):1640-1644.
27. Thayaparan A, Yu J, Homer NS, Leroux T, Alolabi B, Khan M. Return to sport after arthroscopic superior labral anterior-posterior repair: a systematic review. Sports Health. 2019;11(6):520-527.
28. US Bureau of Labor Statistics. Databases, tables & calculators by subject. US Department of Labor. Available at: https://www.bls.gov/data/#prices. Accessed February 28, 2022.
29. US Bureau of Labor Statistics. Unemployment rate: 25-34 yrs (LNS14000089). Federal Reserve Bank of St Louis. Available at: https://fred.stlouisfed.org/series/LNS14000089. Accessed February 28, 2022.
30. Van Nielen D, Wilson M, Hammond J, Joyner PW. Biceps tenodesis vs. repair for type II SLAP tears in patients under 30 years-old. Orthop J Sports Med. 2017;5(7 Suppl 6):232596717S00395.
31. Werner BC, Pehlivan HC, Hart JM, et al. Biceps tenodesis is a viable option for salvage of failed SLAP repair. J Shoulder Elbow Surg. 2014; 23(8):e179-e184.