Most of the surgical options described are aimed at treating the soft tissue abnormalities associated with internal impingement, though some have investigated procedures focused on the bones of the shoulder. For example, Riand et al[58] described a derotational osteotomy with myorraphy of the subscapularis muscle as a treatment option. In these patients, the persistent pain after articular debridement was believed to be caused by increased humeral retroversion and prevented the patients from returning to their throwing sports. After the osteotomy, 55% of the patients were able to resume their sport at full level.

## Summary

From the authors' perspective, the literature from the past 2 decades has demonstrated increasing awareness and knowledge of the causes of posterior shoulder pain and internal impingement of the shoulder. More data and long-term follow-up studies can be expected, especially investigating the different treatment options. To date, we know of no prospective studies directly comparing treatment modalities, which is a limitation of the current body of evidence. Most of the current studies are clinical follow-up, not comparative but observational in nature. The condition itself presents difficulties in study design because concomitant shoulder pathologies make matching groups for a study difficult. Anecdotally, the authors have observed increased glenoid retroversion, as described by Crockett et al[21] when comparing dominant to nondominant shoulders in throwers and nonthrowers. In the authors' opinion, the posterior glenoid shape remodeling may lead to a prominence of the posterior glenoid. There is then an increased risk of contact between the articular surface of the rotator cuff and the posterior glenoid margin. Our hypothesis is that this shape change of the glenoid contributes to the internal rotation deficit and may then lead to internal impingement. Though the role of glenoid retroversion in the natural history of the disease is currently unclear, further study may reveal this as a future target for treatment.

The repetitive motions essential to the sports of overhead athletes place supraphysiologic strains on the shoulder and may result in a variety of changes, including exostoses, capsular laxity, increased humeral retroversion, scapular muscle imbalance, and rotator cuff tendonitis. However, distinguishing between pathologic and adaptive processes is difficult for even the most experienced of surgeons. Initially, conservative treatment and nonoperative therapy should be attempted, but failure may result in the necessity of surgical intervention to allow the patient to resume high levels of competition. For the surgeon, the importance of addressing all comorbidities at the time of surgery cannot be understated, especially capsular laxity and contracture, as failure to do so has demonstrated poor outcomes. Looking to the future, further studies into the role of the Bennett lesion, glenoid version, and a standardized classification system of these shoulder injuries should help to improve our understanding of internal impingement the overhead athlete.

## Conflict of Interest Statement

Steven Behrens, MD, Jeffrey Compas, BA, Matthew E. Deren, BS, and Mark Drakos, MD disclose no conflicts of interest.

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