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WHAT I HAVE LEARNED

What I've Learned—Russ Warren

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Russ Warren was a running back in college at Columbia University, played semipro football with the Providence Steamrollers while attending medical school at SUNY Syracuse, before training in residency at the Hospital for Special Surgery (HSS). He then spent time in a fellowship with Charles Neer. He was briefly in private practice in Lynchburg, Virginia, but returned to HSS in January 1977. Warren was surgeon-in-chief at HSS from 1993 to 2003 and was the long-time head team physician for the New York Giants football team. He was president of the American Orthopaedic Society for Sports Medicine in 1994. He was a founding member of the American Shoulder and Elbow Surgeons and became president of ASES from 1994-1995. He was awarded the O'Donohue Award for sports medicine research in 1982, 1991, and 1994, and the Neer Award for shoulder research in 1989, 1995, 2002, 2003 and 2006. Warren was inducted into the American Orthopaedic Society for Sports Medicine Hall of Fame in 2008. – W.J.M.

Some thoughts on shoulder surgery

In seeing patients over the last 40 years for shoulder problems, there are a number of things I have learned and some I would change.

My interest in shoulder problems occurred after I dislocated my shoulder in high school football. I can recall the foot in the axilla approach to reduction was not the most pleasant event. Subsequently, I was not allowed to play football for 2 years because of the shoulder issue. I was not told it could be repaired. The doctor died, and I resumed playing in high school and college. This was my introduction to the shoulder and sports medicine. Such as it was, I recognized that the field was deficient and also that shoulder care was lacking. It also made me aware that early surgery after a first-time dislocation may have significant value and is something I have increasingly suggested to my young patients.

Dr. Charles Neer subsequently repaired my shoulder while I was in the Navy and noted significant arthritis after some 20 to 30 dislocations.

In performing shoulder surgery for instability, I have noted that what you do on one side of the joint can affect the other side. Thus in the laboratory with Steve O'Brien, we noted that there was about 25 mm of translation anteroposterior in a normal joint and that to dislocate a shoulder anteriorly you had to create injury to the posterior band. Thus in some loose shoulders, it is of value to repair both sides, which is doable arthroscopically.

From the laboratory work, we eventually described the shoulder as a circle and what you do on one side will affect the other; thus, a contracture anteriorly will push the head posteriorly, leading to arthritis, or subsequent posterior instability can occur after an anterior stabilization, which we have noted in a number of patients referred for "recurrent instability." We also noted in the laboratory that to enable a shoulder to dislocate, an anterior labral tear was insufficient. We needed to create a capsule injury as well.

Multidirectional instability (MDI) has always been an interest of mine since having a fellowship with Dr. Neer. One day in his office, we noted how inferior the head could go, and I told him it looked like a sulcus, a term that caught on.

My initial attempts at arthroscopic stabilization were using a suture placed through the glenoid and tied posteriorly.[4] This was a somewhat difficult technique, which led to our developing the Suretac. This was a different technique that could

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address a labral defect but not capsular laxity, leading to a failure rate of 20%. The Suretac had a head that could separate and create irritation because the polyglycolic acid could cause some bone resorption or synovitis.

In the early 1990s, Dave Altchek and I repaired a number of rotator cuffs using the Suretac, similar to Lanny Johnson's staple.[1] The repair did heal, but the head would create a subacromial loose body that required arthroscopic removal and ended our using this approach despite noting that the cuff had healed.

Not every new technique is of value, and sometimes we learned this the hard way. Capsular shrinkage seemed to have value in loose capsules. We used it initially but had a failure rate of approximately 30%. We did not have chondral death or capsule ruptures because we were not aggressive with it. New techniques need a few people to perform and report 2-year data before being used more extensively.

Arthroscopy has greatly improved our shoulder surgery and allowed us to note pathology that can be missed with open surgery. Posterior instability was basically poorly treated as an open technique, but arthroscopic approaches have been extremely successful, including capsule ruptures or reverse Hagel, where a repair has been successful in a number of our patients.

On a clinical level, I have noted that if a patient tells you his shoulder is loose or unstable, he is generally correct, even if you have trouble convincing yourself in the office; further study will demonstrate injury. MDI has been described as not having a labral tear and being only capsule laxity. We had written a paper about MDI with labral tears in loose-jointed patients, and I asked Dr. Neer about his thoughts. He stated that he simply wanted to have a group of patients with one pathology and eliminated labral injured patients but agreed they can have MDI.

Although the scope approach for anterior instability has greatly improved, I do not think we should entirely give up on open approaches; in particular, those young teenagers who play contact sports and have sustained multiple dislocations who are loose jointed with a sulcus sign may be more reliably treated with an open capsular shift with labral repair. The trade-off is some loss of motion and probably more degenerative joint disease in the future, but stability is the goal if the athlete is resuming a contact sport. He or she will tell you, "I want it to be stable next season." Similarly, there is a significant increase in the use of bone graft for shoulder instability, although of great benefit in some patients with >20% of loss, there is still a role for standard open techniques with more limited bone loss of <20%.

The world of shoulder arthroplasty has evolved greatly over the past few years. As a fellow with Dr. Neer, I helped perform a number of total shoulder replacements and noted that we had no solution for deficient cuffs. I recall meeting Mel Post, who was using a constrained prosthesis to no avail, and not until Grammont started in the 1990s did an answer arrive with the reverse prosthesis.

My interest in arthroplasty design started after having to remove more than one stem to convert a hemi to a total; thus, the concept of a modular system with head removal evolved. At that time, David Dines was a resident and knew a sales representative with a young start-up called Biomet. We and their team then developed the final product, which became quite successful. One of the features we used was to have a reverse Morse taper that facilitated working on the glenoid. In addition, we used a titanium stem to facilitate bone ingrowth and thus did not require cement, except for fractures and rheumatoid patients. John Fenlin developed a modular system about the same time, but it did not achieve common usage. I recall Charlie Rockwood beating up on David and me about the need for modularity, but his subsequent design included it.

One of the best improvements that we made with our design was to have a hybrid glenoid that allows bone ingrowth to the porous metal stem. This appears to have significantly decreased our glenoid loosening rate.

The increased use of the reverse prosthesis has altered our treatment of shoulder fractures significantly in patients on whom a hemiarthroplasty would be an option. We may hold off on surgery and see how they do using a reverse as a later option. The delay does not preclude a successful result, whereas a delay in using the hemiarthroplasty led to inferior results for 3- and 4-part fractures.

My overall impression is that we should do away with a cemented prosthesis, if possible, because the issue of loosening is still present. The titanium stem in the humerus does not need cement except for fractures and rheumatoid patients, whereas the hybrid stem has greatly decreased loosening, screw fixation will ultimately preclude using cement. Screw fixation with the reverse has worked well. We have created a convertible baseplate that one can use for a total shoulder and later convert to a glenosphere for a reverse with screw fixation, avoiding the use of cement, which I believe will become commonplace for total shoulder replacement.

Cuff repair has gradually improved arthroscopically, and whether you use a single row or a double row, we still have defects because the issue seems to be more biologic than mechanical. It is surprising how well some do, whereas others struggle. I have always used a 6-week sling period and did not go through the "aggressive shorter rehab" that some have advocated. Post sling, I have noticed the patient has significant weakness that precludes lifting their arm without a shrug; thus, the arm should be assisted in elevation until it can be done without a shrug. Having the patient lie supine and punch the ceiling with progressive weights will allow the deltoid to assist the cuff and can avoid an early post sling painful shoulder.

Our observation has been that young adolescents can sustain a subscapularis avulsion and that this should be considered in patients aged younger than 16.[3] They are frequently missed and led to a paper by Lamont et al describing these cases. I have had 2 patients who were seen early after injury where the displacement was small (<5 mm) and the fragment healed. Some, if diagnosed late, may have a large osteophyte 3-5 cm long.

In the office working with fellows who initially evaluate patients and seeing outside consults, the issues that are commonly missed are acromioclavicular (AC) joint pain and cervical disc disease. The overlap with cervical disease is significant, and often the shoulder and cervical spine are both involved and need treatment. The overlap of C5-6 issue resulting in deltoid and biceps weakness is important to sort out. Spurling's test and use of a reflex hammer are highly useful and need to be part of every shoulder surgeon's evaluation. In addition in patients presenting with severe pain, a joint infection and a pancoast tumor needs to be considered as they are often missed.

It has been interesting to see how AC joint injury has evolved. Many athletes can tolerate grade 3 instability but not a grade 5.

As Basmajian noted, horizontal adduction is important because if the clavicle slides under the acromion, it is likely to cause subsequent pain and thus benefits from early surgery. I tried for a period to do a technique of drilling the clavicle, but early on decided against the risk of fracture in contact athletes and thus going over the clavicle with a graft is sufficient. More important is to address the AC joint, because as Debski showed in the laboratory that isolated treatment of the coracoclavicular ligament leaves rotational instability at the AC joint. It is clear that surgery should address both the coracoclavicular ligaments and AC joint. When the ligament is avulsed, it can be repaired or the graft incorporated into the repair.

A final observation concerns biceps tenodesis. In the 1980s, Dines and I reported on frequent misdiagnoses that were involved in biceps tenodesis, such as cuff disease and instability.[2] During the 1980s and 1990s, the incidence of biceps tenodesis dropped dramatically. Today it has regained its popularity. Whether they all need to be done is not clear. As to the technique, we went through a phase of drill holes at the lower end of the bicipital groove. I have not been a fan of the subpectoral approach. It is important to open the sleeve, because as S. Taylor and S. O'Brien have noted significant pathology in the groove. The tenodesis can be done with a bone tunnel or simply an anchor that pulls the tendon to the bone. Recently in the laboratory, Rodeo et al have found that both techniques heal to the surface and no strength differences in the failure load were noted.[5] Thus, I prefer the bone surface.

I have enjoyed being a part of this evolving field and realize that much of what we have done in the past can and will be improved.

Disclaimer

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References

1. Altchek DW, Warren RF, Skyhar MJ, Ortiz G. T-plasty modification of the Bankart procedure for multidirectional instability of the anterior and inferior types. J Bone Joint Surg 1991;73:105-12.
2. Dines DM, Warren RF, Inglis AE. Surgical treatment of lesions of the long head of the biceps. Clin Orthop Relat Res 1982;(164):165-71.
3. LaMont LE, Green DW, Altchek DW, Warren RF, Wickiewicz TL. Subscapularis tears and lesser tuberosity avulsions in the pediatric patient. Sports Health 2015;7:p110-5. http://dx.doi.org/10.1177/1941738114533657
4. Pagnani MJ, Warren RF, Altchek DW, Wickiewicz TL, Anderson AF. Arthroscopic shoulder stabilization using transglenoid sutures. Am J Sports Med 1996;24:459-67.
5. Tan H, Wang D, Lebaschi AH, Hutchinson AD, Ying L, Deng XH, et al. Comparison of bone tunnel and cortical surface tendon-to- bone healing in a rabbit model of biceps tenodesis. J Bone Joint Surg Am 2018;100:479-86.