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Clinical Faceoff: Distal Biceps Rupture:
Operative Versus Nonoperative Treatment

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When I was a resident approximately 20 years ago, distal biceps rupture was an underdiagnosed injury. I remember meeting patients who had no idea that they had ruptured their biceps, with the injury sometimes having occurred a decade earlier. Now that distal biceps ruptures are more easily repaired, things are remarkably different. Many people think the biceps is the big muscle in the

front of the arm and fear they will not be able to flex it. Knowing that they are “broken,” patients in pain often imagine they always will be in pain unless they get the injury fixed. The rate of surgery varies substantially by surgeon, which suggests the need for a decision aid with dispassionate, easily understood information to help patients determine their preferences based on the best-available evidence. Surgeons seem to agree that the benefit of surgery is a little more supination strength, with flexion strength returning close to normal with or without surgery. An untreated rupture causes less deformity than with proximal biceps rupture. Surgery adds a scar and does not entirely prevent deformity. The main areas of debate seem to be the incidence, severity, and impact of pain with extended use of the arm (fatigue pain) without surgery,

and the rate of adverse events with surgery. I asked John D. Lubahn MD, Orthopaedic Program Director & Chair at the Hamot Medical Center in Erie, PA, USA and Pedro Beredjiklian MD, chief of hand and wrist surgery at the Rothman Institute in Philadelphia, PA, USA to address the issue of preferred management of an acute distal biceps rupture.

David Ring MD, PhD: *Advocates of operative treatment of distal biceps ruptures cite deformity, weak supination, and fatigue pain as consequences of nonoperative treatment. Are these valid concerns?*

John D. Lubahn MD: The answer is yes and no. After 30 years in practice, I’ve managed patients from all walks of life. Some are concerned, some not. For example, the average farmer or individual who owns his or her own business is more concerned about how soon he/she can resume working, and overall cost of treatment than (s)he is about deformity. A person who uses tools on the job may notice weakness in supination (such as when using a screwdriver), although the use of power tools has largely decreased this problem. The rare patient who does repetitive supination may tire earlier. While these are indeed valid concerns, I have had patients return to extremely

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strenuous jobs such as working in the oil and gas drilling industry, sheet-metal work, and general labor in a local state park after nonoperative treatment.

Pedro Beredjiklian MD: In my experience, weakness in supination, fatigue pain, and deformity are predictable consequences of untreated distal biceps tendon ruptures. Patients who present to me for treatment of an old, untreated distal biceps rupture have one or more of these symptoms. When I find an incidental old biceps rupture, patients do acknowledge some symptoms. What varies is the patient's response to these symptoms. Age, activity level, occupation, and psychosocial issues influence symptom intensity and magnitude of disability. Patients who do not seek treatment can adapt to the symptoms, while those who request surgery cannot. In other words, I believe the symptoms are always there, but patient variables determine whether treatment is sought.

Dr. Ring: *The average supination strength without repair is about 50% to 60% compared to about 80% with repair. Is that 20% to 30% average improvement in supination strength worth the potential for synostosis, fracture of the radius, nerve palsy, and other major adverse events?*

Dr. Beredjiklian: The surgical risk-to-benefit ratio has to be evaluated in the

context of each individual patient. A 65-year-old retiree may experience little or no advantage from a 30% increase in supination strength, and as such any risk involved in surgical repair is probably not worth the benefit. In contrast, even a partial restoration of 35-year-old heavy laborer's ability to work could certainly be worth risking the relatively minor (less than 1% to 2%) occurrence of a major adverse event or any other detriment associated with the surgical procedure.

Dr. Lubahn: The risk to a sedentary person is not worth the potential benefit of a modest increase in supination strength. I believe the patients who benefit most are younger athletes, particularly gymnasts. I have treated several muscular male gymnasts injured in a dismount from the stationary rings. They returned to nearly the same level of competition after repair. I am not sure every construction worker, particularly smokers who may not be in the best of health, will benefit from surgery. Patient education is the key to patient satisfaction. I advise patients that complication rates are in the 15% range, maybe even a little higher if you include dysaesthesia in the distribution of the lateral antebrachial cutaneous nerve.

Dr. Ring: *Patients and surgeons are influenced by the sense of urgency to get the muscle repaired before it*

becomes physically shortened and can no longer be directly repaired. Is this a valid concern and how much time can patients and surgeons take to decide whether or not to do a repair?

Dr. Lubahn: Generally, for a retracted rupture, I believe that if the patient waits longer than 3 months, the likelihood of a successful repair is less than if the repair is performed within the first 4 weeks. In the last year, I have operated on one patient who, for a number of reasons, waited longer than 3 months prior to my seeing him. He was able to convince me that for his job he benefited from strong supination. Since he was young, I reconstructed his biceps insertion with an allograft. Six months after surgery, his allograft is intact, but elbow flexion and supination are weak, he still complains of some pain, and now has dysesthesia in the distribution of the lateral antebrachial cutaneous nerve. I have one other patient who delayed treatment initially because he was getting married and I ended up performing the surgery approximately 4 weeks after the injury. He eventually returned to his job in the sheet-metal industry managing to convince his employer to modify his job somewhat such that he requires less repetitive work and less heavy lifting. Six months after surgery his supination and elbow flexion remain weak.

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Dr. Beredjiklian: I have been able to perform a primary repair in patients as late as 6 months after injury, and just a few days ago I struggled to repair a tendon only a few days after the avulsion in a muscular patient in whom the tendon stump retracted high into the mid arm. Recently, Morrey and colleagues [2] described the treatment of a group of patients in whom the elbow had to be flexed more than 60° to perform an anatomic repair. They found that their group did well from the patient satisfaction and functional outcome (Mayo Elbow Performance Score) perspectives, obviating the need for allograft reconstruction in these patients.

Dr. Ring: *Does the type of repair matter? Does the tendon need to be inserted into the bone (two-incision technique)? Is it important to have a strong repair in order to allow immediate movement of the limb or it is acceptable to cast the arm for a month or so after repair?*

Dr. Beredjiklian: In my experience, the type or method of repair likely makes no difference, and the limited available biomechanical and clinical research sheds little light on this matter. I have used a single incision, suture anchor repair, with no bone tunnel for many years with low complication and high patient satisfaction rates. Many of my contemporaries and

colleagues use other methods of repair (two incisions, bone tunnel, cortical button) with similar results. Surgeons can use the repair method and approach they are most comfortable with. I do not believe that immobilization in a cast is necessary—a hinged elbow brace is sufficient and well-tolerated by patients.

Dr. Lubahn: I prefer a two-incision technique with a bone tunnel. I began repairing biceps tendons prior to the advent of suture anchors using a two-incision technique and anchoring the distal tendon in a drill hole at its insertion site with a heavy nonabsorbable monofilament polypropylene suture (Prolene; Ethicon Inc, Somerville, NJ, USA) passed through smaller drill holes on the contralateral side of the radius tying the suture over a bridge of bone. My preferred technique has evolved to using an EndoButton (Smith & Nephew, Andover, MA, USA) a majority of the time to secure the distal biceps to the radius. While translational research suggests that repair with a suture anchor is adequate for healing, leaving the distal biceps attached to a suture anchor on the cortex of the bone does not seem as secure to me as burying it in the bone. I agree that a hinged elbow brace is adequate protection in most patients.

Dr. Ring: *When patients present more than 6 months after rupture with a*

retracted biceps rupture, what is the role of reconstructing the biceps with an interposition of allograft or autograft tendon? Is that surgery considered for aesthetics or function?

Dr. Beredjiklian: Reconstruction of old biceps ruptures with tendon allograft should be tailored to each individual patient's needs. Data are limited, but there appears to be a functional benefit to reconstruction with improvements in DASH and Mayo Elbow Performance scores [3].

Dr. Lubahn: Success with late reconstruction requires a motivated patient and the patient needs to realize that the result will not be as good as with primary repair. The results are better for so-called “partial tears” or biceps tendinosis where there is no muscle retraction.

Dr. Ring: *A patient who presents with an acute distal biceps repair feels “broken” and in need of repair. The pain, swelling, and bruising reinforce the sense that the arm may not be dependable without surgery. How do you help patients balance the sense that repair is necessary with the evidence that the arm will work well without repair?*

Dr. Lubahn: It is important to me that patients understand the range of outcomes from operative and nonoperative treatment of distal biceps ruptures so they can make an empowered, informed

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decisions. I helped with a recent study of 16 patients that chose nonoperative treatment [1]. Only one regretted not having surgery. The average score on the DASH was nine (about the average for the general population) and the average on the Mayo Elbow Performance Index 95 (out of 100). Eight patients reported weakness when lifting heavy objects, six with turning a screwdriver. The average supination and flexion strengths were 52% and 98% of the opposite side, respectively, but this difference did not seem to influence the DASH or Mayo scores, and so maybe it was not so important to those patients whom we studied.

At a recent regional meeting, several presenters advocated routine operative repair of distal biceps ruptures, whereas the current President of the American Society for Surgery of the Hand, Bill Seitz MD, and I told the audience that we operate on more

complications from distal biceps repairs in the course of a year than acute tendon ruptures. Patients are often relieved to hear that surgery is optional and they do not need to take time off work if they choose nonoperative treatment.

Dr. Beredjikian: When it comes to the decision on whether or not to repair the tendon, I make every attempt to educate the patient on the best evidence available, the risks and potential benefits in particular, so that each patient can make an informed decision based on his or her values and preferences. While I try to act as an impartial health advisor, it is probable that at least on a subconscious level I do steer the younger patients toward repair and the older ones toward conservative treatment. Other than the occasional patient who prefers the more paternalistic patient-doctor relationship model (“You’re the doctor, you tell me

what I should do”), I do believe that the vast majority of patients can make the best decision for themselves if presented with clear information of the pros and cons of each treatment approach.

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