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Rotator Cuff Tears: New Understandings

You are listening to ReachMD XM157, The Channel for Medical Professionals. Welcome to Medical Breakthroughs from the University of Pennsylvania Health Systems with your host, Northwestern University Internist, Dr. Lee Freedman.

Rotator cuff injuries are among the most common problems that afflict patients. What new insights from biomedical engineering can help us in our approach to this bothersome condition? I am your host, Dr. Lee Freedman and with me today is Dr. Louis Soslowski, Professor of Orthopedic Surgery and Bioengineering, Vice Chair of Research for Orthopedic Surgery, Director of the Pennsylvania Center for Musculoskeletal Disorders and Director of the McKay Orthopedic Research Lab.

### DR. LEE FREEDMAN:

Thanks for being with us Dr. Soslowski.

### DR. LOUIS SOSLOWSKY:

Thank you very much.

### DR. LEE FREEDMAN:

Well, rotator cuff problems I see all the time in my practices of primary care, doctor how often does this problem afflict patients across the country and what is the mechanism of injury?

### DR. LOUIS SOSLOWSKY:

Well, rotator cuff injuries are the most common cause of shoulder pain in adults. Furthermore it is the second most common cause of musculoskeletal disorders in their work environment secondary to low back pain. So once we are in the adult population, the rotator cuff injuries are extremely important. They occur through many mechanisms. Clinically people talk about 3 categories, those are intrinsic, extrinsic, and overuse conditions that I can maybe briefly describe each of those. When we think about intrinsic mechanisms of rotator cuff injury, we first think of things that are intrinsic internal to the tendon. Things such as decrease in vascularity and altered collagen fiber organization. A degenerative condition due to chronic disuse. When we talk about an extrinsic condition, there are certain anatomical features about the rotator cuff in particular; the supraspinatus tendon, which is the most common of the rotator cuff tendons in terms of

injury and the supraspinatus tendon, has to pass through an enclosed arch formed by the coracoid, acromion, and the coracoacromial ligament that connects the 2. Extrinsic mechanisms are usually due to some encroachment of that physical space through which the supraspinatus tendon must pass and that encroachment of space causes damage to the tendon and that's what we usually think about when we talk about extrinsic scenarios. When we talk about overuse, we are talking about either athletic repetitive use due to overhead activities very common in the sports, baseball, volleyball, swimming for example as well as repetitive use in manual workers such as you know assembly line painters, carpenters, people who have to do repetitive motion with their arm and all 3 of these factors intrinsic, extrinsic, and overuse all contribute significantly to the prevalence of rotator cuff injuries.

**DR. LEE FREEDMAN:**

So to appropriately address the problem, one should try to address each of these 3 factors?

**DR. LOUIS SOSLOWSKY:**

I think the difficulties in treatment today is that we don't really have a good way very often of determining, which of these factors or in fact, combination of these factors is the causative event in terms of rotator cuff injuries. Rotator cuff injuries start very slowly. They will start with someone having shoulder pain, generalized shoulder pain, but of course they are not going to see their doctor just because they have generalized shoulder pain, not even at that point in a primary care scenario so that condition goes on and its only closer to end stage or at least mid stage disease that a doctor is consulted in the first place and at that point, identifying the initial mechanism of injury is quite difficult and so it is important to understand based on patient's history and workup and x-rays and physical evaluation of what factors are likely most causative of the pain and lack of function in order to best treat the patient.

**DR. LEE FREEDMAN:**

And are their specific things in a clinical evaluation that is on physical examination or with diagnostic testing that would lead one to focus on either the intrinsic, extrinsic, or overuse, one more than the other.

**DR. LOUIS SOSLOWSKY:**

The classic condition is first to get a series of x-rays that include a so-called outlet view of the shoulder, which allows you to see the general shape of the acromion. General shape of the overhanging arch and frankly historically as recent as several years back, this was believed to be the primary factor, which is if the acromial shape were such that it were curved or hooked, then the surgical approach was straightforward, which was remove that curved or hooked nature of the acromion and thereby relieve that external extrinsic compression to the tendon, then there is some very convincing data that shows both in patient populations and in cadaveric studies in the laboratory that the incidents of rotator cuff tears and these curved hooked acromion is much greater than when the acromion is flat. So an x-ray is a key factor in terms of identifying the extrinsic contribution. The overuse contribution is probably more straightforward generally speaking, but harder to diagnose. What is the person's occupation? What is their recreational activity? Does that predispose, we know what conditions, what sports, we have epidemiologic data to say what are the scenarios that induce overuse or repetitive injury type of scenarios to the rotator cuff.

**DR. LEE FREEDMAN:**

So taking a good history can help with that aspect of it.

**DR. LOUIS SOSLOWSKY:**

That's almost exclusively history based because there is no, you know, diagnostic test per se that one can perform to say, aha this is an overuse injury, but certainly one can diagnose that from history. Regarding intrinsic issues, there are some laser Doppler type studies that can be done to look at blood flow in the region, but that tends to be more of identifying this as a degenerative condition, which is also in part done on patient history, how long has this been present. Is this an elderly person, things like that?

**DR. LEE FREEDMAN:**

If you have just tuned in, you are listening to medical breakthroughs from the University of Pennsylvania on ReachMD XM157, The Channel for Medical Professionals. I am Dr. Lee Freedman and discussing rotator cuff injury and tear with me is Dr. Louis Soslowsky, Professor of Orthopedic Surgery and Bioengineering at the University of Pennsylvania.

Dr. Soslowsky very often we see MRIs being used to look at the soft tissues, to look at the tendons themselves. Is that helpful?

**DR. LOUIS SOSLOWSKY:**

Yeah, that's very helpful, particularly in trying to diagnose size and location of tear, that's something that cannot be well done on x-ray for example, certainly the tendon is not seen, so in trying to identify the size and location of the tear, the MRI can be extremely valuable and that of course will help dictate surgical treatment. Regardless at that time prior to potential surgery, one would go through significant conservative therapy in almost all types of cases.

**DR. LEE FREEDMAN:**

And does that anti-inflammatory, ice, physical therapy approach really result in healing and cure of the problem?

**DR. LOUIS SOSLOWSKY:**

Well there are different thoughts on that, and I guess the first and frankly quite important feature is ice and rest and physical therapy can relieve the pain and with appropriate activity modification and physical therapy to train certain muscles to acquire early or later or more or less one can certainly help the patient significantly go back to most of what they used to do. The question as to whether it truly cures the disease or the injury is really a second question. Certainly if patients can go back and be happy and perform all their activities of daily living and so on, then that's fine, but ultimately it probably hasn't really healed the tendon and there is some data coming out now that suggests a small rotator cuff tear that responds well to conservative therapy as we are discussing now will likely progress to a larger tear later, which will be more difficult to manage and in that case surgically, then there is a little bit of a debate in the field now as to whether one should operate on those sooner versus later.

**DR. LEE FREEDMAN:**

Is there data about after surgical treatment, what is the incidence of re-tear, or after conservative treatment, re-tear and functional limitations.

**DR. LOUIS SOSLOWSKY:**

Yeah, that's a very important point. So most of the data suggests that in many cases, pain can be relieved. People will seek rotator cuff treatments for acute primary reasons, one is pain and the second is loss of function. So for pain, many rotator cuff procedures work quite well and pain is one thing that patients are told they can expect significant relief. The question of function is a separate issue and you bring up the issue of re-tear rate, which is particularly important here because re-tear rate is now more and more being recognized, as an important clinical problem with second look arthroscopy with ultrasound or MRI, we are beginning to determine and appreciate more commonly the fact that in frankly most rotator cuff repairs, I am sorry to say, there is a high incidence of re-tear rate, which may not result in significant pain, but certainly the data shows has significant loss of function.

**DR. LEE FREEDMAN:**

And is this tear of the tendon from the bone or.....?

**DR. LOUIS SOSLOWSKY:**

Yeah, most rotator cuff tears and re-tears are the tendon from the bone. There are some cases, although a minority of intratendon, tendon-to-tendon tears, but most rotator cuff tears are tendon to bone and the re-tear is the tendon off the bone.

**DR. LEE FREEDMAN:**

And in terms of the re-tear and functional limitations, how long a time should one rest the arm versus try to get the shoulder back into some activity after a procedure?

**DR. LOUIS SOSLOWSKY:**

This is also a very important point and I was actually the subject of some controversy and the subject of some of our current research. Twenty years ago, post rotator cuff repair, the postoperative care was immobilization for a period of several weeks and with the advent and commonality of arthroscopy, people thought well, lets get these people moving faster to avoid the problems of stiffness or loss of range of motion or those type of confounding factors and consistent with treatment in the hand, what we have gone to here is a faster mobilization because one patients wanted and two it is generally believed that that increases the rate of healing to get some mechanical loading, but actually what has happened is now that we have measured re-tear rate, we have realized actually there are some fundamental differences when evaluating data looking at problems in the hand versus problems in the shoulder. Those problems are simply in the shoulder as we just discussed. Most of the problems are tendon to bone healing and then the hand, frankly most of the problems with tendon, the tendon healing and more of an acute nature rather than a chronic nature. There are some very fundamental differences that one would expect would result in fundamental difference postoperatively. Furthermore in the hand, the primary problem is adhesions and scar formation. Whereas in the shoulder, the primary problem is re-tear. Not adhesions and scar formation. In fact, what we found in the laboratory is that in the shoulder, any loss of motion or stiffness seems to be recoverable with time and the tradeoff for that is an increase in repair strength, which is really a fundamental improvement in the functional ability of patients.

**DR. LEE FREEDMAN:**

And so it would make sense that if adhesions and the like are the problem that early mobilization would be helpful, but if it is a tendon-to-bone healing issue, it may be best to let that heal a little bit before you start stressing that.

**DR. LOUIS SOSLOWSKY:**

Right, so its clear that in tendon-to-tendon healing in the hand and the data is very convincing and compelling that passive motion early is very important, otherwise adhesions and scar formations form that really are problematic, and just to take a step back, I think what has happened in the shoulder, well people looked at that hand data and said wow that's convincing data which it is and said let me try this on patients because who wants to be in a sling for an extended period of time. Everyone wants to get back to motion and philosophically you say, well some controlled loading is a good thing and motion to reduce adhesions, but in the shoulder that's not our primary problem. Our primary problem is re-tear rate.

**DR. LEE FREEDMAN:**

I want to thank Dr. Louis Soslowsky who has been our guest pointing out a very important point in the healing of rotator cuff tears, stressing the contrast with hand injury recovery saying that in order to prevent re-tear which is the main problem after rotator cuff repair a period of more prolonged rest may indeed be appropriate rather than early mobilization.

This has been Dr. Lee Freedman, your host, thank you for listening.

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