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Musculoskeletal Ultrasound Applications

You are listening to ReachMD XM160, The Channel For Medical Professionals. Welcome to advances in medical imaging, a program discussing the latest innovations in clinical radiology and imaging technologies. Best diagnosis with real-time imaging makes ultrasound an attractive device for orthopedic application. Today, we will discuss the role of musculoskeletal ultrasound compared to better-known diagnostic tool such as MRI. You are listening to ReachMD radio on XM160, The Channel for Medical Professionals. Welcome to advances in medical imaging. I am Dr. Beverly Hashimoto your host and with me today is Dr. Sherry Teefey. Dr. Teefey is a Professor of Radiology at Mallinckrodt Institute of Washington University in St. Louis, Missouri. Today, we are going to discuss the applications of ultrasound in musculoskeletal imaging.

DR. BEVERLY HASHIMOTO:

Thank you Dr. Teefey for speaking with us today.

DR. SHERRIE TEEFEY:

Oh! it's my pleasure, thank you for the invitation.

DR. BEVERLY HASHIMOTO:

First of all, what is most common sonographic application of musculoskeletal ultrasound in your practice?

DR. SHERRIE TEEFEY:

In our practice the most common application is to evaluate patients who have shoulder pain. Our orthopedic surgeons actually prefer in many incidents is that we evaluate such patients first prior to even considering an MRI.

DR. BEVERLY HASHIMOTO:

So what things are you looking for in these patients when they have pain, because obviously there could be a lot of different causes.

DR. SHERRIE TEEFEY:

Ya, shoulder ultrasound is pretty much good towards evaluating the rotator cuff for tear. We do also look at the biceps tendon and are very good at evaluating biceps tendon ruptured dislocation, subluxation and not very good for evaluating patients who have large subtle changes of inflammation of the biceps tendon.

DR. BEVERLY HASHIMOTO:

Do you find when you see these patients that your extremely accurate compared to the MRI or do the surgeons then go ahead if you have an abnormal exam and go on to other test.

DR. SHERRIE TEEFEY:

We actually did some research in this area where we had a study in which we compared the accuracy of ultrasound to of the diagnosis of the rotator cuff tears and then correlated our findings with these findings at surgery and we found that we were as accurate as MR and in some incidents subjectively from the surgeons, they often feel we are more accurate in certain cases in particular in describing the morphology of the tear itself, and the way we perceive this with our surgeon then with our MR radiologist is not that were competitive, but that in fact with two modalities are complementary. If the orthopedic surgeon was more concerned about a ligamentous pattern a capsular or bony problems or a labral problem, they would order an MR because these are areas of ultrasound is not going to be as effective in diagnosing the problem.

DR. BEVERLY HASHIMOTO:

So if you see a tear, what does your surgeon normally do?, do they proceed to other types of test or do they go ahead and go to the treatments phase.

DR. SHERRIE TEEFEY:

They typically would go the treatment phase unless we raise an issue with the examination as might happen in an obese patient where we might not see the cuff as well as we would have liked to, in that case then they would consider doing an MR.

DR. BEVERLY HASHIMOTO:

Now in my laboratory what we found is many of our shoulder ultrasounds on patients who have actually have been re-injured after surgical repair, because our surgeon feels that ultrasound does have advantages since the MR has many artifacts after repair. Have you had that type of experience as well?

DR. SHERRIE TEEFEY:

We have and in fact we also did a study comparing the ultrasound findings in patients who had had cuff repairs to surgical findings when they had to go back in on these patients, and found we were very accurate in diagnosing problems in the postoperative patient.

DR. BEVERLY HASHIMOTO:

In the postoperative patient, do you have any problems with deciding whether, I guess it at what point you decide that a recommend that the surgeon actually go in and re-repair as supposed to just go to conservative therapy.

DR. SHERRIE TEEFEY:

But that's typically up to the surgeon based on the findings if we see that a patient has torn his cuff again and is in pain often times the surgeon will re-operate on the patient, but I think in cases where we don't see tear that very comfortable to treat the patient conservatively and with physical therapy if necessary to try to handle the problem.

DR. BEVERLY HASHIMOTO:

When you don't see a tear, do you find that a number of these patients actually have partial tear, is that an issue or not.

DR. SHERRIE TEEFEY:

We do in prior study I eluded to where we compared MR to ultrasound in evaluating patients, the rotator cuff tear, we found both has a less accurate in evaluating partial thickness tears. I think since that study of views, gain more experience we have become better and are more accurate in diagnosing partial thickness tears, but sometime when there is cuff degeneration known as tendinopathy and its rather focal it can be difficult to distinguish the two. We now doing a cadaver study examining the characteristic one would see with ultrasound in diagnosing tendinopathy to help us better understand this whole process and improve our accuracy.

DR. BEVERLY HASHIMOTO:

So when you are looking in at the tendons of the shoulder and you found it you are very successful with tears have you, sought of extended that experience to other tendon in the body, we found that ultrasound has been useful for other tendons.

DR. SHERRIE TEEFEY:

It has, there are several articles out by other research who have shown that ultrasound is very effective in diagnosing tendon tears about the angle, either the perineal tendons or other tibialis posterior as well as the flexor tendons of the toe. We've also used it in evaluating the tendons within the hand and wrist, the flexor and extended tendons and it has been quite effective, and in other areas as well in looking at ligaments or looking for fluid collection around the knee ultrasound has been shown to be quite accurate.

DR. BEVERLY HASHIMOTO:

If you just tune in, you are listening to advances in medical imaging on ReachMD Radio XM160, the channel for medical professionals. I am Dr. Beverly Hashimoto and I am speaking with Dr. Sherrie Teefey, Professor of Radiology at Washington University St. Louis, Missouri. We are discussing musculoskeletal applications of ultrasound with Dr. Sherrie.

It's been interesting about your discussion concerning other tendons and ligaments, certainly ligaments are a challenge just because of their size and you said that you have had some experience in the hand, I know that's a really critical area in terms of deciding tears isn't that what you found as well.

DR. SHERRIE TEEFEY:

Ya, we tend to look more closely at the tendons in the hands. We haven't had too many requests for ligaments although there are certainly applications with ultrasound, but the typical common lumps and bumps in the hands such as ganglia or small solid benign tumors ultrasound is very accurate. We also studied this in a paper with our hand surgeons and found if we look at the hand surgeons' initial clinical impression as to whether a lesion was fibrocystic versus what was seen in ultrasound, that ultrasound was much more accurate, and this is an important information prior to treatment or surgical therapy because it helps guide the hand surgeon as to have the most effective way to treat their patient.

DR. BEVERLY HASHIMOTO:

Well, that leads me to the fact that we found it is very useful to use ultrasound therapeutic aspiration in our situation and supraspinatus ganglion cyst. Have you used ultrasound for a therapeutic aspiration or diagnosis as well?

DR. SHERRIE TEEFEY:

We have on occasion typically in the patient who has pain and may not be able to undergo an operation for a month or two, in those situations we aspirate strictly to help relieve the pain temporarily. Those patients since going to operation because the cause of the ganglion is usually from the labral tear that needs to be repaired.

DR. BEVERLY HASHIMOTO:

So you have actually then done quite a few of these labral cysts and found at least some partial relief at least for the time, is that correct?

DR. SHERRIE TEEFEY:

We have done a few over the years, we haven't done a large number because typically the surgeons try to get these patients to the operating room as soon as possible.

DR. BEVERLY HASHIMOTO:

In the hand does it make any difference to aspirate some of these ganglions or not.

DR. SHERRIE TEEFEY:

Well, we started to study with this, but then I think the hand surgeon decided that aspirating in the long run really doesn't provide much relief, because you really need to, if the patient chooses hand surgery and to actually resect the origin of the ganglion so that it doesn't

recur, so injecting steroids or aspirating is largely temporizing.

DR. BEVERLY HASHIMOTO:

Now in doing the musculoskeletal ultrasound since you are so challenged by different locations, have you found that you required any special equipment or can any kind of ultrasound machine do it or what do you recommend for those who are interested in starting?

DR. SHERRIE TEEFEY:

We certainly need a good quality machine with a high-resolution linear array transducer to be able to scan, and one that has a variable frequency that can be changed based on patients body habitus.

DR. BEVERLY HASHIMOTO:

Have you found that you can use some other compact equipment or you, do you feel that you still need to resolution of a larger machine.

DR. SHERRIE TEEFEY:

There are some companies now that are producing some excellent more compact machines, I only have familiarity with one but with that one machine I think I would easily be able to diagnose the rotator cuff tear.

DR. BEVERLY HASHIMOTO:

And I guess the other application that comes up in musculoskeletal ultrasound that certainly does in the rest of the body, if there are use for color Doppler or any kind of Doppler.

DR. SHERRIE TEEFEY:

Yes, certainly in evaluating the biceps tendon I've found it helps to diagnosis tendinitis, or tenosynovitis, there is somewhat being done now with the intravenous contrast agents and evaluating the rotator cuff with ultrasound, but otherwise I don't find color Doppler is very helpful in the past itself.

DR. BEVERLY HASHIMOTO:

For the intravenous contrast are they interested in finding discontinuity of vascularity as a finding for tear is that what there are using it for or is it for more for information?

DR. SHERRIE TEEFEY:

The only study that's has been published with largely to evaluate volunteers and look at the normal vascularity of the cuff itself, but then many possible applications in terms of healing response and repair and as well as the correlation as this is all pretty new research that is evolving.

DR. BEVERLY HASHIMOTO:

So what do you think is the future of musculoskeletal ultrasound you see any future applications that at least interest you I think you might stuck to look out.

DR. SHERRIE TEEFEY:

There are lot of areas that are being explored, people are beginning to look more closely at some of the smaller ligaments at the nerve, certainly there is some institution that do a lot of interventional work with ultrasound whether their injecting steroids or aspirating, so there is lot of I think different areas there to be explored.

DR. BEVERLY HASHIMOTO:

Now have you ever used ultrasound to follow a effectiveness of treatment for example in the shoulder after rotator cuff repair, has a surgeon ever used that as a method to try to see if the repair is going well or any other part of the body.

DR. SHERRIE TEEFEY:

We were actually doing a study now and there is another study that's going to be published in terms of re-tears rate as to whether in the repair itself using a single or a double role of suture anchors is more effective in preventing re-tears, so we are looking at some patients in a couple of studies to determine if one repair technique is better than the other.

DR. BEVERLY HASHIMOTO:

And I guess after a rotator cuff tear, if you for example are looking at the shoulder when do you expect to see no evidence of any kind of defects in the tendon at all, I mean when do you expect it to look perfectly normal after surgery repair.

DR. SHERRIE TEEFEY:

But the tendons really never looked completely normal, because depending on the quality of the cuff substance in the first place is to be repair how long the tear was there, is the cuff substance of poor quality versus an acute tear and again the patient who has good cuff issue all of that is going to impact the repair and now at times when tiny little defects may be present because you can almost never get under 100 percent water tight repair. So it really varies from case to case, but the tendon themselves are often degenerated and there is a lot a different factors as to what you might expect to see.

DR. BEVERLY HASHIMOTO:

Are there any signs that you see that tell you that this person perhaps has a poor prognosis for a long-term success in terms of you know what you are saying that different tendon have a different look after surgery even after a significant length of time, do you find that there are certain findings that concern you enough to have to call the surgeon say you know there isn't absolute tear but this tendon doesn't look it's looking very well.

DR. SHERRIE TEEFEY:

But I think more importantly for the overall prognosis of the patient we provide this information preoperatively as to whether or not there is steady infiltration of the muscle that often pretends a very poor prognosis because if the muscles are completely fatty atrophied the patient not be going to be able to use the arm very effectively and this is important information that we do provide preoperatively, but we don't typically follow postoperative patients unless a problems arises and typically if the patient has recurrent pain after surgery and may go back to see the orthopedic surgeon. They will send them us to check for recurrence of the tear.

DR. BEVERLY HASHIMOTO:

So if a patients do have the fatty atrophy do the surgeons do something different in terms of that are postop exercise program for example do that help or as there are not been any particular way to handle their problem.

DR. SHERRIE TEEFEY:

Well, it's my understanding that the muscles do not come back and that the fatty atrophy persists, so any kind of physical therapy program to rebuild the muscle really is not going to be very effective.

DR. BEVERLY HASHIMOTO:

So that's really important information and at least per the surgeon to discuss with the patient prior to surgery at times like.

DR. SHERRIE TEEFEY:

Correct.

DR. BEVERLY HASHIMOTO:

My thanks to Dr. Sherrie Teefey who has been our guest. We have been discussing musculoskeletal applications of ultrasound. I am Dr. Beverly Hashimoto, and you have been listening to Advances in Medical Imaging on ReachMD radio XM160 the channel for medical professionals. Be sure to visit our web site at reachmd.com now featuring podcasts of this and other featured series. Thank you for listening.

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