Dr. Andrea Spiker:  
Welcome everyone to the Arthroscopy Association's Arthroscopy Journal podcast. I'm Dr. Andrea Spiker from the University of Wisconsin. And today I have the honor of being joined by Dr. Marc Safran, who is a professor of Orthopedic Surgery and Division Chief and Associate Fellowship Director of the Sports Medicine Program at Stanford University. Dr. Safran was the first author of the article titled Criteria for the Operating Room Confirmation of the Diagnosis of Hip Instability: The Results of an International Expert Consensus Conference, which was published in the October 2022 edition of the Arthroscopy Journal. Welcome Dr. Safran and thank you so much for joining me.

Dr. Marc Safran:  
Well, thank you very much for the honor of being asked to join you, Andrea and happy to be here.

Dr. Andrea Spiker:  
So Marc, to start our discussion, will you please tell us a little bit about your current practice?

Dr. Marc Safran:  
Yeah. I'm a Sports Medicine Physician first and foremost, at Stanford. I do surgery on the shoulder, elbow, hip and knee, but about two-thirds of my practice is hip-related and Non-Arthroplasty.

Dr. Andrea Spiker:  
You've published a number of studies on hip instability in the past. Can you describe for the listeners what hip instability is and then tell us a little bit more about how you became interested in hip instability. And then to go a little further, can you then tell us a little bit about how your understanding of instability has evolved over the years?

Dr. Marc Safran:  
Hip instability, it's kind of an area that I just started to see more and more. And the more you look for it, the more you see it. Basically coming from a Sports Medicine perspective, like the shoulder... And even though we talked about the shoulder being a ball and socket joint, obviously it's more like a golf ball on a golf tee. The femoral head has motion relative to the acetabulum. Like the shoulder, we talk about symptomatic laxity. Some people have a lot of laxity but no symptoms and that's not truly instability, that's just laxity. And then there are people that have symptoms associated with it. We started off actually... We were doing some research with Stefano Zaffagnini and the group from the Rizzoli Institute. They had come to Stanford and we had done some basic science research and we found that the femoral head moves relative to the acetabulum when it's intact. And then as we dissected away the soft tissues, the more the soft tissues got dissected away, the more motion of the femoral head relative to the acetabulum.  
And actually when we presented that research at the ORS in 2008, most people that came up to the poster said, "Well, you're crazy, that doesn't really happen." I may be crazy, but that's what the data shows, that the femoral head does move relative to the acetabulum. And obviously with time people have shown that the femoral head does move relative to the acetabulum in asymptomatic individuals. Jacques Menetrey showed that with professional ballet dancers in Switzerland. And then Joshua Harris has shown it with his Splits Radiograph in Houston. And Stephen Aoki has shown that using biplanar fluoroscopy that you can actually see in asymptomatic patients as they move their hip, the femoral head does move relative to the acetabulum.
And I became more and more interested in it because people were talking about postoperative instability in patients and dislocations in patients. And I actually had a patient that had feelings of instability and the general concept was, with time the capsule will heal postoperatively. And I think we had done a fairly extensive lateral capsulotomy, which is how I do my hip arthroscopy and started to become more and more interested in this concept of instability. We had done some studies showing that it can exist in the cadavers. And then Shane Nho really took the baton and did some great studies showing that with capsulotomies, there’s excessive femoral head motion and translation. And then when you see as you go back and look, Wenger had published a paper in Clin Ortho that showed that for patients that they had operated on for symptomatic labral tears, that 87% had bony dysmorphology, either FAI or dysplasia.

And so the question is, what about those other 13%? Were they just truly individuals that just had labral tears that were symptomatic, or potentially they could have instability. And as I started to see more and more patients that had normal bony morphology but had clear intraarticular pain, we started to see that their hips were more easily distractible in surgery, and then we started to notice different patterns of damage in the joint relative to what you would see with impingement. And the more you look for it, the more associations we've found over time.

Dr. Andrea Spiker:
That's a wonderful history. Now Marc, in the past I've also heard the term micro-instability. Though I've heard you mention the term instability, can you discuss what the current preferred terminology is?

Dr. Marc Safran:
It continues to be a term that needs to be, I think, better defined. I've always called it micro-instability because again, I come to it from the Sports Medicine shoulder world where if you had a dislocation that's an instability episode, to differentiate it from a true dislocation or true subluxation, the term micro-instability in shoulder had evolved. And so in the early 80s, people used to say you can't have instability of the shoulder without a dislocation. But then obviously we know now these days that you can have instability without dislocation. And I think the same is true in the hip. So to try to differentiate from a true dislocation of the hip, we started to just call it micro-instability, though that's been contentious. And even at the most recent ISHA meeting, I had discussion with a classic open hip surgeon and what I call micro-instability, he would call instability. But they would just say you have a dislocation or you have instability, whereas I call... In a spectrum, dislocation is the one extreme of instability and the micro-instability is another.

And I think we need to have better terminology for this, that is, I think, a subject of study in and of itself to get some consensus. But I think consensus is necessary, but to me it's either instability without a dislocation or I just call it micro-instability even though we don't call a dislocation macro-instability.

Dr. Andrea Spiker:
It seems like it's an evolving concept that we'll stay tuned for in the future. Now, why do you think instability has been such a challenge for us to diagnose in patients with hip pain?

Dr. Marc Safran:
Well, certainly examination of the hip in and of itself has been difficult because it's deep, it's just a lot of soft tissue envelope, muscles affect the area around the hip. You can't really palpate the hip like you can the knee and even the shoulder would lag behind the knee as far as ability to examine for all sorts of things, including instability. So I think the soft tissue envelope, most people generally has a concept,
they feel like it's a ball and socket joint. It's so well constrained that they can't have instability unless you have significant dysplasia.

But again, I think as we start to look closer at the hip and see the contributions of the soft tissue structures and as we start to look more closely at instability, I think it's becoming easier to diagnose. Though I'm not entirely sure we're going to have the "Lachman" of the hip where a single test is going to be able to tell us definitely if somebody has instability, kind of like in the shoulder, it's a combination of some tests that may need to come together to suggest that the patient has instability. Again, just because it's a deep joint, it's a constrained joint and there's a lot between the skin and the joint itself that may be a source of pain.

Dr. Andrea Spiker:

And that leads to an excellent contribution to our current understanding that you and your co-authors have done, which is this consensus paper. Let's move on to talk about those eight criteria that the consensus conference agreed upon as consistent with this interarticular diagnosis of hip instability. First, you discuss the ease of distraction. Unfortunately there's really no standardized method of measuring this, but it's more of a subjective measure felt by the surgeon. But even so, it seems that there was a hundred percent agreement with the consensus group that this was a sign of hip instability intraoperatively. Can you tell us a little bit about how you assess this?

Dr. Marc Safran:

Well, that's the thing. In all reality, when we as a group... And again you had 15 live in-person there, or by Zoom, we had 15 people that all had said, "Yeah, it's more easily distractible." And we didn't get into how to define the ease of distraction because everybody used differently. One person always puts 50 pounds of force on the hips when he does this arthroscopy and he says, "Well, if it distracts more than a centimeter, that's consistent with instability in his practice." Another said after they bent the joint when the patient's in Trendelenburg and it's more than two millimeters of distraction... So everybody uses a different term, some use a load cell. For us on the table that I use at Stanford after we get rid of the gross traction, if it's less than 11 turns, fine traction to get the hip distracted a centimeter, then that's consistent with instability, and that's just over the years of comparing patients that have and don't have instability.

So for our number, we went back to look at the pattern of damage and compared the pattern of damage with the number of turns and the ones that I ended up doing applications on. And so we had worked back and figured that it was less than 11 turns was the number that we used. So there's different ways of describing the ease of distraction as those different ways of describing the capsule quality is different. So we decided not to get into the weeds of trying to sort out what is the one way to define ease of distraction, but it was consistent. Everybody has some way that they figure out that the distraction was easier than the average patient.

Dr. Andrea Spiker:

And I think any surgeon who does it, a lot of hip arthroscopy will be able to at least have that intra radar reliability. They'll understand what seems to be easier than the typical distraction. So I think you're absolutely spot on and just saying that this is a one criteria to be determined by each individual surgeon. Second, the consensus group described the inside out pattern of acetabular chondral wear. So what's different about this type of chondral wear than what we see in, say cam type impingement?
With the cam type of impingement, due to the mechanism you have that so-called carpet phenomenon, so you have the softening of the articular cartilage delamination, the wave sign, if you will. And then the true delamination, which tends to occur a bit away from the labral control junction, which you’re seeing with the instability. And again, at a more extreme is what you’d see with your dysplasia patients. You tend to see a wearing down. With the femoral head moving excessively at the rim, it starts to wear down the rim. So it’s usually only a couple millimeters from the edge of the acetabulum to the edge of the acetabulum at the labral control junction. And it's a wearing down phenomenon. It's not a thickening, it's not a delamination, it's not a lifting off of the cartilage itself.

Dr. Andrea Spiker:

Next, moving on the third, fourth and fifth signs described, these all have to do with the location and pattern of labral damage. So can you describe for the listeners how the location or pattern of labral tearing in hip instability might differ from femoral acetabular impingement?

Dr. Marc Safran:

Yeah. Martin Beck in his paper on FAI early on in the early 2000s showed that for cam impingement particularly, the greatest amount of damage was antero-laterally and it tended to extend more into the acetabular face, whereas pincer tended to be more global and damage. What we see with the instability patterns is straight anterior, so kind of in that two to three o’clock position or straight lateral. So two to three o’clock being anterior, we’d reference that off of the so-called “psoas U” or that indentation in the anterior acetabulum or straight laterally. And we particularly see the straight lateral pattern around the 12 o’clock area being associated with people, for instance, of high Tönnis angle or acetabular roof angle. So again, using dysplasia as your extreme, if you will, outside instability, you see this pattern both for the labrum and the articular cartilage that’s occurring straight anteriorly or straight laterally.

And Kota Shibata who did a two year research fellowship at Stanford with me, actually broke down the patterns of damage, interestingly comparing our FAI patients with our instability patients. And what he showed basically, if you’re seeing straight anterior or if you’re seeing straight lateral, for both straight lat... For labral damage and particularly control damage, it's associated with that inside out pattern and or labral chondral separation that again, you should be alerted to potential of instability as opposed to FAI being more antero-lateral.

Dr. Andrea Spiker:

And now the sixth item that you mentioned was parafoveal cartilage damage or central femoral head chondromalacia. Why do you think this occurs in hip instability and not in other types of hip pathology?

Dr. Marc Safran:

I spent a lot of time trying to figure that out and actually talking with Leunig about this, he felt that actually this parafoveal damage or central femoral head chondromalacia is probably the head somewhat... Maybe subluxating posteriorly and rubbing against the edge of the acetabulum. We actually did a study here looking at it because I was always taught that chondral damage on the femoral head was a worse prognostic sign than chondromalacia on the acetabulum.

But I found that those that had this parafoveal chondral damage actually didn’t do as poorly as I thought. I think it’s more the weight bearing femoral head damage that is poor prognostically. And so when we looked at all the patients that I’d operated on that had central femoral head chondromalacia, it was associated with hip instability the majority of the time. And so I think it is a good sign. Others have also noted that. And then actually at the time of this consensus conference, we actually had just
submitted our paper showing that central head chondral issue is associated with our instability patients. But we think it's wearing off against potentially the posterior aspect of the acetabular rim.

Dr. Andrea Spiker:
The seventh consensus finding was a capsular defect and then the eighth was capsular status. So can you discuss briefly how this might present differently in a primary hip arthroscopy setting versus a revision setting?

Dr. Marc Safran:
Yeah. I mean capsular defect particularly in a revision setting should be a big clue. If you're doing an arthrogram and you see extravasation in the fluid, I think that would be another sign that you should pay attention to that might be associated with instability. And I think that has led to a lot of surgeons doing closure of the capsule after they do their capsulotomy. As we know, sometimes these capsulotomy heal and sometimes they don't and even with repair. So I think if you see a capsule defect again, that I think should be a clue that we should pay attention to it. You also see capsular defects on occasion after somebody's had a traumatic dislocation, though post dislocation instability is not common. It's pretty rare. Again, I would look for a capsular defect in that situation.

As far as the capsular status, again, it was one of those things just like the ease of distraction. Everybody had a different way of defining that the capsule was poor quality, if you will. Some called it a flimsy capsule. Some said ease of cutting the capsule when they did their capsulotomies. Some noted decreased capsular thickness either on MRI or when they're trying to do their capsulotomy, some define to have thin capsule or some even had if they look starting in the peripheral compartment, there's increased capsular volume in that area. And others defined it as ease of resistance when introducing your cannulas into the joint. So again, multiple different definitions of how people defined that the capsule was not the standard of what you'd see with a normal patient or an FAI patient. But more than 80% noted that there was a difference in the patients that are unstable versus those that are not.

Dr. Andrea Spiker:
So there were a number of other signs you discussed as a group, but which did not reach a high level of consensus at this time. Can you discuss some of these?

Dr. Marc Safran:
Yeah, I mean I was kind of surprised that Ligament of Teres tearing was not associated necessarily in the two-thirds of the group. Thought it was associated with instability, and certainly John O'Donnell has published on this as well, that the Ligament of Teres tears are associated with thinner capsule. And again, he thought that was associated with instability. But many people say, "Well, you have arthritis patients that have Ligament of Teres tear and don't necessarily have instability." And I think that was probably why that didn't reach the threshold.

There are different arthroscopic instability tests that different people in the group used. So there was no one test. There were a couple of people that said, "Well, when you externally rotate the femoral head when locking, there's excessive femoral head translation." Again, not objective numbers, but they noticed that. A couple noted femoral head subluxation or gaping with the hip flexed or they'll do dynamic assessments with flexion and rotation while assessed through the peripheral compartment. But unfortunately, some of those people were doing it after doing a capsulotomy. So the affected role of that was unclear.
And so when we looked at that ultimately the exam under anesthesia, there was probably about 30% said yes, and about in about 30% or 25% said no. And then there were some undecided. A couple of other areas, it was probably too early to say there's a so-called drive through sign that had been described by Dr. Aoki. Some people have noted synovitis infer immediately or Ligament of Terry's labral kissing lesion if you will, where the labrum and the Ligament of Terry's are close to each other at the anterior inferior aspect of the joint. And the reality was, only a few people have seen this or talked about this. So a few people said yes, and just a few said no as well. There was a lot of people that just said, I don't know. In fact, probably about 60-70% said they didn't know for this Ligament of Teres labral kissing lesion. So it's one of those things that maybe we should look for more and we might actually see it. So again, it's one of those things that we say, the eyes don't see what the mind doesn't know. And so once this was brought out and discussed, I do look for it more often and I think, so do others. And the femoral head divot sign that Ben Domb described, again is one of those things that we don't see it very frequently. And the question is, again, there was a lot of people that were unclear whether or not this was a sign or not, something they hadn't really been looking for.

Dr. Andrea Spiker: 
Well, I think this is a great step for us to at least be aware of these things. And as you said, maybe now everybody will be looking for it more often we'll have a better idea of what truly leads to or is a sign of instability in the future. So I'd like to just touch on what your thoughts are and how we can use these intraoperative criteria to aid patient treatment. The underlying assumption here is that the surgeon will already be doing a hip arthroscopy when they identify these criteria that are associated with instability. So would it be accurate to say that the patient has already been diagnosed and offered treatment for presumably some other problem? How then can we use this to help patient care?

Dr. Marc Safran: 
Well, I think the first thing is to be aware of it. So if you see some of these signs in the hip, then you need to be concerned that they may have instability. And I think you can have instability certainly with FAI, several authors have shown that when you look at patients that have hip dislocations, traumatically in sports, a lot of them have concomitant FAI. And so I do think you can have FAI either cam or pincer where you can get the leverage of the femoral head neck junction against the acetabulum. So I think that if you're operating on a person and you see these changes, then I think you need to be careful of the capsule and what you're doing with the capsule. We do know that the majority of surgeons in this country and actually worldwide tend to do capsulotomies when they do their hip arthroscopy, but not the majority repair the capsule.

And so I think if you see these signs, I think you need to be cognizant and careful about the size of capsulotomy you make. And then if you do see this, I think you should make a point of trying to close the capsule and protecting the patient. I think also taking extra care to maybe repair the labrum to try to give some added support for stability of the hip. And if you are doing a labrectomy, particularly segmental labrectomy, at least give consideration, particularly patients with more shallow acetabuli or high roof angle or some signs of dysplasia, I think gives some consideration to labral reconstruction as well.

Dr. Andrea Spiker:
Now looking toward the future, how can we further our understanding of hip instability? And then where do you see our diagnosis and treatment headed

Dr. Marc Safran:
I think now that we see it, I think we need to study it more, need to figure out what is the consequence of the instability. There’s always the question, if you tighten the hip, can you make it too tight? I think we need to look at those types of things. But I think now that we have kind of a gold standard by which we can reference hip micro-instability, question is, can we be better at identifying it preoperatively so that when the patient’s going to the operating room, we know that we’re dealing with instability and how we need to manage things based on that.

So again, it’s all about identifying these things and if you treat the right patient with the right procedure, then they'll get better. And so I think that when we look at the patients that have micro-instability, a lot of patients I see have had prior operations and many not. But if you address the capsule as Stephen Aoki showed in his series, he used to do capsulotomies and not repair them and had 33 out of a thousand patients with instability and he repaired the capsule, the patients get better and they do well.
So I think it's the awareness to treat our patients and be more precise in our diagnosis. If we can get there preoperatively as well, that would be ideal so that we know what we're dealing with going into the procedure.

Dr. Andrea Spiker:
Well, thank you so much Dr. Safran. This has been a wonderful discussion and a very important publication to further our knowledge of hip instability in the field of hip arthroscopy. Thank you so much again for joining us. We look forward to what the future holds in our understanding of hip instability.

Dr. Marc Safran:
Well thank you very much for the invitation. I really appreciate it and I appreciate the journal for publishing the article because I think this is something that's important that we all need to be aware of. So thank you again very much, Andrea, for your efforts.

Dr. Andrea Spiker:
Dr. Safran's article titled Criteria for the Operating Room Confirmation of the Diagnosis of Hip Instability: The Results of an International Expert Consensus Conference can be found online at www.arthroscopyjournal.org. This concludes our episode of the Arthroscopy Journal Podcast. Thank you for joining us.

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