Good evening, and welcome to the program. We are here live in Chicago, Illinois. My name is Todd Sekundiak, and I'm assistant professor of orthopedic surgery at Creighton University Medical Center in Omaha, Nebraska, and we're here tonight with Dr. Wayne Paprosky, professor of surgery at Rush University Medical Center. And we're going to be tackling tonight the issues related to revision of hip surgery and specifically tackling the problem of an acetabular revision. Wayne, when you’re planning for a revision procedure and you’re looking at the patient’s radiograph, what is the process kind of going through your mind when you’re attempting to get what you need to revise the respective components?

Well first of all, as we all know, those of us who do revision surgery, we want to be able to make sure there isn’t any infection. So we always make sure that we have sed rate, CRP, WBC, and if those are elevated, then we tend to go to an aspiration preoperatively in order to see whether or not the cell count is elevated, and especially in today’s world where there is some confusion with respect to issues of metal-on-metal, I think now I’m doing that more often in order to help sort out issues of, whether or not there may be an infection preoperatively, sometimes intraoperatively we’re having a little difficulty determining this. I know we’ll get into this a little bit later.

I then want to determine whether or not the components are loose. I think that’s the most important issue, and we can do this by determining whether or not on seroradiographs there’s been any change of manual inclination of the acetabular component or whether or not there’s been any migration. Similarly, whether or not there are radiolucent lines around the acetabular component that may give us an indication. The second thing we want to look at is whether or not the femoral component has changed position, whether or not it is bone ingrown, fibrous, or loose, if it’s cementless, and whether or not it follows Harris criteria for loosely, if it’s cemented component. So that’s the most important thing to determine before we go into surgery. And then, of course, we want to make sure we understand how much bone loss is present and whether or not it’s reconstructable by conventional means or whether we have to go to the next level and do different forms of secondary procedures.

Specifically, we’re going to be addressing one of my revision procedures that I performed in the last few months, and Wayne is obviously going to critique that for us. Wayne, are there any other ancillary investigations that you have to do to determine the size of defect or what type of augments or acetabular components you’re going to need for that revision procedure?

We have, over the past probably 15 to 18 years, developed a system whereby by using plain radiographs, that is AP pelvis, as well as Judet views, we’re able to assess the bone loss of the acetabular component by just briefly deciding whether or not the migration is greater than three centimeters, whether the migration is up and in, which makes it a more difficult procedure, namely that would be Kohler’s line is violated, and an anterior/superior reconstruction is necessary. That’s a more difficult augment reconstruction versus up and out, greater than three centimeters, which require a buttress augment, and then we look at the ischium to determine if there’s ischial lysis, and that would be a different type of an inferior reconstruction.

Fortunately, if those criteria are not significant enough, you’re generally dealing with a type II situation where we would generally not need augments, but we want to know this preoperatively. And on the acetabulum if there’s any doubts or concerns or you’re just not sure, certainly a CT scan helps. Femoral side is a little bit easier. It’s more two dimensional, not as abstract as a socket, and you really want to determine whether you have enough intact isthmus to get rotational stability with a distally-fixed component, whether it be course coded or of a spline tapered nature.
I agree with you. You know, I think it’s rare, do you agree, that you actually need any further – investigations like CT scans? I mean, I think being with you many years ago you would always teach us to hope for the best, but plan for the worst. And it’s not a matter of having one reconstructive option, but having a few different options available to you.

Yes, that’s correct. And that’s why you can only put so much credence into the preoperative assessment by going and getting multiple studies, different reconstructions, 3D reconstructions. I really don’t think that you want to hang your hat on that and be committed to that. As Todd said, you want to have other options. And even if you think this may be just a simple Type II defect, you still could get fooled, you could uncover a pelvicus continuity and then you may be augment. And a lot of times osteolysis there’s a lot more bone loss present, and you just have to be prepared to deal with it intraoperatively and have these options.

Do you agree that sometimes the defect can be made worse by actually removing the components so when you look at the radiograph it, as you say, may look like a Type II defect, but with attempting to remove these components, especially, like you said, with the lysis, it’s very easy for the surgeon himself to make that defect worse?

Well I hate to admit to this, but when we were first dealing with removal of ingrown components and we thought, well they had to be removed to remove the lysis know, and that that’s the only way you could have successful revision, I personally destroyed a couple columns, took out a lot of medial bone. We then tried some different types of devices that were space occupying, different kinds of gouges, they seemed like – it seemed like it was a good idea, but we still sacrificed bone. We then tried to cut the cup in order to peel it away from the medial wall.

But by and large we realized that there had to be taken when your cup was removed, and it was developed – the device was developed that, I call it the “apple core device,” you can core out the acetabular component with little or no bone loss. And actually only, you really, for the most part, only have to go up one size. So that really changed our fine-tuning of acetabular revisions when we had significant amount of bone loss, lysis, didn’t want to remove the cup, but it maybe was malpositioned, so we left them there because we were afraid to destroy the bone, and ended up with dislocations. So the successful removal of these components to reposition the new components has really made a big different such as the use of the explant system.

Before we get any further, I’d like to promote the audience if they have any questions for Wayne or myself to just push the “Ask” button there on your screen and we’ll be happy to address these for you. Wayne, maybe what we’ll do is begin getting into my case, and then specifically go through the process – or through your process of how you removed the components and obviously get into the reconstructive options for those.

This case that I did a few months ago was a 76-year-old male who had a hip replacement done approximately two years ago. Unfortunately he had two dislocations with this hip replacements and continued to have ongoing pain in his trochanteric region and pain in his groin. Surprisingly, which is kind of a little add-on or anecdotal issue to this story, he did have some sciatic nerve issues and did have some partial foot drop issues with his initial procedure. And so what I’m going to do here, Wayne, is to show you the radiograph here. Here’s AP and lateral of that involved side. And once you take a peek at that I’m also going to show you the AP pelvis which then obviously I’d like to have your comments on that.

And my issue when I look at this hip, I mean, it doesn’t look that bad to me, and I’m trying to figure out, you know, where this guy’s pain is coming from. Obviously you’ve already alluded to the fact we want to rule out infection, and we did those investigations and obviously that was negative. But when you look at this how do you discern whether this pain’s coming from his hip or whether something else is going on?

Well you first of all need to, as you said, do an assessment of the position of the components, and this appears to be a reasonably well done hip. If we look at the acetabular component it appears to be medialized. It has secondary fixation with spikes. The position, it’s certainly not too vertical. The head makes it difficult to assess whether or not it has enough anteversion built in. That certainly would be a concern based on the fact that dislocation was present. With this large head dislocation is somewhat more unusual, but nonetheless, I can’t from this particular X-ray give an accurate assessment of aversion of the component.

The large diameter head can sometimes give soft tissue pain from impingement due to ilipsoas, tendinitis. Although the cup isn’t overhanging at all anteriorially, I don’t know what it’s like laterally. So the first thing we have
to look at with these large diameter heads, especially in a female, but some males there is the potential for iliopsoas, tendinitis, or just impingement on the soft tissue. The stem looks fine, I don’t see any abnormality there. So that’s the first working diagnosis once we’ve ruled out infection. We want to make sure, secondarily, whether or not there is any type of impingement, separation from the metal-on-metal device, which can be causing inflammation, shedding of metal particles, and increasing the iron level thus increasing the likelihood that inflammatory cause could be a source of the pain. So that’s second cause. We’d want to see whether or not there were any soft tissue abnormalities for potential altered tissue reaction.

And the third thing is just simple loosening of the acetabular component since we now know that a lot of these one piece acetabular components with large heads have a higher rate of loosening due to potential lack of initial fixation since screws can’t be used in these particular kinds of cases. Number two, the possibility exists that increased frictional torque can lead to loosening since these shells are loose, and is it a chrome cobalt surface since chrome cobalt does not appear to have as good an ingrowth surface as titanium.

Those are all great points. My issue is if you are going to do a total hip replacement and have a cup of your choosing, would you, first of all choose, a cobalt chrome cup as a style that you’d put in?

No, I wouldn’t. There was a lot of evidence from the early days, several different companies had chrome cobalt cups, some with larger beads, some with smaller beads. And at retrievals, and these were at autopsy retrievals, not loosening or failed components, these were well-functioning components. And when these chrome cobalt acetabular components were retrieved at autopsy there was little or no ingrowth, maybe 5 to 10% of the surface of the acetabular was ingrowth. And the only ingrowth that really occurred was either around screws or around spikes. So it became rather apparent at that time that chrome cobalt probably was not a good surface.

So, Wayne, my problem is here I’ve got a 78-year-old guy, I don’t want to go back and revise this, he’s not crazy, but he’s got a painful hip. He didn’t sign up for this, and we see those radiographs. So where are we going to go from here? He’s got real symptoms. You know, I guess the issues – you know, I take credence in everything you said. I don’t get serum ion levels, do you think that should be part of my pre-op workup for these situations and will that change what you’d do for this patient?

As we all know there has been an issue with metal-on-metal and ALVAL reaction and altered tissue response, and so initially I felt that probably everybody that had pain with a metal-on-metal hip had pain because they had some kind of an immune response, allergic response to an increased burden of metal byproducts. So since I come from an institution that probably may have one of the most well-known metallurgical surgeons, namely Dr. Josh Jacobs, and we have a specialized lab, I did and still do get metal ion levels on every one of these metal-on-metal patients, whether it’s a Monoblock system or a modular system. And I think we do that since if the patient had a high level, but there was no evidence of iliopsoas tendinitis, which you determine preoperatively, and whether or not the component was ingrown or not.

So, for instance, if I have this patient with pain, and I went in and the acetabular component was not loose, was well-fixed, and the patient had pain, and preoperatively there was an elevated metal ion level, I would then feel I would be obliged convert this patient to a titanium acetabular component with polyethylene liner. So that’s the main reason that I get these metal-on-metal – these metal ion levels. Plus we have protocol for dealing with all of these cases, and we want to be consistent as we look up and try to make some kind of an intelligent algorithmic treatment approach to doing this.

I appreciate you guys trying to get an algorithm, you know, for us to make better decisions in the clinical setting. My issue is when I look at that radiograph, I agree with you, I think all three of those issues, whether it’s ion levels, whether it’s failure to ingrow, whether it’s an impingement issue, I think all those – I don’t think they have to be a problem in themselves. I think it can be a combination of all those. And I think, with a long discussion with your patient, I think you decide whether you’re going to go in and attempt to make this patient better or not. And, again, I think that’s a clinical decision we all as surgeons have to make. And obviously in this situation I think you convince yourself and the patient convinced himself that, you know, we need to do something for him.

So what would you plan in this situation? You think this is going to be a tough revision or an easy revision? And I want to ask you another question, I guess, you know, even when these cuts are ingrown for all the reasons you say that they have a core preponderance to ingrow, are they difficult to remove?
Well, certainly, even though they may not have bone ingrowth, you can have a dense adhesion – a dense fibrous adhesion, mainly what we call “fibrous ingrowth,” and that is something that’s still just as – you can still destroy bone trying to put space occupying gouges or osteotomes circumventially around the cup. Number two, the tendency is to maybe partially pass these devices and then start banging on this, and then you fracture the column. The other issue is those spikes can be a problem. I’ve removed quite a few of these different types of designs for severe damage to the metal shell in some of the older designs. But we’re removing from malposition, and you can pull out large chunks of bone. So this, even though you think that, well, the surface is not that ingrown, this can still end up creating a long day in the OR if you have – if you get a good look at the posterior column because it’s in your hand because it’s still attached to the acetabular component.

Good response. We have a question from the audience, and the question was, “Do you really see a difference between trabecular metal and the other titanium alloy coatings, and what’s the difference?” And I want to add on to that mis-setting, would you bring both available or is there one component of choice that you’d bring into this setting?

Well because revision bone is not the same as primary bone, and because we’ve had excellent results with these badly damaged acetabuli, mainly the 3B, even probably discontinuities, my feeling is if I can – this seems to work so well in the difficult cases, I don’t believe there’s any such thing as a chip shot or a guaranteed acetabular revision. So I want to have the best chance I can. And it’s clear that this is superior to other metals that have been used in severe defects before since their track record’s poor. So I want to just make sure that I don’t get any loose things, so I’m using it in every revision, then I fix it with screws. But I believe that it’s the frictional fit that gives you excellent initial stability, and no doubt the increased porosity probably promotes more rapid ingrowth before any mechanical loosening can occur.

So they’re already at strike two here, and you don’t want strike three. So trabecular metal, I guess, is your material of choice in these settings is kind of what it sounds like.

Yes.

If we could go to the video and we’re going to, again, show this case. Obviously our plan here was to maintain the femoral component. We do a traditional posterior approach. You can see our markings there. The landmarks are already displayed in ink anterior and posterior. Again, Wayne, if you have any comments, please just butt in here and we’ll hold the video and go a little bit further here.

I think here when we go in we’re going to be a little bit surprised. I think this was actually a lateral approach, and something that was surprising here which was causing the patient’s discomfort was that there was avulsion of the trochanteric musculatures, specifically obviously the abductors. And you wonder if, again, that was leading to some of the issues of the patient having the recurrent dislocations. We can go and argue about this issue of whether an anterior approach or posterior approach has more dislocations, but I think whatever approach you choose to do obviously you want to do it well. You want to comment on your choice of approach in these settings?

Well in a case like this where I believe that I’m probably going to remove the acetabular component, I could get in trouble, I could have some problems with fracture or need to do a reconstruction of the acetabular in posterior, so I’m going to do a posterior reconstruction – I’m sorry, posterior approach just for access to the acetabulum if I need to do a larger reconstruction. And so otherwise the potential that you face here by not doing that may be a much more difficult reconstruction.

Can we hold the video there just for a second. I want to comment on that fluid, and I wonder if you could comment on that also, of the issue of that turbid fluid with metal-on-metal articulations. First time seeing that it’s quite a scary-looking type of fluid, and initially you think that it’s puss. You want to comment on what happens to that fluid or why it looks that way?

Well the first time that I – first metal-on-metal revision I did, I saw that fluid and the patient happened to have an elevated sed rate preoperatively; the cell count also was elevated, so I said, “Well this is infected,” and I took all the components out. And as it turned out, nothing grew and it wasn’t infected. And so I believe the inflammatory response from the joint capsule no doubt creates this turbid fluid in response to the particulates generated from the metal-on-metal inserts.
Yeah, that’s a great point. I mean there’s so much particulate debris that’s generated, you know, and that’s actually the metal debris I think that we’re seeing in there, and, as you said, the response to it. Well – sorry.

One comment so we don’t let it go, on your abductors, you did mention that it was an anterior approach, and that could have been the reason maybe that this didn’t heal (INAUDIBLE). But I’ve also noted in these metal-on-metal failures that even with a posterior approach sometimes the toxicity of the metal debris can destroy the abductors. So in this case we may not know what the cause of this was.

That’s a very good point. And I’ve seen that in the old metal Meyer hips. A long time ago we had ceramic and titanium together, and you’re right, I think you can get such a high level of ion debris in your periarticular tissues that it’s toxic to the tissues and will actually, like you said, kill off your abductors, and you’ll find this big dead granuloma in there that you’ll have to scoop out. Can we continue on with the video here.

So here we’re going in posterior approach. I don’t know if we can see it here that well, but there’s kind of a partial avulsion in front, and do you agree this doesn’t look like that necrotic setting, you can get kind of that gray or black tissue and things look reasonably viable here, would you agree?

Yes. And it’s a little shiny, and that, I think, is some early stages of inflammation, but it’s not that gray, dead tissue.

So we really attempt with this posterior approach not to do a capsulectomy, and you taught me to do that. You can see here we’re literally just trying to split the capsule from a 12:00 to a 6:00 position. Do you agree that that’s a critical point with these posterior exposures?

Yes. You want to be able to save this and be able to reattach some of this, either like to do drill holes or just a soft repair to the posterior abductor tissues. But I think saving this is an excellent approach.

Yeah, we’re just getting that spoon between the acetabular component and the head itself and, obviously, attempting to do as gentle of a dislocation as possible. I think my point here is just to show that’s not me causing the scuffing, but you can see there is some scuffing on those heads. Is there anything to look at there, you know, to kind of figure out what’s going on at this point or we just proceed to examine things?

Well I think it’s probably not going to help make a decision as far as to remove the component or not. But I think if there’s a definite area that was maybe more scratched, more eburnated, that could certainly be edge-loading or separation, which may explain the pain if the cup isn’t loose. And if you see an abnormal eccentric wear pattern, it could certainly help you justify why you’re removing it because this certainly could cause pain, just localized inflammatory pain just from abnormal wear.

Could we pause the video once more? So, Wayne, we went over these issues of why this is loose. So how do I determine whether this cup is loose, because even the cups that I see are loose, I can’t wobble them, and I don’t know — I mean, sometimes I can, if it falls out in your hands, but the point is I see a lot of these cups that are loose, but, you know, you have to do a little more aggressive testing?

Yeah, I’ve had an instrument that I’ve used for many years that I use to remove the cemented components from the acetabulum, and it’s called a footed impactor. And what I like to do in these cases is to if there are screws, remove the screws, in this case there aren’t any screws; make sure you expose a superior edge, and then the footed impactor is placed at the corner of the – just so it doesn’t interfere with the bony acetabulum, but just a good grip on the superior corner of the acetabular component. And, in general, if this is loose, one or two whacks, and I’m not talking about winding up and hitting as hard as you can, taps just like you would bang in a femoral component, only from the other end, and nine times out of ten if they’re loose they will move and they will change position. So I think yanking on it with a Kocher, pushing on it with your thumb is not good enough.

Do you think these cuts, though, behave differently than a traditional cementless cups? Because these cuts, you know, the manufacturers know that we don’t have screw holes, so there’s these ancillary fixation devices, this one you see has pegs, you know, some have had fins, and that’s where I still can get fooled, so to speak, because hitting on them in that they can still be relatively solid. But have you seen some even when hitting on them when you kind of check them with the explants system that they’re still not ingrown?
Yes. Like I said, the majority of these have come off, but several of them have not. And that’s why you have to go and look at all of the parameters. So you say, okay, it hasn’t come out, that does not necessarily mean that there isn’t fluid behind there. You have to know that these thinner shells deform more. You have an enlarged head with increased frictional torque, and so that’s continually create a situation where the increased frictional torque, the thinner shell is subjected to micro-motion, but yet you can have, in response to the micro-motions, some fibrous ingrowth. So you have to be confident in your diagnosis that, “Okay, patient did not have, as we saw, pseudo-tumor, did not appear to be an ALVAL reaction.” Yet, as I mentioned earlier, the metal levels were high, we ruled out iliopsoas tendonitis. There’s no spinal issues, there’s no inguinal hernia, femoral hernia. So you have to be confident that based on elevated metal ion levels, the fact that there’s growing pain, maybe even a preoperative anesthetic with Novocain and noted that the response was a decrease in pain. You have to be confident in the diagnosis that, okay, I’m going to go to the next step because I do believe this is the offender; he showed you there was some scratches, I don’t know if there was an burnishing in that centric area, that, okay, I’m going to pass that explants system around this and I’m going to remove it, and I’m committed to the fact that this is — there’s no other cause for this pain, so I’m going to convert this to a new cup with a polyethylene liner.

That’s a great (INAUDIBLE). We had a question from Nashville that asked, “Is there any one best method for evaluating the failed metal-on-metal hip?” And I think you answered that by literally saying you got to put all the pieces of the puzzle together and listen to your patient and obviously your radiographs in a clinical setting, and come up with a solution. You want to — we’re going to roll the video quickly here. And what we’re going to do here is maybe you can just describe how you used this tool, which is the Explant system, once we kind of go through the video here. So obviously we’re exposing the margins. And would you use Explant in this situation before we kind of hit on it, or how would you kind of use the system here?

I still would bang on the edge of the component. But what I like to do is make sure that, obviously if it doesn’t move, I would go to the Explant system, and what you want to do is make sure that you have a circumferential guide so that you at least have some exposure around the periphery of the socket. So I might take a pencil tip just to get a little channel and get started so then in case I have an osteopenic patient, banging on it like this may not create a fracture. But this is a non-osteoopenic patient, very good bone, so this is exactly how I would do it in this case after having gotten my centering device so that I can rotate the small — the shallow blade around. Just beware not to bang on this device too hard in osteopenic bone because you can potentially fracture or remove chunks of acetabulum that you don’t want to remove.

Yeah, those are great points. I think getting as much of your exposure as possible. I like using the Explants sometimes to get it around to actually help expose that bony rim and remove some of that overlying kind of lytic or reactive tissue that you see here. This one here I’m kind of banging or trying to find where those pegs are. You know, that’s my biggest concern here because I’m still not certain whether this cup is loose or not. Obviously here I’ve committed to taking this cup out based on the patient’s symptomatology and everything that we’ve talking about before. And you can see the little flusher fluid, that’s a little bit of blood and I think that’s a little bit of fluid behind the cup there. And obviously this is just the short blade that I use, and you can see obviously there’s really no ingrowth in that cup.

And that seems to be what pretty much all of these symptomatic metal-on-metal patients who do not have the pseudo-tumor or the ALVAL response. I think what everybody thought was that this is what — oh, these are all allergic phenomena, and I don’t think people realize that a lot of these are loose simply because of inadequate initial fixation and inadequate design and increased frictional torque from the head.

Guys, could we hold the video again. And I just want to show the audience the Explant system here. If we could have a — just a close-up here onto the Explant. So here it is here. And you can see this is the — I believe that’s a 28-millimeter head onto the short blade. And then there’s an additional long blade that once you kind of obtain initial pass with the small, you then assemble that long blade. You want to comment on how you would actually go into using this?

Just like you did. What I try to do after I bang it, I try to use that handle and torque it around a little bit to slide it. But as you pointed out, with those spikes you really can’t do that. But I’ll try to get fine, like you said, the distance between the two spikes. If you adequately clear everything in between the spikes you should not have any problem with fracture. And if you take a little bit of bone away from the spikes — with the spike, that’s not the end of the world. The only thing is that if these components violate Kohler’s Line and do go beyond the end of the
inner table, sometimes you it can be a little more difficult to get these out. So you really have to take your time and resist the torqueing, banging on it like you did. Make sure you advance it around the circumference as opposed to torqueing on this because that's how you could potentially fracture.

That is a good point. These blades are nice and sharp, and as I alluded to you earlier, I do like them to slice through the soft tissue, but the worst scenario, like you said, once you’ve sliced through that soft tissue, if you do start torqueing and if you haven’t got that long blade all the way through on the bone cuts, you’re going to remove the floor of the acetabulum along with your actual component.

Once you have cup out like you’ve seen on the video so far what’s the next step? I mean, I think you’ve got to even be careful on this situation because you can see there that’s bleeding bone, it’s a pretty raw surface. If you just go and take your reamers and start preparing your acetabulum as you normally would in any other setting, or do you take some cautionary steps first?

First of all, I would probably make sure that there weren’t any more – any other deficits. I would palpate the rim. And I would want to make sure – I would take a Cobb. I would want to make sure there was no inadvertent fracture, iatrogenic, pelvic discontinuity created. And you have to be careful because we don’t know what this – how good this bone is, and you don’t want to just take and ream through this. I would be very cautious. And sometimes I might even just reverse ream this kind of a case, because this is bleeding, it looks rather cancellous, and it look somewhat soft, so you’re already down toward into past the end of the table. And so I would pretty much just reverse ream. I’d be very concerned that I’d create more damage through it.

Those are great points. I agree with you. Explants, you know, before, with the old gouges we would just kind of slide them in and randomly pass them, and as you said, we could easily create elliptical shapes. With Explant being purely hemispherical it’s almost done the reaming for you.

Yes.

Once you cut around cup, you have a nice round surface, I think the last thing you want to do is start removing more raw bleeding bone. So I think that point of just putting the reamer in reverse to kind of size your defect, and away you go to press-fit your cup into that setting.

A general rule of thumb with the Explant system is let’s say this is a 52 cup, for the most part you’re not going to go up much more than one size, and that has been pretty much our rule or the case for us. So it just tells you the difference between that system, and we published data in core, and our average cup size went up eight to ten millimeters; that is five sizes of cups when the cups were you either cut the component or use the gouges. So it’s clearly bone sparing. And little to no further work is necessary.

Wayne, we have, again, another question, although we’re not addressing it here, “What’s your process of assessing component fixation on the femoral side?” Is it kind of the same thing or do you do anything different?

Well the femoral is a little different. You are able to, by criteria that Charles Aim [PH] put forth probably 25 years ago, you need to know before you even enter the operating theater whether or not that component is ingrown or not ingrown. You are able to assess whether or not there’s going to be migration, any pulling away from the greater trochanter, whether there’s any spot wells at the junction of the porous coating in the smooth portion of the stem, whether or not there’s a circumferential radiolucent line, whether it’s divergent, whether there’s a pedestal, and on the lateral whether or not there’s any stress yielding.

If you see even the slightest decrease in bone density where the porous coating is on the lateral, that implant is ingrown regardless. So I don’t even test implants intraoperatively. I know beforehand because it’d be like pulling the flowers out to see if they’re alive, you don’t really want to try to remove this and say, “Gee, there’s a lot of bone attached to this, I guess I shouldn’t have done this.” At the same time we don’t want to ignore the preoperative findings and leave a stem that should be removed.

I’m glad you like to keep your flowers pretty, that’s kind of a good thing. Another question we have is, “Are there issues related to a level of corrosion you might see on all these different papers that would lead you to revise a component?” So, specifically, would corrosion on a Morse Taper cause you to take something up?
Boy. Certainly in an older patient, no. It does not appear that the corrosion on a titanium surface is – does not seem to be as damaging as the corrosion I’ve seen on a chrome cobalt surface. Having said that, given the task of removing a well-fixed implant, whether it’s fully porous coated, whether it’s proximally coated with a “corondimized” distal aspect, you can create a whole lot of problems no matter how careful you are, how good you are at extended trochanteric osteotomies, you can still crack off the abductors as the vastus ridge, you can create fractures, you can have the next implant not ingrow. So long answer to your question is I have not yet removed a well-fixed femoral component for corrosion yet, not in these metal-on-metal situations, and with the improved designs in machining techniques of these devices and how they match the tapers.

Good answer. You were kind of scaring me there that I thought you were going to revise a well-fixed component solely for corrosion. I’ll tell you, I’ve actually revised a component for corrosion, that’s when it’s corroded so badly that I can’t get the head off.

Yeah. Yeah.

And you’re kind of between a rock and hard place. We have another question here about, you know, doing synovectomies. And obviously, you saw with that fluid, we have a lot of metal debris. And one of the people in the audience was actually questioning, “Should we do a complete synovectomy or capsulectomy here to remove that metal debris from the capsule?”

Well I think whatever you visually see, and if it’s capsule, I think you can remove it, providing it’s not a portion of that posterior capsule that you’re going to sew back to prevent dislocation. It’s my opinion that as that debris that’s left in the capsular tissue, not massive amounts of metal debris in muscle tissue, over the years I have really only removed what I felt was accessible that was not going to result in instability, that was not going to take so much tissue away that I might weaken the patient’s muscular function. So I don’t think it’s that critical. And once you remove the debris generator or the offending generator, the body has remarkable ability not only to improve and restore tissue function and get rid of a lot of the debris, but it also is able to repair severe osteolytic lesions without the use of bone graph. So I don’t really get carried away with massive debris.

Yeah, I kind of – I’m of the same theory. My concern is a couple. First of all, obviously if you do a capsulectomy you’re going to create a horrible situation for stability, and that’s going to be concerning. (INAUDIBLE) I think you should take it out. I put a little bit of solace in the fact that if it’s in the synovium it’s already sequestrated, it’s already kind of been gobbled up, you might say, by the synoviocytes, so it kind of being released back into your joint space is probably going to be limited.

Again, we have another from the audience. We kind of went through this whole process here when looking at these components, and I kind of alluded to that earlier with you, you know, you were saying about CT scans. Do you use bone scans or nuclear imaging to determine here if this cup is loose or if that’s actually going to be causing you a problem?

Nuclear medicine I call unclear medicine. And I only do it – first of all, it’s a no benefit, in my opinion, so it’s probably a year-and-a-half out. They say a year, I wait a year-and-a-half. And I only will get a bone scan if I am just still not convinced that the surgery I’m going to do on this patient is going to make them better. And then if I absolutely think to myself, you know what, I just do not think that – let’s say there’s isn’t – metal ions are low or normal, and the acetabular component doesn’t look like it’s migrated, the patient has the similar symptoms that you’ve described, everything else has been ruled out; I may then get a bone scan, and if a bone scan is not hot, and the metal ion levels are low in this case, I may not revise, I may give the patient another six months. By and large I don’t really find them very helpful unless I’m just – it’s to make – it’s going to make me – you know, operate, non-operate, that’s very rare, so if that’s not the case, I’m not going to do it.

Well I think, like you said, it’s trying to separate real symptoms that you can make better versus, you know, symptoms that you can’t really help. What I’ve done occasionally is actually got sequential bone scans, so get that one bone scan if you’re going to wait and watch, get another one three or six months down the road, and it’s amazing what you can see. I see it more beneficial usually on the femoral side, you know, where you’re looking at a proximally coded stem, but it’s sliding up at the tip. And you get that X-ray or the bone scan, you know, three or six months later and see even hotter at the tip of the stem. Well, you know something’s wrong there, it’s potted distally and it’s not supposed to be doing that. So I think those are good points that you make for us.
We’re going to take one more question then go back to the video here. “What the best way to rule out this whole issue of iliopsoas impingement?” Is there something you can specifically do, or is this whole continuum of problems that we’re seeing with each style of cups that you just decided that this is what we got to do to make it better and revise this component?

First thing is the clinical diagnosis, and obviously it has to be groin pain, it has to be pain resistance to flexion of the hip, as well as pain when you first step on the hip. But clinically it’s going to be mostly groin pain, but then you have to – the next most important thing is to take a radiograph of lateral and see if that acetabular component is overhanging, if it’s proud, because that is, to my opinion, probably the number one radiographic – or most important finding to determine whether or not it could very likely be iliopsoas tendinitis.

If I don’t see that, I then will tell my selected radiologist, who we schooled and discussed with, to do the next stage which would be an injection on the CT guided imagery, an injection into the iliopsoas tendon of Novocain, followed by a steroid. But if I don’t see a overhanging acetabular component I don’t think that that diagnosis is going to probably pan out. So the combination of a overhanging lateral acetabular component on the lateral and a positive CT guided image injection by an experience, pre-selected radiologist that reduces the symptoms, that is a diagnosis of iliopsoas tendinitis and that patient, if the steroid doesn’t work the first time, maybe the second time that patient has to have an acetabular revision.

Do you agree, though, that those symptoms that you were describing when you’re examining your patient could also related simply to the cup loose knee?

Absolutely.

Okay.

And unfortunately I probably – before we understood this a couple years ago, I had several of these patients who I was still convinced had iliopsoas tendinitis, didn’t think of the cup loosening, and I think one patient had three injections. Now we now evolved to this next level of thinking. So it absolutely fooled me.

So you’re saying these types of cups and what they’re made of and how they’re constructed and just because of the size of the head articulation is a different kettle of fish, so to speak, than the traditional, you know, acetabular component, hip arthroplasty component, and how it behaves from a loosening perspective?

Oh, absolutely. I don’t think that conventional porous coded acetabular components fixed with screws, I don’t think – they basically don’t loosen unless maybe you have an initial infection, groin infection. So I thought we had solved primary acetabular loosening, and that’s why I think I just didn’t suspect this. I mean I just got surprised. The first one of these I went in and hit, I was already to show my fellows a great demonstration of the Explant system, and I just said, "Well sometimes --," and then it just came out. And then they’ve all mostly done – many of them have done that. So it’s an absolutely different kettle of fish.

And I think one of the reasons in the females that is such a big problem is female anatomy of the acetabulum is not normal, there’s a lot of acetabular rim defects, insufficiencies. We’ve tried to put a bigger up in, altered your position because you didn’t want to have overhang, you don’t have secondary fixation, a big head, thin cup, frictional torque, also leads to increased loosening which we never saw before. So entirely different animal, and you have to look up these large, one piece, metal-on-metal components as probably proving or disproving loosening – or they’re loose until proven otherwise.

You kind of made a little comment there, and I don’t know if you even realized that you made it. But do you believe that these Monoblock metal-on-metal articulations behave differently than the modular metal-on-metal articulations?

Oh, yes, with respect to loosening, I have revised several modular metal-on-metal components for malposition, for infection, for squeaking, for dissociation of the metal taper articulating surface, and numerous other reasons. I have yet to find a loose modular acetabular component, regardless of the manufacturer. And not all of them were fixed with screws, I believe. I’m a person who likes to use screws, but I’ve yet to see any of them loose as opposed to the majority of these. So it’s definitely a different animal.
Great, Wayne. If we could now roll the video. So we've taken out the metal-on-metal cup. You can see its rod there. And there's my metal reamer. And I'm doing exactly what you told me to. You see the reamer there, but I'm simply placing it on reverse, so I'm kind of compressing that cancellous bone. I believe this bone can be stress shielded, too, don't you agree, because it's a stiff cup?

Yes.

And so we're using those reamers on reverse. And I can't remember the sizing. I think I was critiqued because I probably went up four millimeters rather than the two millimeters you told me to go up. But we're just kind of getting an assessment of fit there, assessment of coverage, you know, making sure it's bottoming out. You can see there's a relatively good grab there. But there's no question that that's a good surface for potential ingrowth, would you not agree?

Yes, and these metal – any time you have metal debris, whether it's from a head wearing through plastic in the metal, always much more vascularity to these things, and this is no exception.

Well that's a great point. Maybe that's that whole inflammatory component that you were kind of talking about before. I mean the body doesn't like all this junk there and it's reacting to it.

Yes.

So here you see we're actually using a revision acetabular shell. This is a pure tantalum component. There's a little ring there that's solely used for insertion. And would you use this type of component here or would you use the other style of tantalum cup, which is the modular revision component? And maybe if we just pause the video there for another second.

I use this particular type of component, the revision shell, without a titanium substrate, to allow for insertion of the modular acetabular articulating surface. I use that exclusively in the type III defects. This is a type II, but the caveat is this is very osteopenic. I believe you are absolutely right, it's osteopenic, it's inflammatory, it's damaged, and it's not like your somewhat more eburnated bone with various portions that may have a little bit more bone density. So I want to treat this as if it were type IIIB bone, even though we don't have the defects. So I want a less stiff acetabular component that I think will best suit this defect. In the average type II that is not osteopenic and not subject to this massive inflammatory response of the bone in the hyperemia, I'll generally use the modular device.

If we could just have a close-up on these two different styles of cups here. So what Wayne's talking about, this cup here is actually the cup that I inserted on that patient. That's the revision tantalum shell, it's a pure tantalum component, it's not just a coating. And, as I said, that shiny ring you see there is actually solely for the insertion tool. And within that cup, as Wayne was saying, you're actually able to cement your liner of choice.

The advantage to this cup is obviously it's a very low modulus of elasticity. And what we haven't talked about – remember, this guy that we're seeing, like Wayne was talking about, is osteopenic because he is 78 years old still. And so for those reasons that Wayne was talking about, and for the reason – you know, I believe this cup is good in all situations, although it's fussy because you have to spend the time of having to cement a liner into it. But it eliminates back-sided wear, the locking ability of the liner is very, very good, but you do have to take the time to cement it in.

And you're locking screws in.

Right. That's a good point, too. Once you put those screws in that cup, as Wayne was saying, it's truly a locking screw, a locked screw/cup construct. Now the other cup option, and there's a couple different forms, is this cup here, and, again, if we could have a close-up on that. This is kind of a modular component with a titanium core, as you see in there. It's still tantalum coated, but the kind of more traditional locking ring and mechanism that you normally see. As Wayne was saying, because of this titanium core, it's a much stiffer construct, and so in osteopenic bone you might not get as good of immediate response to the cup when it's that compromised. And, Wayne, like you said, with lesser defects you use this cup. Is there any specific reason other than you want to get home to the wife and kids earlier or?
I just feel—I don’t think the advantage is there for me to have to spend the time to cement in. The other thing is usually these are smaller diameter defects, the type IIs, and the difference is—I don’t know if we have—so if I put in a 54 shell and I decide to use a cementable device, I’m probably—this device—this plastic is going to be larger, so I may not get as big a head size as I would if I just snap in the modular device so that I can—with a 56 or a 58 acetabular component in a type II defect, I can get a 40 liner; whereas if I cement into that, I’m probably not going to be able to because I need room for cement, whereas when you get into the bigger sizes which are the type IIIs, then it doesn’t matter what you do. So that’s probably one of the other reasons I can get the largest head. And, as you know, the number one reason for failure in revisions is dislocation.

But as you say, I don’t think we’re strongly passionate one way or the other.

Oh, no.

Other than in those severe defects.

Yes.

In the severe defects I think you’ll agree with me that the revision acetabular shell is much better potential for ingrowth there, much better potential to put different screws in positions where you might not have options.

Oh, absolutely. I don’t think there’s even a discussion. In type III there’s no place for the modular device.

Now what about in those type IIIs because in those type IIIs I can’t get my cup positioned always where I want it to be because I don’t have bone there. Does that revision shell give you any options for being able to kind of decant or cant your liner in a slightly different position than your cup is or?

Boy, that’s controversial. I tend to be of the belief that probably the liner should be parallel with—it if we can maybe show the tape, maybe a little smaller one. I believe that if you’re cementing, it probably should be—if we can have a close-up here.

Can you guys do a close-up? There you go. Great.

Yeah. I believe that probably if you’re cementing, your best fixation is probably if this is flat against the surface as opposed to canting it some. I think that if you elevate it like this, I think I’d be a little nervous that this may pull out if you left some of this exposed. So I haven’t had the courage to do that. Some people do. I don’t. Intuitively it seems like it might be a problem.

I do it. I mean, I’m not promoting that we should malposition our cups ever. But, you know, for those bad defects—remember, these are defects where in previous situations we had to put cages in.

Right.

And when we had cages in those situations, I mean, when I was with you, we would have to put these liners in positions that we didn’t like because those cages would be going in vertical. To be honest, I have canted it off a little bit like this, and I’ve never had them loosen. And I agree, you can’t be excessive with it, and it doesn’t give you a reason to be sloppy, put it that way.

However, I think if you use the cementable device, then I think—with the prefab grooves, I think this bonding is much better than anything we can make in—before these came out we would groove our own modular acetabular devices, and they’re thinner. These are much thicker, so that may become akin to what you referred to when we cemented the poly into cages; those were cementable liners. So that—I would say if it meant you putting it—ripping out your great trabecular metal cup reconstruction because it went in less anteversion than you thought, I would say probably it’s okay to cheat by ten degrees.

All I can say is “Phew.” Let’s roll the video again here. So we’re putting that revision acetabular component in. And as you said, you know, we attempt to get screw fixation in all these revisions. I think I was a little amiss here, I do, like, two screws, and I think I only got on end, but I’ll have to kind of look at that video. I like to line those screw holes up kind of with the iliac wing, and what I do is kind of put those, I call them “homerun screws”, to kind
of get them into the iliac wing and solely run them up superiorly there, having them not come out between the inner and outer table. Is that how kind of your homerun screws there?

Yes, absolutely. And then I try to get them anteriorly by being carefully because it’s in danger zone, and I like to try and get one down ischium. But those two – those superior screws are absolutely the homerun screws.

Now what I’m doing here, you can see we’re getting pretty significant bleeding. Remember, that’s from the bone. That’s not from anywhere else. And we just actually covered up some of the holes in the TM where the raw cancellous bone is. I used to put bone wax also over my screw heads, but because of the issues that you talked about, I’ve kind of eliminated doing that because you get that locking screw construct with the cement going right onto the head of that screw, and to be honest, removing of the screws with the cement is really not that difficult, you know, on that revision setting.

I noticed you’re using a big liner. Do you try to use as big as possible a head you can?

In most revisions, I would agree. You know, we’re getting a younger and younger population, but remember here I had that abductors. If you have an issue with dislocation, I agree with you, you know, obviously as long as you’re within reasonable polyethylene thickness, I think the biggest possible you can do is great.

What about constraint, the abductors are a little shabby?

Well I know we’ve had discussions with this before. You know, I don’t like using them automatically, I think they’re recipes for disasters. I think if you need them, use them. But we got a 40 head here, you know, put your cup in good positions, make sure everything is good position, and, you know, I’ve been pretty happy, even with this posterior approach, as long as we repair things appropriately.

You know, and we’ve been looking, these abductors aren’t so good, trochanteric escape. In the revisions that does not mean you have to use a constrained liner. I think a lot of scar tissue forms, they heal, so I think there is a concern. We’ve seen some where the constraint actually will pull out the acetabular component, even if it’s tantalum or anything, if it has osteopenic bone or it’s a type IIIB. So the big head, and if it dislocates later on and the component is ingrown after three to six months, well then you can deal with it then. I’d much rather have a late dislocation than an early loosening.

Right, or a failed construct by your catcher ripping all your good work out. So the other question I always get, so we cement this in, how the heck am I going to get this liner out if it does dislocate? I mean should I be scared of that or is that not a big deal?

Well you get the reamers that somebody else uses, not your own acetabular reamers, or some old ones, and I would just ream through it, and it pretty much – it can be removed very, very quickly. So that’s not even an issue.

So you ream the polyethylene out. Do I have to then get rid of all that cement? Do I have to ream or – right down back to the tantalum or?

No, I don’t think so. The component’s probably already ingrown, and so I just cement back over it, maybe burr it up a little bit. You don’t have to go trying to get all the morsel up. I think cement bonds well to other cement.

Yeah, I agree with you, too. And it actually makes for a relatively easy revision.

It does.

You just put a new liner in of your choosing. So there we’ve actually cemented the liner in. Obviously when we’re trialing here it’s obviously critical not to be fast to get to the martini bar and let that set up because you’re going to change the position or lever the position of your component out. And so cement to set, there’s our actual femoral head, we’ve reduced it, checked it. And this is the critical point that you taught me, this is what is critical in primaries and revisions, would you agree?

Yes, absolutely. If you do not do this you will not have a dislocation rate that will approach the anterior approach. This is maybe the most important things of the whole case right here.
And for the audience’s sake I’m going to just describe what we’re doing here. If you notice we’re actually stitching to the anterior capsule. So with most posterior approaches you take that posterior flap of tissue and you’re trying to repair it onto the trochanter, and with the first internal rotation it kind of rips off. So with doing that vertical split pushing the capsule anteriorly forward and pushing the posterior capsule posterior, you just simply let them oppose each other, sling them over the head, and just tie them with the rope, which is usually that number five tie chrome that I think you taught me to use quite a while ago. And then the closure after that is pretty standard and routine. You do anything on this postoperative protocol with the whole MIS push and early recoveries and early discharges?

I treat revisions differently. I still want the patient to know that they’ve had a reoperation, that the tissues take longer to heal, and no matter how magical the ingrowth surface is, I keep them partial weight restriction, and I still tend to put these people in a brace just to – for about a month just to remind them that they have to take it easy. I don’t know that it reduces the dislocation rate, but I just want them to understand that we’re taking – we’re more precautionary in the revision, and I think they might treat it a little better that way. Quite frankly, you know, there are some people who just let everybody walk on these revisions. I just want to protect the soft tissue, keep the patient honest.

I think those are good points. And I think it’s the choosing of the surgeon. To be honest, I’m not as mean as you. I can’t torture them with that awful brace. I’m just joking. But I agree. The problem is if you get these other ones that feel so much better so quick and they start doing crazy things and come back at six weeks or eight weeks and they’re asking you why they’re more sore again, they were feeling great and here they are, they dislodged things or pulled things apart.

And just muscle pain, I think they’ve got muscle atrophy over a period of time. And on the other hand, I think I have probably become a little less disciplined. I’ve been doing less and less braces. We’ve got some data coming out that it probably doesn’t alter the dislocation rates, so it’s more just to slow them up.

Well let’s take a look at the postoperative radiograph here. It’s not the best quality, but there’s our radiograph. You can see the cup. It’s a little bit horizontal, but it’s kind of a flexed picture. You know, it’s surprising, this guy, don’ ask me why, we haven’t changed his length dramatically, and it’s obviously an abducted X-ray, but his sciatic nerve actually got better. I know you might think it’s BS, but he truly improved. And I don’t know what that was from, if it’s a pressure effect. I’ve seen him in follow-up. He’s ecstatic with the feel of it. He knew immediately almost that that gnawing pain was gone. Do you believe it’s real or that’s succumb to that placebo effect?

Did you release the gluteus max tendon?

You know, I don’t tend to, but I wonder if it’s even just doing the capsule release, you know, a little bit, and kind of – I can’t explain it. He’s a little bit shorter there, obviously that’s the same implant, the cup’s a little more medial. And he is slightly shorter. I don’t think that’s the greatest radiograph.

You might have reduced his tension by reducing some of the posterior/inferior tissue. You may have, just to retract your femoral component anteriorly, you may have, to get it out of the way, you may have released a little more on the back and along (INAUDIBLE). And maybe just – that’s what Dr. Ranawat believes that a lot of sciatic nerve problems are as a result of compression from the gluteus maximus tendon.

Well we’re going to wrap it up here in a few minutes. And if there are still any questions I just want to advise the audience that we’ll be having another live session in an hour from now and be reviewing things again. And if you want to give us a vote of non-confidence, feel free to do that in the next episode.

On behalf of Zimmer, we would like to thank the audience for your participation. Wayne, once again, it’s just great to see you and we truly appreciate your knowledge and helping us out with this difficult case. And I’ll give you the final word, if you have anything else to say.

Well I think this just brings about the point that we’ve created a new set of issues for ourselves. And as Todd pointed out, this is a different animal than the routine modular, plastic, or metal articulating acetabular component. And it has given us a whole new arena of diagnostic issues that we have to focus on. I know I’m looking at these patients much more differently, much differently than the patient with different implants. So just mostly the
message I want to leave you with is beware that you have to go to another level and have a different thought process to try and solve these problems, something that was different than before. And we’ve created it, so we have to now solve it.

Thanks a lot, Wayne. And on behalf of the OR-Live team, I would just like to tell everyone, good night.