

GLOBAL AP ANATOMIC TOTAL SHOULDER SYSTEM
METHODIST HOSPITAL
PHILADELPHIA, PA
April 17, 2008

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ANNOUNCER: DePuy Orthopedics is continually advancing the standard of orthopedic patient care. In a few moments, you'll be able to watch a live global AP anatomic total shoulder surgery from Methodist Hospital in Philadelphia. A revolution in shoulder orthopedics, the Global AP gives surgeons a wide array of options with an arrange of neck, angle, and version variability which allows adaptability to a patient's unique anatomical makeup. Dr. Gerald R. Williams, Jr., a shoulder specialist from the Rothman Institute of Pennsylvania, will perform the procedure, as shoulder and elbow reconstruction specialist, Dr. Douglas Boardman III will moderate. OR-Live makes it easy for you to learn more. Just click on the "Request Information" button on your webcast screen and open the door to informed medical care. Now let's join the doctors.

00:01:03

N. DOUGLAS BOARDMAN III, MD: This is Doug Boardman from Richmond, Virginia. We're here at Methodist Hospital in Philadelphia, where Dr. Jerry Williams will be performing a total shoulder arthroplasty. Before we go to Dr. Williams, I'd like to encourage viewers to feel free to e-mail questions. And should anyone require any additional information, please feel free to request that information utilizing the buttons on your screen. And now I'll turn it over to Dr. Williams.

00:01:31

GERALD WILLIAMS, MD: Welcome to Methodist Hospital and Thomas Jefferson University Medical Center. I'm Jerry Williams. I'll be performing the surgery today, and we have lots of help. We have Tiffany helping us scrub, Mitzi is our nurse first assist, Dr. Wiesel's our shoulder fellow. Tisa we have behind the screen is our certified registered nurse anesthetist, Dr. Wells is our anesthesiologist. We have Amy circulating, we had Erika, she must've left. She got scared. Kevin from DePuy. And we have Dr. Song visiting us from South Korea. This patient is a 78-year-old male who has osteoarthritis of his left shoulder. If you look at his AP view here, what we can see is that he doesn't have quite the normal situation that we will see for somebody with severe osteoarthritis. He does not have a really big inferior osteophyte. Has a little bit of proximal migration and even has a little bit of juxta-articular erosion, making you think that it might be an erosive-type picture. His posterior -- excuse me, his axillary view, however, does show some posterior subluxation, about 25%. And if we come over here to his MRI scan, we normally would have a CAT scan, but he came to see me with an MRI. You can see that he has a Walsh-type B2 glenoid with posterior subluxation of about 25% and probably 4-5 millimeters of posterior wear. And the goal of our procedure on the glenoid side will be to asymmetrical in the high side slightly so that we can put the glenoid component in neutral version and we'll put in an anatomic Global AP stem on the humeral side. And if you'll wait a moment, I'll get back over to the other side. Prior to your joining our webcast, we did the approach. We did a delta pectoral approach,

as you can see. We took the pectoralis major medially. We took deltoid laterally with the cephalic vein. This is a Brown deltoid retractor that is in the subacromial space over the top of the humerus. This is a self-retaining retractor called a Kobel retractor. We'll put a shallow arm under the deltoid, the medial arm under the conjoined tendon. Before opening this widely, we've already palpated to find our axillary nerve, which we'll protect throughout the procedure. The musculocutaneous nerve, which does have a -- can have a takeoff as close as a centimeter and a half to the tip of the coracoid, but often is not palpable in the surgical field because it comes into the conjoined tendon so distally. In this particular patient, it's not in the surgical field, so we don't have to worry about that nerve quite as much. Let me have a freer, please. We have -- I don't know if this projects well. It looks like it does, actually. This would be his subscapularis. This is a bicipital groove. We have taken out his biceps and tenodisted right here to the upper border of pec major. So our bicep is tenodesed, we've excised the biceps all the way to the superglenoid tubercle and have incised the rotator interval all the way to the base of the coracoid. We'll take down his subscapularis with a lesser tuberosity osteotomy. Large curved osteotome, please. It's always a question about how deep we go with this osteotomy. I tend to go almost to the base of the wound, maybe not quite. Almost to the base of the bicipital groove but not quite. I think it's important to have a wide osteotome so you don't make a bunch of small passes at the lesser tuberosity and make it a bunch of small pieces. And I think it's important for it to be curved so that it comes out of the osteotomy surface at the anatomic neck. Hit me.

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Suck in there, Brent. Hit me. good. Once more. Good. So there we have a nice piece. Everybody always asks how wide, I'd say usually about 5 millimeters. Large straight osteotome. We use that only to get us a little mobility. Large Cobb. I can't do this operation without a Cobb elevator. That gives our flex-- that gives us nice flexibility to the lesser tuberosity. One millimeter Dacron tape. We will now pass three sutures around the lesser tuberosity to use not only for traction on the lesser tuberosity but for our repair at the end of the procedure.

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N. DOUGLAS BOARDMAN III, MD: Jerry, would you say that this is how you handle the subscapularis and biceps in the majority of your cases now?

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GERALD WILLIAMS, MD: I would say osteoarthritics, all my cases. Sometimes I won't do an osteotomy in a rheumatoid if the attachment site of the subscap to the lesser tuberosity is not stout. I worry a little bit about taking the osteotomy. But if it's an osteoarthritic or anybody else that's got a non-eroded attachment of the subscap to the lesser tuberosity, I'll take it as an osteotomy.

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N. DOUGLAS BOARDMAN III, MD: Is that irrespective of the degree of contracture?

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GERALD WILLIAMS, MD: Pretty much, yes. I guess if I had somebody that was below -30, I probably would take it off at bone and then advance it over to the osteotomy surface, but pretty much anything else, I think anything above, say, -20, -10, I probably would do an osteotomy. I excise the capsule and generally it gives you enough length back that it really is not much of an issue. I did worry about it initially when I first started doing the osteotomy. Now what we do at this stage, if you peel the osteotomy back, you'll notice that we do have -- let me see a freer -- we do have -- that's superior glenohumeral ligament right there. So let's see a knife. So the first thing we do is we make sure we've got everything disconnected up here... and it looks to me like it is. Now the next thing that we'll do, it's important now that -- we had the arm internally rotated to expose the bicipital groove, well, now we'll

externally rotate it to bring the subscap muscle fibers out to see us. Let me see a Scofield, please. What happened to our picture? Thank you. We've got the subscap -- very lower portion of the subscap exposed now. Let me see a knife. I've already coagulated -- clamped and coagulated the antehumeral circumflex vessels. I'll go down here in the fleshy portion of subscap and I'll make an incision through subscap only. Let's have a freer. We then use a freer to find the interval between subscap and capsule. Small Cobb. We'll gradually pass an increasingly larger instrument into that interval so we can get the interval between subscap and capsule freed up. Large Cobb. Can you take out that Scofield, Mitzi? So now we have the interval between subscap and capsule identified distally. We'll lift up on the lesser tuberosity osteotomy. Brent, I'm going to get you to hold that. Let me see a knife, please. So now that I've got -- I can see the interval where the subscap and capsule is over here laterally from the osteotomy. I know that I'm in that interval with my Cobb. So what I'm going to do now is I'm going to work from medial to lateral and I'm going to peel the subscap off of the capsule. And once you get started with this, it goes pretty quick. It's kind of difficult to appreciate where the layer is initially, but once you get this started and you make your first pass out here through the osteotomy surface like that, then it becomes much easier to go the rest of the way.

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N. DOUGLAS BOARDMAN III, MD: Do you visualize the axillary nerve on every case?

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GERALD WILLIAMS, MD: Absolutely. So I'm now in that interval between subscap and capsule, taking all the way to the top. So you can see now, that would actually be -- that hole right here, this would actually be the hole through which you would see the upper rolled border of the subscap if you were doing an arthroscopy. Let me see a curved Mayo. So now we're going to finish our incision in that layer across the top with a pair of scissors. All the way down to the base of the coracoid, and now we know that we have the subscapularis and lesser tuberosity completely freed up from the underlying capsule, so we'll now put the medial limb of our Kobel under the lesser tuberosity. Hold that for me, Brent, please. So now we're looking at the capsule. That's the capsular flexion. Let me see the curved Mayos back one more time. Tiffany, could you clamp those over there for me, please? So let me see a pickup. I'm getting sick of looking at that piece of degenerated tendon or whatever that is. Okay. So now we're staring at our capsular flexion over here laterally. What we'll do first, before we go and take our subscap -- I mean, our capsule down -- let me see a small Cobb. I'll stay right on capsule, down to the bottom of the joint. Now let's see a blunt Hohmann. This is, again, right on capsule. Somebody's head's in the way. Mitzi, I think it was you. Let's have a bovie. Seem to be losing our light every now and then. Okay. So now we're going to take our capsule off the anatomic neck. Starting up here, superiorly. Let's see a pickup, please. Am I still out of the way? Yes. So we'll take our capsule off the anatomic neck starting up here superiorly and heading inferiorly. Now as I get down towards the bottom of the head, rather than following the head, what I'll do is I'll take this incision right down to the shaft. I feel that bone right there. So I'm going to take this down to the shaft and take this incision from the shaft up into the anatomic neck area and stay right on bone. I think that's another way to stay safe from the axillary nerve. So again, we're down here on the shaft area. Let me see a small Cobb.

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N. DOUGLAS BOARDMAN III, MD: Jerry, have you released the upper portion of the pec major tendon?

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GERALD WILLIAMS, MD: I did release a very small portion, probably 5 millimeters. So I'm now going around the anatomic neck -- or excuse me, the surgical neck --

with a small Cobb. Now we'll take our blunt Hohmann. We know that this is subperiosteal now. Suck in there, please. And as we get down to the bottom, we'll now externally rotate the humerus. I got it. We'll externally rotate the humerus. You can see our capsular flexion as we continue inferiorly. Let me see a bovie, please. So we continue this down around a corner. Okay, now again, as we get closer and closer to the bottom, I have a mechanical arm holder here, which I failed to mention when I first started, which does help. But what I've done now is I've taken it out of the mechanical arm holder and I've got the arm in pretty much maximum external rotation. You can see all the way around the corner here. Let me see a freer. You can see all the way around the corner here. This is our inferior osteophyte. We can see that we still have a small capsular flexion here, but we're all the way around the corner. Let me see a knife. These capsular releases in the very beginning are very important. They're what allow you to get, to be honest with you, glenoid exposure. This is one of the most important steps, the glenoid exposure right here. So I've gone around the corner of the humerus, I know that the axillary nerve is behind her retractor. And so I've now -- I've got that humerus delivered all the way up into the wound. And I can still feel a little bit of capsule back there. Let me see a knife. So we're actually going to go around the corner, all the way around the corner here to the posterior aspect of the humerus, and cut the entire capsule. Small Cobb. So we're all the way around the corner at this point. So now what we do is we're going to deliver our humerus into the wound. We're going to take out our self-retaining retractor. Mitzi, for now, take out the blunt Hohmann. Let me see a large Derra. So we're going to put a Derra retractor, this large flat retractor -- Mitzi, I think -- yep, you got it. That goes in the glenohumeral joint. We got a large Derra retractor over the humerus, I'm going to take a blunt Hohmann and go around the -- hold that for a second, Mitzi. And go around the surgical neck, staying right on bone so I don't get nerve, and then the move to get the humerus out of the wound and into the operation is simultaneous adduction, extension, and external rotation. And that's the kind of view that you should get of the humerus when you do that, and it's been a very gentle maneuver. We didn't really do anything hard to get it out. It was all about the capsular releases. Let me see a rongeur. So now what we do is we take out -- we take off the humeral osteophyte so that we can identify the anatomic neck. And I think it's important to do this before you make your humeral cut, and the reason is that, again, for glenoid exposure, one of the things that you can do to give yourself a big break as far as glenoid exposure is concerned is to narrow the AP diameter of the humerus. Anything you do to make the humerus narrower from front to back will allow you to displace more of it posteriorly with a retractor so that you can expose the glenoid. So I think it's important to remove osteophytes in the beginning of the procedure before you take down -- before you make your humeral cut. Again, the idea is to expose anatomic neck.

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N. DOUGLAS BOARDMAN III, MD: Do you have a guide for where the osteophyte stops and the neck starts, Jerry?

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GERALD WILLIAMS, MD: It's harder down at the bottom. I think the best place to start is about right here, just below the lesser tuberosity. You can usually get a pretty good sense for where the anatomic neck is up there. As you get down lower, it actually -- as you know, Doug, the humerus is not really a sphere. It actually is elliptical in the AP plane, so there actually is a little bit farther continuation of the humerus inferiorly than the anatomic neck, and so the best place to define the anatomic neck is here in this anterior portion of the cortex. I don't know if they can see all the way around the side here, but we now have the humerus completely defined all the way around. So let's see a bovie. So I'm going to try to mark the

anatomic neck. You can see up here, this is where the anatomic neck starts. We're going to follow this all the way around. So that's the angle of our neck cut. Neck shaft angle. That's where we're going to make it. Now, I can actually -- the secret to exposing this humerus to be able to see the back of it is not external rotation, it's actually adduction and a little bit of extension. And that allows us to actually visualize the rotator cuff attachment back here so that we don't cut it off with our saw. So I know that that's where I'm going to go. Let's have the saw first. So we're now going to cut our neck shaft -- we're going to cut our humerus with our neck shaft angle right where we drew it. Mitzi, can I get you to hold that right there? So that's where we're going to start our cut. So that's where we're going to start it. Now I'll put my finger around the back to feel where the anatomic neck comes through, and I'm going to aim at my finger. Now, obviously, as I get closer, I'm going to move my finger. So that gives me both the version and the neck shaft angle of where I want to make my cut. And when you have a device that has a -- the ability to give you a variable neck shaft angle, you don't have to be perfect, because there's a little bit of flexibility. In fact, there's 15 degrees either side of 135 flexibility in this implant, so it doesn't have to be perfect. So let's just see how well we did. We'll bring this back out. Let me see a little bit of irrigation, please. I'll tell you, he does have some juxta-articular erosion next to his cuff attachment site. His cuff attachment really is -- has thinned a little bit. So if we look at where we got, you see there's our cuff reflection right there. Let me see a pickup. See, that's part of his cuff. See a knife. I'm going to have to check his posterior cuff before we're done so make sure we don't have to repair it or reinforce it. Let's see that saw back for just a second, I have a little ridge right here. So the next thing that we're going to now that we have the humeral head cut off is we're going to estimate the size. Looks to me like it might be around a 48. Let's have a 48 by 18. Doesn't matter whether it's offset for now. So we'll lay this on here, we'll look at it, and if I look at that, I'm thinking that that's looking a little small maybe. So let's see a 52 by 18. So here's a 52 by 18, looking a little better, and we probably do have some osteophytes still down here, but that still might be a little small. Let's see a 52 by 21. Remember, there's a pretty narrow relationship between the radius of curvature and the neck width. So 52s are usually 21s. And if I look at how that goes from front to back up top, that looks pretty good. And all I really have down here is this osteophyte, and that's probably osteophyte. So this probably is going to be a 52, so you might want to change your glenoid reamer over to a 52. Let's -- before we -- come out with those two, Brent. Let's look at his posterior cuff while we're here since we saw it was a little thin in the -- so here's his entire cuff attachment site. Actually looks pretty good. I'm okay with that.

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N. DOUGLAS BOARDMAN III, MD: Jerry, can you comment on the version.

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GERALD WILLIAMS, MD: Yeah, what I did was I put him in native version. So if we look -- let's have a Richardson. I didn't really look at the angle, the epicondylar access when I made my cut because I was putting him in his native version. But if I externally rotate his arm and look in so that his osteotomy surface is parallel to the -- or perpendicular to the floor and then look at his arm, it's probably 35%. So he's 30-35% of retroversion, and that's what's normal for him. I tried to -- what I did was I tried to start my osteotomy on his anatomic neck anteriorly, and I tried to exit my osteotomy on his anatomic neck posteriorly. Now in terms of positioning of the arm for glenoid exposure, I don't know if you can pan out at all to see -- can you pan out to see where this arm is? Can the cameraman pan out? Can you pan out to get a wider angle view, or no? Can you pan out so you can get a wider view? No, yeah, keep going. Keep going, perfect. Okay? Now, the arm -- people talk about putting

the arm in abduction, extension, and external rotation. What I've found is the best place to put it is wherever the osteotomy surface winds up being parallel to the surface of the glenoid. That seems to give you the most amount of freedom. So I'll put it there, I'll lock my mechanical arm holder, and that's where we're going to start off with glenoid exposure. So now we're going to take a little bit of time here for our camera people to get a good angle for this glenoid exposure, because obviously that's one of the more difficult things.

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N. DOUGLAS BOARDMAN III, MD: Jerry, while we do that, we have a question with regard to the debate of hemi versus total shoulder arthroplasties in patients over 65.

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GERALD WILLIAMS, MD: Well, you know, I look at that argument either way. You might say, "Well, boy, they're 65, they don't have that high of an activity level, why not just give them a hemi arthroplasty?" I look at it exactly the opposite. We know for a fact, and it's actually now not debatable. If you look anyplace, there's probably six or eight articles in the literature right now that have compared hemis to totals. Even Dr. Rockwood, my friend and mentor, published an article that showed pain relief was better in totals. So that debate's over. Pain relief is better in totals. You do have to deal with the fact that the glenoid components can wear out. So what better patient to put it in than an older patient that doesn't have quite as long a life span? So from my perspective, I pretty much always put totals in unless they're under the age of 50. But as the patient gets older, I actually think you can make a stronger argument for total rather than hemi. So I usually put this sponge under the Fukuda retractor because the edge of the Fukuda can sometimes rip through the deltoid and rip through the vein. We'll get you a better look here in a moment. Hold that, Mitzi. Your camera, whichever camera's going to be looking at this glenoid exposure, should be looking at it from right here. You should be coming right over my right shoulder and you should be trying to look right over the edge of that retractor. Let me see a Kocher. This structure right here is the anterior capsule. That's the capsule that we separated from the subscapularis. And the subscapularis is this layer. So the first thing we're going to do is make sure that that layer is completely freed up all the way over medial and there's still a little bit of the subscap muscle fibers on it I can see right here, just a few. So we're going to go through those muscle fibers. Cobb elevator, large. So now we're going to peel this muscle layer off the capsule so that we're right on capsule, all the way down to the bottom of the joint. And right now I can actually, if I were to put my finger in here and palpate under the subscap, I can actually feel axillary nerve. So what I'm going to do is I'm going to take a blunt Hohmann retractor and I want to put this blunt Hohmann between the subscap and capsule right down at the inferior aspect of the glenoid. We're going to get you a good picture here momentarily. This picture needs to be coming in straight from here. Let me see a Metzenbaum and a pickup, please. Large Cobb. So I'm all the way down to the bottom of the joint. Let me see another blunt Hohmann. Okay. Great. Suction. Now, Doug, you're going to have to help me a little bit. Let's see, whose hand is that? That's Brent's. This has got to be a little higher. It's got to be coming in -- it's got to be coming like this. What you're trying -- what I want you to try to see is I want you to try to see that white thing right there. Let me see this, Brent. Let me see this. Like that. You see that?

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N. DOUGLAS BOARDMAN III, MD: Much better.

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GERALD WILLIAMS, MD: So I still have capsule here, which I'm going to get rid of right now. Let me see a curved Mayo. So I'm going to cut through this inferior

capsule and excise it. So I've cut this inferior capsule all the way to the glenoid. And now I'm going to excise this anterior capsule.

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N. DOUGLAS BOARDMAN III, MD: Jerry, do you routinely use interscalene block plus general for your total shoulders?

00:27:41

GERALD WILLIAMS, MD: Yes. I leave it up to the patient, but that's what, most of the time, they choose. So I don't know if you can see this or not, I don't know how well you can see, Doug, but this is the inferior glenoid right here. Mitzi's retractors, these two blunt Hohmanns are between the glenoid and the axillary nerve. This is subscap right here. This is a large Fukuda retractor, and that's obviously the glenoid. Let's have a reverse double-prong Bankart retractor. This retractor will go under subscap on the anterior glenoid. We try to keep that osteotomy right behind it, that osteotomy fragment. So I guess we're doing all right. maybe we could raise the table. That might help. Could you raise the O.R. table, please?

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WOMAN: Can you raise the table, please?

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GERALD WILLIAMS, MD: Now, let's get rid of this. That's good. Now let me see a single-prong Bankart retractor. So we'll put a single-prong Bankart posterior superiorly. Just like that. Now Doug, you've got to help us and tell me whether or not you can --

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N. DOUGLAS BOARDMAN III, MD: You're relatively retroverted to the picture right now.

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GERALD WILLIAMS, MD: Let's turn the table away from us, please. You need to be over here, looking straight at that. What they need to see right in the middle of their picture is that white, round thing. Thank you. You see that white thing in the base of the wound right there? That's what they need to see. Bring it down some, bring your whole camera down some. Let's see what that looks like. That's us now, live? Okay. Excuse me, I've got to get on the other side of your camera. Is that any better? I can't see our monitor. Is that any better, can you see that white structure any better? Brent, let me have this. Okay, Brent, that needs to stay like that. Okay. Kocher and a knife. Doug, you've got to let me know if you're seeing anything.

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N. DOUGLAS BOARDMAN III, MD: You're -- the camera's still a little anterior to what would be optimal for this, Jerry. I don't know if you're working on the other camera.

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GERALD WILLIAMS, MD: All right. I don't know what else to tell you to do. Why don't you move out and let's try this other camera. Bring this other camera in and look right here. So you need to come towards us. Doug, any questions while we're sitting here?

00:31:08

N. DOUGLAS BOARDMAN III, MD: Jerry, while we're working on this, what would you say the key to the glenoid exposure is for folks who perhaps aren't as experienced with this part of the total?

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GERALD WILLIAMS, MD: There are several keys. You're going to have to hold off for a minute and hold on. Can I see what -- can I see what you're seeing? I know. Can I see what you're seeing on this camera? Pardon me? Okay, great. Is that better, Doug?

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N. DOUGLAS BOARDMAN III, MD: Yes, that's much better, Jerry.

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GERALD WILLIAMS, MD: Okay, great. Just remember that my face mask is contaminated. So there are several keys. Let me see a Kocher back, please. The first key is to make your capsular release all the way past the humerus. It's got to go all the way around the corner. That's the first thing. The second thing is you have to make sure that you make your humeral osteotomy at the right place. If you leave an extra centimeter of bone on the humerus, you'll never get the glenoid exposed. So that's the second one. The third one is to remove the osteophytes off the humerus so that you narrow the AP diameter of the humerus. Another key is to make sure that when you release the capsule on the glenoid side, that you go all the way around the corner. You've got to go all the way past six o'clock. And actually, we can see our nerve here. Let me see a sponge and a suction. Let me see that for a second, Mitzi. Let me see a knife, please. Okay. So our nerve -- maybe we can't. I can feel it. Our nerve is right there. That's our nerve. That's how close it is to the glenoid. So it looks like, Doug, is it just me -- I think we've got a pretty good view now.

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N. DOUGLAS BOARDMAN III, MD: I think you've got a very good view now. Just with the releases from the glenoid side and the primary osteoarthritic, how often are you releasing the posterior capsule?

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GERALD WILLIAMS, MD: Hardly ever. I take the labrum out all the time, but I hardly ever cut the capsule. Let me see that Kocher back and a knife. Okay. Now we're going to take the labrum out superiorly. I'm going to come all the way around the corner, come down here inferiorly. And that's pretty much got it. So now let me see a little bit of irrigation. I think we've got a pretty good look at our glenoid. Let me see a large Cobb. So we saw from our preoperative MRI scan that there was a little bit of articular cartilage left on the anterior portion of the glenoid and that the posterior portion was slightly worn, so I'm using this Cobb to scrape off that portion that was intact so we can get a better idea of our version. Let me see a large rongeur. Okay, a little bit more irrigation. Now we have a pretty good look at our glenoid. Let's see a 52 glenoid sizer disc. We want to get an idea of our glenoid size. Is our suction clogged or something? Okay, so we put our 52 glenoid sizer disc on there and it seems to fit pretty well. So let's have a bovie. You've got to lean on that, Brent. We'll make a little mark in the center. So that's where our center of our glenoid is. Let's have the centering drill and drill guide for the reamer. So we're going to put our -- oh, that's going to get in your way. I'll go this way, I'll go left-handed. So we'll put this in the center so you can see it. Let me see the drill. And I know from looking at my CAT scan that I've got a little bit of posterior wear, so I've lifted the back part of my reamer off the back a little bit. Brent, you've got to lean harder on your left hand. Okay. Are we in? we want to make sure we're still in our glenoid cavity, and we are. So let's have our 52 reamer. Now, one of the things that you'll find, before I take Brent out, I'll show you, these reamers have a little pilot hole, a pilot that gets stuck in that pilot hole so it stays centered. You'll notice that if we try to get in here with a Fukuda in there, it's kind of difficult. So one of the things that I've noticed that's helpful is to take out your Fukuda retractor. Here you are, Tiffany. We'll keep our single-prong Bankart superiorly, and then I'll use this -- can you suck in there, Mitzi, so I can see this center hole. And you use a reamer as a retractor on the humerus. So you hook the reamer around the edge of the humerus, pull back on the humerus, and then just lay it right in the hole. So I'll do that again just so you can see it. You see our center hole, right? I put the reamer on the other side of the humeral osteotomy, I pull back on the humerus a little bit, and I push

down on the reamer shaft. And that pushes the humerus posteriorly and allows me to set the reamer in the hole, and now the shaft of the reamer is acting as a retractor, and we'll now ream. Okay, irrigation. One of the things we do here is make sure that our flutes are down, particularly the posterior ones.

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N. DOUGLAS BOARDMAN III, MD: Jerry, could you comment in terms of what type of a guide you use for restoration of version anatomically here?

00:37:25

GERALD WILLIAMS, MD: I use my three-dimensional study from preoperatively quite a bit. I notice from looking at my preoperative study that I had probably three or four millimeters of posterior wear, and when I scrape the anterior surface of the glenoid, I notice that I took off probably a couple of millimeters. So I knew I only had to asymmetrically ream two or three millimeters to get down normal. So when I drilled my drill hole for my center drill hole with my guide, I didn't place the guide directly flush on the surface, I lifted it up two or three millimeters in the back. And then this goes in flush to that drill hole. And I'm pretty sure that I'm down. Going to go a little more, and then we'll take it out. Now let's have the large Fukuda back. So again, that goes on the back of the glenoid. Mitzi, you don't need too much on that. Let me see a small rongeur. I don't know if you can see -- are you being able to see this?

00:38:28

N. DOUGLAS BOARDMAN III, MD: The view's just fine, Jerry.

00:38:30

GERALD WILLIAMS, MD: Okay, great.

00:38:32

N. DOUGLAS BOARDMAN III, MD: We had a viewer question about something that you and I had discussed about not releasing the posterior capsule and why in this setting one might not wish to do that.

00:38:42

GERALD WILLIAMS, MD: Right, and I didn't do that for that reason. If they're 25% or more posteriorly subluxated, I will not release the posterior capsule for that reason. So here we have our centering drill and drill guide for the anchor peg glenoid. We just have to make that center hole slightly larger. Let me see a suction, please. So that's still in, it hasn't gone out. Let's see the peripheral drill guide. Now we've got to drill the peripheral holes. Tamp. Mallet. Okay, so now we've got our peripheral drill guide in place. Let me see the drill. We'll drill the superior hole first. Brent, lean a little bit. Good. Let's have a de-rotation peg. Tamp. Mallet. Good. Drill. De-rotation peg. Tamp. Hit me. Good, suction. Let's see if we have enough room for our posterior hole. Now let me show you -- no, Brent, don't do that. Come off. Don't lean so hard. Let me see a blunt Hohmann, please. One trick that you can use if you're having a little bit of a hard time getting that posterior hole is I'll put a blunt Hohmann through the hole in the Fukuda and then lean on the blunt Hohmann. And you see, that gets me a lot more. Now let's have the drill. Lean a little harder, Brent. You can also bring the scapula forward with your guide a little bit. You've got to lean harder, Brent. Good. Now relax. Come out with that blunt Hohmann.

00:41:13

N. DOUGLAS BOARDMAN III, MD: Do you have any thoughts with regard to pitfalls in glenoid preparation to avoid?

00:41:18

GERALD WILLIAMS, MD: Well, I guess the biggest pitfall is lack of exposure. What I see more than anything else is poor placement of the glenoid component probably as a direct result of not being able to see it well enough. Suction. You also want to make sure that when you put the reamer on, when you go to ream the surface of the

glenoid, turn the reamer on before you push really hard onto the surface, because it may grab a prominent piece of bone and really rip -- either fracture a glenoid or pop the reamer out of the glenoid. Let me see this, Brent. I got this.

00:41:50

N. DOUGLAS BOARDMAN III, MD: How much glenoid is enough to put a component in?

00:41:54

GERALD WILLIAMS, MD: What do you mean? Oh, you mean how small can you get?

00:41:55

N. DOUGLAS BOARDMAN III, MD: How small?

00:41:58

GERALD WILLIAMS, MD: Good question. I'm not sure I know the answer to that one. What would you say?

00:42:01

N. DOUGLAS BOARDMAN III, MD: I don't know. How about how shallow?

00:42:05

GERALD WILLIAMS, MD: Hold on. Can you load that back up for me, please, Tiffany? Blunt Hohmann back. I don't mind going out with the central peg. If the central peg goes out a little bit, I'm really not that upset about it. In fact, sometimes I like it. It's pretty good fixation. But I think you need to get at least two of the peripheral pegs in bone and cemented well.

00:42:27

N. DOUGLAS BOARDMAN III, MD: So optimally, a centimeter, centimeter and a half of vault, maybe.

00:42:29

GERALD WILLIAMS, MD: Yeah. Something like that. Impactor. Mallet.

00:42:37

N. DOUGLAS BOARDMAN III, MD: We've had some questions with regard to options in the younger patient. Be that the Rick Matsen's ream and run or allograft interposition.

00:42:48

GERALD WILLIAMS, MD: My approach to that is -- so what we're doing here is we see our glenoid component is down, we're flush. I can see through the holes of the component that we're down. Let me have the Kocher. My approach is -- I did a lot of interpositions in the past, a lot. What I found was -- and I use meniscus. What I found was that the meniscus got chewed up just as much as the plastic did and I wound up having to go back and scope a few of them and take the meniscus out. Take that component out, please. I got the retractor. So what I do now is, in patients that are really active -- I got it, Brent. Hold this. In patients that are really, really active, I'll do just Matsen's ream and run. Suck in there for me, please. And if they're maybe not quite so active -- like I'll give you an example: 26-year-old juvenile rheumatoid arthritic. You can pulse-irrigate that, impact the holes. That person I would do in interposition. I would do a hemi with an interposition because I think they're not so bad on the glenoid, they're probably too young for plastic, but I think that the interposition probably gives them some pain relief. Give you another example: 40-year-old really muscular male weight lifter. That person's going to go back to bench-pressing and chew up anything you put in there, whether it's plastic or allograft. That person, I'm liable to do a ream and run like Rick does without any interposition.

00:44:12

N. DOUGLAS BOARDMAN III, MD: What do you tell them about recovery? My experience has been the ream and run recovery takes a little while.

00:44:17

GERALD WILLIAMS, MD: The patients that have a total shoulder replacement will come in on their first postoperative visit and tell you their pain's gone. The hemiarthroplasty without interposition will come back and tell you that their pain's gone in four months, maybe six. If you put interposition in, they act a little bit more like a total but not exactly like the total. It'll probably come back with pretty good pain relief in the six-to-eight-week range. So I think what you're getting at is the ream and runs and the hemis don't get as good a pain relief for as long a period -- it takes them longer to get good pain relief and it's not quite -- go ahead and mix. And it's not quite as good even when it gets to be as good as it is, as a good total is. In fact, you know, one time I was on a panel at an academy meeting and we were talking about whether or not to do hemis or totals, and there were some people on the panel that were mostly hemi peoples, like Dr. Rockwood, Dr. Matsen. And I was the moderator. And I said if magically you could wake up tomorrow and I told you that there was a glenoid component available that lasts forever in everybody that you used it in, how many of you would do totals? Every one of them raised their hand. So the bottom line is, as I said in the beginning of this, which of them gives you better pain relief is not a mystery. It's actually very well known at this point. I'd be the first to admit that we still have the glenoid wear issue, and we do, and hopefully we'll solve that sometime in the near future, but don't forget that hemis against the glenoid doesn't -- that's not a walk in the park either. You know, you wear away your glenoid so much with a hemi that you can't get another glenoid in, then what do you do? So you know, I don't think that using a hemi completely gets rid of glenoid issues. It gets rid of glenoid plastic issues, but it doesn't get rid of glenoid bone issues.

00:46:12

N. DOUGLAS BOARDMAN III, MD: Along that same line, we had a viewer who wanted to comment with regard to longevity of total shoulders versus hips and knees.

00:46:20

GERALD WILLIAMS, MD: Well, obviously, if you look at -- it depends upon who you put them in. First of all, the young-- the youngest patient population for joint replacement in the United States by far, by almost ten years, is shoulders. So by definition, the average shoulder-replacement patient is almost ten years younger than the average hip or knee replacement patient. But if you look at the numbers, you've got an 87% chance of it being intact and functioning at 15 years. And that assumes everything was put in right, which is not always the case. Most of my revisions, I would say in my revision practice, which is probably not quite half of my practice, my most common revision is a painful hemi to a total. My second most common revision is a revision of a poorly done hemi or total to another hemi or total. So you've got to get it right. And if you get it -- if you get the joint so that it's flexible and you get the pieces in in the appropriate orientation with good technique, you've got an 87% chance of it lasting 15 years.

00:47:21

N. DOUGLAS BOARDMAN III, MD: Now, what are you using here to maximize the fixation of the glenoid cement?

00:47:27

GERALD WILLIAMS, MD: I'm using a cardiac syringe. I drilled a hole in the side of it as a weep hole to get rid of the excess cement and air above this particular portion. The tip of this cardiac syringe fits almost perfectly into a drill hole for the peripheral holes for an anchor peg glenoid. So we will put that, the tip of that syringe, directly in one of the peripheral holes and we'll pressurize the cement. If I happen to go out of the glenoid vault with one of the peripheral drill holes and it was sort of at the base of the vault -- I mean, at the base of the drill hole, I'll take a piece of bone, put

it in that hole, and tamp it in with one of the de-rotation pegs. And I'll put cement back there, but I just won't pressurize it.

00:48:08

N. DOUGLAS BOARDMAN III, MD: What do you prefer to use to dry the glenoid holes with?

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GERALD WILLIAMS, MD: I don't use a CO2 thing that Rick uses. In fact, I've never used it. What I -- and I'm not saying that's bad, I just have never used it. What I will typically do is -- Mitzi, can you hold that? -- is we'll pulse irrigate it, we'll suck it dry, and then pack it with Surgiseal like this. And you can see it's relatively dry. And we'll make sure that that gets sucked out clean. We'll then pressurize the cement. Lean on that a little bit, Brent. And again, I'll try to pressurize that pretty well. So that's the superior one. Now we'll go down to the inf-- to the anterior one. We know all the holes are in the glenoid vault because we already tested them. So we'll pressurize that one.

00:49:01

N. DOUGLAS BOARDMAN III, MD: Should anyone be putting cement on the face of the glenoid?

00:49:04

GERALD WILLIAMS, MD: Good question. I don't think anybody knows the answer to that. Dr. Nayer would say no. My gut feeling is no, because it's not contained. You know, it's not like -- it's not like an acetabulum. You know, you can't really pressurize it. There's nothing that keeps it from sliding out around the edge. So my gut feeling is probably no, but there's really no data, quite frankly. I don't put it on there. I will -- you'll see what I do here in a minute. And here's our most posterior hole. Okay, let me see a clean sponge. And then we'll take it -- I usually use my thumb, I sort of take the last pass across the glenoid, which cleans up the excess cement and pressurizes the cement into the peripheral holes.

00:49:52

N. DOUGLAS BOARDMAN III, MD: Are we going to get a look at the anchor peg?

00:49:53

GERALD WILLIAMS, MD: Yeah, right here. So this central fluted peg, we use no cement. The bone grows between those interdigitations. I do not put bone graft in there. I did for a while, but what happens is it looks great when it's sitting up like this, but as soon as you turn it sideways to put it in the hole, the bone graft's on the floor. So I generally don't put anything in there. And we line it up the way we've got our holes. Let's have an impactor. Mallet. Brent, take that one out. Mitzi, take that one out. When you take out your Fukuda, you have to be careful you don't pop your glenoid out, so I'll put my thumb on my glenoid and sort of peel my Fukuda out under my thumb. And this is sort of the unfair part of the case. I'm usually a pretty fair guy, but I'm unfair in this sense, and that is that I've got bad arthritis of the basal joints of both of my thumbs, so I can't hold my thumb on that glenoid anymore. So the Fellows get to hold their thumb --

00:50:52

N. DOUGLAS BOARDMAN III, MD: That's an occupational hazard of shoulder surgery.

00:50:53

GERALD WILLIAMS, MD: That's an occupational hazard. I'm going to become disabled at some point of my career, collect a million dollars a year and go drink tequila somewhere.

00:50:59

N. DOUGLAS BOARDMAN III, MD: I'll be there with you.

00:51:00

GERALD WILLIAMS, MD: All right. So anyway, that's the glenoid side. We got not too much time. I guess we started about five after four and they want us to go about an hour. We won't need much more time.

00:51:12

N. DOUGLAS BOARDMAN III, MD: We had a question while we're waiting for the glenoid cement to harden --

00:51:16

GERALD WILLIAMS, MD: This always the most fun part.

00:51:17

N. DOUGLAS BOARDMAN III, MD: Exactly. Choices -- selection of primary versus reverse shoulder arthroplasty.

00:51:24

GERALD WILLIAMS, MD: Say that again.

00:51:26

N. DOUGLAS BOARDMAN III, MD: What makes one patient a candidate for an anatomic versus a reverse arthroplasty?

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GERALD WILLIAMS, MD: Lack of a rotator cuff. If somebody has an intact rotator cuff with a center joint, they don't ever get a reverse. At least not in the United States. They might in Europe, but they don't here. Patients who get a reverse are patients that have a nonfunctional rotator cuff. That's the main difference, anyway. There is - - Joel Walsh has talked about, even in patients with a rotator cuff, if they have really bad glenoid wear, like a Type C, a really bad Type C, Joel has now talked about putting a reverse in the Type C glenoids even if they have an intact cuff. And I understand why he does it. That's a very difficult patient population. On the other hand, it's hard for me to do that. The reverse has a whole host of other issues that I don't think you necessarily need to deal with unless somebody can't raise their arm because of lack of rotator cuff function.

00:52:27

N. DOUGLAS BOARDMAN III, MD: With contemporary reaming techniques and glenoid preparation, do you find yourself doing many glenoid bone grafts now?

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GERALD WILLIAMS, MD: I'd say probably three or four in a year. But I honestly believe that what we do with deficient glenoids right now, all of us, is we incorrect-- we incompletely correct the deformity and accept where we put it, which I don't think is the greatest solution. I honestly believe that the solution to those glenoids is going to be a prosthetic solution, not a biologic solution. I honestly believe that there is a tremendous need for a component that will allow us to address those B-2 glenoids especially that we just poorly -- we poorly address at this point.

00:53:11

N. DOUGLAS BOARDMAN III, MD: Is there a degree of retroversion above which you would expect that you wouldn't be able to correct it or undercorrect it and would be likely to need a bone graft?

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GERALD WILLIAMS, MD: Centimeter is the general number you hear. You really can't go much more than a centimeter without putting all your holes out of the glenoid vault. So a centimeter of glenoid bone loss is probably the upper limit without needing a bone graft in my hands, anyway. How about you?

00:53:38

N. DOUGLAS BOARDMAN III, MD: No, I think it's about a centimeter. That's been my experience.

00:53:44

GERALD WILLIAMS, MD: What else? When we get --

00:53:47

N. DOUGLAS BOARDMAN III, MD: We had a question with regard to physical therapy after total shoulder arthroplasty: expectations and limitations.

00:53:57

GERALD WILLIAMS, MD: You know, I've been very happy with our lesser tuberosity osteotomy fixation, so I usually will do passive range of motion to either 30 degrees of external rotation or 40, depending upon how it feels in the operating room. And elevation of 130 or 140 passively the very next day. And then they go with that passive exercise program for the next couple of weeks. At two weeks, I'll take away the limitation of elevation. They can go as far as they can within their limits of pain. I'll take away the external rotation limitation to about 45 degrees at that point. Six or seven weeks, we add strengthening exercises and active exercises. By three months, they're raising their arm probably two-thirds of the way that they will when it's all said and done. Takes them a solid year to get completely over it. With regard to a reverse, it's actually exactly the opposite. We don't -- we do hardly any therapy at all to reverse. With reverse patients, they stay in a sling for two weeks and don't do anything except elbow, wrist, and hand activities. At around two weeks, we tell them to take their sling off and just begin using their arm within their limits of pain and they never see a therapist.

00:55:03

N. DOUGLAS BOARDMAN III, MD: Do you have any -- do you impose any activity restrictions on the total shoulder patients?

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GERALD WILLIAMS, MD: When it's all said and done, I tell them I don't like to lift anything heavier than 20 pounds. But I'm sure they do. They can play golf, they can play tennis. I don't like them lifting weights, I don't like them going back to heavy-lifting activities. But beyond that, those are the limitations.

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N. DOUGLAS BOARDMAN III, MD: You let them go back to singles tennis?

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GERALD WILLIAMS, MD: Yeah, I would. So we've got our glenoid in place. Let's have a black Derra retractor. We use a black plastic retractor as our Derra after we put in our glenoid component so that we don't scratch the component. Large Brown deltoid. Get our Brown deltoid over the top again. Let's have a blunt Hohmann. Blunt Hohmann around the surgical neck, right on bone. We then take the arm out of our mechanical arm holder and we can move this boom now and put it back to where you had it originally. And I'm going to wait to deliver the humerus until you guys get your picture back. Let us know if our heads are in the way. We need to look right into the humerus like we did before. That's good. So now we're going to drop our arm down, deliver our humerus into the wound. And again, as I mentioned earlier, it's not external rotation that really improves exposure so much as it is abduction and extension. So we now have got our humerus cut. Let's have a six-millimeter reamer. We've templated this patient to probably a 14. I start off pretty high, probably within a centimeter or so of the top of the humerus. I know -- I know the orientation of my humerus by being able to palpate it. That was a six. That reamer's actually end-cutting. The rest of them are not, they're side-cutting. This is an eight. let's have a ten. Twelve.

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N. DOUGLAS BOARDMAN III, MD: Do you have guides for our viewers in terms of when to stop reaming?

00:57:21

GERALD WILLIAMS, MD: I don't stop right when I get chatter, but pretty close. Like I still haven't hit much. I didn't even have to turn it on the way down. I got a little bit

of a bite of cortex, but not much of one. And I also look at the cortex of the patient. If they've got reasonably good cortices, I get a little more aggressive, but not a lot. This is not a femur. So I now have got a 14, which is what I templated him to. We're down to our laser line, so we know we're all the way down as far as we need to go. So now we need a box osteotome. This box osteotome will cut the footprint of the implant. There is a hole on this box osteotome that allows you to -- as you bring this into the humerus, this will tell you the orientation of your osteotomy. You bring that down, so that tells you the orientation of your osteotomy. You then remove this rod. And without moving the orientation, you slide this box osteotome down so that the two lateral fins touch the bone at the same time. I'll usually advance them a little bit by hand. And then we'll get somebody to hit me. Mitzi, you're going to have to let Brent do that, I think, because your arm's in the way. Now stop for a second. You'll notice on the side of this box osteotome, there's a little V. I don't know -- can you see that V?

00:58:42

N. DOUGLAS BOARDMAN III, MD: Yes, we can see that just fine, Jerry.

00:58:43

GERALD WILLIAMS, MD: Okay, that angle, what that does is if you put the apex of that V on the cut surface of the osteotomy, in order for this neck shaft angle to be able to be met by our implants -- it has a 30-degree range -- the rest of the osteotomy has to fall within those two lines. So, Brent, go a little farther. So if I stop right there, I know that that tip is at the osteotomy surface and I am within the line, so I know that no matter what this neck shaft angle is that I will be able to meet it with the implant. Go a little farther. Good. Back out. Okay. Now what that's done is that's cut the fin tracks and made the footprint for our implant. Now let's have a broach. Now the broach you want to make sure that these fins on the broach match the fins on your box osteotome perfectly. Brent, you've got a better angle at that, can you tell me whether we're -- okay. Now hit me. Now one of the things that you'll notice -- stop, Brent -- this has a little rocker bar. That rocker bar will quit moving when it comes and lays down perfectly on the osteotomy surface. Go ahead. One of the things that you have to careful of is not to drive it all the way into the osteotomy surface. You want to stop when it's at the osteotomy surface. So we've got a ways to go yet. Stop. Tiny bit more, not a lot. Stop. Okay, so that's it. That's got no motion in it at all, so I know I'm down. We now take our broach handle off. Now, if I were to look at the surface of this osteotomy surface, and I look at the top of the broach, I can tell that -- if this were going to be a 135, and one of the things that we like about this implant is you can use a variable neck shaft angle if you need it, but if it's 135, you can use 135. So the first thing I'll do is I will look at this and I'll say we're off a little bit, but not a lot. Let's see the collar. Another way that you can tell how close you are to 135 is you can put this collar into the broach, tighten it -- don't need to tighten it completely tight, but tighten it enough so it doesn't fall out. Now we take one of these large calcar reamers. You can get a large one and a small one. You lay this calcar reamer on the collar, and then you look from the side and you see how close you are to 135. And you can see, we're not too far off, quite frankly. I probably could use a 135, but I think I'm going to go with a ball taper. If we decided to use a 135, we would just take this calcar reamer and we would ream the surface of the osteotomy just to make it fine tuned, and we would -- instead of using a variable neck shaft angle, we would use a regular 135 rigid taper, which I'll show you in a moment.

01:01:42

N. DOUGLAS BOARDMAN III, MD: And it's important, if one is to calcar plane, to do that by hand not by power.

01:01:47

GERALD WILLIAMS, MD: Yeah, I would say that's a good idea. Let's have a T-handle screwdriver. So now we take out this collar. The other thing that I'm going to look at is I'm going to look at the center of this broach and I'm going to say does that look like it's in the center? Hold on a second. Does that look like it's in the center of the osteotomy surface or not? Now, remembering that I've got an osteophyte down here still. So if I look at it, to be honest with you, it looks pretty darn close to the center. So why don't you give me -- I think it's probably going to be offset, though. Let's have a 52x21 trial head with a trial ball taper offset. So here's the 52x21 trial head offset taper. Here is the trial ball taper. Let me see the T-handled screwdriver. This set screw in the middle, we usually back up just a little bit, a couple of turns, so that it doesn't interfere with those things opening. Make sure you don't open it so much that it falls on the floor. And it doesn't. So now we put this in in its only orientation that it can go in into the head, we then pop the head on the top. And you've got to feel it click into place like that. Now let me see the Brown handle. We then use this handle to spin this -- it does two things. You can use it to spin it for offset and you can set your neck shaft angle. And to be honest with you, as I thought, this is pretty close to center, to be honest with you. So I want it to be right at the very top of the bone, which is right about there. I'm overhanging by about two millimeters in the back, which I'm going to live with. So now I've got it in place. This goes down the center and gets that set screw, and then we tighten it, and that locks the head into position. Locks the ball tape-- the trial ball taper is what it does. So we lock that. Everybody out of the pool. We now reduce it and see how much translation we got. We usually want about 50% translation posteriorly, which is about what we have. I'll even take 100% as long as it comes back in by itself. But that's about 50, we like that. I'll then put the arm at about 30% of external rotation. Brent, pull that lesser tuberosity back over. Just pull the lesser tuberosity over. And I want us to make sure we've got enough subscap length. We got plenty. So that's what we like. So we're going to use a 14 stem, a 52x21 head with a ball taper offset.

01:0:17

N. DOUGLAS BOARDMAN III, MD: Jerry, about what percentage of the cases do you find you're using the ball taper now as opposed to a fixed-angle construct?

01:04:24

GERALD WILLIAMS, MD: To be honest with you, 10%. I'm very often close enough to 135 that I would just ream to 135 and keep it at 135. We got a little bit of our biceps left. I hate that thing. Let me see a knife, please.

01:04:43

N. DOUGLAS BOARDMAN III, MD: Are you a proud biceps killer, Jerry?

01:04:45

GERALD WILLIAMS, MD: Absolutely. Especially in totals. So we know this is what we're going to use. Let's have the black Derra. Now a blunt Hohmann right on bone. Now before we -- before we go to our final implant, we're going to tidy up our humerus. Let me see a large rongeur. So we've got this osteophyte down here that we don't like, we're going to get rid of this, and we're going to make it look nice and pretty. Good. Let me see a small rongeur. Mitzi, hold that right there for a second. Okay, that's looking pretty good. I think I can live with that. Now I've got the arm. Let's have a Kocher. We will take this humeral head off. Now we want to extract the trial so we can make our real one look like the trial. You put this extracting device back behind the broach till it catches the back edge of the broach. Keep a little upward tension on it. And there's our trial. We're going to have Brent go over and make our real one look like our trial. And if you want, maybe we could actually get the handheld camera over there so that we could at least show you how we translate the trial component. In fact, Mitzi, why don't you hold this for a second. And this. And that'll probably stay there. Before we -- while Brent's doing that, let me see the

-- here. I don't know if you can see this. I can't tell where I am. Are you looking at me?

01:06:48

N. DOUGLAS BOARDMAN III, MD: No, we were, but now we're not.

01:06:49

GERALD WILLIAMS, MD: Look at that ri-- look at that thing right there. Can you see it? Looks to me like -- yeah, there you go, perfect. That is the taper that goes in if you want to just do a 135. That taper goes in, and the only thing you have to worry about is the offset of the humeral head, just like the Global Advantage or any other fixed neck shaft angle device. If you want to use a variable neck shaft angle, what Dr. -- look over here, right here at this stand, if you can zoom in a little bit. What this stand does, the first thing he's doing is he's marking the humeral head offset, he's made a pen mark right here where the offset is for the humeral head. That can then be removed. This tower goes on, this -- these components up here remain loose. This rod goes through those components and it sits into that taper in the orientation that that taper is in. And then we tighten this. What that's done is that's registered the position of the taper with respect to the stem. So then we take this off. We take our real stem...and we put our real stem in here. So now we've got our real stem in. The real stem first has a collar that looks like this. What this collar allows you to do is to revise this implant if you ever need to without taking the stem out. We thought that would be an important feature. And one of the things that we like about it is you can revise it out of the patient, because we did some studies to show that if you impact -- if you use a mallet to impact the implant in the body, you get about 10% of the forces that you get if you did it on the back table. So now let's go back to the stand. We put the ball taper back in here, the new ball taper. This device goes back in to register the position of the ball taper with respect to the shaft, okay? Now we hit that with a mallet, tap it first gently to get it set. Okay, now hit it. Okay, good. That locks those two tapers. Now we take the head, Brent is going to mark -- he's already marked on the side -- on the edge of the head where the maximum offset is. That line's going to line up with the line that he made on the top of the stand. We're going to impact that. Good, so there's our implant put together. We take a one-millimeter Dacron tape, we pass it around the neck of the prosthesis, as this will go into our closure of our lesser tuberosity. I think before we let you guys go, I just want to show you how we do the lesser tuberosity and then we're done. So let's come back over here. Mitzi, go down below, I got this. Grab that for just a second. Good. So hold on. Good, got it. So now we're going to take this implant -- can you show us the picture from the boom? There we go. So we're going to take this implant, we're going to make sure that our fin tracks line up exactly. Brent, can you tell if we are? Can you look and see whether we're lining up? Okay, so we line up those fin tracks exactly, we take our sutures out here for our lesser tuberosity. Impactor. Go ahead. Now hold on just a minute. Go ahead a little harder. Good. Now that gets us right down onto the humeral osteotomy surface where we were originally. Let's see a freer. I sort of like where we are, I think that looks good. I think we're right at the cut service of the osteotomy. Now everybody out, we're going to put the humerus back in. Step on that pedal, Mitzi. Now good. Let's have the Kobels, one deep -- no. Yeah, one deep and one shallow. So here are our osteotomy sutures that go around the osteotomy surface. Here's our shallow blade. Let's have the Kobels. Blunt Hohmann. Okay, so there we are over the top. Now we've got three sets of sutures to fix our osteotomy. One is this one that goes from the implant up to the bone tendon junction. The second set is these, and they're fragmentary sutures. And the third set is a soft-tissue side-to-side suture at the top, which we'll place in a moment. Empty needle driver. So the first one we're going to pass is this superior one that's gone through the -- through the prosthesis. Next we'll

pass this inferior one that's gone through the prosthesis. Okay, we'll put a hemostat on those and cut the needles off. All right, now let's have a large free needle.

01:12:31

N. DOUGLAS BOARDMAN III, MD: Do you always close the rotator interval, Jerry?

01:12:33

GERALD WILLIAMS, MD: Laterally. Not all the way over medially, just laterally. Now you'll see -- let me see a freer. Here's our osteotomy surface right here. So our osteotomy goes right there. So we're first going to take the top one. Let's have a big free needle, please. I drive these sutures right through the bone with a large big free cutting needle. So we load our sutures -- we load our sutures onto this big free needle. We know that this is the top one, so we're going to start this at the top of the osteotomy surface as laterally as we can get and we're going to drive it straight out through the bone laterally, which went through pretty easy. All right, so there's the first one. That's the upper interfragmentary suture. Now the second one is this one. So we're going to take that big free needle again. Again, we're going to drive it through the osteotomy surface and out the lateral cortex. All right, now we've got our third one. And we're going to take the deep one. Large free needle. I'm going to drive that one through the inferior portion of the osteotomy, out the lateral cortex. Okay, so those are our three interfragmentary sutures. Prior to tying those, we're now going to pass our anatomic side to side suture. So let me see a pickup. So I'm going to hold my osteotomy in its anatomically reduced position and I'm going to take this one-millimeter tape and I'm going to pass it across the rotator interval in a figure-of-eight. There's one. There's the second one. Now let's cut the needles off. Now we're going to tie that one first, because that's going to anatomically reduce our lesser tuberosity. So we'll get Brent to hold that with a needle driver. Tie this off. And cut that. And I will typically tie the middle one of the interfragmentary sutures. Lay that one down. I use my thumb to sort of set it down and then pull the sutures as tight as I can. Off. And I'll typically do the upper one next. Cut that. Again, we'll pull that nice and tight. Off.

01:17:03

N. DOUGLAS BOARDMAN III, MD: So, Jerry, this technique with the osteotomy allows you to follow subscap healing radiographically post-op.

01:17:08

GERALD WILLIAMS, MD: Exactly. And we tie the bottom one. Again, we pull it nice and tight. And then the last stitch is the stitch that goes -- off -- goes around the neck of the prosthesis and through the bone/tendon junction, and what that does when you tie it is it pulls the medial edge of that lesser tuberosity under the edge of the head and locks it from going medially. So those are your three sets of sutures closing the lesser tuberosity. Those are the -- we've done the first two sets, now we've got this last one, which is the one that goes through the bone/tendon junction that came from the prosthesis. Off. So then what we've done now, we will check what kind of motion we have, so we'll take this out -- leave that there, Brent. You've got a pretty good shot at that lesser tuberosity. And you can see, that's pretty good. We've got very good motion, probably 45 degrees. The very last thing I do every case is make sure I still have an axillary nerve. So we'll palpate the axillary nerve, and it is in fact there without any tension. So we're pretty much done. We'll now do a standard closure, we'll pulse irrigate the rest of what we have, we'll close the delto-pec interval with a couple of Vicryl sutures over a drain. So that's pretty much it. Are there any other questions, Doug?

01:18:50

N. DOUGLAS BOARDMAN III, MD: We had a couple with regard to the glenoid, one of which was use of cement in the anchor peg hole, and I think that's a big no-no.

01:18:59

GERALD WILLIAMS, MD: Yeah, I would say no to that.

01:19:01

N. DOUGLAS BOARDMAN III, MD: And then experience with fracturing the glenoid during glenoid preparation.

01:19:06

GERALD WILLIAMS, MD: I've done that once in my life, and that was when I had the patient up in this mechanical arm holder device and it wasn't locked in like I thought it was. And her arm fell out and crushed the Fukuda against the back of the glenoid and smashed it and I had to bone graft it. I've never done it with a reamer or an anatomic glenoid. I have done it with a reverse, with a much more osteopenic glenoid. I think the way you avoid it is first of all get good glenoid exposure so you're not having to push and pull and work real hard. And secondly, when you get the reamer against the glenoid surface, before you turn the reamer on, don't push -- don't bury the reamer as tight as you can against the glenoid surface and then turn it on. Turn it on first and then push gradually medially. It's sort of like the concept of when you're reaming a femur, don't ever turn the intramedullary reamer off and back on again. You always want to keep it on and gradually move so that you ream the bone. The same is true here. You don't want to turn the reamer on with maximum pressure against the glenoid.

01:20:03

N. DOUGLAS BOARDMAN III, MD: One might argue for turning it on just as you engage the bone or right before.

01:20:07

GERALD WILLIAMS, MD: Correct.

01:20:08

N. DOUGLAS BOARDMAN III, MD: Particularly with reverse.

01:20:10

GERALD WILLIAMS, MD: Especially with reverse.

01:20:15

N. DOUGLAS BOARDMAN III, MD: I think that covers most of our -- most of our questions at this point.

01:20:18

GERALD WILLIAMS, MD: Great. Super. Thank you very much. I'd like to thank everybody.

01:20:25

N. DOUGLAS BOARDMAN III, MD: So I think right now with things completed, we'd like to thank everyone for joining us and remind the viewers that if anyone wants any additional information, feel free to request it using the buttons on your screen. Thank you.

01:20:48

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