

ANNA N.

OK. Well thank you, again, for having us. And my part, as Anne said, has a few more pictures. So hopefully it will keep you awake a little bit longer. So my job, as an orthopedic trauma surgeon-- so I mostly treat broken bones. However, I do have the privilege of working with a lot of older people, because our population is aging. So we thought it would be interesting, actually, to get started on this osteoporosis Fracture Liaison Service. And it's been, I think, very successful so far. But obviously, with the coming onslaught, we need all the help we can get. So hopefully, this will convince you guys to get involved.

MILLER:

So a lot of people, as Anne mentioned, there's the gap between men and women and who believes that they are at risk for osteoporosis. So I would argue that men are equal to women, or women are equal to men, depending on how you want to put it. But in this case, I'm particularly referring to osteoporosis.

So we evaluate every patient over the age of 49, whether they're male or female, especially if they've had a previous fracture. And the vast majority of my population are motor vehicle collisions, so a lot of people will say, well, I've never had osteoporosis before, or I had a normal bone density, or I'm a guy, we don't get osteoporosis. But just because you are in a car crash doesn't mean that you don't have osteoporosis. So we evaluate everybody.

Men may be more resistant to treatment. As we discussed, there is a lot of historic confusion about who gets osteoporosis. But really, the variety of fractures is the most important thing. And as Anne mentioned, men are actually at much higher risk, once they have a fracture, of having more morbidity and mortality afterwards.

So I'm just going to go over one of our most common fractures that we see, which are hip fractures. So this is an example-- and I hope these project pretty well-- of what a normal pelvis looks like. So this is a 20-year-old male. You can see the bone. It's great. There's no major calcifications in the arteries. There's no weird arthritis, or anything going on.

This is a classic example of an osteoporotic hip fracture patient. So you guys can see the difference. I'm going to go back one more time. Nice, white bone. Clear bone, OK? So it's obvious, just from looking at the X-ray, that this person has horrible osteoporosis. Now, we can't technically diagnose it from just the X-ray itself. But just from the fact that they have a hip fracture, you can diagnosis it. So you can see that here.

And these are very, very common. There are basically two common types of hip fractures, and this is one of them. It's called an intertrochanteric hip fracture. I'm sure you all have heard of it. You can see that that leg is kind of pulled up, and shorter, and turned. And the patient's probably very uncomfortable. They probably have a lot of other medical issues. You see they have some old clip in here. They may have some constipation going on, probably some arthritis in their spine and SI joint. So these people have a lot of other issues, besides just their hip fracture.

So for these types of fractures, we usually start by getting, what we call, a traction view. And this is just a regular picture of the hip, and then we pull on it just a little bit. The patients don't love it, but it is important for us to see exactly where that fracture line is because, depending on where the fracture is, we can decide is that fixable, or does it need a hip replacement, which is obviously a big difference for the patient. So if the fracture line is a little bit further down, like this one is, as opposed to way up high on the neck, it usually has the blood supply intact, so we can go ahead and fix it.

So this is an example of how it affects that particular fracture. So this is that patient, but this is now the patient is on the operating room table. And we actually put them in traction on the table. So there's weights pulling on their leg. Now, you can actually hardly even see the fracture, because it's lined up really nicely. So I'm just going to play this for a couple of minutes so you can kind of see exactly what we do to fix these.

That's looking at it from the side. And then, we put in a guide wire to kind of estimate where the main screw is going to go. This is after we make an incision. We're kind of measuring exactly where that is. We're kind of trying to get that rod right in the center of their head, putting in a screw, and then putting the side plate on. So the side plate is one of the main fracture treatments that we have. And that is a pretty standard treatment for these simple intertrochanteric fractures.

So this is another example of a slightly more complex fracture. So again, you see same kinds of problems. The bone is very clear. This person has an artery that has more calcium in it than his bone. And here, you see this horrible fracture.

So this person actually fractured below the lesser trochanter area. You see the fracture on the other side is probably right around here. So you see that the leg is no longer attached, of course, and we have to do something to fix it. So the other option for fixing these is putting in an intramedullary nail.

So in this one, instead of putting that plate on the side here, we kind of put it all the way down the canal. So we're using hooks to bring the bones back together. We put this guide rod down the center of the canal, all the way down to the knee. And then we put this giant rod all the way down that canal. So hopefully, even though it's a huge surgery for them at the time, hopefully, it will protect them if they ever had another injury, because the rod goes all the way down. The knee is at the right side of the screen there.

What happens when you choose the wrong implant? This is a patient who showed in on my clinical with this X-ray and complaining that his hip hurt, which you might imagine. If you had all these broken screws in your hip, it would hurt.

So this poor gentleman is 90. He is a retired veterinarian who's blind, but still very crotchety. And he is extremely skinny, very emaciated. You can imagine exactly why he has osteoporosis. He clearly doesn't have enough nutrition.

This bulge here, which looks like a little bit of fat, is actually a giant fluid pouch that he's kind of formed around this implant, because it's irritating his skin and soft tissue so much. So this poor patient had the wrong implant placed and failed his hardware. He has been trying to walk around on it. It's killing him. It's ruining his quality of life, which is-- you know, we're fixing the hip fracture so he can get up and walk again.

So we take him back, and we put on this giant rod, which is just like the video I just showed you. So I took out all that broken hardware. We put the rod-- oops, sorry-- we put the rod in to go all the way down to protect him if he ever falls again. Of course, he's already had both of his knees replaced, so I'm thinking the next thing that's going to happen is he's going to break right here, between.

And you can see, actually, that his legs are more bowed than the rod. So this is very, very common. The older people get, they actually get more bowing in their femurs. And our rods are kind of all the same radius of curvature. So his problem was that the leg was more bowed on this view, but it was also more bowed on the lateral view.

And here, you see what happens. And the tip of that rod is extremely close to poking out of the bone. So I'm looking at this thinking, there is no way he's not going to come back with a fracture right here. So we actually took him back to the operating room again and put a plate and screws around the implant, all the way down to the total knee replacement. So now, he's protected if he ever has an issue again.

The problem with these is that these people will always do something-- I mean, it's not really their fault. I'm accusing them, but it's the bone that's the problem, right? So the metal is 50 times stronger than the bone. So if you put a stress riser in that's a knee replacement and a stress riser in that's a nail right above it, the weak spot is always going to fail. So these people go through a lot. And if we don't get to them early on by treating them with medication or treating their osteoporosis, this is what they end up having to undergo.

OK. This is just an example of a femoral neck fracture. So here, you can see that the ball has fallen off the-- the ice cream has fallen off the cone here. So this is what the normal hip looks like. And here, you can't really see that neck area very well, you just see the head itself. Again, horrible bone. You can hardly see the X-rays. Lots of other problems going on with these people.

So this is the kind of person that's going to get a hip replacement. This is actually a partial hip replacement to replace that broken ball, because the ball itself, once it breaks off like that, has no blood supply. So we can't really fix it, because the bone won't heal again. So you can imagine this is a very morbid procedure.

The patients do relatively well after having a hip fixed, but most people drop one level of function. So if they were using a cane before, they're now going to be using a walker. If they were already on a walker, they're going to be in a wheelchair. And up to 50% of hip fracture patients die in the first year after they break their hip. So if we can prevent them from ever getting that far, it's far better for the patient.

OK. So what about all the other fragility fractures that Anne was talking about? So I'm just going to show you all some other examples of the horrible things that happen to these people. So this one is a proximal humerus fracture. So it kind of looks like a hip, but from a different angle.

So this is the glenoid here. This is, again, the ball. It's supposed to be sitting on the ice cream cone up here. This patient is not happy. This is actually an axillary view, which they take by like lifting up their arm and taking an X-ray of their armpit. So I'm sure this patient was especially not happy as this X-ray was being taken.

So for that, we usually do either fix it or do a replacement. Just like with the hip, it has the same issues with the blood supply. So that one, because the ball had come off completely, we went ahead and did a partial shoulder replacement, which again, not an ideal solution. These people would much rather have their original bone, if we could save it.

This is an example of the vertebral compression fracture. You see the size of that little pancake, as opposed to the normal vertebra. Obviously, this person also has a lot of other little things poking out. That's all osteoarthritis in the spine. But that is what is going to be causing their pain.

And I have to share a story with you guys. I just had my personal annual checkup. And I went up to the woman, and she's like standing me up on the thing. And I've always been 5' 3". Obviously, I'm not a very tall person, but I'm proud of my 5' 3".

And she said I was 5' 2" and 3/4. And I thought, nobody ever does 3/4. Can I just be 5' 3"? And she's like, but I'm going to take off an extra quarter of an inch for your shoes. She made me 5' 2" and 1/2. And I was really sad. So I'm a little worried I might have one of these hidden in me. Anyway, watch out for that height loss. It's a problem.

So this is an example of a kyphoplasty. Actually, I don't know if this is a kyphoplasty or vertebroplasty, but you see how the center of that bone now has a really white blob in it. So they literally take bone cement, or some people call it glue. It's literally cement that's squirted in there as a liquid and then solidifies to help keep that vertebra from compressing more.

The problem is, as you can see, that white blob is about a million times more dense than the bone around it. So now, this bone is super, super hard. These ones are still really, really fragile. So the next thing that happens is they take a hard step and the ones above and blood crunch, because that one is so hard. So it is very helpful for their pain, but they can get more problems because of their osteoporosis, if that's not treated separately.

All right. This is a patient who has our pelvic insufficiency fractures. Now, you can see this one is a recidivist. This patient just will not stop coming back for more. This person did not get appropriately treated, right? They had a hip fracture. Then they came back and had another hip fracture. Now, they have an inferior pubic ramus, a superior pubic ramus, and a bunch of sacral fractures in the back, because nobody treated their osteoporosis.

So I'll admit it. I'm a surgeon. I love operating, and I don't like to do all the medical stuff. But it is really, really important for these people, which is why we have Anne Lake.

[LAUGHTER]

And this is an example-- so we actually have noticed that there's an increasing number of distal femur fractures. So this is down by the knee. You can see how this person-- basically, the femoral shaft just imploded into their femoral condyles, here and here. And there there's actually a split between them also.

So these people-- you can see the patient's overweight. She doesn't do a lot of activity. She hasn't been treated for her osteoporosis. She slipped in a hole in her yard, and this is the fracture that she got. That is not normal. This is why we call them pathologic fractures, because a normal person wouldn't get this without a high-speed motor vehicle crash.

So she gets a humongous plate, which goes all the way from her knee, down here at the bottom, all the way up to her lesser trochanter, up here. So that's a huge plate. But unfortunately, what's the next thing that's going to happen? She's going to come back with a break right up here, if she doesn't get her osteoporosis treated.

For these, sometimes we like to do that rod, like I showed you with the older gentleman, that goes all the way up. But when you have the break into the joint, you need all these screws to hold it together. So that's not really an option. So it's a difficult treatment scenario.

And now, we have a new onslaught of peri-prosthetic fractures. So this person, same story as the last lady. She had a hip fracture, then got a partial hip replacement. You can tell, whenever you see a cable, that's a sign of a struggle. So there was some problem. While they were in the operating room, they must have cracked her bone putting that in, because her bone was so fragile. Didn't get the appropriate management. And now, she has this below it, which makes my job really easy, because now, I have to work around that thing.

So we do, similar to the last one, a plate, screws, all the way up, cables around it. And now, hopefully, that leg won't break again. Maybe the other one. So these people have a lot of problems.

And then, the last one that Anne referred to a little bit as the distal radius fracture. So this is a wrist. Hand is up here. This is the end of distal radius, and this is the radial shaft. So you can see how it's tilted off about 45 degrees back. And again, those are usually just from a simple fall. And in this case, it was actually from a polytrauma.

So this is a real problem that we're facing these days. Again, population is getting older. We're having more people that are driving for longer. I actually saw a study recently that 40% of all drivers are over the age of 60 now. So this is going to be more and more of a problem, until the Google car comes and saves us all. I'll be out of a job.

So this woman had that distal radius fracture. Now notice, this is her right wrist. She had this left hip fracture, femoral intratrochanteric and femoral neck-- actually, it's broken here and over here-- right ankle, and left proximal humerus. So she had one of all four major fractures, except the pelvis, which miraculously was safe.

So with these elderly people, you don't want them laying in bed for six months getting pneumonia and bedsores. You want them up and walking around and moving as soon as possible. So what we have to do is try to do implants and get all the bones fixed as quickly as possible to let them move.

So she actually had such a severe fracture that one of our tumor surgeons had to do this special prosthesis, which is a proximal femur replacement. They actually cut out all the bone of the proximal femur that was broken and replaced it with metal. I fixed her ankle on the right side where she can walk on it immediately. This is her left shoulder, which had a humeral nail, which we do very, very rarely. But it's something she can put her full weight on right away.

And then this is her right wrist. So she can't put her weight on her hand, but she can lean on a walker with a platform. So she can use her left arm to push, her right arm to platform, and walk on her right ankle. The left hip was actually the one thing he didn't want her to walk on right away. But she was able to get up much sooner. This woman was in the hospital for 67 days. And a lot of that was her lungs and breathing. But they come up with a lot of complications.

So just one other aside. This is atypical femur fractures. So Anne mentioned this in the Nexium ad. But when we talk about atypical femur fractures, we're usually referring to fractures that people have sustained after prolonged use of medication, which is often bisphosphonates.

So what they look like is this. It's a little bit different than the hip fractures that I showed you before. They're usually in the subtrochanteric region, which is just under the lesser trochanter. And they often have this little beak. Do you all see that little point, how it's kind of sticking out to the side? So before they fracture, you can often see this little beak on the X-ray, which I'll show you in a minute.

The problem with these fractures is that they are basically a stress fracture. A stress fracture is a fracture that you get and you can't heal it, because you don't have either the proper building blocks, like calcium and vitamin D, or there's so much stress on that area that it doesn't have time to heal. So that happens a lot in marathon runners. It happens with this female athlete triads that you may see people who have amenorrhea. And then, in these people, the theory is that the bisphosphonate keeps the bone from remodeling appropriately, because it stops the bone from breaking down. The osteoblasts are still building bone, but the osteoclasts are not remodeling.

So these people, on average, take two and a half surgeries to fix them. So you do not want this to happen to you. This woman, luckily, I fixed her with this nail, and it healed. Now, you can see it's a little bit crooked. But the other interesting thing, which you may not know just from looking at it, but I know because I did it, is this is a pediatric nail. Her bone was so tiny that we couldn't put an adult sized nail in it. So these tiny, little, elderly people have a lot of issues that we have to deal with.

This is a patient who somebody else had tried to treat with a nail. And you can see what happens and why they need two and a half surgeries. Basically, the bone doesn't heal. And you walk on it, walk on it, walk on it. The metal will break, before the bone will heal. So this person was taken back and re-affixed with a different kind of implant. They usually have to have bone graft. They have to have other metabolic agents inserted to get them to heal.

This is another patient who came in with a failed treatment of this. This looks very similar to the one that I showed you all before. All the screws are broken, and the plate has lifted off the bone, because the bone never heals. So I took her back and put in a rod and nail down the leg. And this took two years to heal. So it's a long, long process with these people.

This is a patient whose fracture was healing so poorly and had so many attempts at it that they ended up doing a proximal femur replacement, because they could never, ever, ever get that fracture to heal. She also had one on the other side that they did get to heal.

So that's one thing that happens very commonly with these people. They'll get one on one side, like this patient. My partner fixed this with a nail. Did great. She's back. This is three months. It's actually healing.

She was on Forteo, which helped with the healing. They also did bone graft, and they put in BMP, Bone Morphogenetic Protein, which is about \$2,000 extra in the surgery, to get it to heal. Three months, she's feeling fine. Comes back at six months feeling great, totally healed.

Nobody noticed this tiny, little beak beginning on the other side. Do you all see that? It's just a little bit poking out over there. So she didn't have any pain. Nobody noticed it. She comes right for her one year anniversary complaining of thigh pain. So this could have been treated six months ago. But now, it's at the point where it absolutely has to have surgery.

She says, well, it hurts me, but I don't want to have any more surgery. But if you explain to her the consequences-- she was lucky, because it healed the first time they did it. But if you explain the consequences of two and a half more surgeries, potentially, if it breaks all the way through, a lot of patients do elect to go through prophylactic treatment of this. So you put this rod in prophylactically, before this breaks, to keep it from breaking.

We actually just have published-- well, the paper is actually coming out next month in our *Journal of Bone and Joint Surgery*. But what we found is that not everybody gets these fractures. So nobody exactly knows who's going to get them and who's not. All we know is taking prolonged bisphosphonates over five to seven years is a risk factor.

But our studies show that, actually, depending on the angle of the neck, compared with the shaft, the people who have a lower angle have a higher risk of breaking. Which makes sense because, a lower angle, you're putting more stress right on this zone, biomechanically, every time you walk.

So we're actually now recommending that anybody who has had one of these fractures gets an AP pelvis X-ray to measure that angle. And if they're at risk, then they may need to have closer follow-up, because a lot of these people break before they've ever had any assessment. Or they've had thigh pain, but they didn't want to go to the doctor. And nobody checked it. So this lady got a rod prophylactically for that other side.

And this is just a final image to show that-- this is a patient that I showed earlier that had the humeral nail. These people, if they're treated well, and they get their preventive measures, can actually do really, really well. So this is him after breaking everything in his back, to living life with his really, really cute wife that has been married to him for over 70 years.

This is our Fracture Liaison Service team. This is Dr. Emery, who's one of our tumor surgeons, and myself. And of course, it's headed by Anne Lake, who you already met. If you all do have any questions or problems with patients, we're happy to see them anytime, any kind of metabolic bone issue, annual osteoporosis evaluation, or anything like that. We're happy to talk to them. And we're happy to answer any questions that you all have. Thank you.