

Melanie Cole (Host): Welcome to the podcast series from the specialists at Penn Medicine. I'm Melanie Cole. We're highlighting clavicle fractures today with Dr. Samir Mehta. He's the chief of the division of Orthopaedic Trauma and Fracture Care at Penn Medicine. Dr. Mehta, it's such a pleasure to have you join us. I'd like you to start by telling us a little bit about how common, the prevalence of clavicle fractures and the different types that you see, how these fractures occur.

Dr. Samir Mehta: So, clavicle fractures are very, very common injuries. They can happen through a multitude of different ways. Typically it's people landing or falling on their shoulder or landing or falling on an outstretched arm. Imagine a bicyclist hitting trolley tracks or a curb and flipping over their bike, landing on their side, a quarterback getting tackled and landing on their shoulder. These are just a couple of the ways that people will sustain clavicle fractures. They're very, very common. And I wouldn't say it's a dime a dozen, but it's one of the most common things I see.

Melanie Cole (Host): Dr. Mehta, how has treatment evolved over time for clavicle fractures? Are there non-surgical options that we're looking at now for these patients? And if so, what are some of those modalities?

Dr. Samir Mehta: When I've talk to patients about clavicle fractures, I tell them it's story time. Let me start by saying that when we talk about clavicle fractures, there are three sort of different categories.

Category one is your mid-shaft clavicle, the clavicle fracture that happens right in the middle of the clavicle. And that's about 80% or so of clavicle fractures. And we'll spend our time talking about that because it's the most common.

5% is what we call a medial clavicle fracture. It's typically a fracture dislocation. It's right where the clavicle meets the sternum. So it's right by the center of your chest. And these are typically high energy injuries where the clavicle can dislocate or fracture towards the front of the body, so out the front, which is not a huge deal, or it can fracture towards the back of the body, or a posterior dislocation, which can actually be life-threatening. And so in posterior dislocations, these are typically surgical urgencies or emergencies if they are impeding or impinging on the structures that are around the heart and throat. I'm not going to focus on that because those, if that happens, are pretty obvious and patients are rushed to the hospital.

There's also what we call a lateral clavicle fracture. These are fractures that are the very edge of the clavicle towards the shoulder. They only make up about

15% of the fractures that happen. Oftentimes it's a landing or loading of the shoulder when you land on that side. These are often treated non-operatively. And again, because there's such a small percentage of the ones that we see, I'm going to not touch on that because that's a whole separate conversation.

But we're going to focus mostly on those mid-shaft clavicle fractures. And so when we talk about treatment, historically, and I say historically, this is almost pre my time, clavicle fractures were treated non-operatively. Nobody fixed a clavicle. You threw them in a sling or a figure of eight wrap, which is this like contraption that actually doesn't do anything. It didn't work. And you would basically pat people on the shoulder and say, you're going to do great, have a great life.

And nobody followed those patients to see how they did. They just assumed they all did well. The only patients who really got fixed when they had clavicle fractures, and again, I'm talking decades ago, were patients who had really catastrophic injuries. And what I mean by that, are patients who had an open fracture where the bone was sticking out of the skin, where patients had neurologic injury in that limb. They were polytrauma patients, meaning they had multiple injuries, so they needed their clavicle to be able to mobilize. They had a vascular injury that required repair and so you had to fix the clavicle to give the vasculature some stability.

These are the worst of the worst injuries if you will and they didn't do well. And so surgeons said see if you fix them, they don't do well so we shouldn't be fixing them and it was almost comical because there was some bias there, as you can imagine. You're only fixing the worst of the worst and you're getting bad outcomes and making a broad generalization and saying, "Oh, see, you shouldn't fix clavicles because they all do bad," but you're only using the worst of the clavicles to make that decision.

So you could see that for a long time, clavicles were treated very, very conservatively, non-operatively. That all changed in 2007 when the Canadians came along and did a prospective, randomized trial looking at patients with isolated clavicle fractures.

So these are patients who they just broke their clavicle, right? There's nothing special or nothing unique about them. There are no other injuries. Very clean sort of injury specific to that clavicle and they had about a hundred and fifty patients total that they did and the patients were randomized to having their clavicle fixed or not fixed and they were followed for two years to see how they did. So this gave us an answer about whether or not patients who have their

clavicle fixed do better or worse or should have it fixed or shouldn't have it fixed and it opened a whole Pandora's box, if you will, about the idea or the concept of surgically stabilizing clavicles.

So if you read the Cliff notes version of the paper or whatever the kids are using now, you would read the paper and think everybody should have their clavicle fixed. And that's not what the study came out and said. There were a lot of nuances to their research.

What the research told us, and there have been now multiple papers about clavicles since the Canadians wrote that original prospective study—so, as I talk about this data, this is now putting together not just that Canadian study that really was pivotal in our understanding of whether we should operate or not operate on clavicles, but also other work that's been done.

The Cliff Notes version of what the Canadians and others have said is, if you break your clavicle, and if you heal, at one year, there's really not a huge difference in your outcomes. Now, there are a lot of nuances to what I said. The first part was, if you heal, right? So what's the heal rate? If you have surgery, the heal rate for clavicle fractures is 90 plus percent. Some papers suggest as high as 99, 98 percent. If you have non-operative treatment of your clavicle fracture, your heal rate is typically around 80, 85 percent, still way better than the odds you get in Vegas. But not as good as operative treatment. Okay, but either way, right now the numbers are still very much in favor. Whether you have surgery or not surgery, the chances are you're going to heal your clavicle. The real sort of dilemma is, if you fall into the group that does not heal and then have surgery, your outcome is not as good as had you just had surgery off the bat.

Melanie Cole (Host): That is just so interesting. What do you do in that case?

Dr. Samir Mehta: Right? So now the problem becomes, can I predict the future, right? Can I predict who's not going to heal? Because if you're in that category, then you're saying, “Well, look, if I'm not going to heal and I'm going to need surgery anyway, then just do surgery now because then I know my outcome is going to be as good as if I just have surgery off the bat.”

So there's been some work done on this and there's been a few different factors that have been shown to affect fracture healing. The first is the amount of displacement. If the fracture is displaced by more than a hundred percent—meaning, basically, the bone is shifted so that there's gap between the two ends, that is a risk factor. Another risk factor is if you have shortening of the clavicle

by more than two centimeters. So if the two edges are overlapped by more than two centimeters, that then pulls your shoulder over and that can affect your shoulder function down the road. And the last thing that was shown to result in a high risk of nonunion, meaning the bone doesn't heal, is this concept of a Zed fragment. When you look at the X-ray, it looks like the letter Z, the fracture shape or morphology.

And so when you have all of those factors, it dramatically increases your risk of developing a delayed union or nonunion, which will ultimately affect your outcome. Now, that's one piece of this. The other piece of this that I talk to patients about is, if you're going to have your clavicle fixed, we know that at one year, like I said, if you have non-operative treatment, the curves meet in terms of your outcome. But what happens before one year? We know that patients who have their clavicle fixed have much better function, much better pain control, way faster than patients who don't have their clavicle fixed.

And that kind of makes sense, right? If I stabilize the bone, you're going to feel better and be able to do more faster than if you let nature or let the body heal on its own over 6, 12, 18 weeks, assuming you heal. But eventually, at one year, those outcomes are going to be equal. So, that also affects people's decision making.

Melanie Cole (Host): Well, I'd like you to expand on that because the shared decision making parameters that are employed at Penn Medicine seem to be what you're getting at here, Dr. Mehta, because as you said, predictive risk factors aside, nobody can quite tell. So, it's between you and the patient, yes?

Dr. Samir Mehta: Well, it's really up to the patient, but I think it's important for the patient to understand what they're getting themselves into either way, right? I'm not saying that every clavicle needs to be fixed because if it's not fixed, it might heal just fine, and you're going to be left with a deformity because the bones won't go back to where they normally are, so you're left with a bump.

Some people are like, I don't want a bump. Well, then you're going to exchange that bump for a scar because I'm going to have to make an incision and put plates and screws in to fix the clavicle. So you either have a bump or you have a scar, but you're going to have something when it's all said and done.

I think the biggest issue that I talk to patients about is, what we allow them to do post-operatively. Because of how we fix clavicle fractures at Penn, we typically use two small plates; we let patients be very aggressive after surgery

and what I mean by that is I let patients use their arm immediately after surgery, full range of motion right away, sling only for comfort. I tell them, I discourage them from using it. I expect them to have full range of motion by the time I see them back at their two week followup.

And if they have their full range of motion back, I don't even put them in physical therapy. I let them strengthen on their own. I let them back to bike riding at two weeks. And just as an example, I've let a football player play football seven weeks after surgery because it was the high school state championships and he wanted to play.

I've let a professional surfer less than three months after surgery, had surgery in October, he was surfing Christmas day. I've had a patient who is a triathlete, four weeks after he broke his clavicle, he ran the Baltimore Marathon. So patients can be very, very functional very quickly. And I think that's part of what goes into some patients' decision making.

They don't want to have to be in a sling for a prolonged period of time. They don't want to have to, like, wait for the fracture to heal. They want to be able to swing a golf club, swing a tennis racket, that sort of thing sooner rather than later, they want to be able to, I will let patients ride a bike two weeks after surgery. I'll let them get on a trainer or a Peloton or something like that pretty quickly after surgical intervention. I think that's one of the things that patients take into consideration as to whether they want to do something surgical or not. And I think that's a really important piece of it.

Melanie Cole (Host): Before we wrap up, I'd like you to speak just a bit about how the post-operative protocol impacts your decision making. Is ERAS (Enhanced Recovery After Surgery) involved? How is post-surgical pain managed? As you're telling us that you're getting them right back to physical activity and letting them work that pretty hard to make sure that they are recovering in the way that you'd like them to. Speak just a little bit about how that all impacts your decision making.

Dr. Samir Mehta: Yes, so that's really important. I always tell patients there's no point in fixing your clavicle if you're not going to use the arm right away and I get frustrated when I hear stories about patients having their clavicle fixed and then they were put in a sling for six weeks and told they couldn't move their shoulder. Well, then what was the point of fixing it?

So fixing the clavicle means being able to use the arm and the shoulder right away. That's really critical to me and to my decision making, and to their

decision making. In terms of post-operative pain control, you know, we use local analgesics intraoperatively. We use a very, very small amount of opioid pain medication, and most of it is anti-inflammatories, ice and acetaminophen to help get over the hump. Most patients will say they feel better post-surgery and the pieces of bone aren't moving, than they do pre-surgery. And the biggest, if you will, complaint I hear is why didn't we do this sooner? Because of the difference in how they feel with the bone being stabilized, compared to the bone edges moving and grinding and pushing on each other.

Patients will say the first couple of days obviously after surgery are not great, but once the bone is stabilized and they can start to be more functional, getting themselves dressed, being able to take a shower, brush their teeth, they just feel better about what they are and who they are.

In conclusion, I'd like the providers to know that clavicle fractures really are treated very differently now than they have been in the past and it really is very much a shared decision model where patients need to know what the opportunities are with both operative and non-operative treatment and functionally what they can and cannot do with either option, so that they can make an educated decision about how they want to proceed and move forward.

Melanie Cole (Host): Thank you so much, Dr.. Mehta, for joining us. What a great guest you are. To refer your patient to Dr.. Mehta at Penn Medicine, please call our 24-7 provider only line at 877-937-PENN. Or you can submit your referral via our secure online referral form by visiting our website at pennmedicine.org/referyourpatient.

That concludes this episode from the specialists at Penn Medicine. I'm Melanie Cole. Thanks so much for joining us today.