

SPEAKER: Communicating this entails a big part of my practice, I think similar to what Jaycee said earlier today. There are limited cases for it, but in a properly selected patient I think that it's still a great operation. And I'll start off by talking a little bit about the background of the operation, technique that I use, and some data that I have published on outcomes.

So the original description was published in '98 by [INAUDIBLE]. It does involve a relatively large exposure with soft tissue disruption to get the screw entry points as well as through the disk space. In '97, and subsequently in 2001, these techniques were extended by Kevin Foley, with the evolution of minimally invasive spine surgery and percutaneous pedicle screw fixation, concepts that we've already discussed a little bit today.

The principle is really not only a small incision, but preservation of soft tissue. And coming from a paramedian approach respecting more normal tissue plants to get that access to the spine, while preserving the corresponding musculature. Same principles apply to the percutaneous pedicle screw placement.

So indications, exactly the same as for a normal TLIF [INAUDIBLE] or [INAUDIBLE] degenerative disc disease, vertical foraminal stenosis. There are times when I'll use this as part of the basic formula of operation [INAUDIBLE]. As with everything we do, the most important thing is patient selection. This may be attractive, on first glance for a more limited fusion, but if you looked at entire spine, more of a global spine problem requiring a better solution. However, this is a different case where a patient has a mobile L4-L5 spondy, primarily L4-L5 distribution leg pain. Globally well balanced, and the goal here is to leave him that way after you fix the problem.

When thinking about minimally invasive surgery, really key here is that patients don't come to us like this. And so we have to figure out ways to visualize the anatomy and do a safe operation without actually seeing it. This is a guy I served with up in rural California whose dad had a successful spine operation so he got this tattoo. And the way I did it is to actually use navigation. I'm really excited to see Juan and Ibrahim talk about their use of navigation in their practice.

I think this will significantly minimize the dosage in particular to the surgical staff. I'll show you a little bit of data about that. But the way that I set this up is an [INAUDIBLE] at the foot of the bed, a reference arc that's placed contralateral to the Telos so it doesn't get in your way. And then do a normal spin after you place your reference arc in VSIS. And then I use microscope and limited fluoroscopy just to check occasionally and rod. And these are the steps. Incision is typically about 3 and 1/2 centimeters from midline. You can fine tune that with navigation to get that really nice trajectory down the pedicle. These are my standards so the size is regardless of the patient's size, even morbidly obese.

Navigated screw placement. All the instruments are navigated, so you can see them in real time. And then drop the screws on the contralateral side, and just mark the lateral side that you can be routinely in between. I use navigation for a lot of other stuff other than just screws. I actually use it to place my tube, to make sure it's coaxial with the disc space. And then dilated through the [INAUDIBLE] muscles to do that in a minimally invasive operation.

And so this is just a video down a microscope. A little bit of residual soft tissue removal. And then doing a standard laminotomy to decompress nerves, giving you access to the disc, and we can clean out the lateral recess. And we see something looking like a [INAUDIBLE] there. I use navigation also to delineate and inferior pedicles, so you can really aggressively remove that bone and get access to the disc. And this is what it looks like, you're using the navigation to show you what those pedicles are since you're not going to directly visualize them.

So I really defined that pedicle and made a lateral cut to disarticulate the interior articular process. And then we're moving on to [INAUDIBLE] removal. A little dissection. Shows you the [INAUDIBLE] and then we're moving the superior articular process relatively efficiently. Any pedicle can be defined with navigation, same thing with disc. You've got a really nice trajectory down the disc space, like this.

And sometimes for various collapsed discs you have to get in there with an [INAUDIBLE] usually do that or fluoroscopy. And then again, with minimally invasive, similar to what Juan said, you really are relying on the interbody space for your fusion. So I do have to spend a tremendous amount of time preparing that disc space to get that fusion that we need. And again I use some periodic fluoroscopy, just to visualize those endplates while I'm sizing up the disc space for the eventual cage. And again, the cage goes in with fluoro, and the rod is also placed under fluoroscopy compression. Again if you need to induce a little bit of the lordosis you can take off the [INAUDIBLE] through the tube also.

Often, I do this [INAUDIBLE]. Perc screw has nothing but invasive TLIF at the bottom. And so I was curious about radiation exposure using intraoperative CT scan spot fluoroscopy. And overall, the numbers compare relatively favorably to other published cites on radiation exposure during minimally invasive operation. With respect to outcomes, I did a metanalysis as a fellow, looking at minimally invasive versus open TLIF, comparing all the comparative studies, about 1,000 patients in each group. And what we found was similar to other reports, invasive TLIF was associated with equivalent operatomp times, lower blood loss, however higher radiation exposure, shorter possible [INAUDIBLE]. It's also similar to previous reports. Similar very, very high fusion rate. And actually lower complications in minimally invasive TLIF compared to open.

Similar but very, very good outcomes with respect to early in plate disability, and actually a little bit less long term pain relief compared to open TLIFs. And lastly, touching a little bit on what Jaycee talked about earlier today, minimally invasive TLIF and post-operative lordosis. I retrospectively reviewed about 160 patients that had one year outcomes. And what we found is that, again, these are patients that you're not trying to correct for, but patients that are well-balanced, and moving into it you just want to leave them that way. And this can certainly be achieved. I looked at one level TLIFs, two level TLIFs, and even patients who you had to aggressively distract that disc space with complete disc collapse.

So overall, what we're finding is lower complications when you do these operations minimally invasively, however you do have to overcome the learning curve that everybody knows about. And maybe increased benefits in the obese or the medically unfit or elderly. Possibly less [INAUDIBLE] that definitely needs more study, and lordosis can't be maintained after these operations. Thank you.