

Surgical Staplers: Charles Mulligan, MD

Intro

My name is Charles Mulligan. I'm the Chief of Thoracic Surgery at Christiana Care and Helen Graham Cancer Center. And I'm responsible for the thoracic surgery service line, which includes lung cancer, esophageal cancer and benign lung and esophageal disease.

Why and how often do you use a surgical stapler?

Makes it ease of use and that's how you can do minimally invasive surgery. If you have to tie things and do that- you can't do minimally invasive surgery with tying everything. So it helps you do small and minimally invasive surgery.

If I'm resecting somebody, you use it at every case. It depends on what case you're doing- if you're doing a surgical resection of a lung tumor, you're doing multiple fires every case. If you're not doing- if you're doing esophageal work, if you're doing benign disease- you're not cutting anything else-- you don't need a stapler unless you're extending or enlarging or anything in the esophagus. And so that's a variable thing. In cancer cases you are using the stapler to cut out disease.

What defines the success of a surgical stapler?

To me it's ease of use and having secure staple lines that don't leak.

It's twofold. One is the stapler design itself, two is the tissue that you're trying to divide. And so every tissue, you can't use one stapler for every tissue. You have to use different staplers with different staple heights for each tissue. With lower profile staples for thinner tissue like pulmonary artery, thicker staple lines for the stomach. And in the lung parenchyma where it's real thick in areas, you have to use real thick staple lines and so it varies. And so the success is getting nice D-ring staples to form. And so it varies on both the instruments you're using and the tissue you're trying to staple.

How does the staple design affect the integrity of a seal?

The integrity is formed by the number of rows of staples. And so to me, more is better- does it mean better? No. But it's kind of a serial fire of staplers and you get three rows of staples that are a little bit slightly different in heights. And they come down and gives you a kind of almost like a double purse string around something. And so to me that is encouraging- doesn't mean you're not going to leak. But the true key is if true deformation of the staples, whatever everybody will talk about. And do all the staplers do that? No. And because the tissue will distort it. But majority of the staples, if you have more staples, less likely to have all of them fail.

Compare the Medtronic and Ethicon staplers.

I use one stapler, predominantly- I've used a couple throughout my career but the predominant stapler that I use is the now is the Medtronic, which is the former Covidien which is a former US Surgical, which has actually the first stapler that I've used since 1997. And the main reason why we used one stapler your entire career or most of your career is because it was the only- the first one that would go, that was allowed to go across the pulmonary artery. And so that is why I've always used it. And if- they've been through all the iterations of it- it's easy to use, easy to fire, easy to manipulate in the lung, and they've made it better as they've gotten more articulation and stuff like that. And so it lays six rows of staples and cuts in-between. You get a new blade on each device, each cut. And you can use it 25 times per case. And you almost never have to open another handle. I have used other staplers such Ethicon and actually you try to look at it closely because the hospital was pushing for it when they were an Ethicon hospital. And

the power, they had a powered 40 stapler or 45 stapler or 35 stapler, that was reasonable because it could go across low profile and you'd do okay. It got real small pulmonary arteries but you couldn't use it on big things. And it was pretty easy to use. The one for the pulmonary artery is very easy because it had a articular dial where you could rotate the stapler. The other one that they use, the other one, powered one you have this stupid claw. That's the biggest piece of- it's the most annoying thing in the world to try to articulate a stapler. And to me it was the most burdensome thing in the world. Now an Ethicon stapler person will say it's the easiest thing in the world. But to me it was the most ridiculous thing in the world. And the reason they couldn't use the one articular thing like Covidien was because of patent rights. And so I mean, I've used, predominantly been, Covidien/Medtronic stapler person because of utility and the benefit of the lung. And we actually made them give us an exception for use before it became a Covidien place.

Powered vs. non-powered staplers

The only time I used the powered where I liked it was when I was using the vascular powered from Ethicon just to trial it out. It works well; it has the same mechanism knob that you can twist and rotate the jaws and it will work smoothly. You had to get used to it. It's a little heavy, a little bit off balance. I played around. They brought their Covidien/Medtronic one by my office to play with, and I was like, Oh hell, no, it takes too long. I can fire my staplers by hand faster, and power doesn't provide me any benefit. The power it provides I think the bariatric surgeons some benefit because they're getting tired, their hands get a little weak trying to staple that stomach, but they just need to work on your hand grip. I'm just kidding. But to me, I don't think power is that important- I think it's the least important aspect.

What are some frustrations when using surgical staplers?

The articulation you can never get through 90 degrees with the staplers that you need. And you don't necessarily need that all the time and as you articulate the stapler closer to 60 degree mark, the jaws get smaller. So as you articulate more, you have less space to put something in, which is aggravating. But it's the mechanism of the mechanics of what you have to do- as you do that, you lose some of your range of motion. And so that's a challenge and annoying, but you can adjust the locations and how you put tissue in. You make do. And then the other problem is when you get real thick tissue is trying to get it- the staplers to bite and lay proper staples. And if you get somebody with bad fibrotic lung, it becomes like stapling a rock, and that can be problematic.

What is your process of setting up a stapler?

I know how to load them better than anybody in the hospital. And so if I have a tech that doesn't know how to load them, I'll show them how to do it because- the only time, I've had one misfire in my entire career, and it was when it was loaded improperly. And so I learned after that I check to make sure you can open and close it properly, and if it does, it will fire. You will not have a misfire. It's- I've yet to see a misfire that happened because of other mechanical problems. And so it comes on the field. They know to check it- the techs know to put load in and open and close it, make sure it does and hands it to me. I'll open and close it myself and then use the stapler.

What is the process of adopting or recommending a new device?

This is hospital driven because of money and cost. And so actually I was the one fighting for Medtronic and Covidien to come in. And every argument that they had from Ethicon- they would say the cost is cheaper for Ethicon. But when you added up number handles and stuff you used- and actually I said, Okay, I will try this. That's why I tried the Ethicon stapler, and I didn't make my partner do it. And I said I will try it and I will prove what the cost is. And the cost is neutral; if it saves anything it's like ten bucks. And so hospital looks at it as what they get for their buck. And what Ethicon provided was great suture. But they tagged it on with their mechanical devices. An Ethicon stapler person will be just as adamant

about what I'm as adamant about Medtronic/Covidien. And so each surgeon has their preference of what they trained with. I think that it's to me it's comfort level and stuff and what the hospital does is they're doing a total business costs. They say, what are they getting? Whatever companies are giving the best deal is what they're selecting. Economic deal. And it usually comes as one big bundle and then they try to force everybody use it. And then sometimes you have push-back which they're getting push-back now from people that are Ethicon users because it's not quite the same. The Ethicon power stapler is a lot better than Covidien. Covidien's bulky and cumbersome, and to me not worth- I'd rather just use the stapler, bigger short handle stapler, but without power, it's easier and faster. If they forced me to do the electrical, I would be a little bit pissed. So I think the problem with Covidien is their power stapler is not that good. Ethicon has a better power stapler and better mechanism except for the claw.

It's a financial decision by the hospital. And hospitals sway and switch. Majority of hospitals used to be Ethicon and over the last few years they've switched and been more Covidien across the country or more Medtronic. Why? They're getting better deals. And then, you know, they're still able to get the suture from Ethicon, which is a better suture. And so they're accepting two costs there.

Adopters of a new device- you can be a champion from the surgeons. A lot of times it's driven by the hospital. Hospitals are getting hit from. Sometimes we'll drive it and try to get something- we tried it, and it's difficult. We got an exception to the rule to be able to use Medtronic when we they were an Ethicon facility. You can do that and they're getting push-back now from a lot of Ethicon surgeons that they're having issues with their staplers. And that's more just bias. Personal bias, just like I have a personal bias with Covidien or Medtronic. And so I don't think- it's not like we lobbied for them to change to Medtronic. They changed because they got a better offer. They're always looking to see what is more cost effective. That offer may change in three years and they'll go-- it's just like free agency in the baseball world. Give me the best offer, I'll go to it. In this case, not the most paid but the least that you had to pay for it and what it entails.

Which factors impede stapler innovation?

It's a diverse thing. And the problem with the staplers is if you're trying to make and innovate, and how do we innovate more on the staplers because everything's patented. And so the problem with Ethicon is they have a good stapler- they could not change the articular mechanism to make the handle move better. And that kind of dampened their- to me the quality of their stapler, but it's a good stapler. And so to me, these patent things are kind of being impingement, even though I understand why they're there. And trying to be able to work together with some type of system where we can use the best of each world and make the stapler the best makes the most sense. But that's never going to happen in the world we have with a free market and stuff.