DAVID R DUHAMEL: We're doing a procedure today called a combined rigid and flexible bronchoscopy to insert a dynamic Y stent in a 65-year-old gentleman.

The patient was referred to me having a problem with recurrent infections and respiratory failure with multiple exacerbations over the last year. His primary pulmonologist was concerned that he may have what's called tracheobronchial malacia, and subsequently did a flexible bronchoscopy and confirmed those findings of a dynamic collapsible airway. As an interventionist, he was referred to me to insert a stent to help maintain the lumenal patency of his airway.

The decision to put the dynamic Y stent in this patient was fairly straightforward. The amount of dynamic collapse that he has is pretty diffuse, extending from his trachea all the way down to both his bronchii. And in my experience, the dynamic Y really works the best of all the stents available in the market in the setting of diffuse tracheobronchial malacia.

The insertion of the dynamic Y stent has multiple steps to it. Initially, we have to get the patient nice and comfortable and need to have a very compliant patient. So they're basically given general anesthesia by our anesthesia service.

I will then insert a rigid bronchoscope down their airway to help basically establish airway ventilation and oxygenation for the patient. That gives me some time to then make an assessment of the airway.

We'll typically pass the flexible bronchoscope through the rigid bronchoscope. Typically, what we're doing at that point is we're making some measurements, we are determining the distance between the carina and the right upper lobe bronchus, as well as the distance of the left main stem bronchus. These are all important since it will help determine the size and the length of the dynamic Y stent.

Another important aspect of the procedure is properly preparing the stent once you've taken the appropriate endoscopic measurements. Certainly, we want to make sure the distance between the carina and the proximal opening to the right upper lobe orifice is determined. We'll then cut the edge of the right main stem bronchial portion of the stent in a somewhat 45 degree angle with the leading edge, the lengthy edge, being on the medial aspect of the bronchus and the shorter aspect being on the lateral aspect of the bronchus. This allows maximum stability of the bronchial wall yet still offering the opportunity to maintain patency to the right upper lobe.

We do a similar thing in the left main stem bronchus but not at such a severe angle as 45 degrees. We'll taper the distal end of the left main stem bronchus. That's just to help prevent the occasional partial occlusion of the left upper lobe bronchus by extension of the distal end of the stent and partial occlusion of the left upper lobe bronchus.

So probably the most important aspect of the dynamic Y measurement is determination of the tracheal length. That's very important because if it's not done properly, with coughing and exhalation, the patient can get irritation of the subglottis and the voice box by basically bumping up the bottom of the vocal chords against the top of the tracheal stent. So we like to leave at least a centimeter and a half below the vocal chords, as far as distance, because as you know the trachea will shorten with coughing and exhalation.

We'll take a measurement from the tip of the carina with the tip of the ridge and bronchoscope and extend it all the way back to just below the subglottis and the proximal trachea. We'll take that length and we'll trim the tracheal portion of the stent so that it's the appropriate length. We simply cut the broncheal arms with a pair of good scissors, and we'll cut the tracheal component with a number 11 scalpel blade.

In the past, we've inserted dynamic Y stents using various techniques, none of which I've found to be all that facile or useful. We've used suspension laryngoscopy, which unfortunately can sometimes be onerous and complex and difficult to use.

In my experience, I've found that a video laryngoscope really is extremely beneficial to the insertion of the dynamic Y stent. The C-MAC works great for us. I find that the laryngoscopic blade is a little easier to use and is stiffer, and it gives you more options in that environment.

One of the most important pieces of equipment is the proper forceps by which you are able to then grasp and insert that stent. These are our Freitag forceps that we use. Basically, the benefit of these is the ability to insert the forceps through the tracheal lumen of the stent and then grasp the two broncheal arms and bring them together, which then allows you to more easily pass them through the vocal cords into the trachea. That in the past has been the hard part, getting this fairly large collection of plastic and metal through the vocal cords and then properly deploying it down in the airway.

Once the patient's completely asleep, and with my left hand I'm exposing the larynx and the voice box using the C-MAC device, I'm then able to advance the forceps and the stent with my right hand and can position the tip of the left main stem broncheal portion of the stent right in the laryngeal vestibule. I typically will then use the little edge to push the vocal cords away to get good exposure and then advance the stent and the forceps down into the trachea. I can do this all under direct visualization.

The next portion of the procedure really is done blindly and is done by a sense of feel so once you're comfortable that you're through the larynx and vocal cords, and your forceps are down into the trachea, you're going to not have visibility and not be able to see where you're going. Basically, you will advance that down as far as you feel comfortable till you are butting up against the carina. You'll feel some resistance.

At that point, I generally will relax the forceps and let the arms open up, and will gently advance without the forceps in a closed position. And by doing that, you should be able to properly seat the stent onto the carina.

Once the stent has been properly seated on the carina, I will then grab my rigid bronchoscope, remove the video laryngoscope, and insert the rigid bronchoscope in a typical manner with exposure of the vocal cords, and advance the scope down. Typically, I can use one of my more narrow barrels and advance that down through the tracheal stent.

Sometimes, what will typically happen is the two arms of the stent will be bunched up either down the left main stem bronchus or down the right main stem bronchus. And it's fairly straightforward to just simply grab the most proximal edge of the stent and pull back. And that will typically get them to properly seat. And then, advance the stent back down forward.

To grab the stent in that situation, I typically will use our more standard biopsy forceps, grasping forceps, through our rigid bronchoscope. Under direct visualization, I can see the tip of the rigid bronchoscope. I can grasp it. I can pull it back with the rigid scope and I can advance it. Sometimes, some lateral rotation of the stent as necessary to get it to properly seat. But generally manipulation with the rigid bronchoscope is necessary to get it to properly seat.

On occasion, we'll need to advance the rigid bronchoscope down through the lumen of the tracheal stent, the tracheal portion of the stent. One technique that is sometimes necessary to properly position the stent is actually to advance that stent down onto the carina. And, oftentimes, we can do that by opening up our forceps very wide, pushing down on the wide bifurcation till it butts up against the carina. And as we put gentle pressure on there, we can back our rigid bronchoscope out to maintain good position of the stent.

The final aspect of the procedure really is just kind of confirmation of proper seating of the stent and making sure that all orifices are patent after positioning of the stent. So typically what is done to do that is we will then pass the flexible bronchoscope through rigid bronchoscope to really give us a better, direct visibility.

We'll advance that flexible bronchoscope down the right and left main stem bronchus. We'll confirm that the right upper lobe is patent. We'll also want to make sure that the most proximal end of the stent is well-positioned in the high trachea. So it's very important that we're leaving a proper amount of distance between the proximal end of the stent and the voice box.

I'm very happy with the results. Going forward, I think the dynamic Y stent will really help that patient improve their quality of life.