So sorry it's a little late here, we were stuck with an emergency, but anyway I wanted to cover some points about an upgrade on minimally invasive esophagectomy and we'll talk about how I would define a minimally invasive esophagectomy and some of the learning curves that we've gone through to get to where we are today with an Ivor Lewis esophagectomy.

How many surgeons in the room do esophagectomy? And how many do it minimally invasively? So pretty much everybody that does it does it minimally invasively. You know when I asked that question just about maybe 5 years ago I had a very different answer, you know I first started giving this talk maybe 10 years ago and I could list the number of centers in the world on one slide that had any experience at all with minimally invasive esophagectomy, so I'm excited to see that over the years it's become more and more routine. We are still not beyond a complication rate or not beyond a potential for improvement or beyond a mortality rate, so that's still a work in progress for sure and it will likely be for a long time. So we'll go through some background and some definitions, evolution and technique and then the results we've had here.

In terms of acknowledgements I don't have any disclosures with any companies but I would like to acknowledge a number of the faculty and my group that have been very important, Katie Argent, Dr. Kuna, Larry, Ryan that was just here, really it's been a group effort over the years. We did our first minimally invasive esophagectomy in 1996, that was an operation done for high grade dysplasia, the lady was about 4'11", weighed 98 pounds and we were done in 4 hours. That was the first one. I thought gosh this is going to be great, you know we did it in 4 hours. But again what do you - 4'11", 98 pounds, no fat, no previous surgery, no chemo, no radiation. So the second operation was 13
hours, that was a big guy, you know 6'3", 275 pounds, prior Nissen, previous chemo RT, so every bad thing you could imagine went into that second case, so we were humbled very quickly in our experience.

So what's the rationale for trying to lower morbidity? Well as you can see from just a few short years ago in the New England Journal they summarized the mortality in the United States across all medical centers and you can see it was significant. Mortality rates range between 8% at the high volume centers to as high as 23%. Now clearly even at that time if you found a center of excellence doing open esophagectomy routinely you would find centers with mortality rates in the low single digits. So it did exist, but hospital stays were frequently still in excess of 2 weeks and in some cases longer.

So a lot of I think pressure on surgeons to try to lower this morbidity and mortality. One as you've heard lots of discussions about what we are doing for small tumors today and sometimes it's not surgery, it's EMR, BARRX, for high grade dysplasia, observation in the setting of a disease that we are pretty concerned about with high grade dysplasia as already harboring cancer potentially, and as you get into the later stages of the disease, advanced stages where we used to do palliative operations, bypasses, exclusions, that's almost completely gone between stents and other definitive chemoradiation, so I think there is a lot of reasons why the surgical volume could be shrinking. However as many of you know that the surgical volume may be actually increasing because of the nature of the disease, that is we are seeing an increasing number of adenocarcinomas.
So we've been trying to improve the standard of care, but at the same time trying to avoid ill advised shortcuts, what are those shortcuts? In some cases it's skipping a J tube, or doing a J tube poorly, winding up with a complication. It might be skipping a pyloroplasty when you used to do it routinely open but now you've decided oh I'll go with the data that says I don't have to do it because it's harder to do and I'm minimally invasive and already 6 hours into it so I'm going to leave that out. It might be a tubularization that didn't go so well, but you accepted it. So I think we don't want to do minimally invasive surgery at the expense of what we would consider to be a high quality operation. So if your best operation is an open, you should be doing it open. If you can duplicate that minimally invasively then I think that's a very reasonable approach. But we don't want to compromise oncologic principles, that is what is your nodal count. If your average node count open is only 3 then I think we've got to go back to the drawing board and see what are you doing wrong conceptually on your nodal counts and are you not doing a good node dissection. But if you are getting in excess of 20 lymph nodes open you should have at least 20 lymph nodes minimally invasively. And that's our current recommendation, I think a lot of people would say the same thing. Negative margins, the same. You really should be able to produce negative margin just as you would with an open operation.

So our way of thinking about minimally invasive surgery for the esophagus has evolved over the years. This was a review back in 2002 by Law and Wong talking about all the different hybrid operations and these still exist because I've talked to a lot of surgeons who are still making that transition from open to minimally invasive. Some still add a mini laparotomy. I was at a course with Tommy Damico recently and his standard operation even though he's the champion of VATS...
lobes he's opening the abdomen. Okay. He said well a little open operation, well a little open operation xiphoid umbilicus with big retractors in for 4 hours, not a little operation. And the same people arguing with him 10 years ago about well my VATS lobe I'm doing a little retractor and stretching a little bit on the ribs, I don't cut them but I just stretch a little bit. And of course he pushed for VATS lobes for years before people started to catch on. So I would argue the same for minimally invasive esophagectomy.

The hybrid operations, the thoracotomies, the partial opens you are really going to have a hard time creating a standard minimally invasive operation that you can compare from center to center without a standard approach. And our standard approach is totally laparoscopic, totally thoracoscopic, no rib spreaders, no hybrid, no hand assisted but totally minimally invasively. Now if getting that done leads to problems, complications then open.

I opened a case yesterday, the chest part went extremely well, the abdominal part first of all started off with malrotation, not my favorite thing to see in an esophagectomy. So you know that's a complicated anatomy for me. So after several hours of working we were close to making the tube but the pylorus wasn't sitting right. First of all it didn't go in the usual place, that duodenum came right out, it didn't go under the pancreas, it came right out at us, so when I'm doing the pyloroplasty I was very uncertain, it just didn't look right to me so I opened. So I think you should be willing to open, and that's after 2,000 minimally invasive esophagectomies. So but not 2,000 with malrotation and a guy that was you know 300 pounds, big guy, so it was not an easy operation so you have to make those decisions.
On the other hand I don't think you need to do a routine thoracotomy or a routine laparotomy for lots of cases, and how do you get from doing open surgery to minimally invasive surgery? Well I think if you are a thoracic surgeon doing VATS lobes you've got a lot of experience with minimally invasive surgery. If you are a general surgeon doing benign laparoscopic esophageal work you've got a lot of experience with benign laparoscopic work and that should serve you well when you start doing esophagectomies. But by and large there is no one operation that's going to prepare you although I would say if you are not experienced with open esophagectomy it's unlikely you'll make any transition at all whether that's from your training or your current practice, if you aren't doing a significant volume of esophagectomies it will be hard to make the transition.

So our two approaches for esophagectomy that we are still doing today would be the McKeown, that is right chest mobilization inlet to diaphragm, turn, belly preparation of the tube and neck anastomosis. So we call the 3 hole McKeown done laparoscopic thorascopic and we do those sometimes, I did one of those yesterday. And the other would be a Ivor Lewis, that is abdomen first, laparoscopic, preparation of the conduit, feeding tube pyloroplasty, turn, and thorascopic mobilization, removal of specimen and anastomosis thorascopically (inaudible). So that's our two standard approaches.

Along the way we tried totally laparoscopic, very difficult to get progress above about 10 cm from the hiatus you start to run into lots of visualization problems, you start to beat up the right cruse, it's difficult to see the nodes, and getting from that level up to the neck very difficult. That first case I
told you about 4'11", 98 pounds, we did that lady totally laparoscopically but when I had the laparoscope in this far I was almost at her thoracic inlet, I mean it's a very different operation in that patient. Some have persisted with the laparoscopic approach, I would not advise it especially for thoracic surgery, you'll be very comfortable thoracoscopically and even for general surgeons I'd say if you are not comfortable with thoracoscopic I would consider partnering with a thoracic surgeon, and lots of practices have combined, they have worked together. I have lots of cases where a general surgeon and a thoracic surgeon have worked together to combine their expertise and share the morbidity of M&M and try to face it together rather than alone by combining their expertise.

So I gave up laparoscopic, lots of reasons why, little advantages. On the lap VATS, that is the McKeown, I think it has lots of good points about it, however we are dealing with GE junction tumor so it's very clear today you don't need to do a McKeown, you may choose to do one but you don't need to do one. In other words we don't need that extra length, that 6 or 8 cm of extra dissection is in an area where there is lots of important structures, disrupting the pharyngeal swallowing mechanism, airway potential issues, recurrent nerve issues and the stretch of the conduit, another 6 or 8 cm, also you've got to go through the thoracic inlet, a little pressure up there in terms of venous distention if you already have a little bit of a dusky conduit and you drag it up through there it will not look any better I can assure you.

So it gives you a little room for error there in terms of length of conduit, teaching the Ivor Lewis much easier. Why, in thoracoscopic everyone in the room gets to see in most cases, there are challenges with lung isolation as the thoracic surgeons in the room would understand. But most - for
the most part when I'm doing an Ivor Lewis I can take it in through and through. Lara Sheehan is our PGY2, I took her through an Ivor Lewis esophagectomy about a year ago as an intern and she did the entire anastomosis. Now she had an assistant on one side holding the camera and the lung retractor, but nevertheless you are able to tell the surgeon exactly what step to do and you are able to watch, and if there is an error you've got a conduit that you probably have room to take off 6, 8 or 10 cm, and you've got an esophagus that you have the ability to completely transect another cm or 2 and go again. You don't have that in the neck. You do not have that - you don't have the visibility, you don't have the extra length, you've got one shot at it and if you screw it up you are probably done. So I think there is lots of reasons why the Ivor Lewis is a good operation.

And from a cancer standpoint you do not need to go into the neck, virtually all the cancer is receded. Occasional squame will be high, occasionally a Barrett's that's going a little higher, will that Barrett's go above even where you can reach with the McKeown, maybe. So it really depends, but our choice as evolved from the McKeown into the Ivor Lewis and we would do this for most cases of GE junction tumors and for some squames. So the only exceptions would be that occasional benign case for say end stage acolasia where you need to get all of the esophagus out or the majority, or the high Barrett's or the high tumor that we still occasionally see in this region. If you look in South Carolina maybe you are faced with higher tumors, squames, etc.

So you may want to consider a McKeown for some cases but I clearly think for lots of reasons the Ivor Lewis has a lot of advantages, and for most of you who have trained in general surgery recently, there is a few gray hairs out there, but I think most of you recently realized you are not getting any
neck experience. General surgery any more you are lucky to do endocrine as a PGY2. Maybe get a few thyroids. After that you are in the belly. In thoracic surgery you are getting little if any neck experience, even when we used to do some Zenker's, give you some high neck experience, now this is being done trans orally in many, many centers for the majority of cases.

So when are you going to get that neck experience if you are going to go out and start doing McKeowins? Well unless you get it in your thoracic surgery residency you probably won't get it, so working up in the neck is going to have a significant recurrent laryngeal nerve injury rate that is going to be unavoidable. Even Mark Orringer in his first 1000 had a 13% injury rate, so something to think about. And will you ever get past your first 1000?

Now this was one of our earlier series and we did start, we tried to start with some of the earlier tumors, although as I mentioned my second patient was not an easy case. Sometimes you are faced with what comes to your clinic that day. So it's not always easy to back away from a more difficult tumor, but if you are starting out I would certainly advise try to pick the smaller tumors, the non-chemo radiated, the non-reops, the less than obese patients, all those will work in your favor. When we did that we took the easy ones first to some degree and we recently updated our series, but in the first 222 as you can see we had quite a few early stage tumors in there and that helped us get over the learning curve to some degree although we still accepted a number with preop chemo on RT.

We do look at more than just the outcomes of alive or dead, we want to look at lots of things like the SF-36 or the HR QOL that tells us about the quality of life. Why is that important? Because some
of these patients are going to live, for sure, they are going to survive their cancer and they are going to survive that first 5 years. And when you get out to 5 years if you've got a twisted conduit, a spiral conduit, a conduit with a transverse lag, poorly emptying pylorus, those patients will suffer the consequences. So understanding how they are digesting, how they are eating, how they are refluxing, all those things become very important for long term survivors and important in the short term as well but glaringly obvious for the long term survivor. Now we talked the Ivor Lewis, I'm going to move on about that because I've covered most of these details.

So our typical Ivor Lewis then today would be starting in the belly laparoscopic, lots of advantages over the McKeown again and the first advantage is you are in the belly where most of the mets can occur that are missed by a standard CT or PET, belly, peritoneal studying, a small liver met, extension onto the stomach that might have been missed, all of that will be obvious. If you go to the McKeown first and do that and get to the belly and you see a liver met you are kind of done, in other words you've already done all the work, you are almost committed to taking that esophagus out and you might have a liver met. So we start off laparoscopically, making the tube. Is it difficult? Well I would say that it's certainly something to think about and that's why some surgeons still would be concerned about doing it laparoscopically. But I'm going to let this video run for a moment because I've actually found that doing it laparoscopically is easier than open.

It takes a little bit of experience but what I have here is an assistant holding the fundic tip and we try to not grab the rest of the fundus that's going to be used for the actual conduit. So this assistant is going to hold the tip up here, another assistant is holding the antrum, so we are getting a little stretch
on that conduit as we sequentially apply staples. Now this distance between the staple line and the greater curve, the short gastric vessels over here becomes very important. We want to be probably in the range of 3 cm, maybe 2.5, that doesn't mean you have a 2.5 cm diameter conduit by any stretch, that conduit - the stomach is always going to be a little bigger than that measurement from say the staple line here. You've got a little curve around, it takes up about a cm, a little curve on this side, this is going to wind up being a 4 to 5 cm diameter conduit. So you can see a very nice long conduit using that sequential stapler application following the greater curve.

Some people say well why not use a 60? Well it's all about geometry, you follow the greater curve of the stomach, it's hard to follow the greater curve of the stomach with a 60 straight linear stapler. I can follow it by doing sequential 30s or 45s, then if my 45 doesn't look right I can adjust for that a little bit. If I lay a 60 out there and it's off by just a couple mm either way it's hard to recover. So I would advise using the smaller staplers, I think you get a little more mileage out of that in terms of a little bit of actual error if you make a slight error you can fix it.

We put a needle J tube in every one. Why? It's hard to have a clinical pathway to deliver nutrition consistently if you don't. Will you get away with it in some patients by not putting it in? Sure, you will get away with it in some patients, but it will come up to bite you sooner or later. Pyloroplasty, we could debate this all day. Do I do it in every case? Yes. I recently had a forum with 3 surgeons I would consider pretty busy esophageal surgeons, Mark Orringer, Nasser Altorky, Tommy LaRue, I don't think you could find a room full of 4 busier esophageal surgeons, everyone did an emptying procedure. I find people all over the world that say they don't do pyloroplasty, no doubt. Why do
we do them? Tom _____ does in everybody. Why do we do them? Well because you will have patients that don't empty. You will. Now you might say oh gosh I'm going to get bile reflux, well I've got a clinic full of patients that tell me they don't have bile reflux. So I don't think the bile reflux is horrible with pyloroplasty, I don't think that's what makes the bile reflux. I think the emptying problems that occur with bad lines or big dilated conduit have more to do with those types of problems than a nice straight conduit with a pyloroplasty. So I do it in everybody. Nodal dissections, yes from the celiac all the way up to and just above the ascus, that's where we stop the node dissection. So making the tube we just talked about, I think I covered the issues I wanted to cover here.

The staple loads I think you should follow the same rules you do with a stapler anywhere. People ask me oh what stapler do you use? I said the right size. In other words you know if you have a stack of paper that's 3, 4 sheets you can use your little Swingline right? If you've got 50 pages you've got to go down the hallway and find that big womp stapler, okay. So the same is true for the stomach. On the antrum down here by these little vessels you can use the gold load, vascular load on the vessels. When you get to the antrum that can be very thick muscle there, you put a purple load there or a blue load and you may not be able to close your stapler. So if you can't or it doesn't close well go to the black, go to a bigger stapler. If it closes easily you are probably fine, it's all about how that stapler closes, how it feels. And when you staple if you have incomplete beams, that is your staples don't close just like that sheet of paper, that stack of paper, you better oversew it because you've chosen the wrong staple load. So if that is the case you are in trouble, that's going to be a problem. If you choose the right staple load I don't think you have to oversew. We've done close to
2000 of them without an unzipped lesser curve staple line so it really doesn't unzip if you use the right - and the new tri-staple technology you know even the black they start with 4.0, 4.5, 5.0, in other words they are using three separate heights on the staple loads now. So you have three rows of staples, three separate heights, they are giving you a little room for error. So I've found that the staples are pretty good. Will I oversew ever? Sure sometimes that staple line is braiding a little too much and I get tired of touching up with (inaudible) and I'll oversew it. If I chose the wrong load or the fellow really clamps down on it and I'm not happy with the look of it I'll oversew it, but maybe 1 in 20 do we oversew.

Tacking it up? Yes, we then tack it. And I will bring this up into the chest. This - I put this slide to remind me to tell you to do that because that's last. As you open the phrenoesophageal ligament you are going to start to lose a lot of air and cause a pneumo. If you do it as one of your first steps well you are going to be fighting that pneumo and maybe dropping blood pressure, it's all manageable, you can put a pigtail in, you can lower your insulating pressure but try to save this step for last and then you will be happier about your loss of insulating pressure and the problem of pneumothorax.

Now the J tube I don't think we have time to go through, I'm happy to show some people those steps tomorrow. Which J tube, well we were debating that yesterday in the operating room, I had one of my colleagues visiting from London and they are not sure which is the right kit. I'm not sure what's the right kit. It seems like just when you like one the company stops making them. I guess there is not a lot of profit in J tube kits today because we really don't have the right kit. And the one we had
which we really, really liked was the Cook, they stopped making it. We bought a bunch of them and now we are out of those. So we are back to square one trying new kits.

Now using the kits with the T fasteners I would tell you to get better at sewing. T fasteners are just not great. It means that you haven't honed your laparoscopic suturing skills, so that would concern me about your readiness for minimally invasive esophagectomy. I'd say if you are having trouble with that, practice. I mean go to the trainer, sew, sew, sew and you will do these without the T fasteners. T fasteners tend to flatten the jejunum up, lead to complications. I'd say it's not the greatest.

Now going to the chest, we are done in the belly we are moving to the chest, the surgeon stands back here, assistant in the front, we've added this 5 mm port. On my earlier slides you didn't see that and we used to suction through this one or back here, but this is a surgeon working here, he wants to keep going. And some people have flipped to prone because of this, that is they don't want to deal with the little bit of blood loss that's running downhill right in your way and if you don't have a suction in or you are not prone it's in the way, it's hard to see. I mean our blood loss has been typically less than a unit so it's not the volume of blood but it's the bad location, it wants to run downhill. By having this assistant, and there is usually no shortage of people to help, between medical students and residents, people wanting to be in the OR we can usually get someone that wants to be there, hold the retractor, the assistant would generally hold the camera and use the suction and do a little dissection with that at the same time. I'm always amazed at how much you
can do with that suction if you are the surgeon helping the resident on that side of the table. So it does come in handy.

So those are difficult ports, and one thing you'll notice about this it sort of opens like this, sort of open the field up. In other words camera in this port may be relatively close but then this one moves out, this moves out, this moves out. So if you can kind of picture that view, that's really the ideal view. If you start moving these up this gets in the way of the camera. Move this too far down you are slipping up the lungs, too far up you are in the way, so this is kind of an ideal configuration that works well for me and you may have a better one, if you do I'm glad to hear about it.

So let's go on, these are some of the steps but let's move on and look at some of these steps actually because I think one thing that I took criticism from early on was the concern over the oncologic soundness of the operation, that is could you do a good node dissection and go from say aorta to esophageal plane to airway plane and get all the tissue in between. So I started taping these steps of the operation early on and showing them, and usually once I showed this part of the operation I really didn't have much criticism because really a picture can tell you a thousand words and the same with a video.

So this is the obvious vein, we divided that, we always staple that and then as we work you are going to see pretty - and this is an obese patient, there is a lot of fat here but we are going to work on the airway on this side and along the aorta over here and you'll start to see it all come together here in a minute and what you are going to see again there is the divided abscess, we are moving up and along
this, you can get right on there. Now you have to be careful, the energy device you are using cannot 
lean on the airway, it cannot lean on the airway. If it does you are likely to get a hole. So there is 
your cartilage and his trachea, your aorta, esophagus, you can see you are pretty close. And then I 
show on even further left atrium, pericardium, left main bronchus, you can see the blue hue of the 
left sided balloon, the right main bronchus, so a clean - I don't think you can do a better dissection, I 
mean it's down to the pericardium, the airway and the aorta. So using that approach we've been 
getting typical nodal counts in the 25 to 30 range, and on occasion we might hit 45. The point is we 
are getting all the nodes. We are getting all the tissue that we can possibly get even through an open 
operation, so we are very pleased with the oncologic soundness of the operation.

Okay, now the other thing that some people are concerned about, I've showed you the big concerning 
areas, the tubularization I showed that's I think very doable, I didn't show you the pyloroplasty, some 
people are concerned about that, so when they are concerned they skip it. I don't want you to do 
that, I'll show you how to do the pyloroplasty tomorrow. And then of course the node dissection, we 
just showed that and now I'm going to show the actual anastomosis and again I can guaranty you that 
I can take a good intern through this part of the operation.

Now it requires a lot of things, it requires certainly that you have a good double lumen tube, well 
placed and you know I would encourage you to be in the room when it's placed. Certainly we 
recommend it, we place all of them ourselves with anesthesia, let's put it that way. I'm not sure how 
everybody is doing their anastomosis. How many use the EEA? Hand sewn? Okay, so a variety. 
You certainly can do it hand sewn. No problem with that, you can do a linear stapler if you want.
You hand sew the anterior wall, that's doable. But we've found that the 28 EEA works in most people. Sometimes you'll have a radiated esophagus that's a little stiff, sometimes a small lady won't accept the 28, a 25 will work. I think with 25 you get a little less of a ring, a little more - a little less margin for error but you can see that 28 really gives you a nice ring, you pull that tissue in and we usually put two purse strings to make sure we get it, and we go to the conduit, bring it up. Just bring up enough that's going to reach, don't bring the whole conduit up, very hard to tuck it back down. So as we open the conduit on the tip we are going to cut that off, when we are done we insert the EEA and the (inaudible), slip that right up onto the EEA device, it should slide up fairly easily, poke out the back wall and dock and fire.

Now this distance up on the conduit that we are cutting off - how many guys discuss that, how long is your conduit, was it radiated, do you want to get more, get rid of more or less? But when you are done that conduit should be, and I don't know if you appreciated that, nice and straight, we didn't have a lot of redundancy left in the chest when we were done. We want to see that lesser curve staple line facing us in the right chest. Why? Because the greater curve line, the short gasket facing the spleen, in other words you don't want it to spiral. So and you saw the diameter, the lie of that conduit all extremely important to good long term results, and we'll demonstrate that tomorrow. I think very important point.

So now when we are done omental flap, it's not easy to create the omental flap I will tell you that because a lot of our patients are obese. But if they have not had prior surgery, not too obese it's very manageable. We take the fat on the greater curve side just below the splenics, so just below the short
gastric and we'll leave a piece of fat hanging off of there. How long and how much, well we usually keep 2 or 3 arcades and we'll head out this way onto the fat and then we transect it. So when we come to the chest we can take this and wrap it 360 degrees around the anastomosis. Do we have randomized data? No. Do we have an updated look back and tell you those with it do better than those without? No. But I think it's a relatively easy step and I'd say that with a bit of a grain of salt, in other words an obese patient with previous you know surgery, the omentum stuck in the pelvis, no it is not an easy step. It may not be worth doing in that case. But non-operated patients if you can get it I think it has clearly saved us some operative leaks. So we've put the drain lying right back here and we will do the wrap, the fat around it and I think that does really add some value in terms of the radiated conduit. I'm not doing it routinely in the non-radiated conduit. So when I have preop radiation I do it.

Now when we compared our Ivor Lewis to our McKeown, and Katie really is responsible for putting this data together, it was almost an even split between Ivor Lewis and McKeown in our first 1000, so again a fair mix of tumors, quite a few early ones but also a lot of advanced tumors as you can see. A number had received chemo and radiation upfront and this is - I'm going to skip this - well actually I'll leave this up here. Basically we included in the study pretty much everybody that underwent an elective esophagectomy between 1996 and 2011 and stratified it based on approach,. Now we looked at the two groups, there really was no difference in the demographics in terms of age etc., it was all pretty evenly mixed as you can see.
Comorbidities, maybe if anything slightly worse morbidity in the Ivor Lewis group only because it was a little more recent and we were taking on a few more high risk patients. The conversion to open was the same in both groups, our median ICU stay was 2 days although when we do this on a clinical pathway it's 1. Why is it 2 when we looked at the whole group? Well I would tell you that a lot of it had to do with the fellow that it's on that day, did you do the operation on a Friday or a Monday? On a Friday they tend to sit in the unit an extra day, so lots of sort of non-science variables come into play when you are doing a retrospective review.

We've got this down to 6 days on the clinical pathway, median number of nodes 21 and 98% with a negative margin and you are going to still wind up with some that will have microscopic disease at the margin. Now when we looked at - did you ever - group, I think we could do a great node dissection in either group, maybe a little better we did in the Ivor Lewis group. Again I think that has to do with those being a little more towards the recent data we've got better. And I don't like 19 as a number, I like to see 23 or more. And again a fairly mixed group. Now what was the mortality? If we took over all the entire 1011 patients 1.68%, a little lower in the Ivor Lewis group. And I think that has to do partly with experience, again a little more recent group, and my bias is that we do a little better in terms of aspiration pneumonias, in terms of true conduit ischemia and maybe pneumonias.

Now when we go out there and look at the rest of the world what's going on? Recent metaanalysis by Biere looked at 10 studies of 1061 patients, they show that there was a trend in a little less
morbidity with the MIE, in terms of overall trends favoring MIE and major morbidity and mortality, pulmonary complications length and length of stay.

When we looked at our data when we combined it with 16 other institutions in a prospective study ECOG 2202 we were trying to look at is MIE feasible outside of Pittsburgh basically. So this study only allowed us to put in 35 patients, Argen helped quite a bit with this study along with Trish Fernando and we allowed a number of institutions to participate. One thing that was encouraging and for those of you just starting I think you are probably aware of this data on your own center if things are going well, that is out of the 106 patients enrolled MIE was successfully performed in 99 patients, that is very few conversions. Overall 30 day mortality rate 2%. I think that's a very respectable number for any trial of any approach. Stage specific survival was similar to open data.

So this was the first report of a multicenter trial of MIE. Now Biere came out recently again with a multicenter open labeled randomized trial, this is recent data out of France published in the Lancet in 2012 and they looked at a group of patients receiving chemo RT and then randomized open transthoracic or laparoscopic thoracoscopic esophagectomy. The lymph node count was very reasonable as you might have expected from our ECOG 2202 study and then from our data. There was no difference in the ability to get a negative margin. The MIE took a little longer and the blood loss was a little less with the MIE group by about 275 ct. Pulmonary infections a little less with MIE and the length of stay a little better in the MIE and the mortality rate was no different, 2 to 3% in both groups. So the quality of life was again slightly favored the MIE group, global quality of life a little better and pain and talking quality of life was slightly better in the MIE group.
So their conclusion from the randomized trial of MIE versus open MIE was in this first trial that patients undergoing minimally invasive approach had an improved short term outcome for pulmonary infections, hospital stay, quality of life than those undergoing open esophagectomy with no compromise in the quality of the lymph node dissection or the R0 R1 results. I think these findings out of France provide some of the earliest objective evidence that short term benefits of MIE are real compared to open esophagectomy for patients with resectable esophageal cancer.

So I'm going to stop there. I think in conclusion our own minimally invasive experience suggests a two field node dissection, is very doable using the Ivor Lewis approach with an acceptable morbidity and hospital stay, preserved quality of life with survival no different stage to stage. We follow the same algorithm for staging and for chemo radiation although I would say that for patients that we think that are in that marginal group that might have one or two lymph nodes positive that you are planing chemo on we might take those to surgery first because we are able to get them onto adjuvant trials very quickly, usually within 4 weeks they are reach for chemo. And we've found our radiation data has been not so strong in favor of the radiation. In other words if we do a good surgical dissection and starting chemo alone our local recurrence rate is only about 6%. So we've questioned pretty strongly the need for routine radiation. Clearly bulky tumors with lots of lymph nodes that's a who other group of patients. I would recommend radiation. But so I'll stop there and open up for questions. Thank you.