

Discussion

Presenter: Dr Andrew Tang



Dr Shanda H. Blackmon (*Rochester, Minn*). Thank you, Dr Luketich, I'd also like to take a moment and appreciate Dr Starnes, who's the president of the American Association for Thoracic Surgery (AATS), and congratulate him on celebrating the 100th Annual Meeting of the AATS

and for planning such a timely and important session for this General Thoracic Breakout. As I look back on last year's meeting that took place in Toronto, I discovered an entire session at that meeting was dedicated to similar topics on frailty and preoperative rehabilitation as they relate to cardiac surgery. It's timely that we now focus our attention on similar topics as they relate to the practice of general thoracic surgery.

I believe thoracic surgeons should take an inventory of the preoperative condition of our patients and their ability to tolerate the surgeries we offer them. In the era of ERAS, prehab, mobile applications, video visits, and telehealth, forward-thinking general thoracic surgeons will no doubt start to formalize the way we optimize our patients to minimize what is now termed, according to last year's AATS meeting, a core functional survival. No longer will we merely look at survivorship and the surgery to be acceptable; we will now look at the quality of life after surgery.

As patients advocate for themselves, they now look for programs that offer them something beyond a simple surgery and rolling the dice. Assessing patients for baseline vulnerability, including their cognitive function, frailty, preoperative nutrition, age, and psychosocial stressors, I believe should now be the standard of care. Further assessing a patient for frailty, including things like wasting, vulnerability, cognitive impairment, activities of daily living, slowing, social situations, malnutrition, depression, weakness, and other comorbidities as well as mental health, can now be performed by offering patients increasingly popular apps, like the one that was discussed at the AATS meeting, the iOS Android frailty tool, created by Dr Jonathan Afilalo, and this is available free.

It identifies patients who would have a predicted drop below a functional level that's recoverable or reasonable and will help them make the best choice about having surgery or delaying to optimize. Once these patients have been identified, prehab, which is a conglomeration of preoperative nutritional optimization, coaching, strengthening, and supporting patients so that they are optimized before surgery, can no doubt improve outcomes. I'm pleased to see that AATS is placing emphasis on such matters.

Reviewing Dr Tang and colleagues' manuscript on quantifying the eyeball test, a novel vitality index to predict recovery after esophagectomy, I applaud the senior author, Dr Sid Murthy, for leading an important investigation, and I'd like to thank them for sending me both versions of the manuscript ahead of time for review. I have only a few questions.

My first question is: Your conclusion states that your esophageal vitality index outperformed other frailty models to predict morbidity following esophagectomy for cancer. Using the Fried frailty index, which is based on 5 qualities, and the Modified Frailty Index, which is 11 comorbidities from the Society of Thoracic Surgeons database for comparison, my question for you is: Why did you choose those and not generalizable apps, like the frailty tool that I mentioned, or the frailty app, or the clinical frailty scale, or something like the frailty wheel? These are more widely used and are readily available and more generalizable beyond patients that are just having esophagectomy. The comparisons you elected to make were based on indices that have to be performed by an institution or a provider, and cannot be performed by the patient readily. How and why did you choose these 2 indices for comparison?



Dr Andrew Tang (*Cleveland, Ohio*).

Thank you, Dr Blackmon, for your questions and for reading over my manuscripts. When we were designing the study originally, we looked at the multitude of publications on frailty across all specialties, and it seems that the common denominator was the

Fried Frailty Index, which was one of the first ones to be developed in the early 1990s as part of the cardiovascular health study through Johns Hopkins. A lot of the other studies base the definition of frailty on how Dr Fried at Hopkins had defined it. So, that's the reason we chose that index.

Specifically, for the Modified Frailty Index, the reason we looked at that was because it was a relatively simple one that has been widely published across disciplines including colorectal surgery, general thoracic surgery, urology, and orthopedic surgery, and we felt that we wanted to provide a spectrum. The Fried Frailty Index was the original, and the Modified Frailty Index was a relatively simple count of comorbidities. We wanted to show that our index can be used as a generalizable way of measuring physiologic status to predict a multitude of outcomes for a multitude of procedures, because we're not boxing patients into 3 separate buckets such as "not frail," "intermediately frail," or just "frail." What we're trying to say is that using these 4 basic metrics, if your goal is to look at, for example, leak after esophagectomy, you can say that a patient who was able to walk 300 m or more is less likely to develop a

leak, or a patient who had a grip strength of more than 40 kg was less likely to develop delirium.

Unfortunately, with 77 patients, we didn't have enough events to model those events individually, which is why we think it is worthwhile to build this into a larger database so that moving forward we can tell our patients, "You walked 500 meters today, so based off the multitude of patients who just had their esophagectomy done in Pittsburgh, your risk of a leak is much lower than how patients did there."

Dr Blackmon. My second question is a plead to change the title of your novel index. You, in your manuscript called it the "esophageal vitality index." Some people might think that they're talking about the vitality of the esophagus. Instead, shouldn't you call it the esophagectomy patient vitality index, recognizing that this is an assessment of the patient and not the esophagus?

Dr Tang. Yes, I think that is a fair point. We definitely do not want to give people the sense that we only care about their esophagus. We want them to understand that this is a big operation and to make sure that they're strong enough to undergo it. So yes, we will definitely consider changing that to make it a bit more user-friendly.

Dr Blackmon. My third and final question is: Why in your assessment did you not include patients who were assessed for fitness of esophagectomy and then not selected for esophagectomy? I think that would be the most value. Looking at people that were assessed by a surgeon, and either because of a comorbidity evaluation, or some other conglomeration. If a young surgeon with no experience says "I think that patient might be high risk," versus an elderly surgeon who's had a whole lifetime of experience assessing patients and looking at them and decided that they weren't, and looking at your assessment model to determine if that correlated with other people deciding that perhaps this patient is not fit. I was just curious if you plan on looking at that, or if you did look at it and just didn't include it in your manuscript.

Dr Tang. Thank you, Dr Blackmon. You hit the nail on the head. For this specific study, we wanted to identify which physiologic metrics were most important and how they're important first, and we included the patients who underwent esophagectomy because we wanted to show that those patients who are weaker than this, or walked fewer steps than this, were more likely to develop a complication. This was more to give us the idea that, okay, these are the things that are easily reproducible and well validated, and they work.

Moving forward, we will start to evaluate all consult patients with this measure to set up a baseline that will serve 2 purposes. Number one, it will help us better stratify who's at greater risk for surgery and who's at lower risk for surgery, but it will also give us a very easy-to-understand bar to set for the patient. "Today you were able to walk 250 m. By the

time you're finished with your induction therapy, and by the time you've regained your strength and your nutrition, I want to see you be able to walk x amount, because we know that this will decrease your risk of complication." You hit the nail head because this is meant for all clinicians, not just the ones who have a multitude of years of experience, where all it takes is a handshake, or all it takes is watching the patient get up and say, "I think they might be high risk," or "I think they might be able to pass." So, the purpose of this is to make it easy for anyone to use.

Dr Blackmon. Did you find that you were able to look at which patients were selected for salvage esophagectomy versus pre-emptive esophagectomy 4 to 6 weeks after treatment?

Dr Tang. We did not look at that specifically. We actually are looking back now through our institutional data at our salvage esophagectomy.

Dr Blackmon. That would be a nice group to look at.

Dr Tang. Certainly.

Dr Blackmon. Congratulations.



Dr Sudish Murthy (Cleveland, Ohio).

Thanks very much for the nice commentary. I think those are very valid and important points you bring up, no question. I think one of the key things you have brought up on numerous occasions, whether it's here or elsewhere, is informing the patient. Some of these issues that we are trying to quantitate, we really aren't just quantitating for ourselves, but also for the patients. Very much as you point out, to give them a better sense of what they might expect, what they should anticipate, etc. to help us make a more informed decision for both of us. I think that is critical, and I think it's a very important point, and we appreciate you sharing those thoughts with us.



Dr Shaf Keshavjee (Toronto, Ontario, Canada).

Congratulations on a very nice study. I think it's a very important area because there are frailty experts out there who have built careers in studying frailty, and they have created all kinds of frailty indices. I think many of these indices have received unwarranted validity, if you will; in that just because they're a quantitative number they garner more respect—if it's quantitative it must be right. That becomes a self-fulfilling prophecy, which I think isn't helping the clinician. As Shanda alluded to, experience helps and is critically important, Griff Pearson used to call it the "foot of the bed test," similar to you calling it the "eyeball test." We see it all the time in major surgery such as esophagectomy or even lung transplant too. On paper, the patient looks like a disaster and you go look at them in the bed and say, "I can pull them through a lung transplant," and we do. Attempting to

accurately quantify that is very important, and it is really important in all of surgery because the referring doctors are pulling out their calculators, calculating a “frailty index” and then saying, “Well, I think this patient is too frail for surgery, maybe we will just send him for radiation,” and those decisions are being made. I don’t care if a patient’s frail or old, I care if they’re fit for surgery or not, and whether I can get them to a meaningful life on the other side of surgery. I think trying to quantify that surgical judgment is very, very important.

Dr Tang. Yes, thank you very much. That was the purpose of this, so hopefully that came across clearly. Thank you very much.



Dr James D. Luketich (*Pittsburgh, Pa*). Regarding the choice of outcomes, did you think about attempting to look at other metrics like a quality of life outcome, etc.? Some kind of return to pre-morbid status, such as, “When can I go back to work?” “When can I really get back to my normal life?” Did you begin to address these factors?

Dr Tang. We haven’t yet, but we still have these patients who we follow regularly. Moving forward, I’d like to know, not just immediately after operation, “what’s your quality of life,” but even a year or 2 years out. Each variable may predict a different thing. What we found was whenever we looked at this, and we also performed this for patients who underwent a lobectomy or pneumonectomy, it just depends on what we’re specifically looking at. If I’m looking at length of stay, the walk distance might be more important. If I’m looking at just activities of daily living, it might have been that the sit-stands are more important. So, moving forward, we’re going to go back and talk to these patients and say, “Okay, now that you’ve recovered, what’s your quality of life a year out, 6 months out from your operation?” We’re going to see how well our frailty index correlates with that.

Dr Luketich. Along the lines of Sid’s comments, I think there’s a bit of a misconception that esophagectomy may lead to never being able to eat normally, or constant dumping, or other issues related to quality of life. So, I think it will be important to look at that, but very nice presentation.