and repeated measurements in the same subject, we did not notice any relevant change in limits of agreement when Zou's method was applied to our data. Estimated bias, precision, and percentage error in our paper should not be affected by any changes in the limits of agreement due to possible fluctuations in cardiac output between measurements.

Competing Interests

The author declares no competing interests.

Theodor S. Sigurdsson, M.D. Children's Hospital, University Hospital of Lund, Lund, Sweden and Landspítalinn, University Hospital of Iceland, Reykjavik, Iceland. theodorsku@hotmail.com

DOI: 10.1097/ALN.0000000000003022

References

1. Sigurdsson TS, Aronsson A, Lindberg L: Extracorporeal arteriovenous ultrasound measurement of cardiac output in small children. Anesthesiology 2019; 130:712–8
2. Bland JM, Altman DG: Agreement between methods of measurement with multiple observations per individual. J Biopharm Stat 2007; 17:571–82
3. Zou GY: Confidence interval estimation for the Bland-Altman limits of agreement with multiple observations per individual. Stat Methods Med Res 2013; 22:630–42
4. Myles PS, Cui J: Using the Bland-Altman method to measure agreement with repeated measures. Br J Anaesth 2007; 99:309–11

(Accepted for publication September 18, 2019.)

Postlaryngectomy Stoma *versus* Tracheostomy: Comment

To the Editor:

Truong and Truong have brought forth some important aspects of general anesthesia using a stoma of a patient after total laryngectomy.[1] However, a few simple questions arise. Regarding *nil per os* status for general anesthesia of a patient after total laryngectomy with a mature stoma, risk of pulmonary aspiration does not cease to exist because as high as 65% of the patients may develop a fistula between pharynx/esophagus and trachea/bronchus or skin around stoma.[2,3] Moreover, because there are only a few contraindications to primary or secondary tracheoesophageal puncture with one-way-valve voice prosthesis, tracheoesophageal puncture is performed as the gold standard procedure for voice rehabilitation in 84% of the total laryngectomy patients.[4,5] However, the seal of the one-way valve can be imperfect, and aspiration potentially occurs through or around the one-way valve.[2] Therefore, for general anesthesia of a patient after total laryngectomy, *nil per os* is indicated when assuming that a conduit may exist allowing gastric contents to get access to the lungs; preoperative clinical assessment may be unreliable and investigations (videofluoroscopy, fiber-optic endoscopic evaluation of swallowing, manometry, and videomanofluorography) may not be immediately possible to rule out these unwanted conduits.[2,3] Assuming that aspiration risk across these unwanted conduits decreases with *nil per os*, a suitable mask (neonatal/infant size) can be used for short periods of emergent and even elective positive pressure ventilation without intubating stoma. As inspired by the National Tracheostomy Safety Project,[6] this is schematically shown in figure 1. Moreover, spontaneous mask breathing through the stoma can ensure optimal preoxygention and ventilation. Of course, the care team must be cautious, and the pressure applied on the mask has to be high enough to ensure adequate mask seal but not too high to cause the compromise of the airway patency of the stoma and/or the segment of the trachea under the mask.

Competing Interests

The author declares no competing interests.

Deepak Gupta, M.D. Wayne State University/Detroit Medical Center, Detroit, Michigan. dgupta@med.wayne.edu

DOI: 10.1097/ALN.0000000000003033

References

1. Truong AT, Truong DT: Postlaryngectomy stoma *versus* tracheostomy: Implications for perioperative airway management. Anesthesiology 2019; 130:1034–5
2. Coffey M, Tolley N: Swallowing after laryngectomy. Curr Opin Otolaryngol Head Neck Surg 2015; 23:202–8
3. Kreuzer SH, Schima W, Schober E, Pokieser P, Kofler G, Lechner G, Denk DM: Complications after laryngeal surgery: Videofluoroscopic evaluation of 120 patients. Clin Radiol 2000; 55:775–81
4. Bozec A, Poissonnet G, Chamorey E, Demard F, Santini J, Peyrade F, Ortholan C, Benezery K, Thariat J, Sudaka A, Anselme K, Adrey B, Giacchero P, Dassonville O: Results of vocal rehabilitation using tracheoesophageal

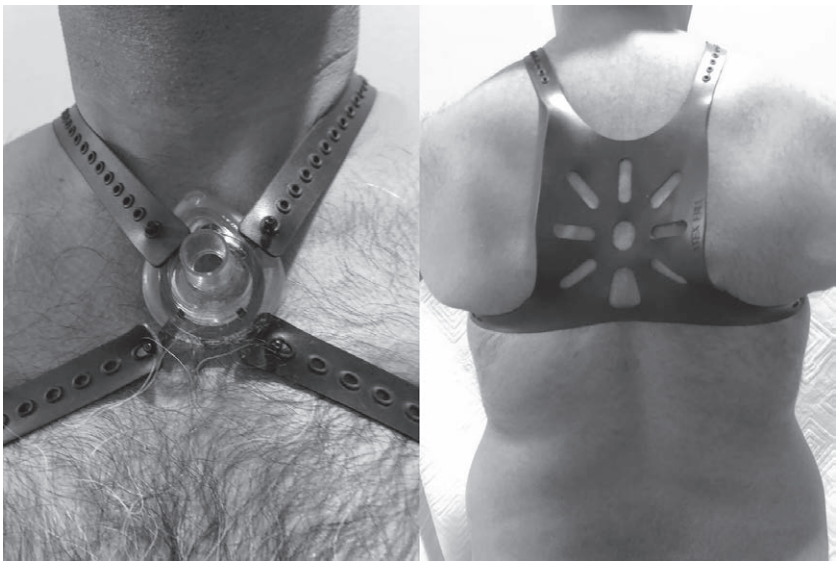

Fig. 1. Anterior and posterior view of the mask application over schematic of total laryngectomy stoma.

voice prosthesis after total laryngectomy and their predictive factors. Eur Arch Otorhinolaryngol 2010; 267:751–8

5. Tang CG, Sinclair CF: Voice restoration after total laryngectomy. Otolaryngol Clin North Am 2015; 48:687–702
6. National Tracheostomy Safety Project: Emergency Care (Adults): Ventilation via the Stoma. Available at: http://www.tracheostomy.org.uk/healthcare-staff/emergency-care/ventilation-via-the-stoma. Accessed January 30, 2019.

(Accepted for publication October 3, 2019.)

Postlaryngectomy Stoma *versus* Tracheostomy: Reply

In Reply:

We read with interest the Letter to the Editor by Dr. Gupta concerning our article Postlaryngectomy Stoma *versus* Tracheostomy: Implications for Perioperative Airway Management.[1] First, it is important to emphasize that the focus of our image and its teaching points centers on patients with a total laryngectomy stoma without additional pathologies causing a communication between airway and digestive tract. After total laryngectomy, the trachea is brought to the skin as a stoma, which no longer has any anatomical connection with the oropharyngeal cavity and digestive tract. Our discussion does not apply to patients with a partial laryngectomy nor to patients with a tracheoesophageal fistula.

The statement "Regarding *nil per os* status for general anesthesia of a patient after total laryngectomy with a mature stoma, risk of pulmonary aspiration does not cease to exist because as high as 65% of the patients may develop a fistula between pharynx/esophagus and trachea/bronchus or skin around the stoma" is not supported by the quoted references. According to reference 2, the reported incidence of fistulas varies from 5 to 65%. By intentionally hiding the fact that the incidence of fistulas can be as low as 5%, the true incidence of fistulas is grossly distorted. Furthermore, different types of fistulas do not pose the same risks for aspiration. In patients with pharyngocutaneous fistulas, the most common type, aspiration of food is highly unlikely. Food in the pharyngeal cavity would have to exit through a fistula to the skin, and find its way to the laryngectomy stoma for pulmonary aspiration to occur. Similarly, reference 3 clearly states that "aspiration is a very common complication after partial laryngeal resection" and does not provide evidence to support the statement about the risk of aspiration in patients with a total laryngectomy stoma. In contrast to total laryngectomy, which is the topic of our publication, after partial laryngectomy, there still exists a communication between the airway and the digestive tract.

In conclusion, it is apparent that Dr. Gupta fails to clearly distinguish the drastically different risks of pulmonary aspiration in two distinct clinical settings: patients after partial *versus* total laryngectomy and similarly in patients with pharyngocutaneous *versus* tracheoesophageal fistulas.

We greatly appreciate the opportunity to respond to this letter.

Competing Interests

The authors declare no competing interests.

Angela T. Truong, M.D., Dam-Thuy Truong, M.D. University of Texas M.D. Anderson Cancer Center, Houston, Texas. atruong@mdanderson.org (A.T.T.)

DOI: 10.1097/ALN.0000000000003032

References

1. Truong AT, Truong DT: Postlaryngectomy stoma *versus* tracheostomy: Implications for perioperative airway management. Anesthesiology 2019; 130:1034–5

(Accepted for publication October 3, 2019.)

Improving Pediatric Risk Stratification: Comment

To the Editor:

It was with great interest that we read your recent article, "Pediatric Risk Stratification Is Improved by Integrating Both Patient Comorbidities and Intrinsic Surgical Risk,"[1] as this model could be useful in prognostication of negative outcomes after surgery, quality improvement, and risk adjustment. This methodologically rigorous analysis empirically derived procedural risk groupings, and added these groupings into a predictive model for 30-day postoperative mortality after common pediatric surgical procedures utilizing The American College of Surgeons National Surgical Quality Improvement Program Pediatric Surgical Risk Calculator dataset. The model also contained five patient variables (American Society of Anesthesiologists Physical Status, weight less than 5 kg, sepsis, preoperative mechanical ventilation, and preoperative vasopressors) to adjust for patient comorbidity. The inclusion of procedural risk groupings improved model discrimination significantly, and groupings were said to represent the "intrinsic surgical risk" of the procedures analyzed.

However, the procedural groupings presented in the appendix aggregate dissimilar procedures into the same risk category, and also separate similar surgical procedures with disparate indications into different risk categories. For example:

- Surgeries to repair craniosynostosis and spinal fusion, which involve large fluid shifts, transfusion of blood products—and in the case of craniosynostosis surgery, a craniotomy—are grouped in the lowest risk category together with digit reconstruction, repair of syndactyly, upper endoscopy, and bilateral myringotomy tubes.
- Tracheostomy is in the highest risk category, while tracheoplasty and pharyngoplasty, procedures that involve similar surgical and anesthetic risks, are in the lowest risk category.
- Burr hole is grouped in the highest risk category, while craniotomy for tumor resection, which is more likely to involve blood loss and fluid shifts, is categorized as high-middle risk.
- Laparoscopic ileostomy, jejunostomy, and colectomy are grouped with the lowest risk procedures, while appendectomy is categorized as low-medium risk; laparoscopic colectomy for congenital megacolon or cecostomy, proctectomy, or small intestine resection are categorized as high-medium risk.
- Pancreatectomy is in the highest category risk. Ventriculoperitoneal shunt and peritoneal dialysis catheter, which typically incur much shorter operative times and do not commonly involve major blood loss or fluid shifts, are also in this highest risk category.

Is it possible that these procedural groupings reflect not only "intrinsic surgical risk" but also insufficiently adjusted-for patient risk factors and surgical circumstances? For instance, laparoscopic appendectomy may incur higher mortality risk than laparoscopic ileostomy because of unadjusted-for acute illness (*i.e.*, the patient is acutely ill, but not septic or on vasopressors), and insufficient time for surgical optimization. Do burr hole, ventriculoperitoneal shunt, and peritoneal dialysis catheter placement confer higher risk of death than a craniotomy because they are more likely to be performed under emergent circumstances such as acutely elevated intracranial pressure, need for intrathecal chemotherapy, or urgent need for dialysis, which the model does not adjust for? Is it possible that surgery for craniosynostosis and spinal fusion, or tracheoplasty and pharyngoplasty, fall into the lowest risk category because most patients present for these elective procedures fully optimized, and are therefore at low risk of death despite the high likelihood of major blood loss and fluid shifts (in the case of craniosynostosis surgery and spinal fusion), or airway loss (in the case of tracheoplasty or pharyngoplasty)?

While sample size and event rate limitations likely limited the authors' ability to adjust for additional patient risk factors (and indeed, in any model it is impossible to do so completely), we have concerns that the identified procedural risk groupings reflect *patient risk factors* and *surgical circumstances* in addition to—and in some cases more so than—*intrinsic surgical risk,* which may limit its utility for risk adjustment in other settings. Given the constraints of the data we have currently,