

Use of lung ultrasound to diagnose intraoperative tension pneumothorax in a pediatric laparoscopic surgery

Sir,

Laparoscopic pediatric surgeries are inherently challenging due to their complicated approach, lengthy duration, and daunting anatomy. Surgical pneumoperitoneum causes an increase in end-tidal CO₂ (ETCO₂) and airway pressures, making it challenging to diagnose an iatrogenic pneumothorax under general anesthesia.^[1] We wish to report the role of ultrasound in diagnosis and management of intraoperative tension pneumothorax during pediatric surgery.

A 13 kg, 5-year-old female was posted for a laparoscopic gastric pull-up. She had a history of corrosive ingestion. After attaching all ASA monitoring patient was induced, and after confirming adequate muscle relaxation, an endotracheal tube (ETT) of 5 mm OD was secured at 13 cm at the level of incisors. Pneumoperitoneum was established with CO₂ maintaining an intra-abdominal pressure less than 10 mmHg.

Intraoperatively there was a sudden rise of P_{insp} (peak inspiratory pressure) to 33 mmHg. Endotracheal tube kinking, mucus plugging, and anesthesia workstation malfunction were immediately ruled out. The surgery was stopped and the pneumoperitoneum released, despite which the patient did not improve.

Meanwhile, oxygen saturation (SpO₂) dropped even further to 85%, and in addition, the patient developed tachycardia (HR 150/min) and hypotension (50/35 mm Hg) which was unresponsive to fluid challenge. Noradrenaline infusion was started at a rate of 0.07 mcg/kg/min, and the fraction of inspired oxygen (FiO₂) was increased from 0.5 to 1. Urgent lung ultrasound was performed to confirm a suspicion of pneumothorax. The linear hockey stick ultrasound probe (Philips L15-7io Biobrand, Koninklijke Philips®, Netherlands 7-15 Hz) was placed on the anterior aspect of the chest and revealed an absence of lung sliding on B mode on the right-side [Figure 1] with M mode imaging showing a bar code sign suggesting a diagnosis of right pneumothorax. A rapid needle thoracostomy (18G IV cannula) was inserted in second intercostal space to relieve the symptoms followed by a right-sided intercostal drain placement. The patient improved hemodynamically. The surgery resumed, and

subsequently, a pleural rent was identified on the right side and repaired. On completion of the surgery, the patient was transferred to the pediatric intensive care unit intubated with stable hemodynamics. [Figure 2]

Intraoperative tension pneumothorax is a rare entity and challenging to diagnose. In this case, the surgical port caused a pleural rent, which in turn acted as a one-way valve during positive pressure ventilation leading to the development of tension pneumothorax. Signs of tension pneumothorax



Figure 1: Absent lung sliding in B mode



Figure 2: Immediate postoperative chest X-ray of the patient showing intercostal drain *in situ*

during general anesthesia are changes in pulmonary compliance, increased airway pressures, arterial hypotension and hypoxia as were evident in this patient.^[2]

Point of care ultrasonography has emerged as a rapid diagnostic tool in an intraoperative and critical care setting. The point on the chest wall where lung sliding intermittently reappears is “lung point.” This is 100% specific for confirming small pneumothoraces but is futile to search for in case of tension pneumothorax because most of the lung has wholly collapsed.^[3] We were able to timely diagnose this condition using lung ultrasound at crucial time points and appropriately and safely manage this patient.

Declaration of patient consent

The authors certify that they have obtained appropriate patient consent forms. In the form, the patient’s guardian has given consent for her images and other clinical information to be reported in the journal.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

TANYA MITAL, SHILPA GOYAL, NIDHI JAIN, ANKUR SHARMA

Department of Anaesthesiology and Critical Care, AIIMS
Jodhpur, Rajasthan, India

Address for correspondence:

Dr. Nidhi Jain,
B-3, Sir, Pratap Colony, Air Force Road, Ratanada,
Jodhpur - 342 011, Rajasthan, India.
E-mail: nidzz11@gmail.com


Submitted: 08-May-2020, **Accepted:** 08-May-2020,

Published: 24-Sep-2020

References

1. Han Q, Wang B, Xu A. Use of intraoperative ultrasonography for identification and management of pneumothorax caused by iatrogenic diaphragm defect: A case report and literature review. *J Int Med Res* 2020;48:300060519898048. doi: 10.1177/0300060519898048.
2. Chen YL, Chen CY, Cheng JK. Delayed tension pneumothorax during surgery. *J Chin Med Assoc* 2005;68:491-4.
3. Volpicelli G. Sonographic diagnosis of pneumothorax. *Intensive Care Med* 2011;37:224-32.

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

Access this article online	
Website: www.saudija.org	Quick Response Code 
DOI: 10.4103/sja.SJA_448_20	

How to cite this article: Mital T, Goyal S, Jain N, Sharma A. Use of lung ultrasound to diagnose intraoperative tension pneumothorax in a pediatric laparoscopic surgery. *Saudi J Anaesth* 2020;14:563-4.

© 2020 Saudi Journal of Anesthesia | Published by Wolters Kluwer - Medknow