
Point-of-care lung ultrasound can detect endobronchial intubation during laparoscopic cholecystectomy

Sir,

Laparoscopic cholecystectomy is considered the gold standard in the management of cholelithiasis. Among the nonbiliary complications, endobronchial intubation after the creation of pneumoperitoneum is well known.^[1] Cephalad displacement of the diaphragm during pneumoperitoneum results in cephalad movement of the carina, leading to endobronchial intubation. This complication results in a decrease in the oxygen saturation as measured by pulse oximetry associated with an increase in plateau airway

pressure. A case of endobronchial intubation during laparoscopic cholecystectomy confirmed with lung ultrasound scan is discussed.

A 26-year-old woman of 56 kg body weight was posted for laparoscopic cholecystectomy under general anesthesia. Her clinical examination was unremarkable, and the routine hematological and biochemical investigations were within normal limits. After institution of routine monitoring in the form of electrocardiography, noninvasive blood pressure,

and pulse oximetry, anesthesia was induced with fentanyl 100 µg and propofol 100 mg. Tracheal intubation with a 7.5 mm ID tracheal tube was facilitated with vecuronium 6 mg and was fixed at 21 cm mark at incisor level. Bilateral equal air entry was confirmed by auscultation and capnography was instituted along with volume-controlled intermittent positive pressure ventilation with 50% nitrous oxide and 2% sevoflurane in oxygen. The airway pressure was between 15 and 17 mmHg. Supraumbilical trocar was placed by the closed method, and pneumoperitoneum was created with carbon dioxide limiting the intraabdominal pressure at 10 mmHg. The other three ports were placed under vision and examination of the peritoneal cavity and viscera was normal. The patient was placed in the lithotomy position with approximately 10° of head down tilt to aid peritoneal insufflation for laparoscopy.

Ten minutes after carbon dioxide insufflation of the peritoneal cavity to 12 mmHg, it was noted that the peak airway pressure increased to >35 cm H₂O and the pulse oximeter reading fell to 85%. All inhalational anesthetics were switched off, and ventilation was continued with 100% oxygen. Peritoneal insufflation was discontinued. On auscultation, air entry could not be heard over the left lung, and right endobronchial intubation was diagnosed. For further confirmation, lung scan in the midclavicular line of third intercostals space on the left and right side was done with a 12-MHz linear probe, keeping the transducer vertical (M turbo, Fujifilm SonoSite, Inc., Bothell, WA, USA). Pleural sliding, horizontal movement of the two pleural linings with respiration, was present on the right but absent on the left side [Figure 1, left]. The absence of pleural sliding was further verified with M-mode identification of pleural motion.

The tracheal tube was repositioned under direct laryngoscopic view. The tube was adjusted so that the cuff just disappeared below the vocal cords and the tube was retied, at 19 cm mark at the teeth. Gradual improvement of airway pressure and arterial saturation followed. A repeat lung scan showed normal movements restored on the left side [Figure 1, right]. Further course of surgery and recovery from anesthesia remained uneventful.

Unintentional endobronchial intubation is one of the causes of arterial desaturation and increased airway pressure during anesthesia. Usually diagnosed by auscultation, it is easily remedied by adjusting the position of the tracheal tube. Laparoscopic cholecystectomy, with upward displacement of the carina by the abdominal pressure, may cause bronchial intubation. The head down position, commonly used in

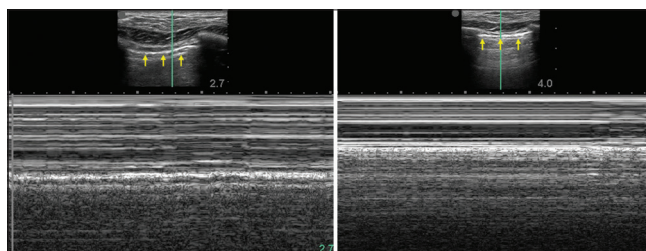


Figure 1: Left: Ultrasound examination showing the absence of pleural sliding (arrow) verified with no motion identified with M-mode. Right: Normal pleural sliding (arrow) restored after repositioning of tracheal tube

this procedure to reduce the incidence of bowel injury, contributes to this problem.

Although auscultation is most commonly employed for determining tracheal tube location, the use of auscultation to distinguish between tracheal and bronchial intubation has been shown to be unreliable.^[2] It has been established that point-of-care ultrasound examination is easy, quick, and significantly more accurate than auscultation in discriminating between tracheal and bronchial intubation in adult patients under general anesthesia.^[3] In this case, lung scan provided a quick point-of-care tool for confirmation of endobronchial migration of the tracheal tube.

High-frequency linear probe of ultrasound is placed vertically on the anterior chest at the intercostal space in midclavicular line bilaterally for this assessment. Sonographic sign of normal lung ventilation is a back and forth sliding of the parietal and visceral lung pleura, which is referred to as the lung sliding sign. The M-mode helps to understand that this movement is relative to superficial tissues. The absence of pleural sliding along with absence of motion identified with M-mode confirmed right endobronchial migration of the tracheal tube.

However, it is possible that in some cases, the pressure delivered toward the opposite lung during endobronchial intubation may not prevent the pleural sliding as that lung field is not completely isolated. This may make the interpretation theoretically difficult. This factor may be a common limitation with auscultation also. We recommend the use of point-of-care lung ultrasound, if available, to rule out unintended endobronchial migration of tracheal tube intraoperatively.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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References

1. Singh R, Kaushik R, Sharma R, Attri AK. Non-biliary mishaps during laparoscopic cholecystectomy. *Indian J Gastroenterol* 2004;23:47-9.
2. Vezzani A, Manca T, Brusasco C, Santori G, Valentino M, Nicolini F, *et al.* Diagnostic value of chest ultrasound after cardiac surgery: A comparison with chest X-ray and auscultation. *J Cardiothorac Vasc*

Anesth 2014;28:1527-32.

3. Ramsingh D, Frank E, Haughton R, Schilling J, Gimenez KM, Banh E, *et al.* Auscultation versus point-of-care ultrasound to determine endotracheal versus bronchial intubation: A Diagnostic accuracy study. *Anesthesiology* 2016;124:1012-20.

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