Problems in beginning a ``POEM''

Sir,

Peroral endoscopic myotomy (POEM) is a minimally invasive treatment for achalasia cardia. Pneumoperitoneum and pneumomediastinum are the most common complications reported for this procedure which resolve spontaneously, but can be life threatening.[1] We report two consecutive cases of tension pneumothorax when we started POEM in our institution.

A 48-year-old male patient weighing 50 kg diagnosed with achalasia cardia and with no known co-morbidities was scheduled for POEM in supine position under general anaesthesia (GA) with endotracheal intubation. After modified rapid sequence intubation, patient was placed on a combination of air, oxygen and sevoflurane with muscle relaxants. During the procedure, there was an increase in airway pressures up to 45 cmH_2O and increase in $ETCO_2$ to 55 mm Hg with SpO_2 of 97%. Despite appropriate changes in ventilator parameters, the patient worsened, oxygen saturation further dropped to 70%, he developed hypotension (88/54 mm Hg) and bradycardia, and ventilation became difficult. An urgent fluoroscopy showed bilateral pneumothorax. Bilateral needle decompression and chest tube insertion improved the patient's haemodynamic and respiratory status. Once stabilised, the procedure was completed without any further issues. He was ventilated overnight and extubated. Post-procedure leak test was negative and he was discharged on the 10^{th} post-procedure day.

Another 50-year-old male patient weighing 48 kg was taken up for a similar procedure. During the procedure, there was an increase in $ETCO_2$ to greater than 60 mm Hg and airway pressures of 45 cmH_2O with a "tight bag". Tension pneumothorax was suspected, and immediate fluoroscopy confirmed the diagnosis. Needle decompression and chest tube insertion relieved the symptoms. POEM was completed. Patient was extubated on post-operative day (POD) 1 and discharged on POD 7 after a negative leak test.

Two patients developing the same complication cannot be considered as a coincidence and we evaluated the cause. Stepwise analysis showed that the gas pipeline was directly connected to the endoscope and the gas flow kept at 2 l/min. Although considered as normal

for endoscopic procedures, this flow must have caused the gas to dissect into the different tissue planes and caused the pneumothorax. A flow meter was added to the system and the flow rate reduced to 500 ml/min [Figure 1]. Moreover, just before the procedure, the flow was further reduced by dipping the end of the endoscope into a beaker of water and just allowing 4-5 bubbles escape every second [Figure 2].

While most endoscopic procedures are safely performed without endotracheal intubation, POEM requires general anaesthesia with positive pressure ventilation to have a still patient to perform this technically difficult procedure, prevent CO_2 leaking into various tissue planes, achieve positive intra-thoracic pressures, minimise mediastinal emphysema and prevent aspiration.[1-4]

During submucosal tunnel dissection and myotomy, CO_2 is insufflated. The muscle fibres and the adventitia are a non-resistant barrier and CO_2 can quickly diffuse into the mediastinum and abdomen.[1,4] This is normally reabsorbed spontaneously. The normal CO_2 flows of 1-2 l/min used during routine endoscopy maybe excessive, creating higher pressures within the sub-mucosal tunnel. The high gas flow in the oesophagus could leak out of its thin wall during the myotomy resulting in tension pneumothorax. Previous reports of pneumothorax during POEM support this hypothesis.[5,6] It is therefore prudent that settings of the scope, flow meter and electrosurgical system be checked before all cases. Inclusion of low flow CO_2 and restricting the flow to 500 ml/min or lesser, and including this in the timeout is important.[2,7]

Following the two cases of tension pneumothorax, we practice stricter monitoring of CO_2 flow and keeping it lesser than 500 ml/min. Any increase in peri-procedure airway pressure entails a careful evaluation of patient for signs of pneumothorax and pneumomediastinum. It is also necessary to rule out intra-abdominal hypertension due to pneumoperitoneum. Abdominal decompression with Veres needle or chest tube insertion is carried out as per the diagnosis. Re-confirm that CO_2 and not air is used.[3] In case these factors are negative, it is necessary to stop POEM for some time to wash out the CO_2.[2]

As POEM becomes a routine procedure and success without complications becomes the rule, one should not become complacent.

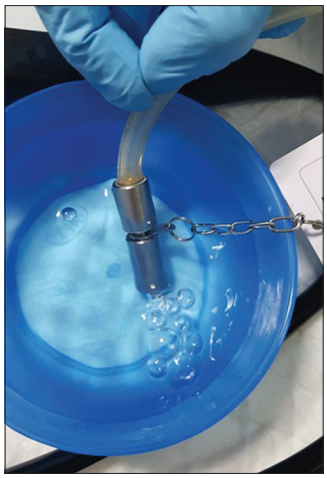

Figure 1: Bubble test to reduce CO_2 flows

Figure 2: Flow meter to control CO_2 flow

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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