Tracheal compression by innominate artery following gastric pull-up in an infant

Sir,

Transhiatal gastric pull-up surgery, indicated in long gap oesophageal atresia, has a number of postoperative complications. We observed an unusual occurrence of tracheal compression caused by innominate artery following gastric pull-up surgery in an infant.

A 7-month-old infant weighing 8.7 kg was admitted for transhiatal gastric pull-up, pyloroplasty and feeding jejunostomy. Tracheoesophageal fistula ligation with gastrostomy and cervical oesphagostomy had been performed 24 h after birth. Flexible fiberoptic bronchoscopy (FOB) was performed under sedation and it ruled out tracheomalacia.

Patient was given general anaesthesia supplemented with lumbar epidural analgesia. Standard American Society of Anesthesiologist monitoring, central venous pressure and invasive blood pressure monitoring were done. Following uneventful surgery, the child was shifted to paediatric intensive care unit (ICU) for
elective ventilation. The child remained stable with minimal ventilatory support, chest X-ray was normal so was extubated on third day. Following extubation, child developed respiratory distress requiring bilevel positive airway pressure support. Chest X-ray revealed right upper lobe collapse with no evidence of pneumothorax. Bronchoalveolar lavage fluid was sterile. On day 5, the child had to be reintubated due to decreased haemoglobin oxygen saturation. FOB showed tracheal narrowing due to compression anteriorly and from right-side with normal airway above and below site of compression.

Contrast-enhanced computed tomography (CECT) chest revealed tracheal compression from the right side at the level of the innominate artery with no evidence of opacity or consolidation.

Intravenous antibiotics, rigorous chest physiotherapy and humidified oxygenation enabled extubation on day 18 after surgery.

Innominate artery normally crosses anterior aspect of trachea about 1 cm above carina without causing any symptoms. In about 3% of population, it can be anomalous arising either too posteriorly or farther to the left. Symptoms could occur if the artery is short in length or the tracheal cartilage is unusually compliant or if there is a distortion of its anatomy following surgery. Surgical treatment is required only in cases with symptoms like reflex apnoea or more than 70% narrowing of the tracheal lumen.

Tracheal compression following oesophageal replacement surgery in infants is extremely rare and reported previously in adults by Kim et al. and Miller et al. Transhiatal gastric pull-up requires blunt finger dissection of the oesophagus from posterior mediastinum. Tracheal oedema may occur due to surgical dissection done behind membranous trachea for carrying out cervical anastomosis.

In this case, the mediastinal crowding effect of posteriorly placed new conduit pushed the trachea anteriorly and to the right aggravating the anterior compression by innominate artery [Figure 1]. Respiratory difficulty was further aggravated in the infant due to the increased tendency of dynamic airway collapse and altered mucociliary clearance as is common in children with tracheoesophageal fistula. Tracheal compression by itself also impairs mucociliary clearance, which may lead to recurrent chest infections. All these factors led to obstruction of airflow, collection of the secretions, infection and respiratory distress. The child responded to conservative management as the reduction of tracheal oedema relieved the compression force of innominate artery on the trachea.

Right upper lobe collapse can also be explained by obstruction of its bronchus due to the presence of the graft in narrow space.

Proximity of trachea to innominate artery should be kept in mind as accidental injury leading to fatal haemorrhage has been reported during tracheostomy. Even fatal erosion of innominate artery leading to the formation of tracheo-innominate fistula has been reported.

To conclude, tracheal compression by innominate artery should be considered in the differential diagnosis of airway obstruction and recurrent chest infection in an infant after oesophageal replacement surgery. Early bronchoscopy and ventilatory support till the airway oedema subside is important. The proximity of innominate artery to the trachea should be kept in mind in such cases before contemplating tracheostomy.

Figure 1: Sagittal and axial section of contrast-enhanced computed tomography showing tracheal compression at the level of innominate artery
Pre-operative CECT chest can guide in planning of surgical approach and help in anticipation of complications due to abnormalities in thoracic vasculature and may be included in pre-operative workup.

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 anonymity will be made to conceal their identity, but the innominate artery in infancy and childhood. Radiology 1981;139:73-5.

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