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Tracheal agenesis: evaluation by helical computed tomography

Abstract We present a newborn infant with type II tracheal agenesis. Helical CT was performed and confirmed the diagnosis. Retrospective coronal and sagittal multiplanar reconstructions clearly demonstrated the complex anatomy of the malformation. The absence of a significant portion of healthy trachea did not present any possibility for surgical correction.

Case report

A 1810-g male child was delivered by a caesarean section in the 32nd week of gestation to a 37-year-old mother (gravida 3, para 2). The pregnancy was uneventful until the 20th week of gestation, when polyhydramnios was noted. Absence of a stomach on three consecutive US examinations led to a tentative diagnosis of oesophageal atresia. Immediately after birth the child developed severe respiratory distress and could not cry despite vigorous efforts. Bag and mask ventilation improved the respiratory status with adequate movement of the thorax. Several attempts to pass a tube into the larynx beyond the vocal folds were without success. The tube dislodged into the oesophagus resulting in sufficient ventilation, but spontaneous respiration was never established.

On direct laryngoscopy, the supraglottic region and the larynx appeared to be normal without a laryngeal cleft. No tracheal cartilages were palpable below the larynx. A nasogastric tube was inserted without difficulty, thus ruling out oesophageal atresia. Oesophagoscopy using a thin flexible endoscope revealed a normal proximal oesophagus. There was a narrow anterior fistula in the mid-oesophagus, representing the bifurcation that continued into two main bronchi.

The baby, being provided with sufficient ventilation, was referred for helical CT. Following scanning, the baby was immediately returned to the intensive care unit, his condition being un-
changed. All the consultants expressed the opinion that the lesion could not be successfully corrected. The family agreed to stop life support and the child died 12 h after birth. The parents refused post-mortem examination.

CT scans were obtained with a Siemens Somatom PLUS-S in helical mode with 1-mm collimation and pitch ratio of 1:1 at 280 mA and 120 kV. Axial helical CT scans demonstrated the anatomical structure of the malformation at different levels. In the cervical region, the tube could be visualised in the oesophagus just in front of the vertebral column, the trachea being absent (Fig. 1a). At the site of the fistula the normal sized main bronchi were visible. The oesophagus was narrowed at this site, whereas the oesophagus below this region was dilated due to insufflation of air through the tube (Fig. 1b–d). Bronchial and parenchymal development seemed to be normal.

Retrospective multiplanar reconstructions were performed with special concentration on the area of the broncho-oesophageal fistula. Thus, we obtained additional information on the two-dimensional structure of the abnormality (Fig. 2). The mainstem bronchi were connected to the oesophagus in the midline by a fistula representing a very short part of the trachea (Fig. 2a–c). The bifurcation was located in an abnormal lower position. These results were consistent with TA type II.

**Discussion**

A serious situation during resuscitation of a newborn may compel the physician to assume a complex malformation of the respiratory tract. Accurate information on the anatomical relationship of tracheal malformations must be obtained quickly. Tracheal agenesis must be distinguished from severe stenosis of the trachea or from a short segment of tracheal agenesis [1]. The latter examples have a significant portion of healthy trachea, which may allow for survival by prompt surgical intervention.

Postpartum, diagnosis of TA may be established presumptively on clinical grounds alone (e.g. immediate respiratory distress, vigorous respiratory efforts, no audible cry and the inability to insert an endotracheal tube) [1, 3]. Stabilisation of the child and ventilation of