



Airway management in surgical correction of severe kyphoscoliosis associated with tethered cord and multiple malformations: A method of tracheostomoplasty by partial resection of the cricoid cartilage



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ABSTRACT

In patients with factors leading to potentially difficult tracheostomy placement, including neck stiffness, obesity, cephalad displacement of the brachiocephalic artery, short neck, or thyroid disease, tracheostomoplasty by partial resection of the cricoid cartilage is a safe and effective method. The case of a 13-year-old boy with congenital kyphoscoliosis associated with a tethered cord and multiple malformations is reported herein. Tracheostomy was necessary for him to undergo extensive surgery, but failed to keep his airway secure as the tracheal tube readily dropped out of the tracheal lumen due to the spinal malformation. A tracheostoma was created by suturing the cricothyroid membrane and skin as a tracheostomoplasty by partial resection of the cricoid cartilage. After tracheostomoplasty, the patient successfully underwent detethering of the cord and corrective scoliosis surgery. After discharge, he had successful postoperative management of the tracheostomoplasty.

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In the surgical correction of spinal deformities, safe perioperative airway management is of utmost importance. Extensive surgery can lead to excessive blood loss or respiratory failure. Spinal deformities may cause difficulties with both tracheal intubation and regional anesthetic techniques, leading to the need for emergency tracheotomy [1–4].

1. Case report

A 13-year-old boy was admitted to our hospital for creation of a tracheostomy. He had congenital kyphoscoliosis associated with a tethered cord and multiple malformations including undescended testes, deafness, voice disorders, visual disturbances, and mental retardation. Furthermore, he had laryngomalacia and subglottic stenosis. Detethering of the cord prior to corrective scoliosis surgery had been attempted at an outside hospital, but difficulty with tracheal intubation occurred during induction of general anesthesia. The patient could be intubated only with a narrow tracheal tube (internal diameter: 4 mm), leading to the suspicion of tracheal

stenosis. Therefore, he was referred to our hospital to facilitate creation of a surgical airway. His thorax had an armor-like appearance (Fig. 1 a and b). An X-ray film showed that the cervical spine was strongly curved anteriorly and that the thoracic spine was strongly curved posteriorly (Fig. 1 c and d). Contrast computed tomography (CT) showed compression of the trachea posteriorly and cephalad displacement of the brachiocephalic artery (black arrows, Fig. 1 e and f). Because of the cervical and thoracic spine deformities, the airway looked like the traditional shape of a boomerang. During general anesthesia, the patient could be intubated with a narrow spiral endotracheal tube (internal diameter: 4 mm) only. When he was intubated, subglottic stenosis was suspected. During tracheostomy, a transverse incision approximately 2–3 cm in length was created. The thyroid isthmus was completely divided. The trachea was prone to collapse anteriorly from the cricoid cartilage. A vertical incision was made in the midline of the trachea through the 3rd and 4th tracheal rings. Based on the perioperative conference concerning the deformity of the trachea and the tracheal stenosis, a cuffless, spiral-reinforced tracheostomy tube with an adjustable neck flange (Ajustfit Neo, Fuji Systems Corp., Tokyo, Japan) was inserted into the trachea. This tube could be freely exchanged to achieve the right length. After the tube was placed, a bronchofiberscope was inserted to investigate the

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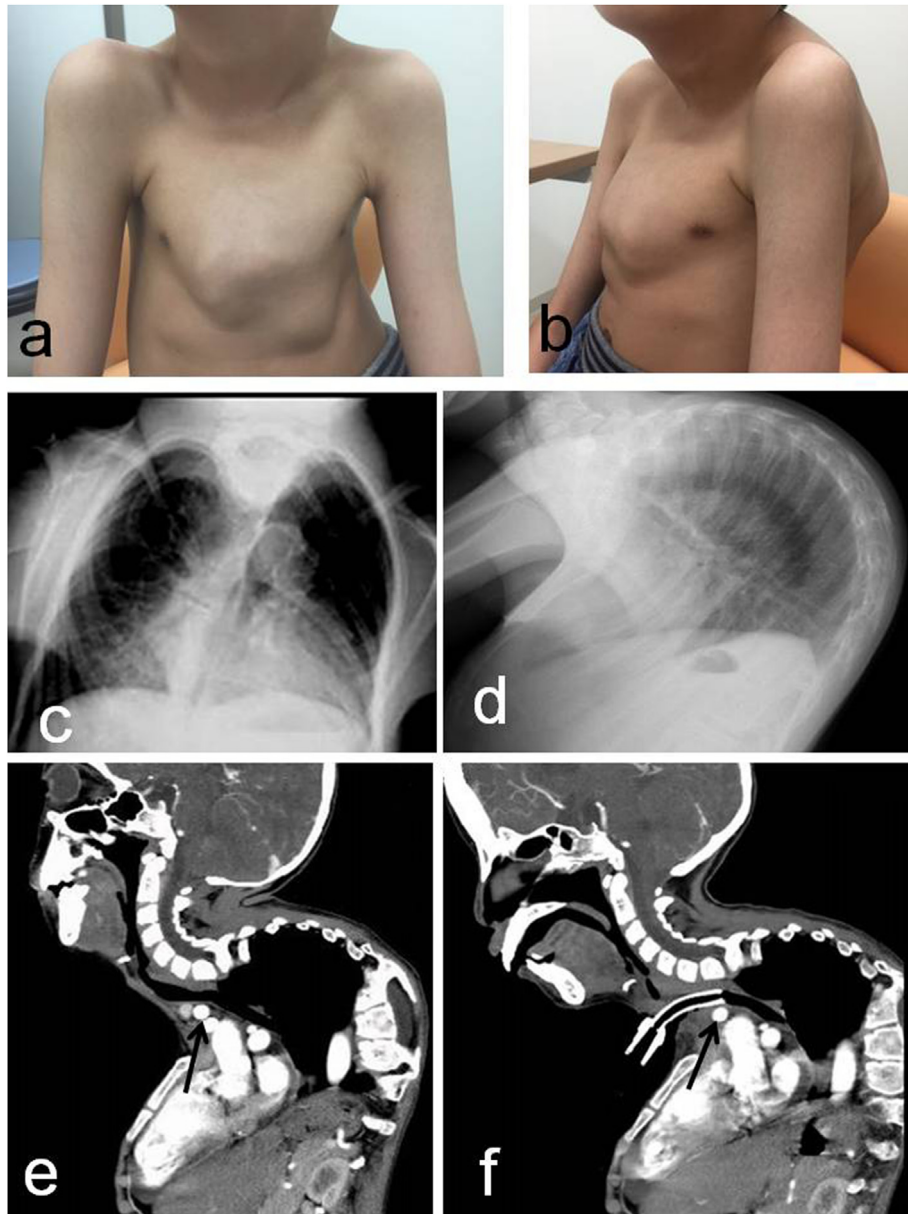


Fig. 1. Physical findings and radiological examinations. **a, b:** The patient's thorax is armor-like. **c, d:** An X-ray film shows that the cervical spine is strongly curved anteriorly and the thoracic spine is strongly curved posteriorly. **e:** Contrast computed tomography (CT) shows compression of the trachea from the back and cephalad displacement of the brachiocephalic artery (black arrow: brachiocephalic artery). **f:** After tracheostomoplasty, CT shows the tracheal tube runs vertically backward at the skin level (black arrow: brachiocephalic artery).

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