**The Perioperative Management of Three Infants with Complete Tracheal Rings and Congenital Heart Disease.**

Y. Tecuanhuey, C. Krucylak, D. Molter, C. Huddleston
*Departments of Anesthesiology, Otolaryngology, and Cardiac Surgery, Washington University School of Medicine, St. Louis Children's Hospital, St. Louis, Missouri 63110*

**Introduction**: There is a noteworthy incidence of laryngeal edema after extubation in infants and small children in whom cardiac surgery has been performed.[1,2]This can progress to subglottic stenosis necessitating repair which can increase morbidity and complicate the recovery from the underlying cardiovascular disease. Children with Down Syndrome have an inherently greater risk of developing airway complications post extubation [ 3] Koh,et.al. were unable to find a predictor of postextubation laryngeal edema in pediatric patients with congenital heart disease and concluded that the higher incidence may be due to a younger age.[2] We were unable to find any reports of congenital airway anomalies influencing postextubation laryngeal edema in the pediatric cardiac surgical patient. We report 3 cases of infants with complete tracheal rings and congenital cardiac disease whose perioperative course was influenced by the early or late recognition of airway pathology. All patients were born at full term and were identified in a six month period.

**Case Report**: K.W was a nine month old with multiple congenital anomalies including a VSD, cleft lip and palate, inguinal hernia and absent toes. During induction of anesthesia for her cleft lip repair at 5months of age, it was
difficult to pass even a 3.0 mm tracheal tube. Immediate airway evaluation by the otolaryngologist revealed complete tracheal rings. The 3.0 mm tracheal tube was positioned above the level of the stenosis and position was confirmed with a chest radiograph. Upon completion of the lip repair, the patient's trachea was extubated uneventfully. She did well and presented for cardiac catherterization the day prior to the scheduled repair. Again, after induction of anesthesia and muscle relaxation, a 3.5mm tracheal tube was carefully positioned above the level of the stenosis. Fluoroscopy confirmed the position. Due to the "high" level of the tracheal tube, the leak around the tube was significant. The anesthetic course was unremarkable and the patient's trachea was extubated without problem. However, cardiac surgical repair was postponed until a followup otolaryngologic evaluation could be completed.

P.B. was a six week old born with Down Syndrome, AV canal and PDA. After induction of anesthesia, direct laryngoscopy was performed. It was found to be impossible to pass anything larger than a 2.5mm tracheal tube into the patient's trachea. At the 10cm mark at the lips, the tube could be advanced no further. Adequate ventilation was achieved and the tracheal tube was secured. The patient was in congestive heart failure and required surgical correction. The AV canal was repaired with the assistance of cardiopulmonary bypass, the procedure was uneventful and the patient was transferred to the PICU postoperatively. Several hours later, airway evaluation revealed laryngeal edema at the site of complete tracheal rings. A larger tracheal tube was chosen and its tip placed above the level of the stenosis. Adequate ventilation could not be maintained due to a large air leak around the tracheal tube and a cuffed 3.0 mm tracheal tube was placed with the cuff below the cords, but with the tip of the tube above the stenosis. Mechanical ventilation was adequate and the patient's trachea was extubated four days later without futher complications.

M.M. was a five month old with Down syndrome, Tetralogy of Fallot and AV canal scheduled for cardiac surgical repair. Anesthesia induction was uneventful and tracheal intubation was accomplished with a 3.0 mm tube. Surgical repair was complicated and the patient was placed on ECMO support postoperatively. The trachea was extubated while on ECMO and reintubation was not possible. The patient's airway was evaluated under anesthesia and the diagnosis of complete tracheal rings and laryngeal edema was made. A tracheostomy was performed and after an additional cardiac surgical procedure, the patient did well.

**Discussion**: We were presented with a small group of infants with similar airway pathology that had significant cardiac abnormalities. In the first case, diagnosis of complete tracheal rings made before the start of the procedure allowed for careful placement of the tracheal tube above the lesion and avoidance of postextubation laryngeal edema at the site of the stenosis. In the second and third cases, the diagnosis of complete tracheal rings was made postoperatively. In each of these cases intubation of the trachea was accomplished with the tracheal tube tip at or below the site of stenosis. That probably resulted in the postoperative laryngeal edema and increased morbidity. We recommend emergent airway evaluation in patients with congenital heart disease who are found to have subglottic narrowing on direct laryngoscopy. In those patients found to have complete tracheal rings, careful placement of the tip of the tube and careful suctioning of the tracheal tube may prevent or limit postextubation laryngeal edema.

References:

1. Periera K. et el., Chest, 1997
2. Koh S. et al., Yonsei Medical Journal, 1995
3. Jacobs I. et al., Arch Otolaryngol Head Neck Surg, 1996