Anesthetic Considerations in Pediatric Tracheal Blunt Trauma Injuries

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Abstract

Background:
Tracheal injury is uncommon following pediatric mediastinal blunt trauma, but proper detection and prompt action is essential in its management. Although less common than penetrating injuries, blunt pediatric neck injuries are more often life-threatening because of associated laryngotracheal disruption.

Case Report:
We report a 5-year old patient with a posterior tracheal wall laceration secondary to fall, who presented with extensive soft tissue edema and subcutaneous emphysema. Immediate airway management involved a collaborative effort by the pediatric anesthesiologist, pediatric ENT surgeons, and operating room staff. All members of this multidisciplinary effort agreed that implementing a conservative approach was in the best interest of this child and that primary repair or tracheostomy was premature. Patient remained intubated for approximately 10 days, under close observation, and was consequently extubated without residual respiratory compromise.

Conclusion:
Ultimately, identification of the extent of damage was the most important undertaking, which involved a collaborative effort from our multidisciplinary team. This patient was treated with conservative management that resulted in a successful outcome.

Discussion:
The literature is scattered with various accounts of pediatric blunt trauma to the upper airway, however most of the literature is described from a surgical approach. This case report expounds upon anesthetic considerations in managing children who have suffered tracheal blunt trauma. Further, identifying key goals in management appears to be a critical point in the proper treatment of these injuries. Tracheobronchial injuries after penetrating or blunt trauma are rare but life-threatening. Seventy-eight percent of patients die before admission and 21% of those reaching the hospital die within 2 hours (4). Previous, evidence primarily based on small retrospective case series recommends early surgical repair as the treatment of choice for tracheal injuries. However, conservative management, as in this case, has been shown just as effective.

Certainly, debate exists as to the most effective modality of treatment, specifically whether conservative, non-surgical management is more appropriate than surgical tracheal repair. Doherty et al maintains that conservative treatment is indicated in patients with stable vital signs, no difficulty ventilating, minimal fluid collection in mediastinum, pneumomediastinum or stable subcutaneous emphysema, and no signs of sepsis or shock (5). Boncos et al consider that lesions smaller than 1 cm in a clinically stable patient can be treated conservatively, while clinically unstable patients or lesions larger than 2 cm should be treated surgically (6).

Given the relative hemodynamic and respiratory stability of our patient, it was determined that conservative management, with endotracheal intubation, intensive care monitoring, and broad spectrum antibiotics was the most appropriate modality. Despite the aforementioned paucity of pediatric blunt trama injuries, it would be interesting to further examine the outcomes of conservative versus surgical management and whether one modality can reduce long-term complications.

Prior to arrival in operating room, patient was gently premedicated while receiving supplemental oxygen via nasal cannula. Child was placed on operating room table in neutral position, and after pre-oxygenation, patient was induced with combined intravenous/inhalation technique. Immediately, no intravenous neuromuscular blockade was implemented to preserve immediate returning spontaneous ventilation.

Reference:

After adequate depth of anesthesia was achieved, gross evaluation of upper airway was carried out with gentle direct laryngoscopy, concluding that soft tissue edema did not prohibit adequate view of patient's airway anatomy. Fiberoptic laryngoscopybronchoscopy revealed an approximately 1-1.5 cm posterior tracheal wall laceration. Further, the laceration was anterior to what appeared to be a pulsatile, vascular anomaly. As a result, primary repair of the laceration was not undertaken, and the endotracheal tube was passed approximately 2 cm distal to the tracheal tear. ENT surgeon was present and agreed that primary repair and/or tracheostomy were not yet indicated, given adequate spontaneous ventilation and oxygenation, with minimal positive pressure, in the setting of this unidentified vascular anomaly. Bronchoscopy was then performed by the ENT team, which revealed no intratracheal perforation.

Patient remained intubated for 10 days following his injury, at which point, serial computed tomography and fiberoptic tracheoscopy revealed resolution of his tracheal disruption. Consequently, patient was extubated without incident and promptly discharged 4 days later.