

Tracheal injury from dog bite in a child

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Case Report

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Abstract

Background

Tracheal injury from dog bites in children is rare. Tracheal injury requires prompt and accurate diagnosis and treatment to rescue the patient. Especially in children, securing the airway is often more difficult than in adults because of their narrow trachea.

Case presentation

We report the case of a 3-year-old girl who presented with multiple dog bites. There were multiple wounds on the head, face, neck, and anterior chest, and air leakage was observed from the cervical wound at the time of transfer. It was difficult to perform oral endotracheal intubation, therefore, we extended the neck wound, probed the trachea, inserted a tracheal tube directly from the cervical wound in the emergency room. Tracheoplasty and another wound cleansing were performed in the operating room. The patient was discharged on the 18th day after surgery, without further complications.

Conclusions

Tracheal injury from a dog bite is rare. It is important prompt and accurate diagnosis and treatment.

Background

Although tracheal injury is relatively rare, prompt and accurate diagnosis and treatment are required to rescue the patient, because of its serious and progressive symptoms, and high mortality. Dog bites are not uncommon among animal bites. The most common site of injury is the extremities; however, the younger the child, the more likely for the face and neck to be injured. The important points in the treatment of dog bites are rapid wound treatment and infection control, especially with wounds on the neck and face.

Case Presentation

A 3-year-old girl with no significant past medical history presented to the emergency department by air ambulance because she was bitten by a neighborhood Doberman-Boxer mix dog. She had multiple wounds on her head, face, neck and anterior chest, and air leak was observed from the neck wound. There were no respiratory problems with manual compression of the anterior neck wound during transport. Under sedation, blind oral endotracheal intubation was attempted; however, the tube was trapped in the airway and could not be inserted. As ventilation became impossible, after extending the neck wound with a scalpel, the tracheal lumen was felt and confirmed with a finger, and a 4-mm tracheal tube was inserted directly from the cervical wound (Fig. 1).

The trachea was considered almost completely transected. An ultrathin flexible bronchoscope was prepared, and oral intubation with a 4.5 mm tube was carefully performed while guiding from the neck

wound again. After respiration and circulation had stabilized, a whole-body computed tomography (CT) scan was performed. The CT scan showed not only surface wounds and subcutaneous emphysema, but also a depressed skull fracture and pneumoperitoneum. After administration of antibiotics and tetanus toxoid vaccine, the patient was transferred to the operating room. The tracheal tube was visible when the anterior neck wound was extracted (Fig. 2A). The space between the cricoid cartilage and the first tracheal cartilage was transected three-fifths, and almost only the tracheal membranous area retained continuity. A part of the first tracheal cartilage was damaged, but a direct suture was possible by trimming. Tracheoplasty was performed with 14 stitches using a 5 - 0 polypropylene suture (synthetic, non-absorbable suture), with interrupted suture (Fig. 2B). No recurrent nerves were identified. The anterior cervical wounds were closed with sutures, but the remaining multiple crushed wounds were washed with large amounts of saline and were temporarily not sutured. She was immobilized with endotracheal intubation for 3 days, and was extubated after confirming that there were no problems with the tracheostomy wound by bronchoscopy (Fig. 3). The left vocal cord showed paracentral fixation, but no hoarseness of voice was observed. On postoperative day 4, a secondary suture closure of the face and head wounds was performed with plastic surgery. Antimicrobial therapy was continued until postoperative day 14, and the patient was discharged on the 18th day after surgery without any further wound infection.

Discussion And Conclusions

Airway trauma is a life-threatening condition that may result from blunt and penetrating neck injuries. Delayed diagnosis and treatment lead to early fatal outcomes or late sequelae, such as airway stenosis. Therefore, prompt and accurate diagnosis is mandatory for the survival of these patients. The symptoms and signs of tracheal injury depend on the site and severity of the injury; most symptoms are not specific to this type of injury. Subcutaneous emphysema is the most common finding. Other symptoms such as dyspnea, tachypnea, respiratory distress, and hemoptysis have also been observed. Additionally, air escape from penetrating neck trauma should be considered as a diagnostic tool for airway injury.

Blind endotracheal intubation may worsen laceration and/or create a false passage for the tube. Therefore, spontaneous breathing of the patient should be preferred until a safe airway has been achieved. As bronchoscopy represents the procedure of choice to locate the site of the injury and ensure that the tube's cuff is inflated beyond the site of the injury, endobronchial intubation over a flexible bronchoscope is the preferred method for airway management and definitive diagnosis. However, in pediatric patients, the narrow tube limits the usefulness of flexible bronchoscopy. Recently, the effectiveness of supraglottic devices, such as laryngeal mask airways or i-gel, has been reported for airway management during tracheal surgery [1][2]. In addition, if the airway is difficult to secure, partial support using extracorporeal life support (ECLS) should be performed as soon as possible [3].

Small lacerations of the trachea can be closed with direct sutures, while complete or partial transection requires trimming of the damaged airway edges and end-to-end anastomosis. It is important to have

sufficient debridement of the damaged tracheal and bronchial cartilage to avoid postoperative complications [4]. Furthermore, early tracheoplasty should be performed before adhesion granulation occurs at the site of injury.

The most common site of injury for a dog bite is the extremities; however, according to epidemiological data regarding pediatric facial dog bites, children aged 5 years and younger are at high risk of being bitten in the face by a familiar dog, and are more likely to require hospitalization than older children. It has been reported that younger children are prone to facial injuries because: (1) they are at the same height as dogs; (2) their heads are large in relation to their bodies; and (3) they do not have the understanding or fear of dogs, and may bring their faces dangerously close to them [5].

Tracheal injury from a dog bite is rare. Most importantly, prompt and appropriate airway management is needed.

Declarations

Ethics approval and consent to participate Not applicable

Consent for publication: Written informed consent of clinical detail and image publication was obtained from the patient's guardian.

Availability of data and materials : All data and materials are available upon reasonable request from the corresponding author

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References

1. Krecmerova M, Schutzner J, Michalek P, Johnson P, Vymazal T. Laryngeal mask for airway management in open tracheal surgery-a retrospective analysis of 54 cases. *J Thorac Dis* 2018;10(5):2567–2572.
2. Menna C, Fiorelli S, Massullo D, Ibrahim M, Rocco M, Rendina EA. Laryngeal mask versus endotracheal tube for airway management in tracheal surgery: a case-control matching analysis and review of the current literature. *Interact Cardiovasc Thorac Surg* 2021;33(3):426–433.
3. Fleißner F, Timm ME, Lang CP, Lenarz T, Kühn C, Jaeger DB. Tracheal transection-A novel airway management. *Thorac Cardiovasc Surg Rep* 2020;9(1): e24-e28. doi: 10.1055/s-0040-1710586.

4. Yamato Suzuki, Hisato Ishizawa, Hiroshi Kawai, Yasushi Matsuda, Yasushi Yoshikawa. Tracheobronchial reconstruction by inverted Barclay's method for tracheobronchial injury in an 8-year-old girl: a case report. *Surg Case Rep.*2022;8:54. doi: 10.1186/s40792-022-01405-w.
5. Chen HH, Neumeier AT, Davies BW, Durairaj VD. Analysis of pediatric facial dog bites. *Craniomaxillofac Trauma Reconstr* 2013;6(4):225–232. doi: 10.1055/s-0033-1349211.

Figures



Figure 1

A 4 mm tracheal tube inserted directly into the trachea through the neck wound.

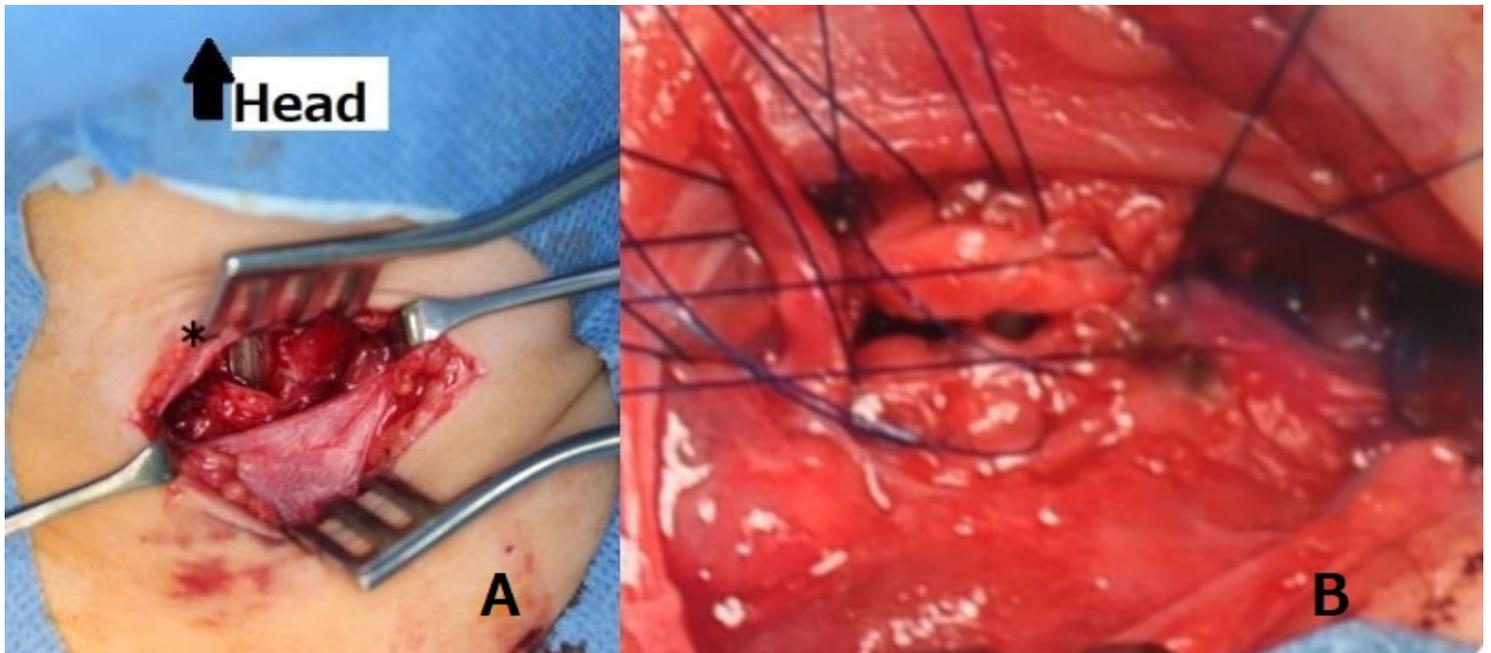


Figure 2

Gross examination of neck wound: (A) tracheal tube identified through neck wound(); (B) directly anastomosed trachea.



Figure 3

Tracheal anastomosis confirmed by bronchoscopy on postoperative day 3.