

Tracheal perforation managed by temporary tracheostomy in a horse

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ABSTRACT

Tracheal trauma with resultant rupture is uncommonly reported in veterinary literature. We report the case of a 16-year-old Thoroughbred gelding that sustained a 1 cm longitudinal perforation of the dorsal tracheal membrane in the proximal cervical region. The horse subsequently developed dyspnoea due to acute upper respiratory obstruction secondary to severe emphysema of the guttural pouches. A temporary tracheostomy caudal to the site of tracheal perforation was performed under local anaesthesia. This procedure helped relieve the upper airway obstruction and aided resolution of the injury by diverting air away from the site of tracheal perforation. After conservative management, the gelding recovered completely.

Key words: dyspnoea, horse, subcutaneous emphysema, tracheal perforation, tracheostomy.

Saulez M N, Slovis N M, Louden A T **Tracheal perforation managed by temporary tracheostomy in a horse.** *Journal of the South African Veterinary Association* (2005) 76(2): 113–115 (En.). Hagyard Equine Medical Institute, McGee Medicine Center, 4250 Iron Works Pike, Lexington, Kentucky 40511-8412, USA.

INTRODUCTION

This report details a case of upper respiratory tract obstruction due to severe emphysema of the guttural pouches as a result of a proximal-cervical tracheal perforation (TP) in a 16-year-old Thoroughbred gelding. Cervical tracheoscopy allowed a definitive diagnosis. Conservative medical intervention through a temporary tracheostomy caudal to the TP helped divert airflow away from the site of injury. This restored normal breathing and may have helped to resolve the emphysema more rapidly. Presenting clinical signs of TP will depend on the size of the laceration. Small tear lesions may be self-limiting. Larger tracheal perforations (TPs) may produce significant peritracheal, subcutaneous or mediastinal emphysema resulting in severe dyspnoea and possibly death if untreated.

CASE HISTORY

A 16-year-old Thoroughbred gelding was examined for cranial and cervical subcutaneous crepitation and anorexia of 12 hour duration following a single episode of colic that was treated with flunixin meglumine (FluMeglumine™, Phoenix

Pharmaceuticals Inc, USA) (1.1 mg/kg, IV, once). Physical examination revealed cranial and cervical emphysema, absence of fever, normal cardiovascular and respiratory parameters. There was no soft-tissue or musculoskeletal trauma and there were no skin injuries to explain the subcutaneous accumulation of air. Thoracic ultrasonography revealed no evidence of pneumothorax. No thoracic radiographs were performed. Results of CBC and serum biochemistry analyses showed a stress leukogram: leukocytosis (12 800 cells/ μ l; reference range 5000–12 600 cells/ μ l) due to mature neutrophilia (11 300 cells/ μ l; reference range 6900–8200 cells/ μ l), lymphopaenia (1300 cells/ μ l; reference range 4400–5700 cells/ μ l) and hyperglycaemia (7.72 mmol/l; reference range 4.22–6.61 mmol/l). Endoscopy of the larynx, trachea (Fig. 1) and guttural pouches was performed.

DIAGNOSIS AND OUTCOME

Cervical tracheoscopy demonstrated a 1 cm longitudinal perforation of the dorsal tracheal membrane of the proximal-cervical trachea (Fig. 1, arrow) with associated mucosal hyperaemia and oedema ventrally (Fig. 1, asterisk). Although submucosal emphysema was present in both guttural pouches, no compromise of the laryngeal lumen was found. A diagnosis of proximal-cervical tracheal perforation was made with resultant submucosal emphysema. The gelding

was treated prophylactically with cefotiofur sodium (Naxcel®, Pharmacia & Upjohn Company, USA) (2.2 mg/kg, IV, q 24 h) and gentamicin (GentaMax® 100, Phoenix Pharmaceutical Inc, USA) (6.6 mg/kg, IV, q 24 h). Flunixin meglumine (1.1 mg/kg, IV, q 12 h) was given as an anti-inflammatory agent and normosol (Normosol®, Abbot Laboratories, USA) (10 L, IV, q 12 h) was administered to maintain adequate hydration for the 1st 5 days of hospitalization while being fed from an elevated position.

On day 2 after admission, the gelding began to have stertorous breathing and increased difficulties swallowing feed. Differential diagnosis at this stage was laryngeal obstruction due to severe subcutaneous emphysema. Endoscopy of the larynx revealed marked reduction in the diameter of the laryngeal lumen secondary to severe emphysema of the guttural pouches (Fig. 2, arrowheads). A tracheostomy tube was placed caudal to the TP in order to facilitate ventilation and provide an exit point for the trapped air.

Following an aseptic preparation of the site at the junction of the cranial and middle third of the ventral cervical region, local anaesthetic (Carbocaine®, Pfizer, USA) was infiltrated into the skin, subcutaneous tissues and underlying musculature. A 6 cm incision was made through the skin, subcutaneous tissue and cutaneous colli muscle, and the paired sternothyroideus muscles bluntly dissected and retracted to reveal the cartilages of the trachea. The annular ligament between 2 adjacent cartilage rings was incised parallel to the orientation of the rings and lengthened to allow placement of a tracheal cannula (Trach tube®, Rusch Inc., USA). The respiratory stertor was attenuated immediately once the tracheostomy was placed. The tracheostomy site was cleaned twice daily with dilute antiseptic solution (Nolvasan®, Wyeth, USA) and the inner tracheal cannula removed and scrubbed gently every 6 hours to remove accumulated tracheal secretions. The horse was withheld from food and water for the next 2 days of hospitalisation. The subcutaneous and laryngeal emphysema was resolved by day 4, and no further

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Received: November 2004. Accepted: April 2005.



Fig. 1: Tracheoscopy of a gelding with subcutaneous emphysema secondary to a tracheal perforation. Note the dorsal longitudinal tracheal perforation (arrowhead) with ventral mucosal hyperemia and oedema (asterisk).



Fig. 2: Endoscopy of the left guttural pouch of a gelding with subcutaneous emphysema secondary to a tracheal perforation. Note the severe emphysema (arrowheads) of the guttural pouch which markedly reduced the diameter of the laryngeal lumen.

episodes of dyspnoea were noted during hospitalization. The gelding was able to eat and drink water without difficulties 2 days after the tracheostomy was inserted.

The gelding was discharged on day 6 after no re-occurrence of respiratory distress. The owners were instructed to keep the gelding confined to a stall for 2 weeks and to administer trimethoprim sulfonamide (Sulfamethoxazole and Trimethoprim Tablets USP; TEVA Pharmaceuticals, USA) (30 mg/kg, PO, q 12 h) for 5 days and to care for the tracheostomy as directed above. Four days following discharge, the tracheostomy tube was removed following healing of the tracheal tear as visualized by tracheoscopy. The stoma was allowed to heal by 2nd intention.

DISCUSSION

Tracheal perforations due to blunt trauma without concurrent cartilage or skin injury are rarely reported in horses^{2,7}. This horse most likely endured trauma to the trachea by either a kick or another blunt force resulting in a tracheal perforation. Tracheal lesions resulting from intratracheal foreign bodies have been previously reported^{1,5}, but are unlikely to be the cause of this gelding's clinical presentation because of the lack of the following clinical signs typical of intratracheal foreign bodies: chronic coughing, pneumonia, halitosis, nasal discharge and epistaxis^{1,5}.

In literature pertaining to humans, blunt trauma contributes to most tracheal injuries, predominantly involving the

membranous portion of the intrathoracic trachea as a result of sudden increase in intra-airway pressure with the glottis closed at time of impact⁴. Reports also exist of TPs caused by endotracheal intubation¹⁰ or secondary to a pressure lesion of the endotracheal tube in combination with weakness of the membranous part of the trachea due to impaired microperfusion⁸. Risk factors for tracheal rupture in human literature are old age, chronic obstructive disease and corticosteroid therapy^{10,11}.

Reported complications following tracheobronchial rupture include subcutaneous emphysema, dyspnea, pneumomediastinum and pneumothorax¹⁰. This case demonstrates that subcutaneous emphysema can lead to life-threatening guttural pouch emphysema if the pressure is great enough to migrate through the subcutis to the guttural pouches. The gelding developed the severe subcutaneous emphysema because of the tracheal perforation and the leakage of air through the site into the subcutis. The air was able to migrate to the guttural pouches because of the location of the tear in the cranial cervical trachea. The tracheostomy was performed to help reduce and direct the air away from the TP site and therefore reduce the subcutaneous emphysema. Subcutaneous emphysema is not uncommon with tracheostomies, but when maintained properly only result in a temporary cosmetic disfigurement.

In this case, conservative repair was elected due to the small partial tear, good apposition of lacerated tissue, resolution of subcutaneous emphysema and no other associated injuries. Small tears may form a fibrin seal rapidly within 24 to 48 hours¹². However, larger tears with subcutaneous emphysema should be treated promptly to avoid infection, obstruction from peritracheal tissue and progression of subcutaneous emphysema to pneumomediastinum with resultant pneumothorax^{2,3,6,7}. Further complications may include halitosis and intratracheal granulation tissue at site of TP that may respond to laser ablation therapy⁹.

In summary, tracheal trauma with resultant rupture is an uncommon occurrence. The diagnosis may be supported by clinical signs such as subcutaneous emphysema, stridor and endotracheal bleeding and confirmed by tracheoscopy. Pneumomediastinum may be detected by thoracic radiography or ultrasonography. In horses, conservative therapeutic management of a TP by the use of a pressure bandage⁴ or non-specific treatment² has been reported and 1 report exists of successful surgical correction of a mid-cervical TP⁷. However, the use of a

tracheostomy caudal to the site of tracheal injury could be an option to divert air away from the TP, thereby preventing further exacerbation of subcutaneous emphysema with resultant upper respiratory tract obstruction.

This may aid resolution of the injury should extensive surgical management not be possible.

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