PHARYNGEAL STICK INJURIES; A SURGICAL EMERGENCY?
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Introduction
Pharyngeal puncture wounds seen in cats and dogs can be caused by a variety of foreign bodies (wooden, metal, sewing needles etc). The most common presentation is in dogs where trauma via the oral cavity is caused frequently by wooden sticks that the dog is carrying, chewing, or chasing after. Occasionally similar injuries are seen in working dogs that run through undergrowth with their mouths open. Presentation may be acute, or chronic (due to a residual foreign body). This presentation will focus mainly on acute presentations, where a thorough and aggressive approach can prevent fatalities or the development of chronic discharging sinuses.

Presenting Signs
Medium to large breed dogs are commonly affected, with previous studies quoting Border Collies as most frequently presented, followed by Springer Spaniels and Labradors. It has been hypothesized that these larger dogs are more vulnerable as they extend they extend their neck and adopt a ‘head down’ stance as they approach the stick at speed, opening the pharynx. Not unsurprisingly, small, toy or miniature breed dogs are very rarely represented in published studies. Again, the breeds represented may be a reflection of the type of owners and their lifestyle!

Presenting symptoms will vary with the type and extent of injury; this is in turn is determined by the size of the penetrating object, the direction and angle of penetration, and the force with which it penetrates. Some of the worst injuries we see in our clinic have resulted from thrown sticks embedding themselves into soft ground and the dog running onto the protruding end with an open mouth.

Recognised trajectories with associated injuries include:
- Sub-lingual
- Rostral pharyngeal- caudal hard palate etc, deep penetration and migration may lead to retrobulbar, temporal and masseteric involvement
- Lateral pharyngeal-most common, an oblique entry by the stick resulting in penetration of the pharyngeal wall.
- Dorsal pharyngeal- usually sticks entering from directly in front of the dog, steeply elevated. Dorsal pharynx, retropharyngeal, and most seriously oesophageal injury.
Owners may witness the actual event, or an acute onset of vocalization, gagging, haemorrhage, and pawing at the mouth. Often the injury may occur out of sight of the owner, and presenting signs may raise suspicion that such an injury has occurred:

- Cervical pain, especially on flexion, or on palpation of the pharynx and larynx
- Palpable cervical or pharyngeal swelling.
- Salivation, often blood tinged
- Depression, lethargy, malaise.
- Anorexia, dysphagia or gagging due to pain and swelling of the pharynx
- Dyspnoea, with URT signs due to pharyngeal swelling. Occasionally pneumothorax or pneumomediastinum will be the cause.
- Pain on opening mouth due to temporo-masseteric trauma and swelling
- Pawing and rubbing muzzle and face
- Cervical subcutaneous emphysema; palpable crepitation, an accumulation of gas from activity of bacteria, or more seriously from severe pharyngeal or oesophageal laceration allowing air to leak into the fascial planes of the neck
- Less frequently: epistaxis, exophthalmus, lameness etc

**Investigation**

Urgent assessment and management of acute pharyngeal injury is vital to resolve any dysphagia or dyspnoea and to prevent the development of chronic complications. It is essential that potential oesophageal tears are identified and treated aggressively as these carry a poor prognosis and need to be picked up as early as possible; there is potential for the development of mediastinitis and pneumomediastinum that is frequently fatal (4 out of 5 dogs with oesophageal tears died in *White and Lane* (1988), 5 out of 14 in *Doran, Wright & Moore* (2008))

General anaesthesia will be required to fully assess and treat the presenting patient. As with all emergency presentations, assessment of the major body systems (Airway, Breathing, Circulation) is performed and stabilization of these is a priority; oxygen therapy and aggressive intravenous fluids to correct hypovolaemia may be indicated by physical findings. In rare cases, with severe pharyngeal swelling, or laryngeal trauma, a temporary tracheostomy tube may be required.

Following induction of anaesthesia and intubation, a thorough inspection of the oral cavity and pharynx must be performed using a laryngoscope. Initially inspect both sides of
the tongue and the sublingual area by pulling the tongue forward, and dorsally. Use the blade of the laryngoscope to push and probe tissue, to displace it and try to identify trauma. An additional blunt probe is useful (eg a pair of closed artery forceps) and a spey hook is useful to retract the soft palate rostrally. Inspect tonsillar, oral palatal surfaces, pharyngeal and perilyngeal mucosa. (Just because you’ve found one wound, don’t stop the examination! A common scenario is for the stick to have gone through the soft palate, and then cross the naso-pharynx before penetrating the dorsal pharyngeal wall).

Radiographs should be obtained on the pharynx, neck and thorax. A wooden foreign body may sometimes be identified, but often wood absorbs water from the wound environment and takes on a soft tissue density radiographically. The presence of soft tissue swelling in the retropharyngeal area, with ventral displacement of the dorsal wall of the oesophagus will often be appreciated in injured animals. Perhaps the most significant radiographic sign to look for is that of cervical emphysema; the presence of gas lucencies within the cervical soft tissues, outside of the lumen of the oesophagus or trachea signifying significant damage to either the pharynx or the oesophagus, and an indication for surgical exploration of the neck. Gas extending down the fascial planes of the neck, subcutaneously, and within the mediastinum is taken as an indicator of likely oesophageal rather than pharyngeal injury.

If endoscopy is available, the oesophageal lumen can be visualised. Pass the scope to the level of the cardia, then assess the mucosa of the oesophagus as the scope is withdrawn. Insufflation should only be used if cervical radiographs have already been obtained. (Unless there is fresh haemorrhage sometimes tears of the oesophagus can be difficult to appreciate. If cervical emphysema is present of a radiograph, I would always surgically explore even if I could not find a tear with a endoscope).

Advanced imaging (computed tomography, and magnetic resonance imaging) have their role, but are arguably more relevant in chronic cases.

**Surgical Treatment**

A contaminated wound has been identified, so antibiotic prophylaxis is indicated prior to surgery. The selection of antibiotic, in the absence of culture and sensitivity, is made on the likely bacterial contamination present. Staph aureus, Strep spp, and E coli are among the most common commensals of the canine oropharynx. Clostridium spp are common anaerobic soil-borne bacteria, that may well be present of the foreign body. We administer intravenous amoxicillin-clavulanate and metronidazole.

In dogs with rostral wounds identified, and no radiographic abnormalities, an oral approach is usually used to treat and manage the wound. The wound should be probed and
explored to assess the depth of penetration and the presence of a foreign body. The pharynx should be packed prior to copious lavage of the wound with Hartmanns solution to reduce contamination and dislodge splinters and bark. For superficial injuries sub-lingually, or of the soft palate the wound can be left open to granulate. For deeper larger wounds the deficit can be closed working orally, but I only surgically close if drainage is established, for fear of creating a sealed contaminated pocket and increasing the risk of infection and chronic implications.

For dogs with caudal pharyngeal punctures, confirmed oesophageal punctures, or where cervical emphysema has been identified radiographically surgical exploration is indicated via a ventral cervical midline approach. This approach provides good access to the retropharyngeal and cervical tissues, and is appropriate in all but the most rostral of pharyngeal injuries. Surgical exploration allows removal of foreign material, repair of pharyngeal or oesophageal tears, lavage to reduce contamination, and the establishment of adequate drainage.

The dog is placed in dorsal recumbency, and a wide clip performed. a skin incision is made from the cricoids cartilage extending caudally approximately two thirds of the distance to the manubrium. The paired sternohyoid muscles are identified and bluntly separated in the midline. The trachea is retracted as required. If extensive bruising, exudates and fibrin are present, identification of the oesophagus is aided by an assistant passing a oesophageal stethoscope, or an oro-gastric tube into the oesophagus orally. Copious lavage and suction are indicated to remove exudates and reduce contamination. Tears of the pharyngeal or oesophageal wall should be debrided and closed (the oesophagus in a 2 layer closure). Any oesophageal repair may be supported by tacking the cranial portion of the sternohyoid muscle to suture line.

Samples can be obtained for culture and sensitivity (swab and/or tissue). Placement of a surgical drain is indicated to manage dead space and residual contamination; the drain is placed within the cervical soft tissues, dorsal to the sternohyoid muscles. Oral wounds can then be sutured provided drainage of the retropharyngeal area is established.

Dogs that have undergone significant oesophageal repair should be kept nil by mouth for a 7 day period after surgery. Nutrition can be provided via a gastrostomy tube, this is best placed via a left flank surgical approach rather than endoscopically, to prevent trauma to the oesophageal repair. Dogs with pharyngeal punctures that have undergone cervical exploratory surgery can have a percutaneous endoscopically placed gastrostomy tube placed if deemed necessary.

Post Operative Considerations
In the post-operative period supportive care will need to continue in the form of analgesia, antibiosis, fluid therapy, and nutrition. Cases where pneumomediastinum or pneumothorax should have repeat imaging to check there is no worsening, or evidence of mediastinitis developing. Surgical drains should be monitored, and outputs recorded; removal is performed when fluid recovery falls to an acceptable level. Gastrostomy tubes are left in-situ for at least 10 days to ensure adequate adhesions have formed between the stomach and the body wall.

**Chronic presentations**

Chronic cases rarely exhibit signs of systemic disease, the presenting complaints are usually discharging sinuses, chronic abscessation, cervical swellings, or dysphagia. Inspection of the pharynx is rarely rewarding in terms of identifying the initial injury (unless the sinus discharges directly into the pharynx). Diagnostic imaging followed by exploration and excision of abscess and tracts is usually undertaken. Identification of a foreign body, and complete resolution of clinical signs is variable.

**Summary**

- Pharyngeal stick injuries are not uncommon, and are potentially life threatening
- All pharyngeal injuries merit aggressive and thorough treatment at initial presentation
- Be aware of the indications for exploratory surgery, and if present act quickly; either yourself, or prompt referral
- Do not adopt a wait and see approach with any suspicious case
- Even in successfully treated cases, warn the owners of the longer term risk of chronic problems