TECHNICAL FAILURES AND COMPLICATIONS IN LARYNGEAL TIE-BACK SURGERY
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Key points
The following are essential requirements for successful tieback surgery

- Careful dissection, meticulous haemostasis and preservation of function of thyropharyngeus m. through minimal dissection.
- Avoid cutting needles for placement of prosthesis.
- Position arytenoid within ‘normal’ range of abduction.
- Carefully management of any dead space during closure.
- Rotation requires less intervention than lateralization.

Laryngeal paralysis is a well recognised syndrome in small animal practice and ‘tie-back’ surgery is still currently the technique that is most widely used to manage the symptoms of the condition. In reality, laryngeal ‘tie-back’ refers to one of two possible surgical techniques:

- lateralization - disarticulation of the arytenoid cartilage and attachment to the thyroid cartilage or,
- rotation - minimal arytenoid dissection followed by anchoring of the muscular process to the dorsocaudal cricoid cartilage to mimic the natural arytenoid movement during respiration.

With experience, tie-back surgery has a high success rate providing immediate relief of the clinical signs with only a brief requirement for hospitalization. There is however a steep ‘learning curve’ associated with this surgery and a number of potential pitfalls can be identified at each of the stages of intervention:

Intra-operative

- Hemorrhage: although the lateral approach to the larynx should not encounter any major vascular structures, bleeding may occur from a number of sites during the dissection; the most important being the transected cricoarytenoid muscle, the arytenoid capsule and if disturbed, the inter-arytenoid site. The procedure should be undertaken therefore with meticulous haemostasis throughout since haematoma developing around the tie-back site can lead to rapid avulsion of the prosthesis; the development of a haematoma in the vicinity of the vocal fold can cause acute airway obstruction. Management of these complications may necessitate airway by-pass and rapid re-exploration of the surgical site.

- Arytenoid fragmentation: over-manipulation of the arytenoid cartilage during the procedure and the use of cutting needles for placement of the prosthesis can lead to disintegration of the cartilage. Although in some cases it is possible to salvage enough of the cartilage to permit satisfactory conclusion of the procedure, a contralateral intervention is usually the safer option.

- Inadequate glottic opening: failure to achieve adequate enlargement of the glottic opening is normally apparent on postoperative inspection. Possible causes include incomplete inter-arytenoid separation / misplacement of the prosthesis during lateralization and inadequate tensioning during the rotation procedure. Immediate revision may be feasible in some cases, failing which a contralateral procedure is indicated.
Immediate postoperative

- **Over-abduction of the glottic opening**: enlargement of the glottic opening beyond the point of maximum natural arytenoid abduction is a common problem for inexperienced surgeons. Depending on the degree of over-abduction, some patients may cope with this complication whereas others will experience dysphagia and aspiration. This complication is normally apparent within 24hrs and in severely symptomatic cases, revision to reduce the degree of abduction or complete arytenoid release with contralateral intervention may be feasible.

- **Hematoma / edema development**: poor haemostasis or dead space management may lead to the development of perilaryngeal hematoma or edema. This will necessitate upper airway bypass since revision is only rarely helpful in this cases.

- **Aspiration**: perhaps the most controversial and misunderstood of all tie-back problems is aspiration. Merely positioning the arytenoid and vocal fold within the normal range of abduction should not of itself cause or promote aspiration. Despite the preoperative absence of glottic constrictive function surprisingly few patients experience aspiration. The assumption that the absence of constriction postoperatively leads to aspiration is over-simplistic and ignores the contribution of the primary glottic protective mechanism namely, the epiglottic shield reflex. Aspiration almost always therefore is associated with postoperative dysphagia in which there is failure of epiglottic function too. The two most common causes of this are excessive arytenoid abduction and absence of thyropharyngeus muscle function. This incidence of this complication can be reduced by avoiding over-abduction and minimal dissection of the thyropharyngeus muscle. Where contralateral procedures become necessary, an interval between procedures is wise to permit recovery of swallowing function.

Longer terms complications

- **Arytenoid pull-through**: chronic pull-through of the prosthesis is sometimes encountered weeks or even months after surgery. The underlying cause of this is not always clear and is not necessarily the result of surgical failure. A contralateral procedure may encounter a similar long term outcome.

- **Contralateral arytenoid collapse**: in some patients that have experienced severe airway obstruction prior to surgery there is a tendency for the non-abducted arytenoid / vocal fold to collapse towards the rima over the weeks immediately following tie-back. This can sometimes be predicted by the postoperative appearance of the larynx; management entails staged contralateral abduction.