Intercollegiate Exam – Viva on Unilateral vocal cord palsy

A 59 year old female patient presents with hoarseness and recurrent choking episodes for a period of 3 months. She is a heavy smoker but otherwise fit and well.

**Question 1: How would you evaluate this patient?**

I would obtain a fully comprehensive history on the onset, duration and severity of dysphonia as well as other upper aerodigestive tract symptoms such as odynophagia, dysphagia, referred otalgia, stridor and weight loss. I would enquire further with regard to episodes of choking, coughing, dyspnoea and haemoptysis. Past medical history focussing on previous head and neck surgery or trauma, intubation, recurrent chest infections, any neurological disorders such as cerebrovascular event or history of malignancy. A thorough head and neck examination should be performed including flexible endoscopy and palpation of the neck to assess for any neck mass or goitre. I would complete my examination by performing a cranial nerve assessment.

**Question 2: You find that the patient has immobility of the vocal cord. What further assessments of vocal cord function could be performed in the clinic setting?**

A videostrobolaryngoscopy (VLS) can be performed where available. It allows for dynamic assessment of the vocal folds to differentiate between structural from functional voice pathologies. Pulses of light allow watching various parts of successive cycles to obtain a complete picture of vocal cord activity. This allows evaluation of symmetry of movement, aperiodicity, glottis closure configuration and horizontal excursion amongst other variables. If the cords are functioning symmetrically, they should essentially be mirror images of each other. Lateral excursion and timing of opening and closing should be identical. The glottis should also be assessed for gap, shape and closure.

Although not routinely performed, a useful adjunct test is electromyography. This evaluates laryngeal muscle function to differentiate between a true vocal cord palsy and fixation of the arytenoid joint.

This is a clinical photograph taken during laryngoscopy showing a foreshortened, lateralised, and flaccid left vocal cord. This would represent a vocal cord palsy.

**Question 3: What are the causes of unilateral vocal cord palsy?**

A number of causes have been identified. Malignant disease is the most common cause of unilateral vocal cord palsy. This results from involvement of the vagus or recurrent laryngeal nerve from tumours of the skull base thyroid, bronchus, oesophagus, and mediastinal metastases.

Surgical iatrogenic injuries resulting in vocal cord palsy include thyroid and parathyroid, oesophageal, pharyngeal pouch, left lung surgery, carotid endarterectomy, cardiac surgery and cervical spine surgery. External trauma in the form of blunt and penetrating trauma to the neck and chest can also result in vocal cord palsy. Other less frequent causes include neurologic disorder, myopathies, Ortner’s syndrome (left atrial hypertrophy), aneurysm of the aortic arch.
and inflammatory diseases. Where no other cause is identified it is classified as idiopathic.

**Question 4: Describe the difference in presentation of patients with a vocal cord palsy related to involvement of the vagus nerve or its branches at different levels?**

Patients will present with symptoms and signs depending on the level of the vagus nerve involvement. The vagus nerve can be affected at various levels. These are firstly above the level of the pharyngeal branch. This is characterised by mild to moderate hypernasality (resulting from unilateral palsy of the soft palate), velopharyngeal insufficiency and an absent or reduced palatopharyngeal gag reflex. Voice quality would be severely breathy and whispered as the vocal cords fail to approximate in the midline resulting from palsy of all laryngeal intrinsic muscles.

Vagus nerve lesions below the pharyngeal nerve branch but above the level where the superior laryngeal nerve separates from the vagus results in palsy of all intrinsic laryngeal muscles. This is in the absence of palatopharyngeal signs and symptoms. The vocal cords are in cadaveric (intermediate) position as there is loss of function from both the superior laryngeal and recurrent laryngeal nerve. Patients typically present with severely breathy and whispered voice quality.

In a patient with lesions affecting the superior laryngeal nerve, palatopharyngeal symptoms and signs are absent. Superior laryngeal nerve palsy most often combines sensory loss with weakness of the cricothyroid muscle. Loss of sensation to the supraglottic larynx can result in symptoms such as frequent throat clearing, paroxysmal coughing and globus pharyngeus. The patient presents with a mild to moderately breathy voice and the ability to change pitch is affected, mainly when singing. Diplophonia and easy fatigability may also be noted. The pitch changes result from the inability of the thyroid cartilage to tilt with respect to the cricoid cartilage resulting in impaired stretching and tensing of the vocal cords. High pitch voice tasks are probably the most reliable way of revealing phonatory dysfunction associated with denervation of the external branch of the superior laryngeal nerve.

Lesions that affect only the recurrent laryngeal nerve result in palsy of all the intrinsic muscle of the larynx except the cricothyroid muscle. There is an inability to abduct and adduct the vocal cord. The paralysed vocal cord rests in the paramedian position due to unopposed medializing pull of the intact cricothyroid muscle. Typically the voice becomes weak, breathy and often diplophonic. The patient may complain of shortness of breath while speaking due to rapid air escape. The airway is usually adequate but may be compromised only with exertion. The recurrent laryngeal nerve also innervates the cricopharyngeus muscle; hence, a palsy can present as dysphagia due to delayed opening of the superior oesophageal sphincter. Patients may also report coughing when drinking or eating indicating aspiration.

**Question 5: What other investigations would you request in the further evaluation of the patient?**

A site specific evaluation of any suspected lesion along the course of the vagus and its branches supplying the larynx should be undertaken. The initial investigations for this should include a neck ultrasound with fine needle aspiration cytology (FNAC) if indicated and a chest radiograph. Should these be inconclusive, a contrast CT scan from skull base to the mediastinum should be requested to evaluate the course of the vagus and the recurrent laryngeal nerves. If the patient is a child, pregnant or suspected to have a generalised neurological problem, an MRI is advised instead.

Should these imaging modalities not yield the aetiology, a pan-endoscopy under general anaesthetic should be considered to evaluate the upper aero-digestive tract.

Videofluoroscopy or a barium swallow may be done to evaluate swallowing mechanism and associated dysphagia. Further evaluation of aspiration and swallow can be undertaken by flexible Endoscopic Evaluation of Swallow (FEES) where available and appropriate.

**Question 6: Describe what you see in the picture given**

This is a picture of a female patient with left pupil is smaller than the right (miosis) and the left palpebral fissure is also narrower than the right because the left upper eyelid is drooping (ptosis).

**Question 7: What is the diagnosis of the patient with the findings given in the scan given below?**

This is a contrast CT scan of the upper mediastinum showing a left sided lung mass suggestive of a Pancoast tumour.

**Question 8: What are the management strategies that you would advocate in the treatment of a patient with unilateral vocal cord palsy?**

I would address management depending on the pathology and resulting disability of the patient. In addition to the treatment of original pathology (malignancy), the patient should receive input through a multidisciplinary approach to target management of voice and swallow disabilities. This is initially through speech and language therapy. Most patients achieve near-normal voice quality and swallowing by voice therapy as the normal cord will compensate for the palsy. For cases with RLN involvement with voice therapy and once vocal therapy has been maximized and further voice improvement is desired, surgical options are considered. Once speech therapy has been maximized surgical intervention is usually delayed until 9-12 months have elapsed to allow for spontaneous recovery, but there may be situations which change this time frame; for example if the patient is aspirating fluids or food...
to a significant degree or there is an urgent need for effective communication.

**Question 9: What are the surgical options for the management of vocal cord palsy?**

For surgical treatment, any improvement in voice will be at the expense of the airway, so judgement is required to achieve the optimum compromise. Treatment may consist of augmentation injection laryngoplasty and medialisation laryngoplasty.

**Question 10: Describe the technique of augmentation injection laryngoplasty?**

This can be done under local or general anaesthesia and a temporary compromise. Treatment may consist of augmentation injection laryngoplasty and medialisation laryngoplasty.

**Question 11: Describe the complications of laryngeal injectable substances**

Complications of Teflon injection include extrusion or displacement, granuloma formation. Unsatisfactory voice results may also occur as Teflon can cause fibrosis and therefore result in a poor vibratory quality of the vocal fold. The irreversibility of the Teflon procedure is a major concern and as a result its use is now very limited. Gelfoam is absorbed in 2 to 3 months and can be used as a temporary treatment of unilateral vocal cord immobility. The reported complications include mild mucosal oedema and erythema and in rare reported cases airway compromise. Collagen injection is derived from bovine collagen which is modified to minimise host immune response resulting in a decreased incidence of allergic reactions. Though three is some resorption of the collagen, this is offset by the deposition of host collagen thereby providing long term voice improvement.

The sustainability of autologous fat injection treatment effect is still inconclusive. As some of the fat will be reabsorbed repeated injections may need to be done. If initially effective, the benefits of fat injection may last from three months to several years.

**Question 12: Describe the procedure of medialisation laryngoplasty (type I thyroplasty)**

Type I thyroplasty was described by Isshiki in 1974. The procedure is usually performed under local anaesthesia to allow the patient to phonate during the procedure. The degree of medialisation can be determined immediately intraoperatively by the quality of the patient’s voice. Topical anaesthesia may be used to facilitate examination of the upper aerodigestive tract during the procedure. The patient is placed in a supine position with the head of bed elevated 30° and neck extended. The deep and superficial tissues at the site of incision are injected with a local anaesthetic solution. A horizontal skin incision is made over the midportion of the thyroid cartilage. The platysma muscle is then incised and subplatysmal flaps are elevated and the strap muscles are then separated in the midline. The outer perichondrium of the thyroid ala is exposed. The midline of the thyroid ala is determined in both horizontal and vertical planes. A small inferiorly based outer perichondrial flap is elevated over the thyroid cartilage window. The thyroid cartilage window is then cut and the dimensions should be 4 by 8 mm in women and 5 by 10 mm in men. Once the thyroid cartilage has been removed from the window the inner perichondrium is then elevated from the medial surface of the thyroid cartilage and care is taken not to enter the airway at any point. The implant is then inserted through the thyroplasty window with simultaneous flexible laryngoscopy monitoring and assessment of the patient’s voice quality. Once the voice quality and vocal fold position are optimized, the implant can be secured to the adjacent thyroid cartilage with a permanent 4.0 Prolene suture. The outer perichondrium should be laid back over the thyroplasty window and the strap muscles are reapproriated in the midline and skin closure is performed.

**Question 13: What are the complications of medialisation laryngoplasty?**

The complications of thyroplasty include infection, haematoma and malposition of the implant including overcorrection, which may result in airway compromise. In patients where malposition of the implant occurs there is usually a persistent dysphonia. Extrusion of the implant into the airway is a rare complication.

**Conflict of Interest**

All authors have no conflict of interest to declare. No extraneous funding was obtained.

**References**