Pre and Post Operative Laryngoscopy in Thyroid and Parathyroid Surgery

British Association of Endocrine and Thyroid Surgeons Consensus 2010

Introduction

Vocal cord palsy is one of the key complications associated with thyroid and parathyroid surgery and is with hypoparathyroidism one of the main causes of litigation(Kern KA (1993) Medicolegal analysis of errors in diagnosis and treatment of surgical endocrine disease. (Surgery 114:1167–1174). A unilateral vocal cord paralysis may lead to hoarseness, loss of volume and a breathy voice. The severity of these symptoms ranges from mild to socially and professionally debilitating. Dysphagia, especially to liquids, is a common associated symptom that may lead to aspiration of saliva and chest infections. Bilateral vocal cord paralysis is associated with airway restriction that may necessitate a tracheostomy or procedures to widen the glottis (Randolf GW, in Surgery of the Thyroid and Parathyroid Glands. Randolf GW (ed) 1993 Saunders/Elsevier, Philadelphia).

Summary

- Fibreoptic laryngoscopy is a routine part of ENT practice and is increasingly a generic skill of the endocrine surgeon.
- Pre-operative laryngoscopy in non-cancer patients with no history of voice change has a low rate of abnormal findings.
- Post-operative laryngoscopy is required as a key quality control measure and should become mandatory.
- The optimal timing of laryngoscopy is unclear but should ideally be performed at or before the out patient follow up.

Need for review

Historically the incidence of vocal cord paralysis was as high as 20% (Lahey FH, Hoover WB. Injuries to the recurrent laryngeal nerve in thyroid operation: their management and avoidance. Ann Surg 1938. 108(4) 545-562) but has been radically reduced thanks to the recognition that it is essential to identify the recurrent laryngeal nerve during thyroid surgery (Steurer M, Passler C, Denk DM, Schneider B, Niederle B, Bigenzahn W. Advantages of recurrent laryngeal nerve identification in thyroidectomy and parathyroidectomy and the importance of preoperative and postoperative laryngoscopic examination in more than 1000 nerves at risk. Laryngoscope. 2002 Jan;112(1):124-33.). The modern day true incidence of temporary and permanent vocal cord paralysis following thyroid and parathyroid surgery is however unknown and almost certainly under reported. Permanent vocal cord palsy may occur in up to 11% of nerves at risk in some series (World J Surg. 2008 Jul;32(7):1358-66. Intraoperative monitoring of the recurrent laryngeal nerve in thyroid surgery. Dralle H, Sekulla C, Lorenz K, Brauckhoff M, Machens A; German IONM Study Group.) . The reasons for the lack of definitive vocal cord palsy data includes that vocal cord paralysis may occur without the surgeon being aware of this during surgery (Lo CY, Kwoh KF, Yuen PW: A prospective evaluation of recurrent laryngeal nerve paralysis during thyroidectomy, Arch Surg 135:204, 2000), that there may be no obvious change in the voice (Steurer M, Passler C, Denk DM, Schneider B, Niederle B, Bigenzahn W. Advantages of recurrent laryngeal nerve identification in thyroidectomy and parathyroidectomy and the importance of preoperative and postoperative laryngoscopic examination in more than 1000 nerves at risk. Laryngoscope. 2002 Jan;112(1):124-33.) and that results that may place clinicians in an unfavourable light are infrequently published. However the true incidence of post-operative vocal cord is most commonly unknown because the larynx is not routinely assessed following surgery.

The drivers for the need for a consensus on UK best practice stems from

- Vocal cord palsy is a key performance indicator in thyroid and parathyroid surgery so should be reliably measured;

- Surgeons currently undertaking thyroid and parathyroid surgery come from diverse professional backgrounds with some routinely performing laryngoscopy because in their core skill base whilst others do not;
- The need to establish a standardized practice that allows appropriate data collection and national as well as international comparisons;
- The need for surgeons to consent patients with their own figures rather than those retrieved from publications by over-achieving world centres of excellence.

The questions that require attention:

1. **Is it necessary to perform a pre-operative laryngoscopy on patients with a normal voice prior to thyroid and parathyroid surgery?**

There may be an alternation in vocal cord movement in between 1 and 2.4% of patients before surgery (G. Dionigi, L. Boni, F. Rovera, S. Rausei, Paolo Castelnuovo, R. Dionigi: Postoperative laryngoscopy in thyroid surgery: proper timing to detect recurrent laryngeal nerve injury. Langenbecks Arch Surg (2010) 395:327-331).

2. **Is post-operative laryngoscopy mandatory in all patients?**

It is possible to have a vocal cord palsy despite visualizing the recurrent laryngeal nerve during surgery (Lo CY, Kwoh KF, Yuen PW: A prospective evaluation of recurrent laryngeal nerve paralysis during thyroidectomy, Arch Surg 135:204, 2000). Indeed the commonest scenario when a post operative vocal cord paralysis occurs is that the nerve is documented as intact at the end of surgery (Snyder SK, Lairmore TC, Hendricks JC, Roberts JW. Elucidating mechanisms of recurrent laryngeal nerve injury during thyroidectomy and parathyroidectomy. J Am Coll Surg. 2008 Jan;206(1):123-30. Epub 2007 Oct 18.). It is also possible to have an entirely normal voice in the presence of a unilateral vocal cord palsy (Steurer M, Passler C, Denk DM, Schneider B, Niederle B, Bigenzahn W. Advantages of recurrent laryngeal nerve identification in thyroidectomy and parathyroidectomy and the

importance of preoperative and postoperative laryngoscopic examination in more than 1000 nerves at risk. Laryngoscope. 2002 Jan;112(1):124-33.). The use of routine post operative laryngoscopy appears to offer more reliable data in this respect. Published vocal cord palsy rates range between 0.3% (Bergamaschi R, Becouarn G, Ronceray J, Arnaud JP: Morbidity of thyroid surgery. Am J Surg. 1998 Jul;176(1):71-5.) where no routine postoperative laryngoscopy was performed and 7% in one centre where it is (Lo CY, Kwoh KF, Yuen PW: A prospective evaluation of recurrent laryngeal nerve paralysis during thyroidectomy, Arch Surg 135:204, 2000). Post-operative laryngoscopy therefore offers the only way of reliably estimating the incidence of reduced or absent vocal fold movement following surgery.

3. **If the intraoperative nerve monitor is used is post-operative laryngoscopy still mandatory?**

Despite no conclusive evidence that intraoperative nerve monitoring reduces the risk of permanent laryngeal nerve palsy it is used by an increasing number of thyroid surgeons. Whilst the positive predictive value of the nerve monitor is low it has a very high negative predictive value. In other words if the nerve monitor indicates a functionally intact nerve at the end of surgery the risk of a post operative vocal cord palsy may be 0% or at the very most 8% (World J Surg. 2008 Jul;32(7):1358-66. Intraoperative monitoring of the recurrent laryngeal nerve in thyroid surgery. Dralle H, Sekulla C, Lorenz K, Brauckhoff M, Machens A; German IONM Study Group.). This begs the question whether this is sufficient or whether this group of patients still require a laryngoscopy.

Even with a normally conducting nerve at the end of surgery subsequent RLN oedema or thyroid bed hematoma can develop and compromise nerve function. This would only be detected on postoperative laryngoscopy. Furthermore, since a laryngoscopy remains the gold standard and standardisation is required it would seem appropriate that these patients in whom the nerve monitor has been used are not exempted from post operative laryngoscopy. Furthermore the rare phenomenon of a delayed vagus or recurrent nere palsy could further complicate the data collection (Am J Otolaryngol. 2001 Jul-Aug;22(4):251-6. Vagal neuropathy after upper respiratory infection: a viral etiology? Amin MR, Koufman JA).

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4. If post-operative laryngoscopy is to be performed when should this occur?

Most cases of reduced vocal cord movement following surgery are neuropraxias where the nerve is anatomically intact rather than axonotmesis where there is axonal disruption (followed by degeneration without loss of the myelin sheath) or neurotmesis where the nerve is definitively severed (Seddon H. (1965). Nerve injuries. Med Bull (Ann Arbor) 31:4-10). Recurrent laryngeal nerve neuropraxias lead to a transient impairment of conduction that usually, but not always, recovers in days, weeks or months. This occurs in a at least 7.1% of thyroidectomy patients (World J Surg. 2008 Jul;32(7):1358-66. Intraoperative monitoring of the recurrent laryngeal nerve in thyroid surgery. Dralle H, Sekulla C, Lorenz K, Brauckhoff M, Machens A; German IONM Study Group.). The earlier the post operative laryngoscopy check the higher the incidence of reduced vocal fold paralysis since the recovery is time related. (G. Dionigi, L. Boni, F. Rovera, S. Rausei, Paolo Castelnuovo, R. Dionigi: Postoperative laryngoscopy in thyroid surgery: proper timing to detect recurrent laryngeal nerve injury. Langenbecks Arch Surg (2010) 395:327-331). Nerve palsies may even occur in a delayed fashion with a higher incidence of palsies detected on day 2 than day 1 on the same cohort (G. Dionigi, L. Boni, F. Rovera, S. Rausei, Paolo Castelnuovo, R. Dionigi: Postoperative laryngoscopy in thyroid surgery: proper timing to detect recurrent laryngeal nerve injury. Langenbecks Arch Surg (2010) 395:327-331).

Early laryngoscopy will detect more neuropraxia, a later laryngoscopy will detect more cases where a permanent injury may have occurred. In the only large study of its kind the cord palsy rate in 825 nerves at risk was 6.4% on the day of surgery, 6.7% on day 1, 4.8% on day 2 and 2.5% on day 14 and 0.8% at 6 weeks (G. Dionigi, L. Boni, F. Rovera, S. Rausei, Paolo Castelnuovo, R. Dionigi: Postoperative laryngoscopy in thyroid surgery: proper timing to detect recurrent laryngeal nerve injury. Langenbecks Arch Surg (2010) 395:327-331). Since the objective is to identify patients at risk of permanent vocal cord paralysis the laryngoscopy can be performed at any time following surgery, with those with a palsy followed up with repeated laryngoscopy to detect permanent injury. primary go i.e. the timing of the post operative laryngoscopy.

5. When and who should perform the laryngoscopy?

Can laryngoscopy performed by the operating surgeon? Whilst an independent laryngoscopy may be desireable, organising this in all patients may represent an obstacle in some environments. Logistically it may be easier for the operating surgeon or a member of the team to do this.

6. Additional issues

What if the patient refuses the post-operative laryngoscopy? These should be documented as such.

Acknowledgements:

Neil Tolley, Jeremy Davis.