
Thyroplasty under general anesthesia using a laryngeal mask airway and fiberoptic bronchoscope

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Purpose: To report the management of a patient, with unilateral vocal cord paralysis, undergoing thyroplasty, under general anesthesia.

Clinical Features: A 25-yr-old man developed hoarseness and occasional episodes of pulmonary aspiration, caused by unilateral vocal cord paralysis. He was scheduled for thyroplasty, in an attempt to ease phonation and to decrease or prevent further episodes of pulmonary aspiration. He refused local anesthesia with sedation and it was therefore decided to attempt the procedure under general anesthesia. The paralysed vocal cord was displaced inwards by a wedge inserted through a window in the thyroid cartilage. We assessed the ideal position of the wedge by using a fiberoptic bronchoscope and laryngeal mask airway during general anesthesia, instead of phonation.

Conclusion: We describe the successful use of a general anesthetic for a thyroplasty, a procedure normally done under local anesthesia with or without sedation, in a patient who was keen to have surgery, but who refused local anesthesia with sedation.

Objectif : Citer le cas de la prise en charge d'un patient, atteint d'une paralysie unilatérale des cordes vocales, qui a subi une thyroplastie sous anesthésie générale.

Éléments cliniques : Un homme de 25 ans a subi un enrouement et des épisodes occasionnels d'aspiration pulmonaire, causés par une paralysie unilatérale des cordes vocales. Une thyroplastie a été prévue pour tenter de faciliter la phonation et de diminuer ou prévenir des épisodes ultérieurs d'aspiration pulmonaire. Le patient a refusé l'anesthésie locale avec sédation et on a alors décidé de tenter l'intervention sous anesthésie générale. La corde vocale paralysée a été déplacée vers l'intérieur par une cale insérée au travers d'une ouverture dans le cartilage thyroïde. Nous avons évalué la position idéale de la cale en utilisant un fibroscope bronchique et un masque laryngé, plutôt que la phonation, pendant l'anesthésie générale.

Conclusion : Nous avons rapporté l'emploi réussi de l'anesthésie générale pour une thyroplastie, une opération normalement réalisée sous anesthésie locale avec ou sans sédation, chez un patient qui tenait beaucoup à la chirurgie mais qui a refusé l'anesthésie locale avec sédation.

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UNILATERAL vocal cord paralysis may occur as a result of intrathoracic disease, i.e. tumours of the mediastinum and bronchi, an enlarged left atrium and aortic arch aneurysms, or dysfunction of the central nervous system i.e. neoplastic and infectious processes at meningeal level, neoplasms and vascular lesions within the medulla¹ or following surgery e.g. thyroidectomy. Unilateral vocal cord paralysis is idiopathic in 30–50% of cases.

Unilateral vocal cord paralysis causes a hoarse, low-pitched, rasping voice. The cause is often the involvement of the vagal nerve from its origin cranially, to its innervation of the muscles responsible for phonation. Complete interruption of the intracranial portion of the vagal nerve results in a paralysis characterised by the loss of the gag reflex on the affected side. The voice is hoarse, slightly nasal and the vocal cord lies immobile in the cadaveric position, i.e. midway between abduction and adduction.¹ The recurrent laryngeal nerves are most often damaged as a result of intrathoracic disease and are much more frequent causes of an isolated vocal cord palsy than are intracranial disorders.

Thyroplasty is a procedure during which a silastic wedge is inserted through a skin incision, at the level of the vocal cords, to move the paralysed vocal cord towards the midline. Assessment of the ideal position is done, by asking the patient to phonate at intervals, during the procedure. This requires the co-operation of the patient and has been achieved with local anaesthesia and sedation. Assessment with the use of a transnasal flexible laryngeal video monitoring under local anaesthesia after atropine and topical nasal anaesthesia has also been described.²

Three surgical methods are used to treat unilateral vocal cord paralysis.³ Injection of the vocal cord to bring it into the midline is the commonest method used in the United Kingdom. A variety of materials have been used including Teflon, gelfoam powder, fat and collagen.³ Second, laryngeal framework surgery: this has been classified into four types by Isshiki in 1974. Thyroplasty type 1 involves displacing the vocal cord inwards with an implant, placed through a window in the thyroid cartilage. The great advantage of thyroplasty is its adjustability.⁴ The prosthesis is inserted under local anaesthesia, using patient feedback to determine the ideal size of the implant and to produce the ideal position.³ Third, re-innervation procedures either with a neuromuscular pedicle or by direct anastomosis with the ansa cervicalis nerve.³

Thyroplasty type 1 is successful for both immediate restoration and long term maintenance of a more normal voice quality^{2,5} and speaking pattern.⁶ Thyroplasty

also decreases aspiration,^{2,5} in patients with unilateral vocal cord paralysis. Thyroplasty moves the paralysed anterior membranous vocal cord towards the midline by using a Silastic® implant for external compression of the paralysed vocal cord. A transverse incision is made in the neck at the level of the thyroid lamina. A window is cut into the thyroid cartilage and a pre-formed Silastic® implant is inserted, pushing the paralysed vocal cord medially.⁷ After vocal cord adduction, breathlessness and hoarseness decrease.⁶ The thyroplasty type 1 procedure may be combined with a posterior closure procedure in patients with a large posterior gap.⁸ Closure of the glottic gap may decrease the incidence of pulmonary aspiration.^{2,5}

Thyroplasty has been performed with local anaesthesia alone³ or with sedation, using a combination of propofol and fentanyl⁹ or midazolam and flumazenil.⁷ Local anaesthesia, with or without sedation, allows the patient to phonate during surgery which enables the surgeon to assess the correct position of the Silastic wedge.

We describe the use of general anaesthesia, in an anxious patient who refused local anaesthesia and sedation.

Case History

A 25-year-old man (height 165 cm, weight 71 kg) developed hoarseness and occasional episodes of pulmonary aspiration. Unilateral vocal cord paralysis (left), caused by a glomus vagale tumour, was diagnosed and the tumour was surgically removed seven months later. Because of the large size of the tumour, cranial nerves XI and XII were damaged during surgery. Post-operatively, the patient was found to have difficulty with swallowing. He was coughing due to aspiration during swallowing.

The initial difficulty with swallowing improved and he gradually progressed from a thickened porridge to a soft diet. At discharge, one week later, he was still aspirating occasionally. He continued to complain of difficulty with speech, in particular hoarseness and slurring, and that his voice tired easily.

Three months later he was scheduled for a thyroplasty type 1 in an attempt to ease phonation and to decrease or prevent pulmonary aspiration. He refused local anaesthesia with sedation. It was decided to attempt the procedure under general anaesthesia.

Temazepam, 30 mg, and 150 mg ranitidine *po*, were given pre-operatively. Non-invasive monitoring (electrocardiogram, non-invasive blood pressure, pulse oximetry and P_{ET}CO₂) was applied before induction of anaesthesia. Intravenous access was established. After pre-oxygenation, 100 µg fentanyl and 200 mg propofol were given to induce anaesthesia. A size 4 laryngeal mask airway (LMA) was inserted and

the patient was allowed to breathe spontaneously. Cyclizine, 25 mg, and 0.25 mg droperidol *iv* were also given as prophylactic antiemetics.

Anesthesia was maintained with a propofol infusion (at 120-176 $\mu\text{g}\cdot\text{kg}\cdot\text{min}^{-1}$), increments of 50 μg fentanyl at 25 – 30 min intervals, total 250 μg (to control increases in BP), and with an inspired oxygen/air concentration of 50%. The $P_{\text{ET}}\text{CO}_2$ was between 60 – 65 mmHg. The patient maintained spontaneous respiration throughout.

A fiberoptic laryngoscope was kept in place throughout surgery to assess the position of the vocal cords, which could be seen through the grill of the LMA. The vocal cords could be seen on the television screen.

Isshiki thyroplasty type 1 was performed. Correct positioning of the vocal cords was also aided by the development of stridor when the cord was pushed over too far towards the midline. Dexamethasone, 8 mg, and 1200 mg amoxicillin were given during the procedure. General anesthesia lasted 135 min.

After surgery, there was an immediate improvement in swallowing and speech. His voice was less hoarse and he had experienced no episodes of coughing after swallowing.

Three months after discharge the improvement in speech and swallowing had been maintained. Flexible nasendoscopy showed a left vocal cord in the midline with good apposition during phonation.

Discussion

Anesthesia, local or general, for thyroplasty presents a challenge for the anesthesiologist, as neither method is considered as ideal either by the patient or the surgeon. Some surgeons consider that general anesthesia is contraindicated.

Several anesthetic problems may arise during *local anesthesia with or without sedation*. As the co-operation of the patient is needed at intervals during the procedure, a balance is required between provision of adequate sedation and anxiolysis, adequate airway control and the ability to reverse sedation rapidly when necessary. The procedure may last for two to three hours and patients may become uncomfortable and restless. Prolonged dissection, more than 30 min, and manipulation of the silastic implant may induce edema, which may lead to overestimation of the degree of voice correction which has been obtained.³ Large amounts of sedation may lead to a loss of tone of the unsecured, shared upper airway, causing airway obstruction and respiratory compromise. The drugs available for sedation are limited to agonist-antagonist preparations such as midazolam and flumazenil⁷ or short-acting drugs such as propofol and fentanyl.⁹

Anesthetic problems also arise during *general anesthesia*. The surgeon needs to see the larynx to assess the position of the vocal cords as a substitute to phonation. Direct access to the larynx may be difficult in patients with cervical spine problems or other anatomical airway abnormalities. If a tracheal tube is used to maintain the airway, there is a limited view of the vocal cords.

Although it has been stated that general anesthesia is contraindicated,⁸ our surgeons were confident that they could attain a good result with direct peroperative observation of the vocal cords. However, to assess the movement of the vocal cords, spontaneous breathing was required.

An additional advantage of general anesthesia was that patient anxiety and discomfort were avoided. The LMA enabled good control of the airway at all times and aided in the insertion of the fiberoptic laryngoscope. The surgeons could see the movement of the vocal cords constantly during the procedure. The development of stridor when the paralysed vocal cord was pushed too far towards the midline also helped to determine the ideal position.

To maintain general anesthesia in this spontaneously breathing patient, our technique was a propofol infusion, while the fiberoptic laryngoscope was in position. The use of propofol also allowed rapid recovery from anesthesia, which is desirable for all procedures involving the upper airway.

Conclusion

General anesthesia for thyroplasty was combined with the insertion of a LMA through which a fiberoptic bronchoscope was inserted. Continuous fiberoptic bronchoscopy enabled the surgeon to assess the ideal position of the medialized vocal cord. General anesthesia, with the use of a fiberoptic laryngoscope, positioned via a LMA, to assess the position of the vocal cords intraoperatively, is a viable alternative for performing a thyroplasty.

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