

## Anaesthesia for thyroplasty

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*The purpose of this report is to describe the anaesthetic considerations for laryngoplastic procedures. Thyroplasty is a procedure which restores the voice in unilateral vocal cord paralysis. The procedure employs an external approach via a window cut at the appropriate level in the thyroid ala. A wedge of silastic is inserted against the inner perichondrium, thereby displacing the vocal cord medially and permitting voice production. Correct placement of the implant is assessed by asking the patient to phonate; patient cooperation is therefore necessary at certain times during the procedure. We describe our management of a patient undergoing thyroplasty. The use of a benzodiazepine agonist-antagonist combination provided both optimal operating conditions and patient comfort.*

*Pour l'anesthésie, les interventions de reconstruction laryngée présentent des problèmes particuliers. La thyroplastie est une intervention qui permet de rétablir la phonation dans les cas de paralysie d'une corde vocale. Pour réaliser cette intervention, il faut pratiquer de l'extérieur une fenêtre au niveau de l'aile thyroïdienne. Un coin de silastic est inséré près du péri-chondre interne pour déplacer la corde vocale vers la ligne médiane et rétablir la phonation. La position correcte de l'implant est déterminée par la phonation extemporanée: la collaboration du patient s'avère donc essentielle pendant l'intervention. Les auteurs décrivent la ligne de conduite qu'ils ont adoptée pour la thyroplastie. L'association de benzodiazépines agoniste-antagoniste a assuré des conditions opératoires optimales et le confort au patient.*

### Key Words

ANTAGONISTS: benzodiazepines, flumazenil;  
HYPNOTICS: benzodiazepines, midazolam;  
SURGERY: otolaryngology, thyroplasty.

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Medialization laryngoplasty describes laryngoplastic procedures which restore the voice in unilateral vocal cord paralysis. Surgical rehabilitation of vocal cord paralysis can be achieved by a variety of techniques; medialization techniques are currently gaining popularity. Type I thyroplasty<sup>1,2</sup> was first described by Isshiki in 1974 and has come into widespread use since the mid-1980s.

The procedure involves cutting a window in the thyroid ala on the appropriate side at a level just lateral to the vocalis muscle. A silastic implant is then inserted between the inner and outer perichondrium to displace the affected cord medially, with resultant improvement in phonation. Continuous video monitoring of the larynx is achieved throughout the procedure using a flexible nasopharyngoscope. The major intraoperative surgical requirement is that the patient be able to phonate at the appropriate time to assess the correct degree of medialization. Our dilemma was in the provision of adequate depth of sedation and yet in having the patient awake and phonating at a predetermined time. This type of procedure is generally performed with the patient under local anaesthesia<sup>3</sup> so that fine tuning of the voice is possible by monitoring voice quality during surgery. We report our experience with anaesthesia for Type I thyroplasty in a patient who was unwilling to undergo surgery under local anaesthesia alone.

### Case report

A 59-yr-old man developed respiratory difficulties following coronary artery bypass surgery, necessitating reintubation. After the second extubation a mini-tracheostomy was placed for control of sputum retention. He was discharged from hospital complaining of hoarseness and decreased voice intensity. It was with these symptoms that he presented to the otolaryngologist two years later. Examination revealed an abducted right vocal cord, and he was scheduled for Type I thyroplasty.

Following institution of noninvasive monitoring (ECG, NIBP, pulse oximetry), intravenous catheter placement and administration of supplemental oxygen, the surgeon infiltrated the incision site with lidocaine 0.5% with 1:200,000 adrenaline. Fentanyl 100 µg and droperidol 1.25 mg were given *iv*, followed by midazolam titrated in 1 mg increments to achieve a Ramsay sedation score<sup>4</sup> of 4 (asleep with brisk response to light glabellar tap

or loud auditory stimulus) and this was attained with midazolam 5 mg. The nasopharyngoscope was inserted to the appropriate level after topicalization of the nasal mucosa with cocaine. A window was then opened in the thyroid ala and a silastic block inserted. Medialization of the cord was viewed with the nasopharyngoscope. At this stage the patient was required to phonate in order to assess the result. Flumazenil 0.1 mg *iv* was administered. Very promptly the patient was able to cooperate with the surgeon and the silastic graft was adjusted appropriately. A subsequent dose of midazolam 2.5 mg *iv* provided sedation for the conclusion of the procedure. The patient was monitored noninvasively (ECG, pulse oximetry) overnight in a high-dependency unit without event. Adequate postoperative analgesia was provided using an acetaminophen-codeine phosphate mixture.

### Discussion

This case provides the anaesthetist with a number of challenges: (a) provision of adequate sedation, anxiolysis and patient comfort; (b) rapid reversibility of sedation when necessary; (c) adequate airway control; (d) the problems of shared airway; (e) ensuring that the patient regains full airway control immediately after surgery; (f) 24 hr postoperative monitoring for obstruction, which may result from overcorrection of the open glottis, oedema and haemorrhage. General anaesthesia was contraindicated because the patient's cooperation was required during surgery. Low-dose propofol infusion may have produced sedation but would not have achieved the goals of anxiolysis and amnesia requested by our patient, which was a major factor in this case.<sup>5</sup> Patient-controlled sedation<sup>6</sup> is increasing in popularity but would have meant less physician control and would not have been acceptable to our patient. Therefore, we felt that a midazolam-flumazenil combination would best fulfil the patient, anaesthetic and surgical requirements.

Midazolam and flumazenil have complementary pharmacokinetic<sup>7</sup> properties, with almost identical volumes of distribution and similar short elimination half-lives. Both are metabolized by the liver. The effects of both drugs can be observed within minutes of administration, enabling rapid dosage adjustments to attain the desired level of sedation. Graded incremental doses allow one to tailor the regimen to suit each individual patient and may decrease unwanted side effects. Adequate monitoring of vital signs and oxygen saturation and the presence of personnel skilled in airway management is a prerequisite for prevention of cardiorespiratory complications<sup>8</sup> especially when, as in our case, the patient was pretreated with an opioid. Coadministration of opioids is useful in that midazolam is known to act synergistically with fen-

tanyl, with a decreased ED<sub>50</sub> for both agents when given in combination for induction of anaesthesia.<sup>9</sup> Opioids and benzodiazepines when used together have been shown to provide superior operating conditions.<sup>10</sup> Titrated small doses of flumazenil provide prompt reversal of midazolam-induced sedation at a predetermined time without reversal of its anxiolytic effects. Flumazenil has no major haemodynamic effects either alone or in combination with benzodiazepines.

Close monitoring is mandatory after thyroplasty procedures, with particular reference to airway integrity. Stridor may occur due to oedema of the larynx and is treated with steroids and racemic epinephrine. Alternatively, stridor may be caused by overcorrection of the open glottis. Airway obstruction due to haemorrhage with haematoma formation necessitates prompt tracheotomy. Rapid patient recovery associated with the use of short-acting agents may facilitate earlier detection of such problems.

Because of the above properties, midazolam-flumazenil combinations may become increasingly employed for procedures in which "wakeup" techniques and postoperative patient vigilance may be required, as after thyroplasty. Since thyroplasty is superior to the previous standard, Teflon injection,<sup>11</sup> it will appear more frequently on operating lists. We feel that the midazolam-flumazenil combination provides optimal intra- and postoperative conditions for such procedures.

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