Abstract: Practical guidelines and algorithms may not always help in difficult airway management. Large thyroid swellings may be responsible for several difficulties during the perioperative period, such as distortion of the airway, endocrine disturbances and metabolic effects. We here discuss the airway management of two patients with huge thyroid enlargement and gross tracheal deviation. One of those patients had also retrosternal extension of goiter. Both patients were scheduled for an excision of their colloid goiter.

Key words: Thyroid enlargement; tracheal deviation; airway management.

INTRODUCTION

Patients with large thyroid enlargements are at risk of difficult tracheal intubation, particularly if the goiter has produced tracheal deviation or retrosternal extension (1). The anaesthesiologist approaching the patient with a difficult airway has a vast armamentarium of techniques and instruments that can be applied to securing and maintaining oxygenation and ventilation (2). We report here the airway management of two patients with massive goiter. Intubation although preoperatively anticipated to be difficult because of evident tracheal deviation in both patients and goiter retrosternal extension in one patient, finally revealed to be easy.

CASE REPORT

Case 1

A 60 year old ASA Grade 11 female, weighing 50 Kg, had huge colloid goiter. She was posted for subtotal thyroidectomy. Thyroid enlargement had slowly developed to the present size over the last three years. It was not associated with any difficulty in breathing or swallowing. She had hypothyroidism for the past three years for which she was on oral thyroxine 100 µg per day. Preoperative thyroid function tests were on the higher side [T3 – 235.4 ng/dl (76.3-220.8 ng/dl), T4 – 14.81 µg/dl (4.5-12.6 µg/dl), TSH – 0.025 miU (0.3-3.6 miU)]. Therefore she was advised to discontinue thyroxine preoperatively. Airway examination revealed a Mallampati score of 3. Thyroid examination revealed an estimated size of 10 × 15 cm, but its lower border was not palpable due to retrosternal extension. X-ray anteroposterior view of the neck showed gross tracheal deviation markedly to the left while the lateral view revealed compression of the subglottic region (Fig. 1). Indirect laryngoscopy showed cords deviated to the left with normal movements. Following informed risk consent, she was premedicated with 0.25 mg oral alprazolam one hour prior to surgery. Awake fiberoptic endoscopy was planned due to extreme deviation of the trachea and retrosternal extension. On the operation table, an 18G intravenous line was set up and all monitors were attached. The pharynx was anaesthetized topically using 4% viscous lidocaine and fiberoptic endoscope was introduced orally. The glottis was further anaesthetized using 4 ml instillation of 2% lidocaine. Larynx was deviated to the left side and a slight obstruction of the trachea was seen. General anaesthesia was then induced using 5 mg/kg sodium thiopentone and deepened with increasing concentrations of sevoflurane. After assuring proper mask ventilation, 75 mg suxamethonium was administered and the trachea intubated with a 7.5 mm cuffed reinforced tube. Anaesthesia was maintained using 1% isoflurane in O2/N2O (33/66% gas mixture), 120 µg of fentanyl.
and 6 mg of vecuronium. The remaining surgical procedure was uneventful. At the end of the surgery, patient muscle relaxation was antagonized using 2.5 mg of neostigmine and 0.4 mg of glycopyrrolate. Before extubation, leak test was performed which did not show any leakage to positive pressure ventilation. This finding was confirmed with fiberoptic bronchoscopy. So extubation was deferred and the patient was transferred to the intensive care unit with endotracheal tube in situ for a further period of 48 hours to avoid airway obstruction secondary to tracheomalacia. Fiberoptic examination of airway was done on 3rd day to rule out collapse of tracheal rings on withdrawal of endotracheal tube and bronchoscope together. Then she was extubated on 3rd postoperative day uneventfully.

Case 2

A 50 year old ASA Grade 1 female with the diagnosis of colloid goiter not associated with any difficulty in breathing or swallowing was scheduled for subtotal thyroidectomy. Physical examination revealed a BMI of 28, a Mallampati class II and a soft thyroid mass of 10 × 12 cm. X-ray anteroposterior view of the neck showed gross tracheal deviation markedly to the right (Fig. 2). She was premedicated with 0.25 mg oral alprazolam. In operation theatre, an 18G intravenous line was set up and all the monitors attached. Difficult airway management cart was kept ready. After preoxygenation and same induction dose of sodium thiopentone, anaesthesia was deepened using isoflurane in oxygen. After confirming easy mask ventilation, 75 mg of suxamethonium was administered. Laryngoscopy revealed a gross deviation of the laryngeal inlet to the right side (Cormack and Lehane grade III) but intubation could be achieved using a 7.5 mm cuffed reinforced tube. Intraoperative and postoperative periods were uneventful.

DISCUSSION

Management of the difficult airway presents a great dilemma for the anaesthesiologist. Practice guidelines and algorithms may help in such situations. However, the anaesthesiologist’s judgement and vigilance remain the primary means to safe airway management. Thyroid masses are potential causes of a difficult airway. Tracheal intubation in patients with tracheal deviation and compression is
challenging. The distorted airway anatomy makes orotracheal intubation with rigid laryngoscopy difficult. Moreover, the induction of general anaesthesia could be risky, because it may precipitate complete airway closure and make facemask ventilation and tracheal intubation impossible due to chronic pressure. Another concern is tracheomalacia in these patients, which can complicate both intubation and extubation. Pressure on the trachea exerted by the neck mass can cause necrosis to parts of the tracheal wall, which can lead to complete collapse of the airway with muscle relaxation. To rule out tracheomalacia, leak test is performed. After deflating cuff of endotracheal tube, note whether there is any leak on positive pressure ventilation. If despite the cuff deflation, there is no leakage of gases to gentle positive pressure ventilation, there is probability of tracheal collapse around the endotracheal tube. In that case, direct visualization of airway patency is suggested. The fiberoptic bronchoscope can be used to assess for airway collapse and vocal cord movement as the endotracheal tube and bronchoscope together are slowly pulled back. If tracheal collapse is noted, the endotracheal tube and bronchoscope should be immediately readvanced and it is advisable to defer extubation. Some patients with huge thyroid do not tolerate supine position due to stridor and tracheal compression. Sitting awake fiberoptic intubation is lifesaving in such situation (3). Tracheostomy may not be feasible due to anatomical distortion of the anterior neck as well as the inability to tolerate supine position in few patients (4). Role of preoperative fiberoptic endoscopy for management of the airway in such cases has been emphasized especially in the sitting position (5). It was not planned in our case as she had no history of dyspnkea or stridor or respiratory difficulty in the supine position. Preoperative risk factors in a patient with large and long standing goiter are goiter for more than 3 years, significant tracheal narrowing and or deviation, retrosternal extension, preoperative recurrent laryngeal nerve palsy, difficult tracheal intubation and thyroid cancer (6). These factors help in predicting the difficulty associated with intubation. Three factors were present in one patient and only one factor in 2nd patient. Hence, fiberoptic was planned for the first case while the difficult airway cart was kept ready for the 2nd case. In the 1st patient, anaesthesia was given after visualizing the airway and ruling out gross compression as intubation under anaesthesia with the aid of muscle relaxants is a far more pleasant experience for the patient than an awake intubation (7). Sevoflurane was used for quick spontaneous induction as we wanted to assess the airway only. Thereafter anaesthesia was maintained using isoflurane as it is cost effective. Though awake fiberoptic intubation could also be feasible under the effect of sedation and topical anaesthesia but was not planned in our case. It is recommended that an initial fiberscopy be done to define the extent of retrosternal extension of the thyroid mass and to rule out obstruction of the airway (8). Awake intubation should be planned if obstruction seems significant. To conclude, the anaesthetist should carefully perform preoperative evaluation and plan fiberoptic endoscopy as an early option for airway management in these patients.

References

Algorithm for airway management in patients with large goiter:

1. Tracheal deviation
   - Present
     - No retrosternal goiter and no tracheal compression
       - Intravenous or inhalational induction followed by conventional intubation
     - No retrosternal goiter Tracheal compression present
       - Initial fibrescopy to delineate the extent of compression
     - Retrosternal goiter present No tracheal compression
       - Inhalational induction followed by fibre optic intubation
     - Retrosternal goiter present Tracheal compression present
       - Awake fibre optic intubation if compression seems significant
   - Absent
     - Conventional intubation