Endotracheal tube positioning in neck extension during thyroidectomy

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ABSTRACT

Aims: To evaluate how much the endotracheal tube moves on neck extension in patients undergoing elective thyroid surgery and whether this is affected by BMI or neck length.

Methods: Prospective study of 30 patients undergoing thyroidectomy during an eight month period in 2013-14.

Results: There were 24 female and 6 male patients included in the study. The mean (+/- standard deviation) upward displacement of the endotracheal tube during neck extension was 7.17+/-5.87mm. Patients with a larger BMI had a statistically significantly larger amount of tube displacement than patients with a smaller BMI (R² = 0.67, p=0.001), and patients with a smaller neck length (as represented by thyro-mental distance) had a significantly larger amount of tube displacement than those with a larger neck length (R² = 0.48, p=0.001).

Conclusion: Neck extension results in upward displacement of the endotracheal tube. The amount of displacement is significantly higher in patients with a larger BMI or shorter neck length.

INTRODUCTION

Thyroid surgery is the most commonly performed endocrine operation in the United Kingdom. One of the most significant complications of thyroidectomy is the risk of damage to the recurrent laryngeal nerve, which carries with it potential voice changes. This was reported nationally in 2010-2011 at 1.8%. ¹

However, the actual incidence of post thyroidectomy RLN injury is likely to be more than the reported figures, as many patients may have unnoticed voice changes and many of these patients do not have vocal cord assessment either pre- or post-operatively.

Therefore identifying the recurrent laryngeal nerve during thyroid surgery remains a vital step of the operation. Using a nerve monitor during surgery has become a necessity during thyroidectomy, particularly in revision surgery, large goiter or cases of thyroid cancer, and it acts as a useful educational tool for trainees.

The senior authors have been using IONM for the past 4 years and in their experience the most common reason for IONM failure is due to tube displacement during patient positioning and neck extension. This can give rise to false signals which has potential patient safety issues.

Therefore the aim of our study was to look at endotracheal tube displacement during neck extension in thyroidectomy, in particular if this is affected by Body Mass Index (BMI) or neck length.

METHODS

A prospective study of 30 patients undergoing thyroidectomy between January to August 2014 was performed. Any adult patients over the age of 16 undergoing hemithyroidectomy or total thyroidectomy during the study period were included in the study.

Patient demographics, body mass index (BMI), neck circumference, thyro-mental distance, and Mallampati score were recorded. The endotracheal tubes were marked at 0.5cm intervals with permanent marker along the prefabricated blue sticker for the electrodes on the endotracheal tube (Figure 1). The position of the glottis against the markers on the tube in the neutral position was noted using a fiberoptic endoscope passed transorally, and a photograph taken (Figure 1). The neck was then extended (as tolerated) using a head ring and shoulder bolster. The fiberoptic endoscope was once again passed transorally and used to photograph the new position of the glottis against the markers on the tube. The difference between the two positions was calculated using the 0.5cm markers to calculate any displacement of the endotracheal tube.

RESULTS

There were 24 female and 6 male patients included in the study. The median age of patients was 54.5 years (range 28-87 years). The mean BMI was 27.8 (range 17.5-34.7) and the mean neck circumference was 43.2cm (range 28-56cm). The mean thyro-mental distance was 56mm (range 38-84cm) (Table 1).

The mean (+/- standard deviation) upward displacement of the endotracheal tube during neck extension was 7.17+/-5.87mm. Patients with a larger BMI had a statistically significantly larger amount of tube displacement than patients with a smaller BMI (R² = 0.67, p=0.001) (Figure 2), and patients with a smaller neck length (as represented by thyro-mental distance) had a significantly larger amount of tube displacement than those with a larger neck length (R² = 0.48, p=0.001) (Figure 3). There was no significant difference in tube displacement between those patients with a larger neck circumference versus patients with a smaller neck circumference (R² = 0.0004, p=0.92) or in those patients with a lower Mallampati score compared to patients with a higher Mallampati score (R² = 0.005, p=0.71).

CONCLUSIONS

• Neck extension results in upward displacement of the endotracheal tube.
• The amount of displacement is significantly higher in patients with a larger BMI or shorter neck length, possibly due to the limitation of neck extension in these patients.
• This has particular relevance for thyroidectomy patients in whom accurate positioning of the tube is essential for nerve monitoring.

REFERENCES


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