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Intubation trauma:
A comparison of two different endotracheal tubes

J. E. Davies, F.R.C.S.,* T. H. J. Lesser, F.R.C.S.,* and M. A. Cobley, F.F.A.R.C.S.† (Gwent)

Abstract

In recent years endotracheal tubes with low pressure cuffs have become available with the aim of reducing trauma to the trachea and larynx. This paper uses laryngographic methods to analyse intubation trauma in 20 short to medium term intubations.

No difference in laryngeal trauma was found between low pressure, large diameter cuffs when compared to standard cuffs.

Introduction

Laryngeal trauma as the result of endotracheal intubation concerns the otolaryngologist not only with the one per cent of severe sequelae such as granulomas or arytenoid subluxation (Kambic and Radsel, 1978), but also with the very common problem of post-operative dysphonia.

Recently endotracheal tubes have become available which are claimed to lessen the degree of tracheal trauma by means of a low pressure cuff with a large diameter and high volume. Although the benefits during long term intubation may be accepted, some low pressure cuffs are promoted for all short to medium term intubations. Any advances in materials or techniques require an analysis of costs and benefits before their role in clinical practice can be accepted.

One method of measuring the laryngeal changes due to intubation is by using the laryngograph to quantify the phonatory function of the larynx (Lesser *et al.*, 1986). Using this technique we have compared a low pressure cuff against a standard cuff.

Patients and methods

Two groups of age and sex matched patients were studied. They all had oral endotracheal intubation as part of a general anaesthetic lasting between 25 and 60 minutes. The patients were undergoing elective surgery not affecting the larynx or pharynx, and were all intubated by the same anaesthetist.

Ten patients were intubated with a 'Mallinckrodt intermediate' tube (group A; low pressure, large diameter cuff) and 10 with a 'Portex' tube (group B; standard cuff). Size 9.0 mm. I.D. tubes were used in males and size 8.0 mm. I.D. tubes in females. None of the intubations were considered to be difficult.

Laryngograph traces were recorded pre- and 48 hours post-operatively using standard technique as described by Gleeson and Fourcin (1983) and the change in standard deviation of the Fx histograms noted.

Results

One patient from each group did not complete the post-operative assessment. The demographic features of the two groups are show in Table 1.

The change due to intubation was quantified by using the change in spread of the frequency histograms of vocal fold vibrations.

Four patients in group A and five patients in group B showed an increase in spread of frequencies.

The mean change of standard deviation in each group was 0.033 and 0.013 respectively.

There was no correlation between age, sex or duration of intubation and increase in spread of frequencies.

Discussion

The results show no significant difference in laryngeal trauma produced by the two cuffs.

Previous findings (Lesser and Lesser, 1987) have shown a relationship between the duration of intubation and degree of trauma. This does not appear to be confirmed in the present study and may be due to the smaller variation in duration of intubation (25-60 minutes).

It is important to remember that one of the main

TABLE I
PATIENT DETAILS

group	A	B
mean age	38	40
range	14–64	25–59
males	6	6
females	3	3

* Department of Otolaryngology, Royal Gwent Hospital.
† Department of Anaesthetics, Royal Gwent Hospital.

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reasons for developing the low pressure cuffed tubes is to prevent tracheal trauma both from cuff pressure and movement. These cuffs can however give rise to several problems themselves. Firstly, they are often more bulky and wrinkled when deflated and can increase trauma to the vocal folds during intubation and extubation. Secondly, care is required with any cuff to avoid over-inflation and prevent the cuff pressure exceeding the mucosal capillary perfusion pressure (Seegobin and van Hasselt, 1984). This danger may be increased by the greater absorption of nitrous oxide into a larger volume cuff. These bulkier cuffs also give rise to longitudinal folds when in position, allowing possible aspiration down the channels created.

There must be a clear distinction between tracheal and laryngeal trauma. Tracheal trauma may have serious consequences, but affects mainly those patients having long term intubation rather than those undergoing elective surgery. Tracheal trauma is unlikely to contribute to the common phonatory changes following intubation, but it is possible that pressure on the recurrent laryngeal nerves may lead to phonatory difficulty. If this is a problem, low pressure cuffs may help. However, Walts *et al.* (1980) showed that there were no paralysed vocal folds in their study of 100 short term intubations.

Visible laryngeal trauma occurs in a significant number of patients (Peppard and Dickens, 1983). Many more have phonatory and sensory symptoms, the noted frequency of which varies between authors.

It is this phonatory function that is being measured using the laryngograph, and this was altered in nine of the 18 patients (50 per cent) completing this study. A previous study (Lesser *et al.*, 1986) showed a higher proportion of patients with changes of laryngeal trauma (87.5 per cent), but these were intubated by different anaesthetists and suggests that intubation technique plays a more significant role than the type of cuff or tube used.

Conclusion

Although low pressure, high volume cuffs may be of value in preventing tracheal complications of long term intubation, we have been unable to show any benefit over standard cuffs in reducing phonatory disturbances after short to medium term intubations.

References

Gleeson, M. J. and Fourcin, A. J. (1983) Clinical analysis of laryngeal trauma secondary to intubation. *Journal of the Royal Society of Medicine*, **76:** 928-932.

Kambic, V. and Radsel, Z. (1987) Intubation lesions of the larynx. *British Journal of Anaesthesia*, **50:** 587-590.

Lesser, T. H. J. and Lesser, P. J. A. (1987) Laryngeal trauma versus length of intubation. *Journal of Laryngology and Otology*, **101:** 1165-1167.

Lesser, T. H. J., Williams, R. G. W., Hoddinot, C. (1986). Laryngographic changes following endotracheal intubation in adults. *British Journal of Disorders of Communication*, **21:** 239-240.

Peppard, S. B. and Dickens, J. H. (1983) Laryngeal injury following short term intubation. *Annals of Otology, Rhinology and Laryngology*, **92:** 327-330.

Seegobin, R. D. and van Hasselt, G. L. (1984) Endotracheal cuff pressure and tracheal mucosal blood flow: endoscopic study of effects of four large volume cuffs. *British Medical Journal*, **288:** 965-968.

Walts, L. F., Calcaterra, T. and Cohen, A. (1980) Vocal cord function following endotracheal intubation. *Clinical Otolaryngology*, **5:** 103-105.

Address for correspondence:
Mr. Elgan Davies,
Department of Otolaryngology,
Royal Gwent Hospital,
Newport,
Gwent.

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