

Modification of the Hörmann technique of hyoid suspension in obstructive sleep apnoea

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Abstract

Hyoid suspension is a procedure to stabilise the retrolingual space in obstructive sleep apnoea. Using the Hörmann technique, a steel wire is slung around the body of the hyoid and fixed to the upper rim of the thyroid cartilage. It was observed, however, that the steel wire may lie very superficially to the pharyngeal mucosa. Evaluation of computed tomography (CT) scans showed a mean distance between the hyoid and the pharynx of only 3 mm. A modification is presented by threading a steel wire through a hole that is drilled through the hyoid bone. Thus pharyngeal exposure of the steel ligature and possible perforation of the mucosa is avoided.

Key words: Hyoid Bone; Sleep Apnoea Syndromes; Otorhinolaryngologic Surgical Procedures

Introduction

In obstructive sleep apnoea syndrome, the airway collapse is either retropalatal, retrolingual or in both localisations.¹ However, the site of the collapse may vary during sleep in different positions. Modern concepts of operative treatment of obstructive sleep apnoea syndrome aim to maintain an open upper airway from the nose to the entrance of the larynx leading to 'multi-level surgery'.^{2,3} Most demanding is the stabilisation of the retrolingual space. Several procedures have been proposed; such as genioglossus advancement, radiofrequency ablation to the base of the tongue, maxillomandibular advancement and hyoid suspension.⁴

Hörmann *et al.*^{5,6} presented a modification of the hyoid suspension procedure originally described by Riley.⁷ The hyoid bone is stabilised and advanced using a steel wire which is slung around the hyoid body and sutured to the upper rim of the thyroid cartilage. In our institution this procedure was adopted in a concept of multi-level surgery. However, a modification of the technique is presented, based on clinical observation and radiological studies.

Material and methods

From March to July 2005 eight patients have been operated on for obstructive sleep apnoea syndrome with hyoid suspension, radiofrequency ablation to the base of the tongue and soft palate and uvula flap. Tonsillectomy and septal surgery were performed when indicated. In one patient post-operative haematoma was observed which was resolved by several punctures. No other complications were observed. In another patient the steel wire shimmered through the mucosa of the vallecula epiglottica at a control three months post-operatively (Figure 1). The patient was free of symptoms.

Radiological studies of CT scans of the neck were performed in 12 adult patients who had no abnormality in the tongue base and the larynx. The shortest distance between the posterior aspect of the body of the hyoid and the pharynx (vallecula epiglottica) was measured using sagittal reconstructions (Figure 2). The mean value was 3.06 mm (standard deviation ± 1.25 mm) with a range of 1–5.3 mm. No difference was found between males ($n = 7$) and females ($n = 5$).

The hyoid suspension was therefore modified in 10 subsequent patients. A horizontal incision and blunt separation of the strap muscles is done as described by Hörmann.^{5,6} However, then the inserting genioglossus

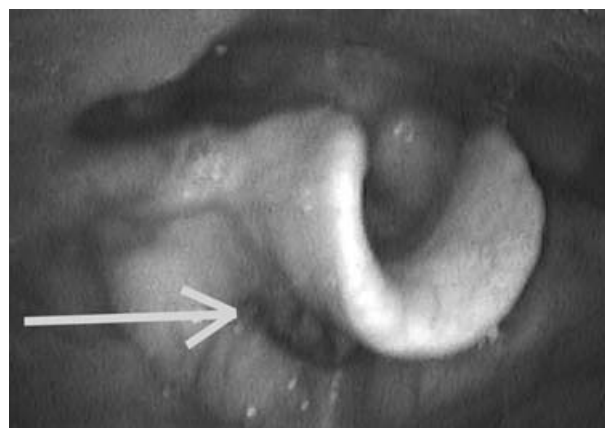


FIG. 1

Laryngoscopic view of a patient three months post-operatively after hyoid suspension using the Hörmann technique. The steel wire of the ligature of the hyoid to the thyroid cartilage is seen through the mucosa (white arrow).

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FIG. 2

Sagittal projection of a CT scan with normal neck anatomy. The distance between the posterior aspect of the hyoid and the pharynx is 0.35 cm.

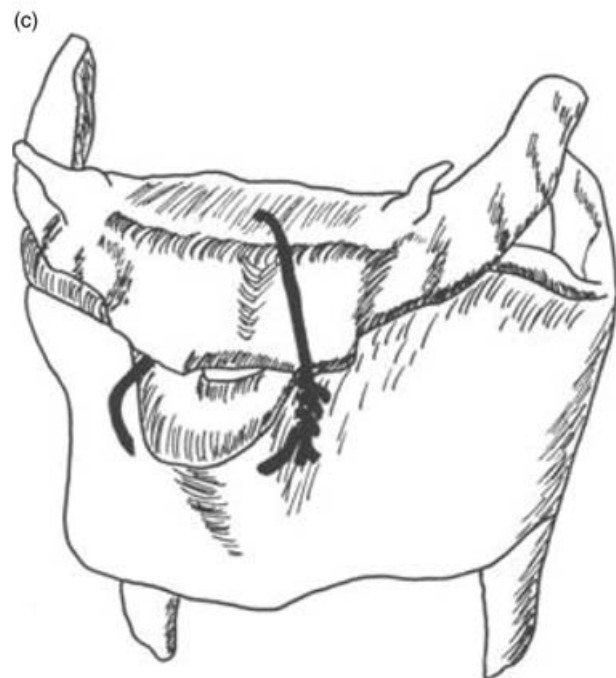
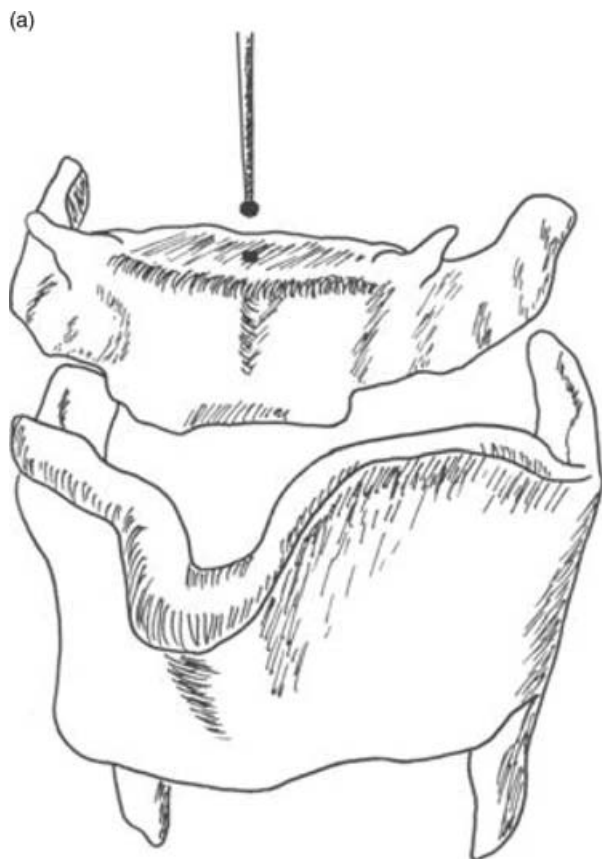
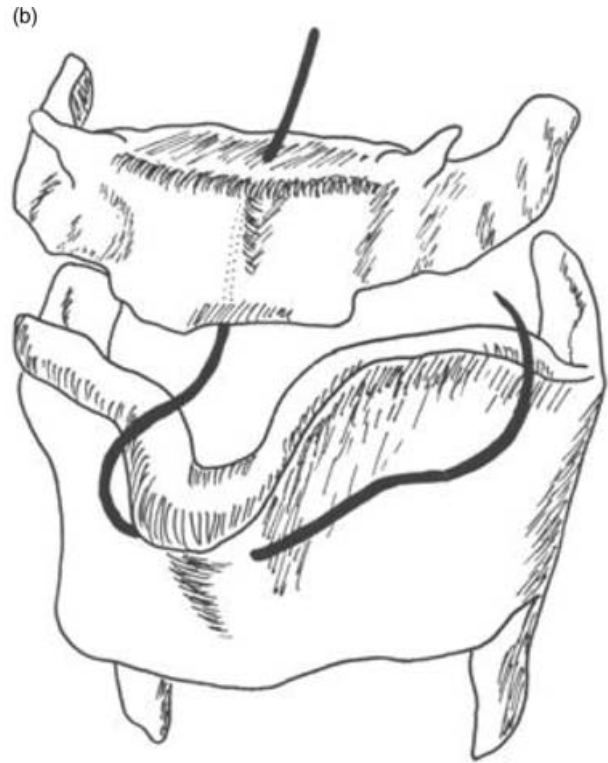


FIG. 3

The Hörmann technique of hyoid suspension is modified by drilling a hole through the middle third of the body of the hyoid (a). A steel wire is threaded through the hyoid and the thyroid cartilage below the laryngeal prominence (b). The steel wire is fixed, cut and bent downwards, thus advancing and stabilising the hyoid (c).

FIG. 3
Continued

musculature is detached in the midline of the body of the hyoid and the upper surface of the bone is exposed. A hole is drilled through the middle third of the body of the hyoid bone using a diamond burr (Figure 3a). Preparation of the musculature should be as limited as possible to only allow drilling.

A steel wire (Ethicon 3, diameter 0.6 mm) is introduced from above and passed horizontally through the thyroid cartilage 4–5 mm below the laryngeal prominence (Figure 3b). Drilling may be necessary in the case of

extensive calcification of the cartilage. The hyoid bone is advanced using a Backhaus clamp and the steel wire is fixed, cut and bent downwards. Thus a triangular steel ligature between the hyoid bone and the thyroid cartilage is obtained (Figure 3c). No complications were observed, except for one post-operative haematoma which was resolved by several punctures.

Conclusions

The soft tissue between the posterior aspect of the hyoid bone and the vallecula epiglottica is small with a mean diameter of 3 mm. Using the Hörmann technique of hyoid suspension, a steel wire of 0.6 mm diameter (Ethicon, Nr. 3) is slung around the body of the hyoid. However, the steel wire may be very superficial and shimmer through the vallecula epiglottica. A modification is presented to avoid pharyngeal exposure of the steel wire with possible perforation of the mucosa. The steel wire is threaded through a hole which is drilled in the middle third of the body of the hyoid bone. No complications related to this modification were noted in 10 patients.

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References

1 Fujita S. Pharyngeal surgery for obstructive sleep apnoea and snoring. In: Fairbanks DNF, ed. *Snoring and Obstructive Sleep Apnea* New York: Raven Press, 1987;101–28

- 2 Utley DS, Shin EJ, Clerk AA, Terris DJ. A cost-effective and rational surgical approach to patients with snoring, upper airway resistance syndrome, or obstructive sleep apnea syndrome. *Laryngoscope* 1997;**107**:726–36
- 3 Verse T, Baisch A, Hörmann K. Multi-level surgery for obstructive sleep apnea. Preliminary objective results [in German]. *Laryngo-Rhino-Otol* 2004;**83**:516–22
- 4 Senders CW, Strong EB. The surgical treatment of obstructive sleep apnea. *Clin Rev Allergy Immunol* 2003;**25**:213–20
- 5 Hörmann K, Hirth K, Erhardt T, Maurer JT, Verse T. Modified hyoid suspension for therapy of sleep related breathing disorders. Operative technique and complications [in German]. *Laryngo-Rhino-Otol* 2001;**80**:517–21
- 6 Hörmann K, Baisch A. The hyoid suspension. *Laryngoscope* 2004;**114**:1677–9
- 7 Riley RW, Powell NB, Guilleminault C. Obstructive sleep apnea and the hyoid: a revised surgical procedure. *Otolaryngol Head Neck Surg* 1994;**111**:717–21

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