
How I Do It

A Targeted Problem and Its Solution

The Hyoid Suspension

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INTRODUCTION

Obstructive sleep apnea (OSA) is a serious disorder that affects up to 4% of middle-aged men and 2% of middle-aged women.¹ Common symptoms of untreated OSA are snoring and daytime sleepiness, which often result in a significant reduction of quality of life.² The pathogenesis of OSA and the associated symptoms consists in a combination of reduced pharyngeal muscle tone and a reduction of pharyngeal airway dimensions.³⁻⁶ Night-time ventilation with continuous positive airway pressure is the standard treatment of OSA.⁷ This procedure requires the patients' compliance. Therefore, operative alternatives such as multilevel surgery were developed to prevent pharyngeal airway collapse. The hyoid suspension, a common part of multilevel surgery concepts, is often combined with other operations, such as genioglossus or maxillomandibular advancement,⁸ uvulaflap⁹ or radiofrequency surgery of the tongue base.¹⁰ Riley et al.¹¹ first described the hyoid myotomy-suspension as a procedure to advance the hyoid bone to expand the airway. First results of a current investigation in our department point to the importance of the hyoid suspension.

The modified hyoid suspension presented here (Fig. 1) is a technique that is simple to perform under local anesthesia if no additional operation needing general anesthesia is planned. This modification promises similar results but is less invasive, and it significantly reduces the length of the procedure.

MATERIALS AND METHODS

We mainly perform the hyoid suspension as a part of the Mannheim protocol of multilevel surgery on patients with diagnosed OSA defined by an apnea-hypopnea index score of greater than 10/hour and confirmed by polysomnography in the sleep laboratory of the Department of Otolaryngology, Head and Neck Surgery at the University Hospital Mannheim. This protocol

combines at least one surgical procedure on the soft palate including tonsillectomy, the hyoid suspension, and a radiofrequency procedure on the tongue base.

Surgical Technique

The skin of the throat between the chin and the sternum is prepared with antiseptic solution and isolated with sterile drapes. One percent prilocaine with 1:200,000 adrenaline solution is injected in the skin to minimize intraoperative bleeding. The incision for the hyoid suspension is placed above the hyoid bone. The upper and lower skin flaps are elevated to expose the subplatysmal fat and muscles. Some of the mobilized subplatysmal fat is resected. The fascia in the midline between each sternohyoid muscle is then incised with an electrocautery device until the plane of the thyroid cartilage is reached (Fig. 2A). The blood supply to the thyroid cartilage is provided by the blood vessels of the perichondrium. Unnecessary elevation of the perichondrium should, therefore, be avoided to reduce the risk of necrosis. The muscles on both sides are retracted to expose the lateral parts of the thyroid cartilage (Fig. 2A). A sharp needle is pierced in through the cartilage without drilling. A steel wire with a diameter of approximately 1 mm is fixed at the end of the needle. The needle is pierced out on the contralateral side of the thyroid cartilage from behind (Fig. 2A). No further alteration of the cartilage is needed to fix the wire, which is now placed near the thyroid notch (Fig. 1C). It must be emphasized that the level of the surgical placement of the wire should be near the thyroid notch to prevent damage to the vocal cords. The muscles are retracted to expose the hyoid bone (Fig. 2B). The steel wire is now placed around the hyoid bone (Fig. 2B; see also Fig. 1B and 1C). The hyoid bone is moved with a retractor inferiorly, in a position ventral to the thyroid cartilage (Fig. 2C; also see Fig. 1 which illustrates the pre- and postoperative position of the hyoid bone). The two ends of the wire are twisted with a needle-holder, pinched off (Fig. 2D), and bent in the subplatysmal fat to avoid later injuries. One drain is placed and brought out on one side. The platysma and subcutaneous fat are then closed with interrupted sutures. The skin incision is closed with an intracutaneous nylon suture.

Postoperatively, a moderate degree of serosanguineous drainage is to be expected from the drain in the first 24 hours. Most patients are able to swallow normally. Some do need the intravenous support of fluids for 2 to 4 days.

DISCUSSION

Our current study stresses the importance of the hyoid suspension within our Mannheim multilevel sur-

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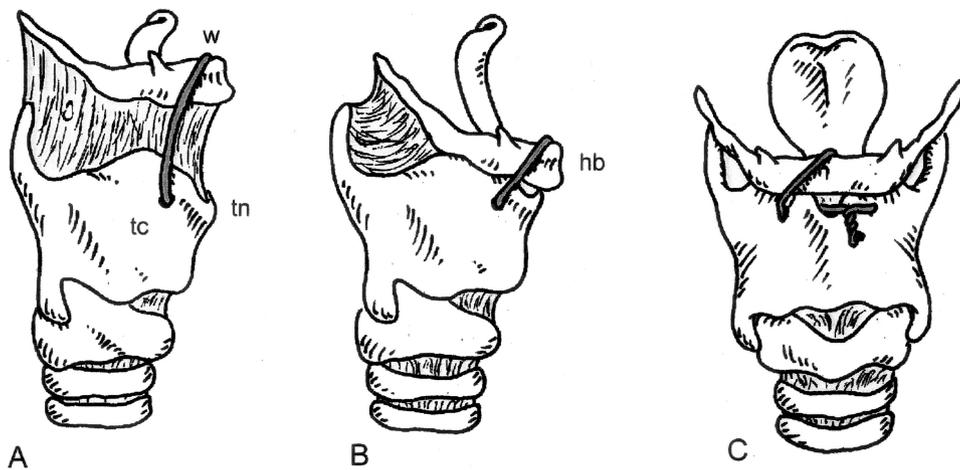


Fig. 1. The wire (w) is placed near the thyroid notch (tn) of the thyroid cartilage (tc) to avoid damage to the vocal cords. (A) Preoperative position of the hyoid bone (hb). (B, C) Position of the hyoid bone and the wire after surgical movement of the hyoid bone.

gery concept. This procedure apparently expands the upper airway by advancing the hyoid bone. Riley et al.¹¹ combine the hyoid myotomy-suspension with an inferior sagittal osteotomy of the mandible and bring the hyoid bone to an anterior and superior position. In our procedure, the hyoid bone is placed anteriorly and inferiorly, as shown in Figure 1, without intersection of sternohyoid,

thyrohyoid, and omohyoid muscles and without osteotomy of the mandible. Therefore, it is less invasive and easier to perform.

CONCLUSIONS

The hyoid suspension as presented here appears to be an effective surgery method. OSA patients, especially

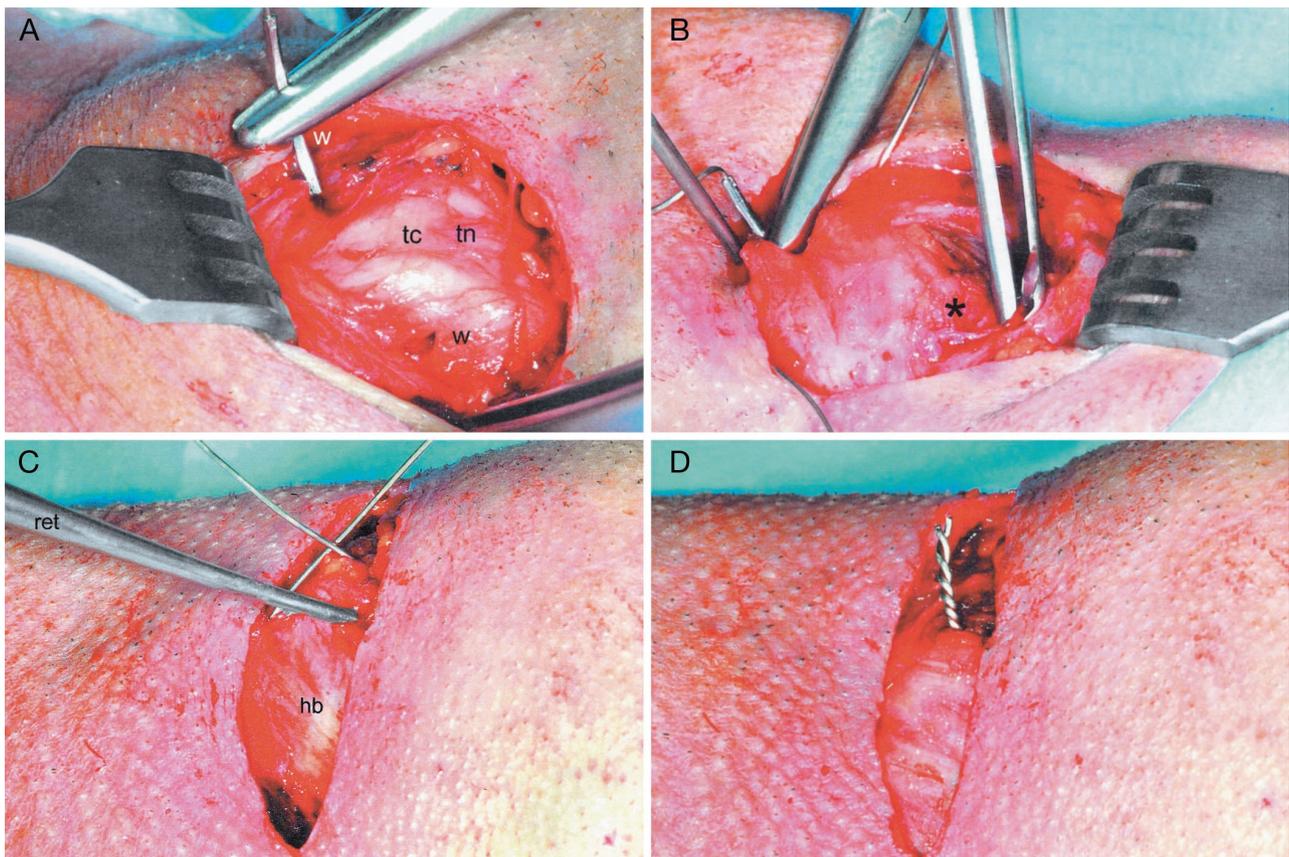


Fig. 2. (A) The needle with the fixed wire (w) at the end is pierced in through the lateral part of the thyroid cartilage (tc) near the thyroid notch (tn) and out on the contralateral side. (B) Then the needle with the wire goes through the subplatysmal fat (*) and around the hyoid bone. (C) A retractor (ret), inserted at the cranial edge of the hyoid bone (hb), moves down the hyoid bone and anteriorly. (D) After twisting the ends of the wire, these will be pinched off and bent in the subplatysmal fat.

those with an intolerance of continuous positive airway pressure ventilation, may benefit from the modified hyoid suspension. Higher success rates were obtained by performing a genioglossus advancement,¹² but this procedure also causes higher morbidity, such as swallowing problems.¹³ To what extent the replacement of genioglossus advancement by the hyoid suspension is also mirrored in a reduction of the postoperative morbidity, while ensuring high efficacy, warrants further investigation.

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