

Int Poster J Dent Oral Med 2001, Vol 3 No 3, Poster 81

## Distraction of the hard palate for treating velopharyngeal incompetence. A case report.

**Language:** English

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**Date/Event/Venue:**

July 1-5, 2000

Cleft 2000, International Cleft Lip and Palate Foundation World Cleft Congress

Zürich

### Introduction

Many procedures have been described to treat velopharyngeal incompetence [4,6-9,11, 14-22]. Up to now, each surgical method is associated with its own specific problems and risks [5,10,12,13]. Clinical outcome is often unsatisfactory depending on the genesis and extent of the anomaly. A new treatment concept for velopharyngeal incompetence was introduced by Carls et al in 1997 [2,3], performing distraction osteogenesis of the hard palate in an experimental study in dogs. Ascherman et al. [1] confirmed this concept in a canine cleft palate model. The presented case shows a clinical application of this new procedure for treating velopharyngeal incompetence in a cleft palate patient.

### Case report and Methods

A 7-year-old male with a surgically closed cleft palate, presented with an extensive velopharyngeal incompetence, severe nasalized speech and rhinoponia aperta. The initial very large, isolated, cleft palate was closed at the age of 18 months through a bilateral pedicle palatal flap. Clinical examination by nasopharyngeal endoscopy showed a 10-12 mm distance between the velum and the posterior pharyngeal wall, which could not be substantially reduced even by provoking a glossary reflex, despite good muscular function. Firstly, a custom-made, individually fabricated, orthodontic-like distraction device was made (fig.1). An expansion screw was inserted which allowed antero-posterior lengthening. The distraction device was stabilized to the teeth through wire ligatures.

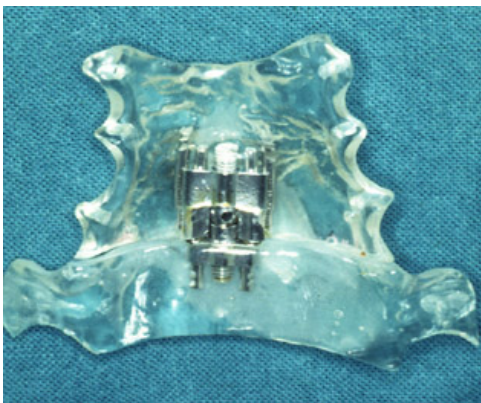


Fig. 1: Distraction Device.

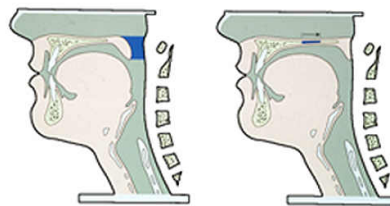


Fig. 2: Principle of hard palate distraction for treating velopharyngeal incompetence.

Under general anaesthesia with endotracheal intubation and after local infiltration of the palatal mucosa with a vasoconstrictant agent, a bilateral posteriorly based mucoperiosteal palatal flap was elevated (fig.3). An osteotomy was made across the hard palate at the level of the transverse palatine suture using a narrow Lindemann burr (fig.4). The pterygoid process, was separated from the maxillary tuberosity while the greater, palatine foramen was detached laterally with careful handling of the neurovascular bundle. The separation of the medial and lateral laminae of the pterygoid process from the cranial base was performed using a curved osteotome.

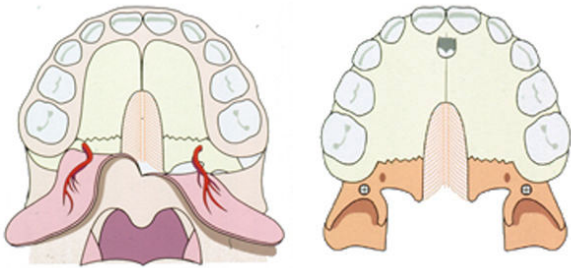


Fig. 3

Fig. 4

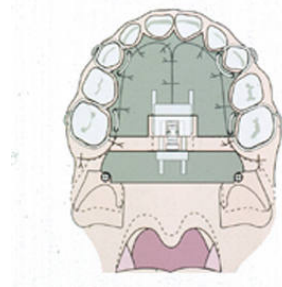
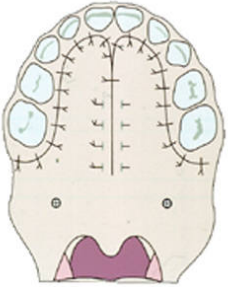


Fig. 5

Fig. 6

Fig. 3-6: Scheme of operative procedure.

Operative access to the hard palate by formation of a bilateral pedicle flap (Fig.3). Osteotomy of the level of transverse palatine suture and separation of the pterygoid process. Transmucosal fixation of screws bilaterally at the bridge between the lateral and medial laminae of the pterygoid process (Fig.4). Adaptation of the wound edges (Fig.5). Distraction device ligatured to the teeth. Screw heads polymerized at the dorsal edge of the device. Confirmed activation of the expansion screw at the end of operation (Fig.6).

The careful handling of the descending palatine arteries running in the pterygopalatine canal was always considered to be of primary importance. After complete mobilization of the osteotomized complex, a 16 mm long screw was introduced bilaterally at the bridge between the lateral and medial laminae of the pterygoid process. Both of the mucoperiosteal palatal flaps were now replaced and the head of the screws were lead through the mucosa by a retrotubar incision. After adaptation of the wound edges, the distraction device could be fitted and ligatured to the teeth. The screw heads were polymerised at the dorsal edge of the distraction device. At the end of the operation, activation of the distraction device was tested.

## Results

Both the surgical intervention and postoperative period were uneventful. Oral feeding was possible on the first postoperative day. The distraction device was well tolerated. No signs of mucosal irritation were found after removal of the distraction device. Mobility of the osteotomized segments did not appear. Four weeks after removal of the device, a 3-4 mm distance between the velum and the posterior pharyngeal wall was measured. Hence, a 7-8 dorsal displacement of the soft palate was registered (fig.9). The mobility of the soft palate was completely retained and characterized by a circular closure pattern. Rhinolalia aperta was still evident, although it was substantially reduced, compared to the preoperative findings. Speech comprehensibility, especially of plosive sounds, was clearly improved.

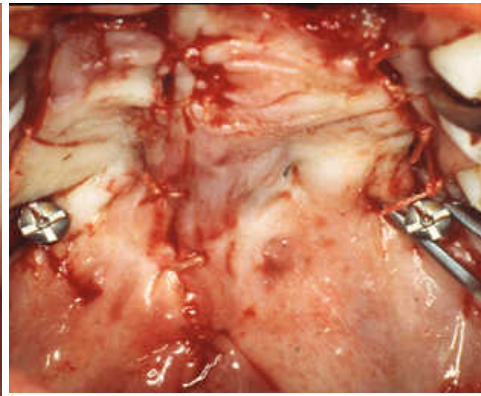
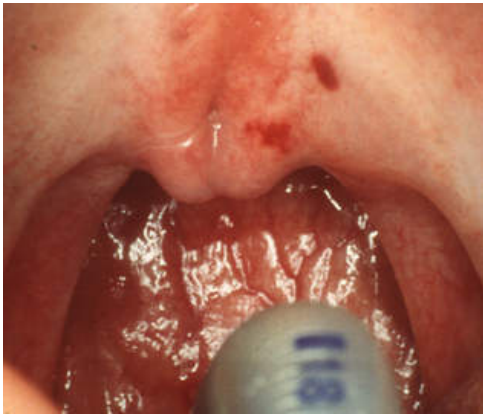


Fig. 7: Velopharyngeal incompetence before treatment.

Fig. 8: After attachment of the wound edges.

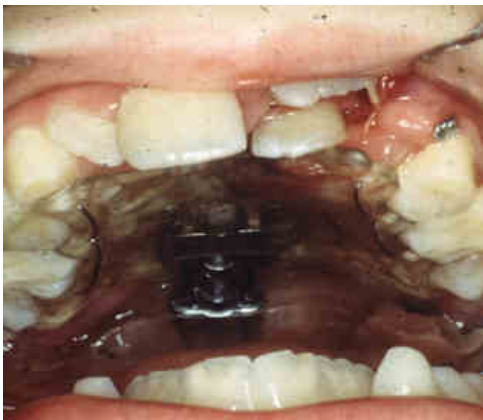


Fig. 9: Distraction device in situ.

Fig. 10: At the end of treatment.

## Conclusions

Our initial experience with distraction osteogenesis of the hard palate for treating velopharyngeal incompetence in a cleft palate patient was satisfactory. Lengthening of the hard palate by distraction osteogenesis may provide an alternative technique to correct velopharyngeal incompetence. However, in the future, more clinical studies are necessary to evaluate long-term treatment outcome of this procedure.

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**Poster Faksimile:**



### Distraction of the hard palate for treating velopharyngeal incompetence. A case report.

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**Introduction**

Many authors have been reluctant to treat velopharyngeal incompetence (VPI) with a hard palate distraction osteotomy (DO) because of the risk of relapse and the need for a second surgery. A case treatment concept for velopharyngeal incompetence was published by Calkins et al. in 1999 [22]. Following distraction osteotomy of the hard palate in an experimental study, Anderson et al. [19] reported that concept as a successful method to treat VPI. The present case report is a clinical application of this new technique by using distraction osteotomy to treat velopharyngeal incompetence.

**Case report and methods**

A 7-year-old child with a surgically closed cleft palate, presented with an isolated velopharyngeal incompetence, severe nasal speech and dysphagia. The child had long-term bilateral otitis media with effusion (OME) through a bilateral grommet insertion. Clinical assessment by nasofiberoptic endoscopy showed a 100% velopharyngeal incompetence with the presence of a pharyngeal web, which could not be reduced even by providing a primary velar, nasopharyngeal muscle, buccal, and/or pharyngeal flap. A distraction osteotomy was performed with a distraction device (Fig. 1). An experimental case was simulated with a distraction device to help therapy. The distraction device was attached to the teeth through two separate T-tubes.

**Results**

After the surgical osteotomy and postoperative period were completed, oral feeding was possible on the first postoperative day. The distraction device was well tolerated. No signs of nasofiberoptic endoscopy were observed after removal of the distraction device. Mobility of the velopharyngeal apparatus did not appear. Five weeks after removal of the device, a 2-d-mm distance between the velar and the posterior pharyngeal wall was observed. Volume of F-199m measurements of the soft palate was reported (Fig. 2). The mobility of the soft palate was completely restored and characterized by a contact of more than 10 mm between the velar and the posterior pharyngeal wall. The contact point in the postoperative findings. Speech intelligibility, especially of pharyngeal sounds, was clearly improved.




Fig. 1 Distraction device




Fig. 2 Amount of hard palate distraction (distraction device) post-osteotomy




Fig. 3 Endoscopic view




Fig. 4 Amount of hard palate distraction




Fig. 5 Endoscopic view




Fig. 6 Amount of hard palate distraction




Fig. 7 Endoscopic view




Fig. 8 Amount of hard palate distraction

**Conclusion**

The hard palate with distraction osteotomy of the hard palate for treating velopharyngeal incompetence in a child with cleft palate. Correction of the hard palate by distraction osteotomy may provide an alternative technique to correct velopharyngeal incompetence. However, in the future, clinical studies are necessary to evaluate the long-term stability of the procedure.

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