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The influence of the Tübingen soft palate plate and early cleft closure on the nasopharyngeal airway for the management of airway obstruction in an infant with Pierre Robin sequence: A case report

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ABSTRACT

INTRODUCTION: A Tübingen palate plate and early cleft closure for successful airway management is described in a newborn with Pierre Robin sequence.

PRESENTATION OF CASE: A three-day-old newborn with an acute airway obstruction underwent primary treatment with a Tübingen soft palate plate.

DISCUSSION: After stabilization of the airway, the cleft soft palate was closed after three months.

CONCLUSION: The Tübingen soft palate plate proved to be a very satisfactory treatment for the infant.

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1. Introduction

Pierre Robin sequence (PRS) was first described by Pierre Robin, a French stomatologist, in 1923 and is characterized by a clinical triad of micrognathia, glossoptosis and a U-shaped cleft palate.¹ It is estimated to affect approximately 1 in 8500 births² and can be isolated or associated with congenital anomalies. PRS is considered to be a sequence and not a syndrome in itself; it is a component of a variety of syndromes. Most authors believe that hypoplasia of the mandible before the ninth week of pregnancy is the inciting factor for PRS. The tongue is displaced posteriorly and superiorly between the

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micrognathia, glossoptosis and cleft palate, a newborn with PRS experiences airway obstruction and different degrees of respiratory distress. There are different methods used to manage these airways, but as yet there is no definitive intervention. Treatment attempts like glossopexy (surgical fixation of the tongue to the lower tooth groove), wire extension of the lower jaw, the use of a nasopharyngeal tube or tracheotomy usually fail to produce good results and are very stressful for the infant.

The Tübingen soft palate plate is generally used to improve swallowing function by moving the tongue forward. The Tübingen soft palate plate was described in the German literature by Brosch et al. in 2004. Combined with an early surgical cleft palate closure (mean

age of 7.3 months), it also has the positive impact of improving hearing ability thanks to better Eustachian tube function.⁴

Our usual treatment involves an orthodontic soft palate plate with a pre-epiglottic baton (Tübingen soft palate plate).⁵ The baton widens the pharynx by pulling the base of the tongue forward and at the same time inducing growth of the lower jaw. The upper airways are thereby kept mechanically free. We describe the case of a female newborn with PRS and upper airway obstruction treated with early positioning of the Tübingen palatal plate and early closure of the cleft palate to secure rapid stabilization of the upper airways.

At birth (39th week of gestation), a female infant weighing 3070 g suffered from upper airway obstruction and intractable hypoxemia. Immediately after birth the upper airways were stabilized with a nasopharyngeal tube. In the delivery room the pediatrician suspected a Pierre-Robin sequence. The airway passage was blocked due to the mandibular micrognathia and the tongue's protrusion into the posterior cleft area. Depending on the tongue's position, the newborn's oxygen saturation decreased to less than 80%. In the neonatal intensive care unit, the infant was presented to the maxillofacial surgeon, who diagnosed the classic triad of PRS symptoms. The infant's general condition and dangerously low oxygen saturation levels necessitated immediate intervention, but the parents refused permission for surgery. We decided to use the palatal plate with a velar spur and frontal wire bows developed by the Tübingen working group (Fig. 1). After taking an impression of the palate, the plate was created in our dental laboratory. A computer tomogram was made and under clear endoscopic

Abbreviation: PRS, Pierre Robin sequence.

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Fig. 1. Modified palatal plate with adjustable pharyngeal spur.

view the wires were adjusted by slight bending. Afterwards the nasopharyngeal position was checked by nasal endoscopy. Under endoscopic guidance, we modified the rigid plastic spur with a wire link of V2A steel between the palatal plate and epiglottid pad.⁶ The modified Tübingen soft palate plate was positioned intraorally on the 5th day after birth and the little patient's vital parameters,

especially oxygen saturation levels, were monitored continuously in the neonatal intensive care unit. Once the device had been inserted, the oxygen saturation levels rose to an average of 96% (ranging between 90 and 100%) (Fig. 2). The child accepted the placement of the palate plate. The Tübingen soft palate plate was tolerated twenty hours daily after two weeks (Fig. 2b). There was no need to correct pressure points or adapt the pharyngeal spur because repeated nasal endoscopy showed a good pharyngeal position. The mandibular position was adapting physiologically and with the inserted plate there was an immediate improvement in mandibular position compared to the baseline position. After three months cleft palate was closed surgically. The infant constantly gained weight, reaching 5700 g at four months after birth. The newborn refused feeding at the beginning of treatment, but with physiotherapy and a nasogastric tube prescribed by the pediatricians, feeding behavior improved after three weeks (Fig. 2c).

3. Result and conclusion

The Tübingen soft palate plate and early closure of the hard and soft palate (velopharyngoplasty) after three months for the management of nasopharyngeal airway obstruction in an infant with Pierre Robin sequence led to immediate improvement in oxygen saturation and respiration. Brosch et al.⁴ also successfully used the



Fig. 2. (a) Newborn with PRS before insertion of the palate plate. (b) Infant two weeks after plate insertion. (c) Infant after five months.

Tübingen soft palate plate and early surgical cleft palate closure in infants, but with emphasis on Eustachian tube function, swallowing and hearing, whereas in our individual case, the challenge was to alleviate acute nasopharyngeal airway obstruction and low oxygen saturation.

The upper airways were effectively freed while a positional change of the retrognathic mandible was achieved, thus allowing further constant mechanical improvement in function of the infant's airways, deglutition and ingestion. This minimally invasive, conservative therapeutic option posed no technical problems. It was manageable, safe and acceptable to the infant. Growth of the mandible was stimulated and it had clearly advanced after four months. The plate was tolerated by our little patient and solved the serious problem of the unphysiological position of the tongue, which before correction had worked as a kind of inspiratory valve, causing mechanical occlusion of the glottis.⁷ The current trend toward non-invasive primary treatment led us to use the Tübingen soft palate plate. In our case of PRS, traumatic surgical complications could be avoided in the initial postnatal period. The Tübingen soft palate plate proved to be a good and efficient means of widening the nasopharyngeal airway to manage airway obstruction, and then allow closure of the cleft palate at the very early age of three months.

Conflict of interest

None.

Funding

None.

Ethical approval

I confirm that written informed consent was obtained from the parents of the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request. The parents of the patient signed the permission for a publication.

Author contributions

I, Gerzanic Lucia and Feichtinger Matthias collected the material. We were supported by Kärcher Hans to write the publication for submitting to your journal. It was the first time for us to use the Tübingen palate plate at our clinic and we could give the patient a non operative way of solution before closure of the cleft palate.

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