



## Presurgical orthopedics in patients with unilateral cleft lip and palate: clinical case reports

### *Ortopedia prequirúrgica en pacientes de labio y paladar hendido unilateral: presentación de casos clínicos*

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#### ABSTRACT

The attention of patients with cleft lip and palate on the basis established by McNeil, Burston, Hotz, Gnoinski among others is hereby presented using a stimulating palatal obturator with 10 patients of the Orthodontics Service at the Children's Hospital of Mexico «Federico Gómez». Two patients didn't return and one died before the second appointment. The benefits of presurgical orthopedics were observed, improving the patient's functional and physical appearance, such as swallowing, tongue position in the oral cavity, improvement in the relationship of the maxillary segments and narrowing of the fissure. Following the protocol established by the Children's Hospital of Mexico «Federico Gómez» based on the Zurich approach (McNeil, Hotz, Burston, Gnoinski, et al), the procedure resulted suitable for surgical preparation of palatoplasty and cheiloplasty in patients with unilateral cleft lip palate.

**Key words:** Presurgical orthopedic, cleft lip and palate, blanking and stimulating plate.

**Palabras clave:** Ortopedia prequirúrgica, labio y paladar fisurado, placa obturadora estimuladora.

#### RESUMEN

Se plantea el manejo de atención a pacientes con labio y paladar fisurado con base en lo establecido por McNeil, Burston, Hotz, Gnoinski, entre otros. Utilizando la placa obturadora estimuladora en 10 pacientes del Servicio de Ortodoncia del Hospital Infantil de México «Federico Gómez», de los cuales dos pacientes no regresaron a sus citas y uno falleció antes de la segunda cita; observándose beneficios de la ortopedia prequirúrgica mejorando el aspecto funcional y físico, como deglución, posición lingual en la cavidad oral, mejoría en la relación de los segmentos maxilares y estrechamiento de la fisura, siguiendo el protocolo establecido en el Hospital Infantil de México «Federico Gómez» con base en el enfoque Zurich (McNeil, Hotz, Burston, Gnoinski, et al), resultando muy adecuado para la preparación quirúrgica de queiloplastia y palatoplastia en pacientes con fisura labiopalatina unilateral.

#### INTRODUCTION

The cleft lip and palate malformation occurs between the 6th and 12th weeks of embryonic life. As we know these are critical weeks in the development of the lip and palate.

A combination of normal connection failure or inadequate development in the abovementioned weeks, can affect the soft tissues and the bony components of the upper lip, the alveolar process as well as the palate thus the cleft lip results from the lack of fusion of the mesenchymal masses of the medial nasal and maxillary prominences while the cleft palate is a consequence of the lack of union between the mesenchyma of the palatal prolongations.

It has been determined that the etiology of this congenital malformation is very diverse and varied,

however it is possible to classify the etiologic factors in two large groups: genetic and environmental.

In 25% of the affected children the cause of the cleft lip and palate is unknown and in the remaining 75%, the etiology is associated mainly to polygenic or multifactorial inheritance, as it is attributed to the result of complex interactions between a variable number of «minor» genes that act by additive action

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(polygenic) usually from hardly identifiable action and number and denominated in general terms as genetic predisposition and usually unknown environmental factors. It should be noted that from that 75% of the cases, only 25% has a family history of cleft lip and palate in its various expressions. It has also been observed that the majority of cases refer a prenatal history of drug ingestion, previous abortions and disorders during pregnancy, emotional disorders, maternal age of more than 40 years, metrorrhagia in the first trimester of pregnancy and gestational diabetes.

Current data suggest that the overall incidence of maxillofacial clefts is between 1:500 and 1:700 births, although in recent years because of birth control and genetic counseling, the incidence has decreased.

Dr. Ignacio Trigos published in the *Journal of Plastic Surgery* that in Mexico, cleft lip and palate, occupies the first place in birth defects, reporting 1.39 cases per 1,000 registered live births, that is one case per 740 live births. These data make it possible to identify that in Mexico there are 3,650 new cases per year, a figure considered as annual incidence of cleft lip and palate at a national level.<sup>1</sup>

It has been shown that lip clefts are more frequent in males, whereas isolated clefts of the palate are more common in women. Similarly, the cleft lip is more common on the left side than to the right. These phenomena lack of explanation and the underlying cause of the deformity is only partially understood.

### **Presurgical orthopedics**

Since the 1950's, in Europe and the United States in the clinics of the cleft lip and palate the ideas of C. Kerr McNeil, Scottish prosthetist, have been considered as fundamental. He supported the use of presurgical neonatal maxillary orthopedics. Through his observations he learnt not to accept that middle third retrusions were due to a delay in development due to a traumatic surgery, and focused on what was established by James Scott who suggested that segments of cleft palate that were debrided downwards and forwards during surgery deprived the septum nasal of its growth impulse by keeping it short, deficient and thus causing depression of the middle third. So it was that McNeil initially suggested by assumptions and observations that repositioning of the maxillary segments using orthopedic appliances would produce an apparently normal maxilla. He created the theory that the action of the appliance would reduce nasal and labial distortion bringing the palatal segments closer together. McNeil stated that

the use of orthopaedic appliances from the moment of birth for the alignment of the palatal segments in an ideal relationship corrects the bone deficiency by stimulating growth of the palatal segments. He interpreted that the cause of many middle third deficiencies was a strict condition of development deficiencies due to the debridement of the vomer during surgery. He even ventured for the first time (without evidence) that growth stimulation through a plate could eliminate almost all palatal fissures before performing the surgical procedure. The McNeil plates were initially built from a series of modified models where the cleft palate was gradually reduced. Each consecutive plate gradually corrected the position of the segments of the palate. These plates had areas of stimulation that pressed gently the palatal mucosa at a distance slightly short of the margins of the fissure. By doing this, he assumed that the light pressure would stimulate growth of the underlying bone thus reducing the width of the cleft.<sup>2</sup>

After the introduction of neonatal maxillary orthopedics also called presurgical orthopedics by C. Kerr McNeil more than half a century ago, it has been quickly adopted around the world, however, scientific evidence of its benefits has not been sufficient. From this moment on, different types of orthopaedic surgery have been described in the literature from fixed appliances with pins to passive plates on the opposite side. Arbitrarily these devices have fallen into three categories: active, semi-active or passive. In summary, active devices are those that will force the maxillary segments to be in a specific position using springs or screws; semi-active systems are those where the segments in a study model were moved to the most favorable position and subsequently by the plate is made on this new model, suggested initially by McNeil and Burston.<sup>3</sup>

Passive devices are those that produce an induction to arch alignment during growth by making adjustments to the plate in specific areas to ensure the spontaneous development of the segments. The plate is held in place by suction and adhesion only, without the need for a mandatory extraoral force. Here is where the so-called «Zürich approach» proposed by Hotz and Gnoinski arises. It is the best known representative of presurgical orthopaedics.

Before the development of the modern school of presurgical orthopaedics there were already in use connections of the clefts by using adhesive tapes thanks to Brophy and his studies where he proposed to connect both sides of the alveolar clefts with the objective of strengthening them for a subsequent lower lip correction.<sup>4</sup>

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