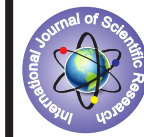


## Neurorehabilitation and physical therapy on infant with Moebius syndrome.



### Science

**KEYWORDS:** Moebius Syndrome, facial paralysis, physiotherapy, physiotherapeutic treatment.

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### ABSTRACT

**Introduction.** The characteristics of Moebius syndrome are result of deterioration of the structures that affect the central nervous system.

**Objective.** To determine the neurorehabilitation improvement in children with Moebius syndrome through physical therapy and electro-stimulation in the Physical Medicine and Rehabilitation Ward of the Children regional hospital Dr. Rodolfo Nieto Padrón in the city of Villahermosa, Tabasco from 2015 to 2016. **Material and methods.** An observational, descriptive, longitudinal and prospective study was made on patients with Moebius syndrome during a period of time of a year (from 2015-2016). Such procedure was done using psychiatric treatment employing the Castillo Morales technique and Electro-stimulation. The resulting data was processed and analyzed with Microsoft Excel Software.

**Result.** Three female and one male patients were evaluated. The patients had an average weight of  $2.88 \pm 0.67$  kilograms, the ages of the patients were  $2.1 \pm .8$  years old. In regards to the Castillo Morales method, we observe 90% of activity of head control, 97.5% in the improvement of suction, and 95% of deglutition. Concerning the electro-stimulation of the suction and deglutition improved 97/5% and 95 % respectively. **Conclusion.** It was found an improvement in suction (97.5%) and (100%) in correct breathing. About the development skills of independent creeping (100%), head control and bilateral rolling both showed a final result of (90%).

### INTRODUCTION

Moebius syndrome is a rare entity that consists in bilateral facial paralysis and the external rectus eye muscle due to agenesis or aplasia of the cranial nerves VI and VII. The rate is that of 1 for every 10,000 births. It affects both sexes (Palmer Morales, et al, 2013). The common clinical characteristics are result of deterioration of the structures of the central nervous system (Sabaneff, Mendez Motta, et al 2014). This causes a hard entrance for air as a result of the limited mouth opening and the risk of central apnea (Requena Mendoza, Cardenas Mendoza, & Frias Chavez, 2014); (McClure, Booy, Katarincic, & Ebersson, 2016).

Described as the combination of congenital paralysis of the abducens nerves and facial, with characteristics such as orofacial malformations, defects on the extremities, and musculoskeletal abnormalities, behavioral and cognitive (MacKinnon, et al, 2015). The syndrome occurs sporadically, where they can be autosomal dominant or recessive and cytogenetic recessive studies linked to the X chromosome that show the location of chromosome 13 (Ferreira Guades, 2014). Being substantial the surgical intervention in a third level hospital (Powell, Sharma, & McKie, 2016).

The adapted facial exercises can help to improve the facial function, mainly to people with moderate paralysis and chronic cases (Texteira, Valbusa, & Prado, 2011). In the same way that electro-stimulation, which consists in applying electromagnetic energy to the organism (in different ways), with the aim to produce in the area biological and physiological reactions. It use has been attributed to the augmentation of muscular resistance, toning, and muscular hypertrophy; reducing pain, cellulitis and improving blood flow. (De la camara Serrano & Pardo Sevillas, 2016)

For the above mentioned, the objective of this study consisted in determine the improvement in the neurorehabilitation of children with Moebius syndrome by applying the Castillo Morales techniques and electro-stimulation in patients in the Physical Medicine and Rehabilitation ward of the High Specialty Regional Children Hospital Dr. Rodolfo Nieto Padron in Tabasco, Mexico.

### MATERIALS AND METHOD.

#### Study design

An observational, descriptive, longitudinal and prospective study was made on patients with Moebius syndrome during a period of time of a year (from 2015-2016) in Physical Medicine and Rehabilitation ward of the High Specialty Regional Children Hospital Dr. Rodolfo Nieto Padron in Tabasco, Mexico.

Universe, sample, and sampling.

The universe and sample was not probabilistic, chosen through a sampling by convenience.

#### Selection Criteria:

Inclusion: Patients diagnosed with Moebius Syndrome and that were referred to the Physical medicine and Rehabilitation ward. Exclusion: Patients with psychiatric treatment previous to the study, older than 4 years old, and hospitalized. Elimination: Patients that perish during the study or had a tracheotomy less than months before.

#### Plan de recolection

The data was recollected through a data recollection tool which consist of a questionnaire of 16 items with variables such as gender, age, weight, type of delivery, head circumference at the moment of birth, head control, rolling, creeping, crawling, standing, gait individual gait, suction, deglutition, mastication, right breathing, gestures.

For the therapy it was employed the integral therapeutic concept of Castillo Morales which indicates: Infants with genetics syndromes and muscular hypotonia, with cerebral paralysis. At the beginning of the technique it was employed sitting and lying on the back (supine); which made it easier for the child to make eye contact with the physiotherapist, executing orofacial stimulation maneuvers, of face and the independent activities of eating and drinking.

It was used electro-stimulation with the equipment MULTIPLEX® at 100 MHZ type of exponential current lasting three minutes per motor facial point.

Both were applied during 33 sessions in a period of 12 months.

#### Analysis Plan

The data was processed and analyzed by the software Microsoft Excel and the data was presented in average  $\pm$  of standard deviation where it was required.

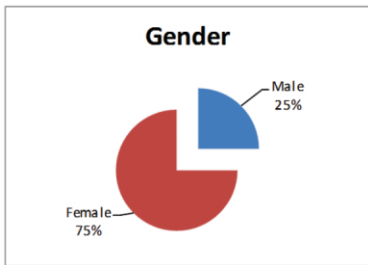
#### Ethical consideration.

This study consists in determine the muscular facial toning and the development skill, therefore, according to the Salubrity Law, Title fifth, Article 99 (Salud, 2016), the project was approved by the ethics and research committee of the High Specialty Regional Children Hospital Dr. Rodolfo Nieto Padron, as well as the Universidad del Valle de Mexico, Campus Villahermosa.

**RESULTS**

As for the patients, 25% of them were male a percentage corresponding to one male child, and three female children (75%). Illustration 1.

**Illustration 1.**



Source: Neurorehabilitation and physical therapy on infants with Moebius syndrome.

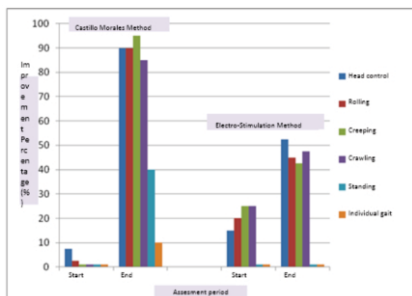
In relationship with the average weight of  $2.88 \pm 0.6$  kilograms; with average age of  $2.1 \pm 0.8$  months.

As far as the development skill with the Castillo Morales treatment, at the beginning of the study the patient had a slight head control (7.5%) and improved a (90%); in bilateral independent rolling at the beginning they had a percentage (2.5%) and achieved (90%) by the end of it; in the case of creeping, after 33 session the results were of 95%.

In relationship with the treatment with electro-stimulation, at the beginning the two patients had a head control of 15% and 20%; 20% for bilateral rolling; 25% for creeping, gait, and standing.

At the end of the 33 sessions applying the electro-stimulation MULTIPLEX® at 100 mhz, an improvement was achieved of 52.5% on head control, 45% of bilateral rolling. Illustration 2.

**Illustration 2. Percentage of Improvement in development skills.**



Source: Neurorehabilitatio and physical therapy on infants with Moebius syndrome.

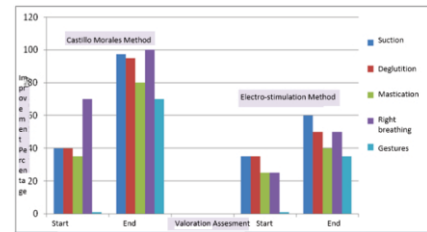
As for the orofacial functions the patients treated with the Castillo Morales method, they started at 40% in suction and deglutition activity, at the end of the study the achieve 97.5% for suction and 95% of deglutition respectively. In the case of mastication they started with 35% of activity, ending with an 80% of improvement by the end of the measuring.

In relationship with the gesticulation and facial muscle contractibility the patients started without any acidity achieving and improving a 70% by the end of the study.

According to the patients that went under electro-stimulation, they started at 35% of suction and deglutition activity, improving a 60% in suction and 50% in deglutition.

As for gesticulation and facial muscle contractibility a 35% improvement was achieved in contrast to the apparent lack of activity.

**Illustration 3. Percentage in the improvement orofacial functions**



Source: Neurorehabilitation and physical therapy on infants with Moebius syndrome

**DISCUSSION**

Moebius syndrome is a congenital paralysis of the facial nerve or a compromise in other cranial nerves. It has been reported abnormalities where the cranial nerves most commonly compromised are Vi or abducent (75% of the cases), while VIII generally is respected (Mendoza Urbano, Ramirez Chayne, & Saldarriaga Gil, 2016). Von Graefe and Möbius proposed that the diagnostic of Moebius syndrome must be done when found simultaneously congenital facial diplegia and bilateral paralysis of the abducent nerve (Palmer Morales, et al, 2013). Similar data were obtained in the physical exam of one two-years-old female child on who facial asymmetry was observed, bilateral convergent strabismus, upper and lower prominently everted lips. The paralysis of the facial left nerve and the paralysis of the bilateral abducent nerve which are obtained by means of a neurological assessment (Revanna Srinivas, Mudabasappagol Vaishail, Shamachar Vedaraju & Rangaswamy Nagaraj, 2016) joined with hearing lost and metal retardation (Rocker, et al, 2014). In our study all the infants showed the presence of carious lesions, as well as beginning of periodontal disease, given the weakness of the muscles that intervene in the mastication process. Martin Mussi et al 2016 point out that patients with Moebius syndrome show diminution on the saliva flow and the capacity of mandibular cushioning.

**CONCLUSION**

In relationship with the final results obtained, a meaningful improvement in patients that were treated with Castillo Morales method was seen. At the end of the study there was an improvement in suction (97.5%) and right breathing (100%) on right breathing, as for the development skills there was an improvement of individual creeping (100%), head control and bilateral rolling both got a final result (90%)

In order to avoid psychomotor delays and high risk neurological damage, it is very important to start immediately with the stimulation in the face and mouth area and activate all the facial muscles.

**REFERENCES:**

- Palmer Morales, Y., & Zárate Márquez, R. E. (2013). Síndrome de Moebius Informe de un caso clínico. Revista Médica del Instituto Mexicano del Seguro Social, 51(5), 584-586.
- Sabaneeff, L., Mendez Motta, H., Castro, J., tufik, S., & Morgadinho Santos Coelho, F. (2014). Moebius syndrome and narcolepsy. Sleep Science, 43-46.
- De la camara Serrano, M. A., & Pardo Sevilla, A. I. (2016). Revision de los beneficios físicos de la electroestimulación integral. Actividad Física y Salud, 1(123-1), 28-33.
- Ferreira Guedes, Z. C. (2014). Moebius Syndrome: Misoprostol use and speech and language characteristics. Int Archives Of Otorhinolaryngol., 18(3), 239-243.
- Mackinnon, S., Oystreck, D. T., Andrews, C., Wai Man, C., Hunter, G. D., & Engle, E. C. (2015). Diagnostic distinctions and genetic analysis of patients diagnosed with Moebius syndrome. National Institutes of Health, 121(7), 1461-1468.
- McClure, P., Booy, D., Katarincic, J., & Ebersson, C. (2016). Orthopedic Manifestations of Moebius Syndrome. International Journal of Pediatrics, 6.
- Powell, T., Sharma, N., & McKie, K. T. (2016). Postobstructive Pulmonary Edema following Tonosillectomy/Adenoidectomy in a 2 year old with Poland Moebius Syndrome. Hindawi Publishing Corporation, 2.
- Salud, S. d. (01 de 06 de 2016). Ley General de Salud. Diario Oficial de la Federación.
- Texteira, L. J., Valbusa, J. S., & Prado, F. G. (2011). Physical therapy for Bell's palsy. Cochrane Library, 10(1002).
- Requena Mendoza, A., Cardenas Mendoza, M. A., & Frias Chavez, M. R. (2014). Rehabilitacion de una boca sin sonrisa. Investigacion materno infantil, 6(2), 75-78.
- Martins Mussi, M. C., Moffa, E., Castro, T., Lira Ortega, A., Freitas, G., Braga, M., ... Cury Gallotini, M. H. (2016). Salival parameters and oral health in the moebius syndrome. SPECIAL CARA IN DENTISTRY, 36(5), 265-270.
- Mendoza Urbano, D. M., Ramirez Chayne, R., & Saldarriaga Gil, W. (2016). Piebaldism-Moebius and prenatal exposure to misoprostol: a case report. Facultad de Medicina -

- Universidad de Antioquia, 29(1), 81-87.
13. Revanna Srinivas, M., Mudabasappagol Vaishail, D., Shamachar Vedaraju, K., & Rangaswamy Nagaraj, B. (2016). Moebius syndrome: MR findings. *Indian Journal Radiology and Imaging*, 26(4), 502-505.
  14. Rucker, J. C., Webb, B. D., Frempong, T., Gaspar, H., Naidich, T. P., & Wang Jabs, E. (2014). Characterization of ocular motor deficits in congenital facial weakness: Moebius and related syndromes. *Brain a journal of neurology*, 137(4), 1068-1079.