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Tutorial

# Orofacial myofunctional disorders related to malocclusion

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# OROFACIAL MYOFUNCTIONAL DISORDERS RELATED TO MALOCCLUSION

**Ana Lía Garretto**

**ABSTRACT**
The purpose of this article is to enhance awareness about different pathologies that can be minimized or alleviated simultaneously. The author writes about the assessment, the etiologies, the differential diagnosis and the most important interdisciplinary team.

**Keywords:**

## INTRODUCTION

The stomatognatic system is a morphofunctional unity anatomically integrated and physiologically coordinated; its constitution is of a heterogeneous conjunct of tissues and organs (Biolcati, Garretto, & Nicosia, 1995). The results of treatment obviously depends on a competent, detailed differential diagnosis and must encompass knowledge of allied specialty areas and related treatments (Cistulli, Palmisano, & Poole, 1998; Davidson, Haryett, & Sandiales, 1967; Feijoo, 1963; Garretto, 1995).

## ETIOLOGICAL FACTORS

Mouth Breathing
The respiratory function has major influence in the development of the Orofacial complex and emerges at birth. Mouth breathing has been associated with a distinct pattern of effects on facial growth (Bresolin, Shapiro, & Shapiro, 1984; Garreto, 1996; Nowak & Warren, 2000). It is known that all children breathe through the mouth from time-to-time because of nasal congestion, transient obstruction or during periods of physical activity or exercise. However, some children, without organic obstruction or congestion related to current hypertrophy tonsils and/or adenoids(Figure 1), to rhinitis, or to allergies (Ramirez de los Santos, 1991; Sweeney, 1997) continue to breathe through the mouth even though the nasal problems no longer exist (Nowak & Warren, 2000; Zickefoose & Zickefoose, 2000). Some investigators have reported that the prevalence of mouth breathing decreases with age (Gross, Kellum, & Franz, 1994; Pierce, 1980; Warren, Hairfield, Seaton, 1988). However, adults may still suffer from enlarged adenoids (Biolcati www.sinfomed.org.ar).

The low/forward tongue resting posture of a mouth breather is obligatory (Adamidis & Spyropoulos, 1983; Ramirez de los Santos, 1991). The effect of this low and forward tongue resting posture in addition to the impact of open mouth posture has two major effects on the growth of the orofacial complex (Ramirez de los Santos, 1991).

First, lower tongue position reduces the role of the tongue in fostering growth in the width of the maxillary arch. Studies have demonstrated that maxillary arch-width is reduced in children with chronic nasal obstruction (Strnad, 1978). Several other studies reported that chronic airway obstruction promoted by nasal allergies and asthma is also associated with posterior crossbites - indicative of narrower maxillary arch (Garretto, 1992, Nowak & Casamassino, 1995; Nowak & Warren, 2000; Venetikidou,1993).

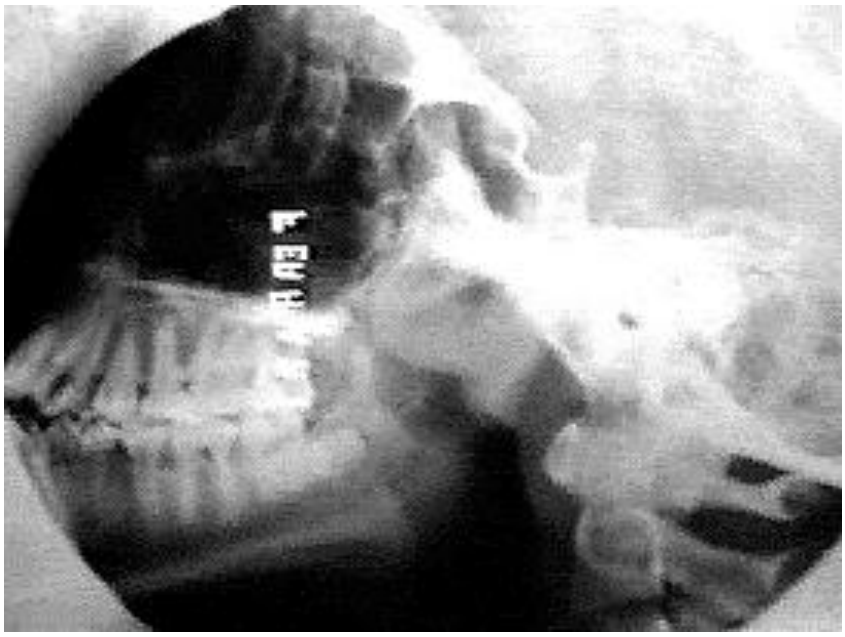

**FIGURE 1**
Adenoids hypertrophy in adults

Second, open-mouth resting posture associated with mouth breathing often leads to over-eruption or to the supra eruption of the secondary molars. The mandible rotates downward in its resting position (Principato, 1991; Strnad, 1978). This downward rotation may contribute to longer lower face height and somewhat retrusive mandibles as growth and development continues.

Some investigators have studied the made a study to investigate the relationship between nocturnal enuresis and upper airway obstruction in pediatric population (Cistulli, Palmisano & Poole, 1998). They concluded that upper airway obstruction is probably one of the contributing etiology factors in nocturnal enuresis. There was improvement in controlling the enuresis after the nasal obstruction was treated. There are several hypotheses to explain the relationship between upper airway obstruction and nocturnal enuresis. Madern

**Lateral Cranio Radiography** is a useful tool to evaluate adenoid size. Sometimes, tonsils shape and size, and the implications of shape and size inrelation to upper airway obstruction can be observed (Cayley, Tindall, Sampson, Butcher, 2000; Maw, A. et al., 1991)). Looking at the cephalometric head film taken by the orthodontist can assist the orofacial myologist (Allegrotti, 1992; Ricketts, et al. 1988).) (see Figure 2). The cephalometric assessment gives more reliable images for the diagnostician by avoiding cranio-rotation, and provides the characteristics of double image of vertical and horizontal branches of the mandible, and the changes that this may produce in the evaluation of the rinopharynx (Garretto, A.: Factores de Riesgo en los desordenes Miofuncionales Orales. Educación Médica Interactiva. http//www.sinfomed.org.ar/revelct.htm; Garretto, 1992; Gross, Kellum, Franz et al.; 1994)

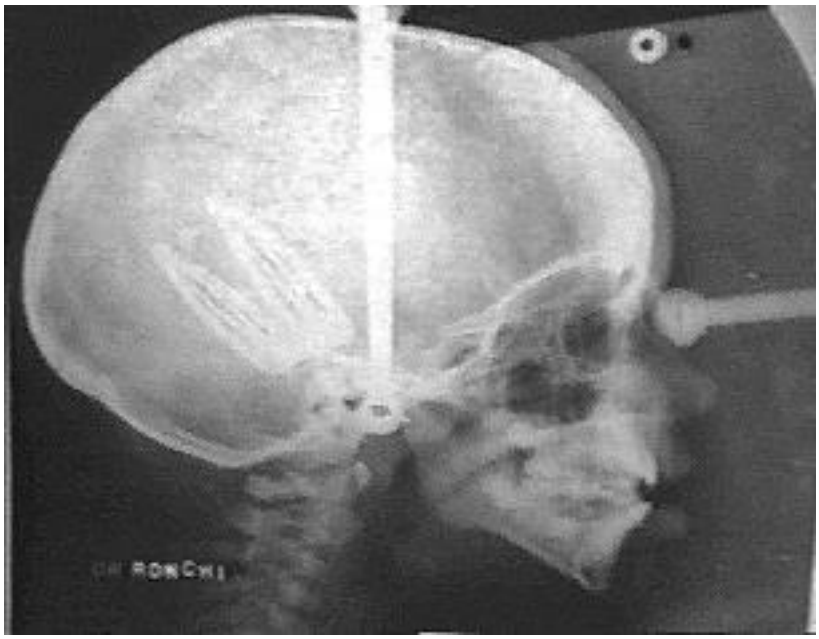

**FIGURE 2**

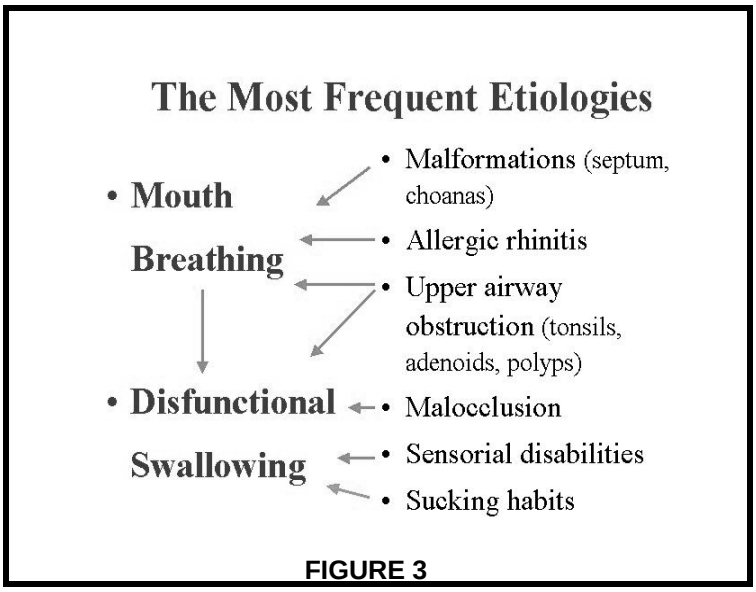


**FIGURE 3**

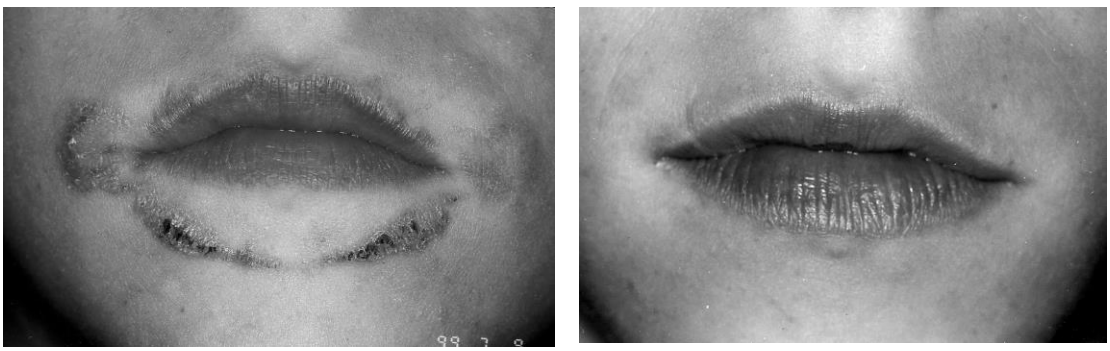

**FIGURE 4**

Mouth breathing or open-mouth resting posturing promotes abnormal swallowing patterns that can lead to malocclusion and sensorial disabilities. The literature expresses a multifaceted myriad of etiologies (Garretto,1993; Hanson, 1988; Hanson & Barrett, 1988; Marchesan, 2000; Segovia, 1988; Zambrana Toledo Gonzalez, & Dalva López, 1999): (see figure 3)

1. Bottle feeding
2. Upper airway obstruction
3. Mouth breathing
4. Excessive non-nutritive sucking habits of the: tongue, digits, thumb, cheeks, objects, clothes, upper and/or lower lip
5. Structural disharmonies (skeletal malocclusions)
6. Deglutition disorders because of enlarged tonsils
7. Restriction of the lingual or labial frenum
8. Long period of open spaces during mixed dentition
9. Tongue size discrepancies (macroglossia or microglossia)
10. Oral sensory deficiencies
11. Genetic structural characteristics such as a narrow and/or high palatal arch
12. Prolonged soft diet
13. Environmental pressures
14. Psychological problems

**Oral habits**

Some oral habits in infants have been linked to medical conditions including associations between acute otitis media and early cessation of breastfeeding. Little association has been found between oral habits and general health beyond infancy; however, such persistent habits can have profound effects on orofacial structures (Hultcrantz, 1991; . Massler, 1982; Nowak, & Warren, 2000). (see figure 4)

Non-nutritive habits sucking behaviors that are adaptative and are rewarded, subsequently become learned habits. Such habits usually are present without psychological abnormality. However, some prolonged thumb or pacifier sucking beyond the preschool years may reflect some psychological disturbance (Nowak, & Warren, 2000). The severity of the non-nutritive induced deformity is influenced by the frequency, the duration and the intensity of the habit (Zdik, Stern, Litner, 1977). Lip sucking is a habit that sometimes depends on the the lips and mouth, or may be related to stress or psychological problems.

Figure 5 represents the frequency and distribution of orofacial myofunctional disorders which were found in 129 children of both sexes, age 5 years to 9 years (mean 7.3 years) with functional malocclusions who were evaluated at the Department of Pediatric Dentistry, University of Buenos Aires (Garretto, et al.; 1996; Garretto, 1999).

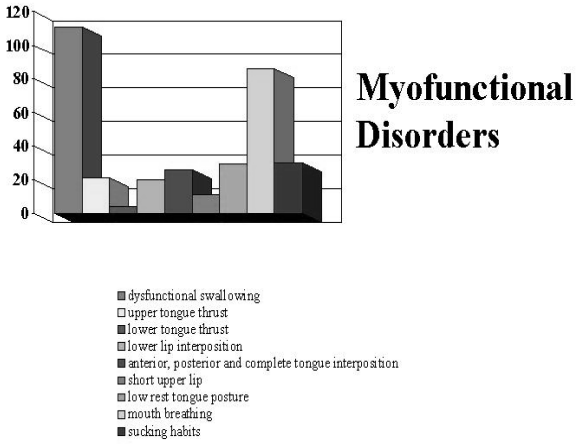


**FIGURE 5**

**? (1982) suggested that nocturnal enuresis is a result of decreased neuromuscular tonus in the course of sleep that is more significant in patients with O.S.A.S. (sleep obstruction apnea syndrome)**

**Obstructive Sleep Apnea Syndrome: (OSAS)**

In an Ear Nose and Throat evaluation parents should be questioned regarding child's sleeping habits. Some of the key

questions include, “Does the patient snore frequently? Is there noticeable thorax contraction during sleep? Does the patient exhibit other signs of sleep apnea?” During the examination when the child is awake, signs of Obstructive Sleep Apnea Syndrome (O.S.A.S.) may not be observable (Biolcati &Garretto,1997; Biolcati**:**www.sinfomed.org.ar). Hypertrophy of tonsils and adenoids is thought to be the number one etiology in this pathology ( Owen, 1995; Paradise, Bernard, Colborn & Janosky, 1998; Venetikidou, 1993). Very small changes in the radius of the oropharyngeal complex can cause great increases in airway resistance (Hultcrantz, 1995; Hultcrantz, 1991). Videotapes taken by parents during sleep, play, eating, television time and other activities can be useful in assisting in making the diagnosis (Biolcati: www.sinfomed.org.ar).
Malocclusion sometimes is cause or effect of myofunctional disorders (Garretto, 1992; Garretto, et al.; 1996); Garretto, A.: Factores de Riesgo en los desordenes Miofuncionales Orales. Educación Médica Interactiva. http//www.sinfomed.org.ar/revelct.htm). The relationship about it was explained.

The orofacial myofunctional occlusion problems in primary, mixed and secondary dentition are reflected in Figure 6: It shows the frequency of malocclusion found in the anterior decrypted study (Garretto, 1999)

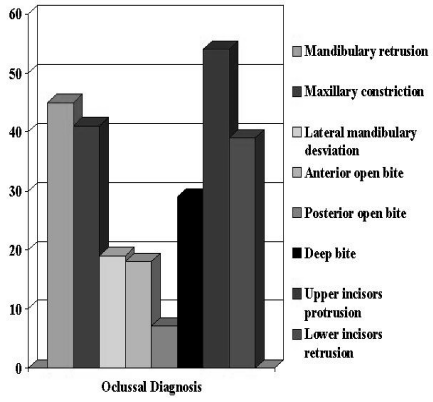


**FIGURE 6**

**TREATMENT IMPLICATIONS**

During 1995, 250 patients reflecting both sexes, mean age 8.5 years of age who received dental pediatric assistance at the Department of Pediatric Dentistry, Buenos Aires University in Argentina were evaluated. The purpose of this study was to explore the relationship between vertical occlusal anomalies: open bite related to abnormal swallowing patterns (tongue thrust) and non-nutritive sucking habits.

The presence or absence of open bite was related to the persistence of sucking habits and abnormal swallowing patterns (tongue thrust) (see Figure 7). Two groups were formed: Group 1 (G1) included 107 patients with orofacial myofunctional disorders, and Group 2 (G2) included 143 patients without evidence of orofacial myofunctional disorders. The findings of this study reflected that 42.8% of the total patients presented non-nutritive sucking habits and/or abnormal swallowing patterns (tongue thrust). 68.22% if G1 and 6.99% of G2 presented open bites. The statistical analysis of both groups by the Chi Square showed significant differences between both groups at $P<0.05$. These results suggest that early treatment of abnormal swallowing patterns and non-nutritive sucking habits may intercept the progression of a functional open bite (Garretto, et al.; 1996).

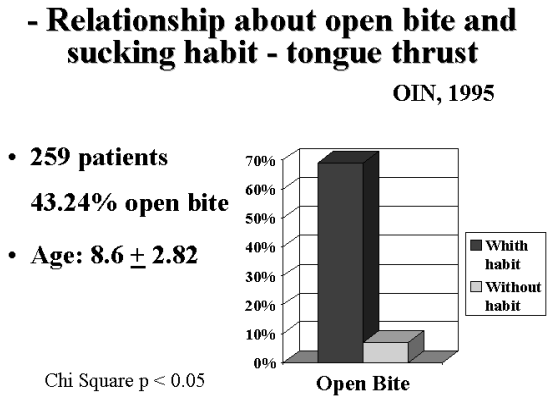


**FIGURE 7**

After the diagnosis by the referral source, the Orofacial Myofunctional therapist must do a thorough evaluation to maximize the

opportunities for rehabilitation (if appropriate), or habilitation. The following should be included in that evaluation (Garretto,1993; Garretto, 1999; Garretto, et al.; 1996; Garretto, 1995; Garretto, 1992):

- Case history
- Spontaneous observations and evaluation of the patient
- Detailed explanation to the parents regarding the problem(s), the etiology(ies)
  involved and what, if any, treatment(s) are indicated
- Installation and assessment of motivation
- Examination of X-rays, videotapes and dental models if appropriate
- Facial examination and photographs
- Evaluation of the orofacial mechanism
- Observations of resting posture and swallowing patterns
- Speech articulation inventory
- Other special an specific tests as needed

Problems such as mouth breathing may require team management for adequate diagnosis and treatment planning. The team follows a conservative approach, even though surgery may be required to manage some problems.

The entire treatment is based on treating the patient as a unique individual. To ensure adequate patient care, all things are documented and explored, even obstructive sleep apnea syndrome (O.S.A.S.)

In Argentina there are numerous ways to approach treatment (Ricketts, et al., (1988). The author admits similarities with other approaches, but emphasizes the importance of how the uniqueness of a patient and the orofacial myologist's philosophy make the treatment unique (Hultcrantz, et. al.;1991) The orofacial myologist's philosophy of treatment impacts **when**, **how** and **why** to intercept a problem.

The orofacial myologist must work at developing a good rapport with the patient, the parent and the referral source. The myologist must be able to adapt to various the age groups, the cultural backgrounds, the social needs in addition to the emotional and economic factors. Prevention, integration, individualization and long-term follow-up should be emphasized. Oral perception and oral stereognosis (the ability of the mouth to recognize shape and texture) should also become a part of the therapy program (Cayley, Tindall, Sampson, Butcher, 2000; Garretto, 1992).

The author was involved in research regarding the "Evaluation of the Treatment of Functional Malocclusions with Orthopedic Appliances and Orofacial Myofunctional Therapy" in 1999 (Garretto, 1999). The purpose of this study was to evaluate 129 children of both sexes and to evaluate clinically the functional malocclusion treatment with orthopedics and orofacial myofunctional therapy in patients in primary dentition and mixed dentition. This study was completed at the Department of Pediatric Dentistry at the University of Buenos Aires. The children were randomly divided into three groups:

- Orthopedics (O)
- Orofacial Myofunctional Therapy (O.M.T.)
- Orthopedics and Orofacial Myofunctional Therapy (O-O.M.T.)

Integral discharge, treatment-duration and dropouts were assessed. The results indicated that the O-O.M.T. group exhibited integral rehabilitation of the stomatognathic system in 100% of the patients, 70.59% of the children in the O group required complementary oral myofunctional therapy treatment following resolution of the occlusal alterations. 81.25% in group O.M.T. required complementary treatment with functional orthopedic treatment to correct the occlusal alterations associated with myofunctional alterations. The lowest

proportion of dropouts was observed in the O-O.M.T. group (6.97%). Statistical analysis of the data was performed by ANOVA and Tukey Kramer's test and revealed statistically significant differences. The results suggest that combined treatment with orofacial myofunctional therapy are more effective and does lead to fewer drop-outs. (see figure 8). The importance of the interdisciplinary team approach to orofacial myofunctional therapy cannot be overlooked. It is essential to assist in the diagnosis, the treatment and the follow-up necessary in therapy.

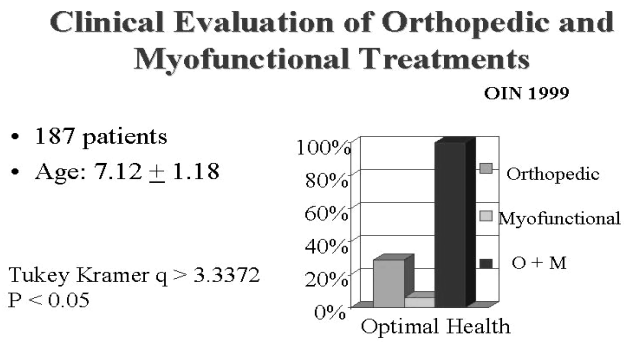


**FIGURE 8**

Orofacial myofunctional disorders related to mastication, deglutition, breathing mode and overall body posture are thought to be contributing aspects to malocclusion. The etiology of the malocclusion is not due to an isolated etiology, but rather the etiology is composed of numerous contributing facets (Gross, Kellum, Franz et al., 1994; Marchesan, 2000; Segovia, 1988; Zambrana Toledo Gonzalez, Dalva López, 1999 ). It is important that the interdisciplinary team be knowledgeable of these interwoven facets. In many dental congresses, lectures, conventions and symposiums the orofacial myologist is now recognized as an important member of such an interdisciplinary team (Garretto,1993). A specialist in orofacial myofunctional therapy must be knowledgeable of the specialty areas that compose the etiologies.

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REFERENCES

**Adamidis I.P., Spyropoulos Mn:** (1983) The effect of lympadenoid hypertrophy on the position of the tongue, the mandible and the hyoid bone. European Journal of Orthodontics Vol 5. pp. 287-294.

1. **Allegrotti, Isabel, y col.:** (1992) Evolución de la oclusión en el niño PRECONC. Curso 3 Odontología Integral para niños II, Módulo 3 Oclusión, submódulo 1. Paltex .

2. **Biolcati A., Garretto, A. y col:** (1997) El niño respirador Bucal. Boletín Asociación Argentina Odontología Niños. 26 (1) 3-8

3. **Biolcati, A:** El niño Respirador Bucal. Educación médica interactiva. htpp//www.sinfomed.org.ar/revelect.htm

4. **Biolcati, A., Garretto, A., Nicosia, O., y col.:**(1995) "El niño respirador bucal" I Congreso Interamericano de O.R.L. Pediátrica. Anales.

5. **Bresolin D, Shapiro PA, Shapiro GG, et al.:**(1984) Facial characteristics of children who breathe through the mouth. Pediatrics 73:622-5

6. **Cayley AS, Tindall AP, Sampson WJ, Butcher AR:**(2000) Electropalatographic and cephalometric assessment of myofunctional therapy in open-bite subjets. Australian Orthodontic Journal ; (1):23-33

7. **Cistulli P.A.; Palmisano R.G.; Poole M.D.:** (1998) Treatment of obstructive sleep apnea syndrome by rapid maxillary expansion. Sleep, 21:8, 831-5.

8. **Davidson, P.O., Haryett, R.D., Sandiales, M. et al.:** (1967) Thumb sucking: Habit symptom? G. de Chal, 34:252-9.

9. **Feijoo, G.:** (1963) Ortopedia Funcional. Atlas de la Aparatología Ortopédica. Mundi.

10. **Garretto, A.:** (1995) Aportes de la Fonoaudiología a la Cirugía en Niños. Actualización en Odontopediatría. Cuadernos de Colección. 1 (2) 29-31.

11. **Garretto, A. et al.:** (1996) Relationship between Myofunctional Disorders and Vertical Occlusal Anomalies. Journal Dental Research 75(5), 49.

12. **Garretto, A.:** Factores de Riesgo en los desordenes Miofuncionales Orales. Educación Médica Interactiva. http//www.sinfomed.org.ar/revelct.htm

13. **Garretto, A.:** (1993) Oral Myofunctional Therapy in Argentina. International Journal. of Orofacial Myology. Vol. 19, 29.

14. **Garretto, A.:** (1992) Terapia Miofuncional Orofacial y su Relación con la Ortodoncia. Revista Sociedad Argentina de Ortodoncia. 56 (111) 22-30.

15. **Garretto, Ana L.:** (1999) Evaluación de los resultados obtenidos en niños con disgnacias funcionales, y tratamientos fonoaudiológico, ortopédico y combinado. Tesis Doctoral. Facultad de Ciencias de la Recuperación Humana. Escuela de Fonoaudiología. Universidad de Museo Social Argentino.

16. **Garretto, Ana L.:** (1992) Terapia Miofuncional Orofacial y su Relación con la Ortodoncia. Revista Sociedad Argentina de Ortodoncia. Vol. 56 N 111.

17. **Gross AM, Kellum GD, Morris T, et al:** (1993) Rhinometry and open mouth posture in children. American Journal Orthodontic Dentofacial Orthopedic 103:526-529.

18. **Gross AM, Kellum, GD, Franz D, et al:** (1994) A longitudinal evaluation of open mouth posture and maxillary arch width in children. Angle Orthodontic 64:419-24.

19. **Hanson M, Barrett, R.:** (1988) Fundamentals of Orofacial Myology. Charles C. Thomas Publisher

20. **Haryett, R.D., Sandilands, M.:** (1970) Chronic Thumbsucking report. American Journal Orthodontic, 57:164-78.

21. **Hultcrantz, E. et al.:** (1995) The epidemiology of sleep related breathing disorder in children. International Journal of Pediatric Otorhinolaryngology 32 (Suppl.) 63-67.

22. **Hultcrantz, E. et. al.:** (1991) Down Syndrome and sleep apnea-a therapeutic challenge . International Journal of Pediatric Otorhinolaryngology (21 ) 263-68.

23. **Hultcrantz, E.:** (1991) The influence of tonsillar obstruction and tonsillectomy on facial growth and dental arch morphology. International Journal of Pediatric Otorhinolaryngology (22) 125-34.

24. **Maddern, B.R.:** (1990) Snoring and obstructive sleep apnea syndrome Pediatric Otolaryngology Sauders Company, Philadelphia, pp.927 – 934.

25. **Marchesan, IQ.:** (2000) The speech pathology treatment with alterations of the stomatognathic system. International Journal Orofacial Myology. Nov;26:5-12.

26. **Marvin L, Hanson:** (1988) Fundamentals of Orofacial Myology. Thomas Books.

27. **Massler Maury:** (1982) Atlas of the Mouth in health and disease. American Dental Association.

28. **Maw, A. et al.:** (1991) Lateral Cephalometric analysis of children with OME: A comparison with age and sex matched controls. Journal of Laryngology and Otology 105 71-7.

29. **Nowak AJ, Casamassino PS.:** 1995 Using anticipatory guidance to provide early dental intervention. Journal American Dental Association. 126:1156-63.

30. **Nowak, A.J., Warren, J.:** (2000) Infant Oral Health and Oral Habits. Pediatric Oral Health 47 (5): 143-64.

31. **Owen, G. et. al.:** (1995) Screening for obstructive sleep apnea in children. International Journal of Pediatric Otorhinolaryngology 32 (Suppl.) 67-70.

32. **Paradise J.L.; Bernard B.S.; Colborn D.K.; Janosky J.E.: (**1998) Assessment of adenoidal obstruction in children: clinical signs versus roentgenographic findigs. Pediatrics, 101:6, 979-86.

33. **Pierce R B.:** (1980) The role of myofunctional therapy in speech pathology. International Journal Oral Myology. 6(4):11-3.

34. **Principato JJ.:** (1991) Upper airway obstruction and craniofacial morphology. Otolaryngology Head Neck Surgery 104:881-890.

35. **Ramirez de los Santos, J.:**(1991) Odontopediatría Clínica, 487-506. Ed. Amigo del Hogar.

36. **Ricketts, R. et al:** (1988). Técnica Bioprogresiva de Ricketts. Editorial Médica Panamericana.

37. **Segovia, María Luisa:** (1988) Deglución Atípica. Interrelaciones entre la Odontoestomatología y la Fonoaudiología. La deglución atípica. Editorial Médica Panamericana .

38. **Strnad J:** (1978) The cause and effect of mouth-breathing as related to malocclusion. Rhinology 16:191-6.

39. **Sweeney, K.D., et al.:**(1997) Establishment of normal values of nasal choanal size in children: comparison of nasal choanal size in children with and without symptoms of nasal obstruction. International Journal of Pediatric Otorhinolaryngology 39 (1) 51-8.

40. **Vavrina, J:**(1995). Computer assised pulse oxymetry for detecting children with obstructive sleep syndrome. International Journal of Pediatric Otorhinolaryngology 33 (3) 239-48.

41. **Venetikidou A:**(1993) Incidence of malocclusion in asthmatic children. Journal Clinical Pediatric Dentistry 17:89-94.

42. **Warren DW, Hairfield WM, Seaton D, et al:** (1988). The relationship between nasal airway size and nasal-oral breathing. American Journal Orthodontic Dentofacial Orthopedic 93:289-293.

43. **Zambrana Toledo Gonzalez N, Dalva López L.:**(1999). Logopedia y ortopedia maxilar en la rehabilitación orofacial. Tratamiento precoz y preventivo. Terapia miofuncional . Masson, España.

44. **Zickefoose W, Zickefoose J.:** (2000) Orofacial Myofunctional Therapy. A manual for complex Cases. O.M.T. Materials.

45. **Zdik, D., Stern, N., Litner, M.:**(1977) Thumb and pacifier sucking habits. American. Journal Orthodontic 71 (2):197-201