Comparative evaluation and co-relation of difficult airway and Temporomandibular joint disorder in skeletal class II vertical growth pattern and class-I malocclusion – An observational study

Abstract:

Introduction: In the recent years it is observed that there has been increase in the no. of cases of Temporomandibular joint disorder and TMJ pain related problem, many of patients go undiagnosed and may transform into irreversible severe cases if the predisposing factors are present. There are different clinical and radiographical methods of diagnosing TMD cases, and one of the simplest ways to diagnose and categorize a Temporomandibular disorder is Helkimo index. The present study is encouraged to measure difficult airway, in Class II malocclusion with TMD.

Materials and method: The observational study will be conducted in Orthodontics and Dentofacial Orthopaedics department, Sharad Pawar Dental College, Sawangi (M), Wardha in collaboration with department of Radiology, Acharya Vinoba Bhave Hospital. Sawangi (M), Wardha. Total 30 patient in age group of 20 to 50 years, will be selected from the patients coming to Out Patient Department (OPD) of Orthodontics and Dentofacial Orthopaedics, Wardha. MRI of patients with skeletal class II vertical growth pattern and class I malocclusion having temporomandibular joint disorder will be taken and then airway is to be evaluated.

Expected Results : It is expected that individuals with skeletal class II vertical growth pattern and class I malocclusion with temporomandibular joint disorder may have a compromised airway.

Conclusion: No such study has been carried out to evaluate co-relation of difficult airway and temporomandibular joint disorder. Thus, this study aims to evaluate it in skeletal class II vertical growth pattern and class I malocclusion.

Keywords: Temporomandibular joint disorder, Skeletal class II, Vertical growth pattern , Class-I malocclusion

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INTRODUCTION:

"Temporomandibular joint disorder (TMD) is defined as pain and compromised movement of jaw joint and the surrounding muscles usually in front of ears and sometimes in the form of headache."[1]

In the recent years increase in the number of TMD cases and adults with pain in TMJ and related problem many of patients go undiagnosed and may convert into irreversible severe cases if the predisposing factors are present.[2]

There are various clinical and radiographical methods for diagnosing TMD cases, and one of the easiest ways to diagnose and categorize a Temporomandibular disorder is Helkimo index.[3] It includes both anamnestic component and clinical examination of dysfunction which categorizes the TMD as mild moderate or severe.[4] There are various remedial way of treating TMD's, (such as orthopedic stabilization, physiotherapy, pharmacological mode and jaw exercise) .[5.6]

Growth deformity in skeletal class II malocclusion caused by the bones usually related with retrusion of mandible in relation to facial structure.[7] The malformation causes functional disorders which involve the upper airway and the TMJ.[8] Various studied had been done to measure the airway; but, prevalence of Temporomandibular disorders in Class II malocclusion with difficult airway measurement are rare, which encouraged the present study.[9,10]

AIM:

Comparative evaluation and co-relation of difficult airway and Temporomandibular joint disorder in skeletal class II vertical growth pattern and class I malocclusion - An observational study.

OBJECTIVES:

1. To evaluate grading of difficult airway in class I and skeletal class II vertical malocclusion.
2. To evaluate severity of Temporomandibular joint disorder in class I and skeletal class II vertical malocclusion.
3. To compare grading of difficult airway in skeletal class II vertical malocclusion with class I malocclusion.
4. To compare severity of Temporomandibular joint disorder in skeletal class II vertical with class I malocclusion
5. To co-relate grading of difficult airway and severity of Temporomandibular joint disorder in skeletal class II vertical with class I malocclusion.

MATERIAL AND METHODS:

STUDY DESIGN

The observational study is to be conducted in the department of Orthodontics and Dentofacial Orthopaedics, Sharad Pawar Dental College, Sawangi (M), Wardha. The patient in the age group 20-50 will be taken. Patient will be informed about the study and their consent will be taken. Careful history, clinical examination and radiographic examination will be done. For each patient, the Helkimo index will be obtained which will classify them as mild, moderate and severe cases from which moderate cases will be selected for study. Based on Helkimo index patient will be classified for TMD and then for difficult airway.

INCLUSION CRITERIA

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1. Individuals who have a malocclusion of class I type.
2. Individuals who have a malocclusion of class II type with vertical growth pattern having Temporomandibular disorder.

Class I malocclusion	Class II malocclusion with vertical growth pattern
ANB angle - 2^0	ANB angle - 4^0
FMA angle-22-28^0	FMA angle- > 30^0
Y-axis -59.4^0	Y-axis - >59.4^0
SN-MP -21.9^0	SN-MP - >21.9^0
Gonial angle - $128+7^0$	Gonial angle - > 135^0
Beta angle -27- 33^0	Beta angle - <25^0

EXCLUSION CRITERIA

1. Individuals with class II horizontal growth pattern.
2. Individuals with class III malocclusion
3. Individuals with non -TMD class II div 1 malocclusion.
4. Individuals with any systemic disease or any muscular dystrophies.
5. Syndromic Cases.
6. Severe skeletal asymmetry.

METHOD:

The following study will be carried out in the Department of Orthodontics and Dentofacial Orthopedics, Sharad Pawar Dental College.

The study will include cases in total. The patients with class II div 1 will be selected from OPD and consent will be taken for the participation in the study. The total cases will be divided into 2 groups:

Group 1 : Class I malocclusion

Group 2 : Class II malocclusion with vertical growth pattern.

From the randomly selected cases in the OPD the cephalometric analysis of subjects is done.

Digital records of the patient (lateral cephalogram, photograph, models) will be taken and stored. The Helkimo index will be taken to assess the existence and severity of TMD in class II div 1 malocclusion patient which will classify them as mild, moderate and severe cases from which moderate to severe cases will be selected for study.

After the clinical and cephalometric analysis of patient with Temporomandibular disorder they will be subjected to MRI for airway evaluation.

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Upper pharynx – upper pharyngeal width is measured from posterior most part of soft palate to the closest point of pharyngeal wall. Measurement of width is taken from anterior half of the soft palate outline. As it is the region for upper respiratory patency. Since a head film of nasopharynx is a 2D representation of a 3D structure.

Lower pharynx -lower pharyngeal width is considered from the junction of the posterior border of the tongue and inferior border of the mandible to the closest point on the posterior pharyngeal wall.

Soft copy of MRI of individuals will be procured and converted to slices or cuts to JPG format. These slices will then be analyzed on AutoCAD 2010 software. Then the image will be scaled in millimeter scale. Using the scale option, the distance between the two points will be measured.

STATISTICAL ANALYSIS

The analysis be done with use of descriptive and inferential statistics (chi square test, student's paired t and unpaired t test, ANOVA test). Analysis will use software of SPSS 22.0 version and graph pad prism of 6.0 version and $P<0.05$ will be taken as level of importance.

SCOPE

1. This study will assist in early diagnosis of co-relation of difficult airway and Temporomandibular joint Disorder .
2. It will indicate the potential risks factors that lead to Temporomandibular joint Disorders in asymptomatic cases.

EXPECTED RESULT :

It is expected that individuals with skeletal class II vertical growth pattern and class I malocclusion with temporomandibular joint disorder may have a compromised airway.

DISCUSSION:

Patients seeking orthodontic treatment are mostly unaware of the underlying TMD's since they are asymptomatic. During the treatment or after the completion they encounter difficulties with TMJ and airway. Class II malocclusion with vertical growth pattern are the majority population for difficult airway.

This study will assist in early diagnosis of probability of patients having TMD with difficult airway. Hence it will provide better treatment planning for both improvisation of airway as well as preventing TMD.

Kirsi et al in 2011 conducted a study to test the difference between the pharyngeal obstruction using MRI and lateral cephalogram. He took images of upper airway using lateral cephalogram and MRI and clinical observation of tonsil was also done. He found that there was significant

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positive relation in the values of MRI and lateral cephalogram. Therefore he concluded that MRI is a better diagnostic criteria for measurement of upper airway.

Nayana et al in 2015 assessed the upper airway measurement in class II skeletal malocclusion to study the association between the measurements , position , length of the mandible. He studied 80 lateral cephalograms with class I and class II malocclusion and measurements were used for cephalometric study. He concluded that in class II individuals the measurement of nasopharynx and oropharynx was compromise. Reduced upper airway measurements were found in class II malocclusion.

Few of the related studies on temporomandibular joint were reviewed [11,12]. Also studies on Class- I, II, and III malocclusion diagnosis and corrections were reviewed[13-15].

CONCLUSION:

No such study has been carried out to evaluate co-relation of difficult airway and temporomandibular joint disorder. Thus, this study aims to evaluate it in vertical growth pattern for skeletal class II and class I malocclusion.

REFERENCES:

1) Dworkin SF, Huggins KH, LeResche L, Von Korff M, Howard J, Truelove E, et al. Epidemiology of signs and symptoms in temporomandibular disorders: Clinical signs in cases and controls. J Am Dent Assoc 1990; 120:273-81.
2) Nordstrom D. ALF Appliance. http://bit.ly/1fXdioQPublished February 12, 2008. Accessed August 10, 2013.
3) The ALF creating facial beauty and balance by EDWIN DELZ,DDS
4) Correction of dental and cranial sidebend with ALF Article in International journal of orthodontics (Milwaukee, Wis.) · September 2010
5) Joseph AA, Elbowaa J, Cisneros GJ, Eisigsb A. Cephalometric comparative study of the soft tissue airway dimensions in persons with hyperdivergent and normodivergent facial pattern. J Oral Maxillofac surg. 1998;56:135-9
6) Sundrani A, Kamble RH, Ahuja MM, Bhola N, Shrivastav S. Surgical Orthodontic Correction of Class II Malocclusion with Vertical Maxillary Excess and Gummy Smile--A Case Report. Journal of Evolution of Medical and Dental Sciences. 2020 Jan 6;9(1):67-71.
7) Dunn GF, Green LJ, Cunat JJ. Relationships between variation of mandibular morphology and variation of naso- pharyngeal airway size in monozygotic twins. Angle Orthod. 1973; 43:129-135.
8) John ZA, Shrivastav SS. A Tri-Laminated Splint for management of Anterior Disk Displacement. Medical Science. 2020;24(104):2096-102.
9) Pirilä-Parkkinen K, Löppönen H, Nieminen P, Tolonen U, Pääkkö E, Pirttiniemi P. Validity of upper airway assessment in children: a clinical, cephalometric, and MRI study. Angle Orthod. 2011;81(3):433-9.
10) Lateral Cephalogram and CBCT as a diagnostic aid for analysis of airway- Review Article. European Journal of Molecular & Clinical Medicine, 2020; 7(7): 1802-1808.

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11) Dhannawat, P., S. Shrivastav, K. Ranjit, and S. Banerjee. “Different Types of Occlusal Splint Used in Management of Temporomandibular Joint Disorders- A Review.” European Journal of Molecular and Clinical Medicine 7, no. 7 (2020): 1809–15.
12) Naqvi, W.M., and T.B. Fating. “Temporomandibular Joint Dysfunction: A Non-Invasive Approach towards the Management of a Long-Standing Condition.” International Journal of Pharmaceutical Research 12 (2020): 1131–34. https://doi.org/10.31838/ijpr/2020.SP1.131.
13) Awasthi, Eshan, Nitin Bhola, Ranjeet Kamble, Sunita Shrivastav, and Abhilasha Goyal. “Treatment of an Adult with Skeletal Class III and A Hemimandibular Elongation A Multidisciplinary Approach.” JOURNAL OF CLINICAL AND DIAGNOSTIC RESEARCH 10, no. 9 (September 2016): ZJ5–6. https://doi.org/10.7860/JCDR/2016/20098.8468.
14) John, Zynul Ali Sirsmith, Sunita S. Shrivastav, Ranjit Kamble, Eshita Jaiswal, and Rajasbala Dhande. “Three-Dimensional Comparative Evaluation of Articular Disc Position and Other Temporomandibular Joint Morphology in Class II Horizontal and Vertical Cases with Class I Malocclusion: A Magnetic Resonance Imaging Study.” ANGLE ORTHODONTIST 90, no. 5 (September 2020): 707–14. https://doi.org/10.2319/121519-801.1.
15) Murarka, Shriya Prakash, Sunita Shrivastav, Ranjit Kamble, Hamza Dargahwala, Prutha Khakhar, Zynul John, Purva Dhannawat, and Shruti Rathi. “Comparative Evaluation of Discomfort, Expectations and Functional Experiences during Treatment of Class II Malocclusion with Forsus Fixed Functional Appliance and Sharma’s Class II Corrector - A Questionnaire Based Survey.” JOURNAL OF EVOLUTION OF MEDICAL AND DENTAL SCIENCES-JEMDS 10, no. 8 (February 22, 2021): 474–78. https://doi.org/10.14260/jemds/2021/104.

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