



ISSN Print: 2394-7500
ISSN Online: 2394-5869
Impact Factor: 5.2
IJAR 2017; 3(11): 18-19
www.allresearchjournal.com
Received: 07-09-2017
Accepted: 08-10-2017

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Evaluation of the effect of the maximum mouth opening on the width of mandible

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Abstract

Mandible flexes upon rotational movement due to contraction of lateral pterygoid muscles bilaterally. This clinical study was conducted to evaluate the effect of mouth opening upon the mandibular arch width. Thirty male fully dentate students were selected for the study. The inter-molar and inter-canine width was measured with digital caliper at the occlusion and the maximum opening position. The mandibular arch width change was calculated in molar and bicuspid region and proposed as mandibular flexure. Mean of the mandibular arch width change in molar and canine regions was. The data was analysed by F- test. It was concluded that mandibular arch width in both the anterior and posterior regions is more at maximum intercuspation (MI) than at maximum mouth opening.

Keywords: mandibular flexure, maximum intercuspation (MI)

Introduction

Mandibular flexure may be defined as the functional elastic deformation characterized by medial convergence of hemi mandibles in jaw opening and protrusive movements [1]. Muscles of mastication that elevate the mandible are masseter, temporalis and medial pterygoid and those depress the mandible are lateral pterygoid, anterior belly of digastrics and mylohyoid muscles. Depressor muscles insert into mandible in such a manner that mandible changes its shape during depression. Electromyography revealed that muscle activity is extremely complex and interrelated in the process of opening and closing [2, 3]. Weinman and sicher propose that bending force on mandible is mainly exerted by lateral pterygoid muscle [4].

Aims and objectives: this study was conducted to evaluate the effect of mouth opening on the transverse mandibular width.

Materials and methods: The subjects were selected from the undergraduate male students of Govt. Dental College and Hospital, Srinagar.

Inclusion criteria

1. Age ranging from 22 to 25yrs.
2. Class I occlusion
3. Fully dentate

Exclusion criteria

1. History of trauma to mandible
2. Malocclusion
3. Temporomandibular disorders
4. Orthodontic therapy
5. Missing teeth

Informed consent was obtained from all subjects

Mitutoyo, a digital caliper (Mitutoyo corporation, Tokyo Japan) was used to observe the distortion of the mandible occurring during mandibular depression. Posterior mandibular width change that occurred from occlusion to the most open position was measured from

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buccal groove of one molar on one side to the contra lateral molar buccal groove(inter-molar). Similarly, anterior mandibular width change was calculated from the tip of one canine to the other (inter-canine). The data consisting of the values of intermolar and intercanine width change from maximum intercuspation to maximum mouth opening was subjected to one way analysis of variance (ANOVA).

Results

Intercanine width change ranges from 0.019 to 0.127mm with standard deviation of 0.026 and intermolar width change ranges from 0.004 to 0.048mm with standard deviation of 0.014 as shown in the table 1. Mean of medial mandibular flexion on opening in canine and molar regions are 0.043 and 0.031 respectively.

Table 1: Intermolar change (IMC) and intercanine change (ICC) during mouth opening.

No.	IMC(mm)	ICC(mm)
1.	0.025	0.076
2.	0.038	0.076
3.	0.022	0.019
4.	0.032	0.022
5.	0.004	0.035
6.	0.042	0.023
7.	0.043	0.127
8.	0.011	0.025
9.	0.048	0.036
10.	0.022	0.036
11.	0.027	0.076
12.	0.038	0.023
13.	0.041	0.045
14.	0.037	0.027
15.	0.044	0.035
16.	0.042	0.044
17.	0.043	0.025
18.	0.002	0.037
19.	0.048	0.036
20.	0.022	0.026
mean	0.031	0.043
St. dev.	0.014	0.026

Table 2: Mean and standard deviation of mandibular flexion in molar and canine regions

Measurement area	N	mean	Standard deviation
Intermolar change(IMC)	20	0.031	0.014
Intercanine change(ICC)	20	0.043	0.026

Discussion

Burch and Borchers [6] showed that mandibular width changes during function using intra oral strip of beryllium-copper spring steel and recorded changes on a polygraph. They found average reduction in mandibular width of 0.61mm.

Novak [7] found medial mandibular flexure ranges from 0.3-1.0mm.

Osborne J and Tomlien HR [5] in an in vivo study concluded that mandibular arch width reduces during forced opening and protrusion, demonstrated that the amount of flexure is more related to opening.

In this study, mandibular arch width change was observed both in anterior and posterior regions and it was seen that mandible flexed more anteriorly than posteriorly.

Conclusion

Thus, it can be concluded that mandibular arch width reduces upon opening from maximum intercuspation position to maximum opening position.

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