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THE OPENING INDEX IN PATIENTS WITH CLOSED LOCK AND WITH MYOGENOUS DISORDERS OF THE TEMPOROMANDIBULAR JOINT

V.V.KARIC

A research report submitted to the Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, in partial fulfilment of the requirements for the degree of Master of Science in Dentistry

Johannesburg, 1999

THE OPENING INDEX IN PATIENTS WITH CLOSED LOCK AND WITH MYOGENOUS DISORDERS OF THE TEMPOROMANDIBULAR JOINT

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DECLARATION

I, Vesna V. Karic do hereby declare that this research report is my own work. It is being submitted for the degree of Master of Science in Dentistry by coursework and research report in the University of the Witwatersrand, Johannesburg. It has not been submitted for any degree or examination at this or any other University.

V. Karic

22 day of March 1999

In memory of my father
Vojislav Karic
1935 - 1985

CONFERENCE PRESENTATIONS

1. Karic VV, Miller VJ, Exner HV, Myers SL. Two subgroups of Myogenous Temporomandibular Disorders Patients identified by the Temporomandibular Opening Index. International Association of Dental Research, South African Division; 1998 Sep 9-10; Worcester, Cape Town.

2. Miller VJ, Karic VV, Exner HV, Myers SL. The Tempero-mandibular Opening Index in closed lock : an Initial Study. International Association of Dental Research, South African Division; 1998 Sep 9-10; Worcester, Cape Town.

PAPER PUBLISHED

1. Miller VJ, Karic VV, Myers SL, Exner HV. Myogenous Temporomandibular Disorder patients and temporomandibular opening index. Journal of Oral Rehabilitation.
   In press.

Abstract

Disorders of the temporomandibular joint (TMD) are the most common chronic pain conditions in the dental population. Limitation of mandibular movement is one of the signs of TMD.

In this study, a new opening index was examined in patients with myogenous and closed lock TMD disorders. This opening index was determined as a ratio between active and passive opening (Miller et al. In press). Patients were examined for TMD using the procedure of Bezuur et al. (1988) and Hansson (1988).

Forty two patients with a TMD of myogenous origin, 11 with a closed lock, and 51 patients with no sign or symptoms of TMD were recruited to the study.

ANOVA showed that the opening index of the group of patients with a TMD of myogenous origin differed from that of a group with closed lock ($p<0.0001$), ANCOVA showed that the opening index in all groups was not dependent on age ($p<0.225$) or gender ($p< 0.569$).

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TABLE OF CONTENTS

		Page
DECLARATION		**i**
DEDICATION		**ii**
PUBLICATIONS AND PRESENTATIONS		**iii**
ABSTRACT		**iv**
ACKNOWLEDGEMENTS		**v**
TABLE OF CONTENTS		**vii**
LIST OF FIGURES		**viii**
LIST OF TABLES		**ix**
ABBREVIATIONS		**x**
PREFACE		**xi**
1.0 INTRODUCTION		**1**
2.0 METHOD		**6**
2.1 Statistical analysis		**10**
3.0 RESULTS		**11**
4.0 DISCUSSION AND CONLUSION		**22**
APPENDIX I	Consent form	26
APPENDIX II	Examination form	27
APPENDIX III	Statistic	28
REFERENCES		29

List of figures

Figure		Page
2.1	Endfeel	10
2.2	Jointplay	10
2.3	Dynamic pain / Static pain	10
2.4	Boley gauge	10

List of tables

Table		Page
3.1	Data for a group of myogenous TMD patients and control group.	12
3.2	Data for a group of patients with a closed lock and a control group.	13
3.3	The opening index (TOI) in myogenous TMD patients.	14
3.4	The opening index (TOI) for a control group with no signs and symptoms of TMD.	16
3.5	The opening index (TOI) for a group of patients with a closed lock.	18
3.6	The opening index (TOI) for a control group with no signs of TMD.	19
3.7	TOI values for a group of myogenous TMD patients and a control group.	20
3.8	TOI values for a group of closed lock and a control group.	21

Abbreviations used in the text

1. ANOVA-------- Analysis of variance
2. ANCOVA------ Analysis of covariance
3. EMG---------- Electromyography
4. MRC---------- South African Medical Research Council
5. TMD---------- Temporomandibular Disorders
6. TOI---------- Temporomandibular Opening Index

PREFACE

The broad long term goal of this project is to develop and use an opening index to aid in the clinical diagnosis of patients with temporomandibular disorders (TMD).

The specific aims of the project are:

1. To examine the opening index in patients with closed lock.
2. To examine the opening index in a group of patients with myogenous origin.
3. To investigate whether patients with TMD of myogenous origin can be identified by the opening index.
4. To compare a myogenous and closed lock group of patients with a group of patients with no signs and symptoms of TMD.

All patients were examined for TMD using the procedure of Bezuur et al. (1988) and Hansson (1988).

1.0 INTRODUCTION

Numerous epidemiological studies have examined the prevalence of temporomandibular disorders (TMD) in given populations. These studies report a range of 40% to 60% of the population as having at least one detectable sign that is associated with TMD (Okeson, 1993; McNeill, 1997; Nilner et al., 1981). However, only about 5% of the population will seek treatment (De Kanter, 1980). Females are more likely to seek treatment than males (4:1) (Dworkin, et al., 1990; Franks, 1964). The aetiology of temporomandibular disorders is believed to be multifactorial (Ash, 1986; Fricton et al., 1988; De Boever & Steenks, 1991) with muscle hyperactivity playing a major role (Haber et al., 1983; Schiffman et al., 1992). It appears that stress and parafunction are important in the development of these disorders (Quinn, 1995; Lundeen, Sturdevent & George, 1987). Some studies suggest that the joint laxity (Hesse et al., 1990; Buchingham et al., 1991; Westling et al., 1992), and the hormonal status influences the development of TMD (Sonkin et al., 1968; Saville, 1968; Abubaker et al., 1993; Campbell et al., 1993).

TMD are included as a subgroup of musculoskeletal disorders (McNeill, 1983). They are defined as a group of disorders of the temporomandibular joint and its (neuro)musculature (McNeill et al., 1983). The cardinal signs and symptoms of these disorders are pain in the joint and / or muscles of mastication, limitation of movement, and joint sounds such as clicking (McNeill et al., 1980). Therefore, the measurement of mouth opening is an important and useful part of the clinical examination for these patients.

Mouth opening is most commonly performed by measuring linear mouth opening (Westling & Helkimo, 1992; Agerberg, 1974). This usually consists of measuring the maximum opening that the patient can voluntarily achieve, from incisal edge of maxillary anterior teeth to the incisal edge of the mandibular anterior teeth (Westling & Helkimo, 1992). A number of complicating factors have been noted when using this measurement. These include dependence on age and gender (Pullinger et al., 1987; Westling & Helkimo, 1992). Another is the influence of the mandibular length - ramus length. (Dikjstra et al., 1995). In addition, measurement of linear mouth opening does not allow division of TMD patients into diagnostic groups.

To overcome the above mentioned difficulties, other methods of measuring mouth opening have been proposed. Angle of the mouth measurements determined with a mandibular goniometer, and claimed to be independent of ramus length, were proposed by Dijkstra et al. (1995). The use of cephalometric radiographs has been suggested by Weijs (1989) and Muto & Kanazawa (1997). Condylar position relative to the articular eminance, measuring mandibular mobility, requires transpharyngeal radiographs and actually measures condylar slide (Meng et al., 1987). Angle of the mouth measurements determined radiographically have also been tried, as have specialized apparati such as the mandibular excursiometer (Danis & Mielenz, 1997).

Each of these methods is costly, time consuming and requires special equipment. Although possibly useful in research, most of these methods are not suitable for routine clinical use. The previously mentioned problems of measuring mouth opening have led to the development of a new temporomandibular opening index (TOI).

The temporomandibular OPENING INDEX (TOI) is based on both maximum voluntary opening, and passive opening and it is given by the formula :

$$T.O.I.= \frac{\text{passive opening(mm)- max.voluntary opening(mm)}}{\text{passive opening(mm)+ max.voluntary opening(mm)}} \times 100$$

In a preliminary study, the TOI was found to be a valuable examination tool, as it could categorise patients into different diagnostic groups. It was shown, for example, that a group of patients with a TMD of myogenous origin differed from a group with anterior disc displacement with reduction (Miller et al., in press). In addition, when looking at the myogenous group of TMD patients, two distinct subgroups could be identified. One subgroup had an opening index grouped around the upper quartile, while the other had an opening index grouped around the lower quartile.

Visser et al. (1995), in an EMG study of a group of myogenous TMD patients, identified two subgroups.

The first subgroup, with an EMG reading grouped around the upper quartile, they designated a strong masticatory muscle group. The second subgroup, with an EMG reading grouped around the lower quartile, they designated a weak masticatory muscle group.

The opening index was determined as described by Miller et al. (In press).

2.0 METHOD

Fifty three patients with temporomandibular disorders, who presented to the TMD clinic, University of the Witwatersrand, were recruited to the study. Forty two of these patients were diagnosed with a TMD of myogenous origin, and 11 were diagnosed with a closed lock. The age range of these patients was between 15 and 60 years and the gender distribution reflected that of the TMD clinic (approximately 75% female), where the examination was done.

Forty one individuals with no TMD were included as a control in the study for the myogenous group of TMD. Eleven patients with no TMD were included as a control in the study group for closed lock patients. Although the control groups were age and gender matched, paired groups were not considered.

The stomatognathic examination for TMD was based on that described by Bezuur et al. (1988) and Hansson (1988).This included anamnesis, mouth opening, lateral and protrusive excursion, palpation of the joint and muscles of mastication, endfeel (the nature of resistance felt by the examiner just

prior to the border for a passive joint movement) Fig.1, jointplay (measurement of joint surface roughness),
Fig.2, dynamic pain test (this test requires only a slight resistance to the patient's mandible during active movements in all directions) Fig.3, static pain test(this requires heavy manual resistance executed by the examiner) and joint sounds (clicking and crepitation). The full examination protocol is shown in Appendix I.

The active and passive mouth opening for each patient was measured as follows using a Boley gauge, Fig.4. Opening distances were measured from the mesial incisal edge of the maxillary central incisors to the mesial incisal edge of the mandibular central incisors. Precision of measurement was to the nearest 0.1mm. For active opening, patients were asked to open their mouths as wide as possible without assistance. Passive opening was performed as described previously by Hansson, Wessman and Oberg (1980).

The opening index was then calculated from the TOI formula:

$$TOI = \frac{\text{passive opening (mm)} - \text{max.voluntary opening (mm)}}{\text{passive opening (mm)} + \text{max.voluntary opening (mm)}} \times 100$$

The clinical examination of the patients and the measurement of the TOI for each was carried out independently by different examiners. Neither was aware of the other's diagnosis or measurement.

Informed consent was obtained verbally and in writing from each patient prior to using data from their patient files (appendix II).



Figure 1 Endfeel



Figure 2 Jointplay



Figure 3 Dynamic pain/Static pain

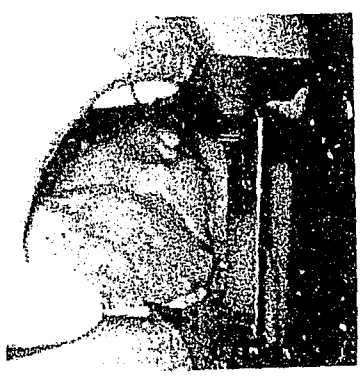


Figure 4 Boley gauge

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Division of the Deputy Registrar (Research)

COMMITTEE FOR RESEARCH ON HUMAN SUBJECTS (MEDICAL)
Ref: R14/49 Karic

CLEARANCE CERTIFICATE PROTOCOL NUMBER M980806

PROJECT The Oening Index In Patients With Closed Lock & With Myogenous Disorders Of The Temporomandibular Joint

INVESTIGATORS Dr V Karic

DEPARTMENT Restorative Dentistry, Wits Dental School

DATE CONSIDERED 980828

DECISION OF THE COMMITTEE *

Approved unconditionally

DATE 980922 CHAIRMAN.....(Professor P E Cleaton-Jones)

* Guidelines for written "informed consent" attached where applicable.

c c Supervisor: Dr V Miller
Dept of Restorative Dentistry, Wits Dental School

Works2\lain0015\HumEth97.wdb\M 980806

==========

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10001, 10th Floor, Senate House, University.

I/we fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee.

DATE .....SIGNATURE .....

PROTOCOL NO.: M 980806

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

2.1 Statistical Analysis

The data analysis was performed by the South African Medical Research Council (MRC). Data was entered separately onto two databases using Epi-info, and the databases compared and corrected until there were no longer any discrepancies. The data was then exported for analysis using statistical software including SAS, Stata and Genstat. The primary outcome is the Temporomandibular Opening Index as defined above. This was compared between groups using a oneway analysis of variance. The assumptions of normality and homogeneity of variance were checked, conclusions were based on the results of the ANOVA. In addition sociodemographic data was collected on all patients and this was summarized by group. Analysis of covariance was used to explore the effect of these variables (e.g. age) on the effect of group on the TOI.

3.0 RESULTS

The data for the myogenous, closed lock and control groups are shown in Tables 1 and 2. TOI measurements for patients in the 4 groups are recorded in Tables 3,4,5 and 6. The mean TOI of the groups as well as standard deviations and upper and lower quartiles are reported in Tables 7 and 8.

Analysis of covariance showed a significant difference ($p < 0.0^{\wedge}01$) between the myogenous group and the control and closed lock group. There was no significant difference between the closed lock and the control group ($p < 0.175$) although the control group appeared lower. Analysis of Covariance showed no effect of age ($p < 0.225$) or gender ($p < 0.569$) on the TOI. Bartlett's test for equal variances allowed the two control groups to be amalgamated ($p<0.0001$)

Statistical analysis is reported in Appendix III.

Table 3.1 Data for a group of myogenous TMD patients and control group

	Myogenous	Control
	n=42	n=41
Female	31	31
Male	11	10
Mean age (years)	34.2	32.3
Age range(years)	12-67	12-66

Table 3.2 Data for a group of patients with a closed lock and a control group

	Closed lock	Control
	n=11	n=11
Female	5	8
Male	6	3
Mean age (years)	40.5	35.1
Age range (years)	22-67	22.5-59

Table 3.3 The opening index (TOI) in myogenous TMD patients

Number	Age(years)	Gender	Max.vol.open. mm	Passive open.mm	TOI(%)
1	48	Female	41.0	44.0	3.53
2	17	Female	42.0	50.0	8.70
3	21	Female	44.9	51.3	6.65
4	43	Female	39.9	45.5	6.56
5	21	Female	48.0	53.0	4.95
6	31	Female	28.2	37.9	14.68
7	36	Female	37.5	46.5	10.71
8.	41	Female	31.9	40.0	11.27
9	48	Female	26.6	43.8	24.43
10	37	Female	42.5	50.5	8.60
11	16	Female	32.7	38.7	8.40
12	38	Male	38.3	51.7	14.89
13	18	Female	46.8	51.9	5.17
14	20	Female	49.8	53.9	3.95
15	50	Female	50.0	56.0	5.67
16	67	Female	40.7	47.9	8.13
17	61	Male	28.7	37.2	12.90
18	32	Male	48.0	53.8	5.70
19	26	Female	49.1	55.6	6.20
20	40	Female	41.9	49.4	8.21
21	24	Male	36.7	40.2	4.55
22	43	Female	48.3	53.3	4.92
23	23	Female	40.0	50.0	11.10
24	28	Male	60.2	61.2	0.83
25	39	Female	38.5	48.0	10.98
26	59	Female	20.0	26.6	14.16
27	12	Male	48.1	56.0	7.78
28	13	Female	37.7	50.3	14.32
29		Female	37.9	40.1	2.50
30	37	Female	54.2	56.8	2.34
31	39	Female	31.8	38.2	9.10
32	36	Male	38.1	48.2	11.70

33	23	Female	43.0	45.0	2.27
34	17	Male	49.5	57.1	7.12
35	42	Female	23.1	30.3	13.48
36	43	Male	39.6	42.9	4.00
37	28	Male	15.5	36.5	40.38
38	48	Female	32.1	39.2	9.96
39	28	Male	42.6	46.4	4.27
40	50	Female	32.7	36.1	4.94
41	19	Female	45.0	48.0	3.23
42	35	Female	35.5	47.1	14.04

Table 3.4 The opening index (TOI) for a control group with no signs and symptoms of TMD

Number	Age (years)	Gender	Max.vol.open. mm	Passive open.mm	TOI(%0
1	21	Female	47.7	50.5	2.85
2	50	Female	38.3	42.5	5.20
3	26	Female	49.1	51.2	2.10
4	19	Female	37.0	39.0	2.63
5	20	Female	44.0	49.0	5.37
6	25	Female	47.0	50.0	3.10
7	19	Female	43.0	48.0	5.49
8	27	Female	42.0	44.0	2.33
9	24	Male	54.2	56.0	2.56
10	49	Female	37.5	40.4	3.75
11	27	Female	40.8	44.4	4.26
12	34	Female	41.5	45.5	4.59
13	28	Female	40.5	43.8	3.95
14	46	Female	40.9	44.7	4.44
15	28	Female	39.5	43.5	4.85
16	23	Male	43.8	47.4	3.92
17	66	Male	34.4	37.9	4.84
18	56	Male	36.5	40.0	4.58
19	60	Male	37.5	41.0	4.46
20	52	Female	45.1	48.2	3.32
21	46	Female	46.1	52.0	6.01
22	40	Female	44.1	47.5	3.71
23	46	Female	59.1	63.5	4.40
24	43	Female	49.4	53.3	3.80
25	21	Male	47.2	51.1	3.97
26	37	Female	50.1	53.6	3.38
27	34	Female	42.1	45.2	3.55
28	55	Male	48.4	51.8	3.39
29	27	Male	49.1	53.5	4.29
30	34	Female	52.1	56.1	3.70

31	36	Female	43.1	49.2	6.61
32	18	Male	44.7	48.2	3.77
33	18	Male	44.1	48.3	4.56
34	20	Female	40.6	44.4	4.44
35	20	Female	41.3	44.0	3.16
36	40	Female	42.4	45.9	3.92
37	35	Female	39.7	43.9	5.00
38	13	Female	41.6	43.8	2.59
39	12	Female	39.8	41.5	2.33
40	31	Female	49.4	53.9	4.36
41	49	Female	43.1	45.2	2.38

Table 3.5 The opening index (TOI) for a group of patients with a closed lock.

Number	Age (years)	Gender	Max vol open mm	Passive open mm	TOI (%)
1	27	Male	20.0	21.0	2.43
2	43	Female	28.0	29.0	1.75
3	46	Male	24.0	25.0	2.04
4	62	Male	23.0	24.0	2.13
5	38	Male	22.0	23.0	2.22
6	22	Female	24.0	25.0	2.04
7	67	Female	31.1	33.5	1.46
8	29	Female	24.8	26.3	2.94
9	39	Male	23.9	24.8	1.85
10	49	Male	28.3	30.1	3.08
11	61	Female	26.8	28.6	3.24

Table 3.6 The opening index (TOI) for a control group with no signs of TMD.

Number	Age	Gender	Max vol open Mm	Passive open mm	TOI (%)
1	27	Female	40.8	44.4	4.26
2	24	Female	41.3	45.3	4.56
3	40	Female	39.8	43.1	3.92
4	29	Male	41.6	43.9	2.75
5	59	Male	43.6	48.7	5.49
6	35	Female	39.7	43.9	5.00
7	22.5	Female	41.2	44.2	3.55
8	49	Female	37.5	40.4	3.75
9	28	Female	40.5	43.8	3.92
10	27	Male	42.0	44.7	3.09
11	46	Female	40.9	44.7	4.44

Table 3.7 TOI values for a group of myogenous TMD patients and a control group.

	Myogenous group	Control group
Mean TOI(%)	8.98(sd=6.80)	3.92(sd=1.03)
Upper Quartile(%)	11.23	4.56
Lower Quartile(%)	4.93	3.32

Table 3.8 TOI values for a group of closed lock patients and a control group.

	Closed lock	control
TOI (%)	2.29 (sd = 0.57)	4.07 (sd = 0.80)
Upper quartile (%)	2.69	4.50
Lower quartile (%)	1.95	3.65

4.0 DISCUSSION

This study found that the TOI of a group of patients with a TMD of myogenous origin differed from that of a group with closed lock ($p < 0.0001$). The above group differed significantly from a control group ($p < 0.0001$). The TOI of the closed lock group appeared to be lower than that of the control. Although this was not found to be statistically significant, this might be due to the small sample size of this group. The closed lock study used a different control group, however, analysis of the two control groups using Bartlett's Test for equal variances allowed these to be amalgamated ($p < 0.0001$).

Analysis of covariance showed that the TOI in all these groups was not dependent on age ($p < 0.225$) or gender ($p < 0.569$). This is a significant advantage over linear mouth opening which has been shown to be dependent on both variables (Pullinger et al., 1987).

The endfeel was shown to be stiff in the closed lock group of patients. In this group, both passive and maximum voluntary mouth opening distances were low. This is suggestive of a mechanical problem.

The myogenous group of patients displayed an elastic endfeel. The maximum voluntary mouth opening in this group of patients was low. However, in contrast to the closed lock group, the passive opening was high. This is what would be expected of muscle splinting (protective co-contraction).

The closed lock patients displayed strong limitation in mouth opening a problem that has been reported frequently in the literature (McCarty & Farrar 1979; Dolwick & Riggs, 1983).

The limited mouth opening in closed lock patients may be the result of intracapsular discal obstruction that potentially limits condylar translation in the affected joint.(Hesse et al., 1996).

TOI appeared to differentiate 2 subgroups of myogenous TMD patients, one with a TOI clustered about the upper quartile, and one with a TOI clustered about the lower quartile. It is possible that the group clustered around the upper quartile corresponds to the weak muscle group suggested previously by the Visser et al. (1995) in their EMG studies of myogenous TMD patients.

Endfeel distances found in this subgroup at least, suggest that it corresponds to the weak muscle group identified by EMG (Visser et al.1995).

The differences between the TOI in these groups suggest that this may be a useful aid in differentiating between closed lock and myogenous groups of patients.

4.1CONCLUSION

The Temporomandibular opening index was found to differ significantly between a group of myogenous TMD patients, a closed lock group, and a control group with no TMD. It also identified 2 subgroups of myogenous patients, one with a TOI about the upper quartile, and the other with a TOI about the lower quartile. It may be that these subgroups are similar to 2 subgroups differentiated by EMG study (Visser et al., 1995).

CLINICAL SIGNIFICANCE

The TOI may be a useful, simple and cost effective diagnostic tool in the evaluation of patients with TMD.

APPENDIX I

Consent Form
Department of Restorative Dentistry
University of the Witwatersrand
Project on Opening Index

Dear(Mrs, Mr, Ms, Dr)_____

I am Dr Vesna Karic of the Department of Restorative Dentistry and I am completing a Masters degree at the University of the Witwatersrand.
I am studying an ability to diagnose different groups of disorders of the jaw Joint and related muscles, as a part of a large research project in the department. I shall be grateful if you would participate in my study.
If you agree a standard examination of the muscles of mastication and the jaw joint, will be performed. In addition, I will measure how much you can open your jaw with a special type of ruler.
This will be done in two ways. Firstly how much yourself can open your mouth. Secondly how much you can open with a gentle pressure on the jaw from the dentist.
This is generally painless. Slight discomfort may be present if you have come to us with pain in the facial muscles. The examination is a part of the routine examination in the TMD clinic, not extra procedures are done.
Participation is completely voluntary. If you do not want us to use the measurements from your examination or you wish to withdraw at any time this will not affect your treatment in anyway.
We would like to kindly thank you for you co-operation.

I agree to the use of measurements from my examination chart in this research project, on a voluntary base.

Name of patient/Guardian/Relative_____
Research member _____
Date_____

APPENDIX II

DR. V.J. MILLER
DENTAL CLINIC
UNIVERSITY OF

ate _____ Therapeutic Alert

ame surname _____ given _____

ddress street _____

city _____ postal code _____

hone home _____ business _____

irthdate _____ Sex M F

ccupation _____ Place of Business _____

arital Status: S M W D Other Name of Spouse _____

ospitalization Number ___ ___ ___ ___ ___ ___ - ___ ___

ersonal Dentist _____

ersonal Physician _____

nergency Contact Person: name _____

relationship _____

phone _____

ere you referred for treatment? Yes No By whom? _____

eason for referral or for seeking treatment: _____

_____ _____

e you covered by any dental insurance? Yes No

l we be required to complete dental insurance claim forms for you? Yes No

me of Insurance Company _____

I, the undersigned, consent to the performance of mutually agreed upon dental treatment including the use of local esthetic when indicated. I assume the responsibility for the fees associated with dental treatment procedures and understand that these fees are due upon the date service is rendered unless previous arrangement has been made. Some atments that include laboratory fabrication(crowns, dentures, etc.) will require a down payment upon initiation of treatnt.

Signature of patient _____

HEALTH QUESTIONNAIRE

MEDICAL

1. Are you currently being treated by a physician for any condition? Yes No
2. Have you ever been seriously ill or hospitalized? Yes No
3. Are you presently taking any medications or drugs? Yes No
4. Have you been taking any medications or drugs within the last year? Yes No
5. Do you have any allergies or unusual reactions to any drugs or local anesthetic? Yes No
6. Do you bruise easily or bleed abnormally? Yes No
7. Do have have shortness of breath or chest pains with mild extertion? Yes No
8. Do you now have or have you ever had any of the following? (Circle appropriate answers).

anemia	epilepsy	jaundice	stroke
arthritis	heart attack	liver disease	thyroid problem
asthma	heart disease	lung disease	tuberculosis
blood disease	heart murmur	kidney disease	tumor
cancer	high blood pressure	nervous disorders	ulcers
cold sores	low blood pressure	rheumatic fever	radiation therapy
diabetes	hepatitis	scarlet fever	venereal disease

10. Do you have any disease, condition or problem not listed above that you feel we should know about? Yes No
11. Are you now pregnant or do you suspect that you may be pregnant? Yes No

DENTAL

1. Have you eger had an injury to your face, jaw or teeth? Yes No
2. Do you suffer from jaw joint (TMJ) pain? Yes No
3. Does your jaw joint ever click, pop or grate? Yes No
4. Do you ever have difficulty chewing your food? Yes No
5. Are your teeth ever sensitive? Yes No
6. Do your gums ever bleed? Yes No
7. Are you dissatisfied with the appearance of your teeth? Yes No
8. Have you ever had the following treatments? (Circle appropriate answers.)

fillings	bite splint	orthodontics
extractions	bite adjustment	periodontal surgery
root canal	professional cleaning	dental surgery
crown or bridge	other _____	

9. How often do you brush your teeth? rarely once daily twice daily more ofter
10. How often do you floss your teeth? rarely once weekly once daily more often
11. When was your last dental checkup? _____ Were X-rays taken at that time? Yes No

Signature of patient _____ _____

EXTENDED FUNCTIONAL

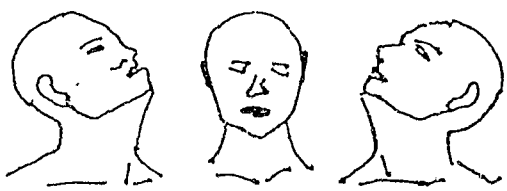
General Questions:

1. Have you ever been involoved in an accident? Yes No
2. Have you ever seen a psychologist? Yes No
3. Have you taken drugs? Yes No

CLINICAL HISTORY OF JOINTS

I have a _____ pain which occurs _____ . It started _____ _____ ago and lasts for _____ min/hours/days. It occurs _____ times a day/week/ month. It is made worse by _____ and better by _____. I also get headaches _____ times a day/week/month as well as stiff neck/muscle fatigue.

Types of Pain



- ☐ Tight
- ☐ Dull
- ☐ Sharp

Patients opinion as to reason for problem

Previous Treatment

by dentist/Physician/specialist/Phsical Therapist

Medication

Parafunction

grinding, clenching, unilateral chewing

Cheek/lip/tongue/biting

Sleep position/working position

Social History

- Profession
- Home
- Family

EXAMINATION

I. Observation at Rest (Picture)

Observation during movement

Vertical overbite _____ mm.

Horizontal overbite _____ mm.

Maximum mouth opening _____ mm.

Pain	
R	L

Passive to Active	
+	
+	
+	

Pain	
R	L

Deviation

R L

Lakro trusion R _____

Lakro trusion L _____

Protrusion deviators to R/L

Retrusion

Type of Endfeel _____

Lip, cheek, tongue, palate. _____

Mark Locking	R	L
Clicking	R	L
Crepitation	R	L

Joint and Muscle State

Joint tests	R	L	
Joint play ( )	P		P
Limitation of motion			
Lateral tenderness			
Posterior tenderness			

Dynamic Pain	
R	L

Static Pain		
	R	L
Opening		
Closing		
Right lat.		
Left lat.		
Protrusion		

Muscle tender to palpation _____

Movement of Cervical Spine

Flexion	°	P
Extension	°	P

Rotation	R	°	P
	L	°	P

Latero flexion	R	°	P
	L	°	P

Dentician

8 7 6 5 4 3 2 1	1 2 3 4 5 6 7 8
8 7 6 5 4 3 2 1	1 2 3 4 5 6 7 8

Jaw Relation

RCP → ICP _____ mm.

Asymm. Slide

RCP → ICP R L _____ mm.

Bruxoposition: _____ Positive Provocation ☐ Wear facets: _____

Working Diagnosis _____

_____

Prognosis _____

Treatment _____

Tests:
X-ray
Physical T.
Emg.

2 - Moderate
3 - Severe

SYMPTOM CHART

NAME

MAJOR COMPLAINT

Symptoms or Condition

Year
Month
Day

Months of Treatment

Maximum Opening

T M J X-ray — RS RP LS LP

Click-O Crep-K Pop-P

Headache — Temp Occip — frequency
intensity

Neckache — frequency
intensity

Tinnitus — frequency

T M J Pain — frequency
intensity

Comments

APPENDIX III

```
tabulate grp, summarize(oi)
```

grp	Summary of oi Mean	Std. Dev.	Freq.
1	3.9285366	1.0369922	41
2	8.9828572	6.8021911	42
3	2.2541667	.5607861	12
4	4.0718182	.79488133	11
Total	5.7565094	5.0732378	106

```
. oneway oi grp
```

Source	Analysis of Variance SS	df	MS	F	Prob > F
Between groups	752.609184	3	250.869728	13.12	0.0000
Within groups	1949.8537	102	19.1162127		
Total	2702.46288	105	25.7377417		

```
Bartlett's test for equal variances:  chi2(3) = 154.2019  Prob>chi2 = 0.000
```

```
. tabulate grp, summarize(oinew)
```

grp	Summary of oinew Mean	Std. Dev.	Freq.
1	3.8998156	1.0875733	41
2	8.9874066	6.7965352	42
3	2.4439597	.64274941	12
4	4.0698248	.82286538	11
Total	5.7684821	5.0664689	106

Table 1

```
. oneway oinew grp
```

Table 2

Source	Analysis of Variance SS	df	MS	F	Prob > F
Between groups	742.71965	3	247.573217	12.93	0.0000
Within groups	1952.53662	102	19.1425159		
Total	2695.25627	105	25.6691074		

```
Bartlett's test for equal variances:  chi2(3) = 147.0894  Prob>chi2 = 0.000
```

```
. xi: regress oinew age i.sex i.grp
i.sex                 Isex_1-2      (naturally coded; Isex_1 omitted)
i.grp                 Igrp_1-4      (naturally coded; Igrp_1 omitted)
```

Source	SS	df	MS
Model	807.763306	5	161.552661
Residual	1878.71965	99	18.9769662
Total	2686.48296	104	25.8315669

Table 3

```
Number of obs =     105
F(  5,    99) =    8.51
Prob > F      =  0.0000
R-squared     =  0.3007
Adj R-squared =  0.2654
Root MSE      =  4.3563
```

oinew	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
age	.0383692	.031662	1.212	0.228	-.0244551	.1011935
Isex_2	-.5421459	.9558718	-0 567	0.572	-2.438803	1.354511

```
------------------------------------------------------------------------------
      Igrp_2 |   5.204192   .962555     5.407   0.000     3.294274    7.1141:
      Igrp_3 |  -1.938617   1.476555    -1.313   0.192    -4.868422    .991187!
      Igrp_4 |   .0929998   1.480292     0.063   0.950    -2.844221    3.03022:
       _cons |   3.022959   1.470585     2.056   0.042     .1049989    5.9409?
------------------------------------------------------------------------------

. gen treat=grp

. replace treat=1 if grp==4
(11 real changes made)

. tabulate treat, summarize(oinew)

           |        Summary of oinew
     treat |      Mean   Std. Dev.       Freq.
-----------+------------------------------------
         1 | 3.9357791  1.0321725          52
         2 | 8.9874066  6.7965352          42
         3 | 2.4439597  .64274941          12
-----------+------------------------------------
     Total | 5.7684821  5.0664689         106
```

Table 4

```
. oneway oinew treat
```

Table 5

```
                        Analysis of Variance
    Source              SS         df      MS            F     Prob > F
------------------------------------------------------------------------
Between groups      742.468971      2   371.234485     19.58     0.0000
 Within groups      1952.7873     103     18.9591
------------------------------------------------------------------------
    Total           2695.25627    105   25.6691074

Bartlett's test for equal variances:  chi2(2) = 149.2884  Prob>chi2 = 0.000

. xi: regress oinew age i.sex i.treat
i.sex                Isex_1-2      (naturally coded; Isex_1 omitted)
i.treat              Itreat_1-3    (naturally coded; Itreat_1 omitted)
```

Table 6.

```
  Source |       SS       df       MS              Number of obs =      10
---------+------------------------------           F(  4,   100) =    10.7!
   Model |  807.688403     4  201.922101           Prob > F      =   0.000
Residual |  1878.79456   100  18.7879456           R-squared     =   0.300
---------+------------------------------           Adj R-squared =   0.272
   Total |  2686.48296   104  25.8315669           Root MSE      =   4.334

------------------------------------------------------------------------------
   oinew |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------+--------------------------------------------------------------------
     age |    .038436   .0314861     1.221   0.225    -.0240315    .100903
   Isex_2 |  -.5431968   .9509537    -0.571   0.569    -2.429862    1.34346
Itreat_2 |   5.184486   .9054742     5.726   0.000     3.388051    6.98092
Itreat_3 |  -1.959129   1.432815    -1.367   0.175    -4.801793    .883533
   _cons |   3.041156   1.434583     2.120   0.036     .1949039    5.88732
------------------------------------------------------------------------------

.
```

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