



ODONTOMETRIC VARIABLES OF PONTIC ELEMENTS OF FIXED METAL CERAMIC DENTAL BRIDGES

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ABSTRACT

Purpose: The aim of this paper is to analyze the odontometric values of elements by lateral metal ceramic dental bridges.

Material & Methods: For this goal there were observed and measured 455 elements from 151 patients.

The measurement was made with an instrument for precise measure (schubler), with precision of 0.1 mm.

The control group was compound from homolog natural teeth.

Results: The per cent of males with fixed metal ceramic prosthetic appliances is 62.25%, and the per cent of females with fixed metal ceramic prosthetic appliances is 37.75%.

The per cent of crowns and pontic elements by males with fixed metal ceramic prosthetic appliances is 61.48%, and the percent of crowns and pontic elements by females is 38.52%.

Conclusions: The frequency of fixed metal ceramic prosthetic appliances and the frequency of pontic element and crowns in dental bridges of lateral sector evidently is higher by males than females.

The total number of elements of lateral dental bridges by both jaws and both sexes gained as a result of our study shows statically suitable reports as a substitute for any two worked elements as abutment crowns in average are two.

The occlusion cervical dimension of pontic elements in our study is higher than natural teeth for 23.49%. This situation affects evidently to increase strength and sustainability of the bridge and at the same time the masticator pressure will be distributed in the appropriate manner.

In vestibule oral dimension the pontic elements of our study are for 8.82% narrower than natural teeth. Value that influence in protection of dental bridge from deformation and breaking.

In mesio distal dimension the mean value of length of pontic elements in our study is for 16.13% lower than natural teeth. This situation will significantly influenced the strength of the bridge and will increase its masticator efficiency.

Taking onto consideration these odontometric parameters in the construction of the pontic of fixed metal ceramic lateral dental bridge, there will be prolonged the longevity of prosthetic appliances, will be increased their preventive

effect, and positively will influence on patients' oral hygiene.

Based to the value of T-test, and according to the value of coefficient of probability ($p < 0.05$), we can say that by our results the statistically significance is important and not by chance.

Key words: Dental bridge, variables, analysis, measurement, control group, mean value

INTRODUCTION

The reasons of lack of natural permanent teeth are different: congenitally, and conditioned, without mention the missing teeth such as consequence of different actions. The direct responsible factors are oral and periodontal diseases, which are present and escort the contemporary man [1, 2].

According to dental medicine literature data, is verified that absolute multitude of people over 16 years old have lack of permanent teeth [1].

In essence, oral disorders such as tooth loss can affect interpersonal relationships and daily activities and therefore the "well-being" or "quality of life" [3]. Also, the lack of appointed teeth, or of a group of them, cause complex disorders like esthetic, phonetic and functional, which obligate patient to ask dentist for help. In that case, prosthetist is that one which through dental bridges should make the reconstruction of disordered stomathognathic system of patients [1, 4].

With dental bridge, such as therapeutic equipment for rehabilitation of masticator organ, there is made an effort as much as possible to imitate physiologic and anatomic situation which enables the solution of the two essential problems, as: technique problem, and biologic problem to [1, 5]. Dental bridges with their shape, size and high dimension must correspond with missed teeth, and must be in correct relation with antagonists for getting a balanced and adequate occlusion [5].

Optimizing dental esthetics is one of the key indications of prosthodontic treatment. Restoring anterior teeth can improve their dimensions, display, and shade [6]

Missing teeth, concretely the empty space between abutment teeth is compensated by pontic of bridge [7]. Its shape is different and essentially dependent from its position in dental arch. In accordance to that, the bridge elements with their size, position in dental arch, shape, color and transparency, their relation by gingival and toothless alveolar ridge

and between themselves should represent an imitation as original as possible of natural missed teeth [4, 8, 9, 10].

By modeling of dental construction, the attention often is concentrated on anatomic shape of compensated tooth. But, there should not be ignored the element of bridge overloading. Firstly, that depends from the choice of teeth abutment and shape of bucolingual width of construction. Secondly, the length of the bridge is important for evaluation of overloading capacity of bridge. Thirdly, the length of bridge is important for evaluation of bridge overloading [11].

To evaluate the aesthetic aspect, a standardized sample presenting oral characteristics closer to the basic aesthetic criteria [12]

Having into consideration all above mentioned facts we have formed the objectives for this paper, which are:

1. To analyze the odontometric values of lateral pontics according sex and jaws of these variables:

- Occluso cervical dimension
- Mesiodistal dimension and
- Vestibule oral dimension

2. To make comparison of obtaining values with counterparts values of natural teeth

3. To define the difference in percentage of getting values from our study and control group.

MATERIAL AND METHODS

The clinic material is compound from fixed metal ceramic bridges of lateral sector in Maxilla and Mandible made in Clinic for Prosthetic Dentistry "Protetika AG" in Tetova from 2010 to 2013 year.

There were examined bridges or adequate parts of semicircular or circular constructions with abutment teeth canines and third molars.

In total, were observed and measured 455 elements of lateral pontics from 151 patients of both sexes, in aged from 26 to 70 years old.

The methodology of work was based on the method for measurement of pontic elements of fixed metal ceramic lateral dental bridge in occluso cervical, mesio distal and vestibule oral dimension with an instrument for precise measure (Schubler, Mecanic Typ 6901-Germany), with precision of 0.1mm.



Fig. 1. Instrument for precise measuring (Schubler)

Definition of analyzed variables

Occluso - cervical dimension (variable of height – H), represent a line from the tangent of bucal tubercle peak to the most proximal and convex peak of veneer opposite gingival alveolar ridge.



Fig. 2. Occluso cervical dimension

Mesio - distal dimension (variable of length – L), represents the distance between two vestibular separations of pontic element, in contact surfaces part.



Fig. 3. Mesiodistal dimension

Vestibulo – oral dimension (variable of width – W), represents the biggest length of vestibule oral dimension.



Fig. 4. Vestibule oral dimension

The obtained data for localization of prosthetic appliances, the number of crowns and elements, data of analyzed variables are notification in a work sheet for each patient separately.

For statistically elaboration of obtained results, there were used the basic statistics and tables, T- test for dependent samples, and like statistically significance was take value for $p < 0.05$.

Like control group were used results of measurement of natural teeth according authors: Lavelle, Lenhossek, Sicher – Tandler and De Yonge – Cohen, realized with the same measurement precision of parameters from 0.1 mm.

RESULTS

The investigated material is compound from 151 treated patients by both sexes with lateral fixed metal ceramic dental bridges. From this total, the per cent of males with fixed metal ceramic prosthetic appliances is 62.25%, and the per cent of females with fixed metal ceramic prosthetic appliances is 37.75% (Figure 5).

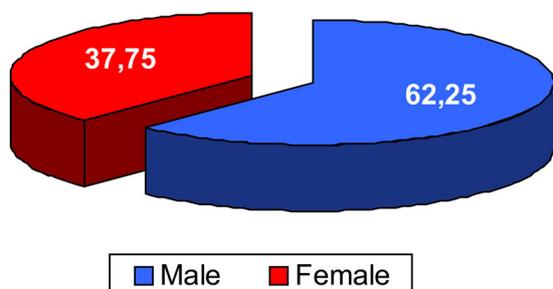


Fig. 5. The per cent of examiners according sex

The per cent of crowns and pontic elements by males with fixed metal ceramic prosthetic appliances is 61.48%, and the percent of crowns and pontic elements by females is 38.52% (Figure 6).

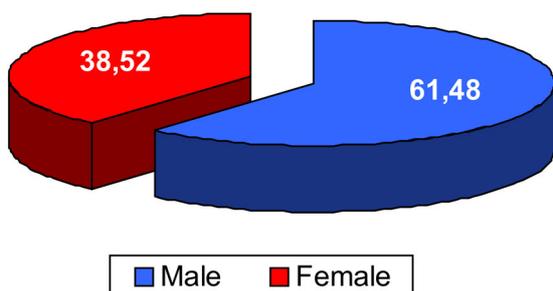


Fig. 6. The number of crowns and elements according sex.

Table 1. Odontometric values of investigated variables of natural teeth of the control group and values of our study in Maxilla.

	H						L							W						
	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7
U 4	8.0	8.7	8.35	9.36	+12.09	P<0.05	6.4	7.5	6.8	6.92	6.92	+0.28	P<0.05	8.9	9.0	8.9	8.93	8.8	-1.46	P<0.05
U 5	7.5	7.9	7.45	9.95	+33.55		6.5	7.5	6.5	6.77	6.77	-0.88		9.2	9.0	9.0	9.06	9.0	-0.67	
U 6	7.0	7.7	7.35	10.8	+46.93		10.7	11.0	10.1	8.14	8.14	-25.53		11.5	12.0	11.7	11.73	9.2	-22.26	
U 7	6.0	7.7	6.85	9.5	+38.68		9.6	9.0	9.8	8.3	8.3	-12.27		11.3	10.0	11.5	10.93	7.3	-33.22	

Legend: **H** - Ocluso-cervical dimension (variable of height); **L** - Mesiodistal dimension (variable of length); **W** - Vestibulo-oral dimension (variable of width); **1** - Lavelle; **2** - Lenhossek; **3** - Sicher-Tandler & De Yong-Cohen; **4** - Mean values of the control group; **5** - Our results; **6** - Difference in %; **7** - Statistics.

The mean getting values from this investigation for first upper premolars are: for occluso cervical dimension 9.36mm, for mesio distal dimension 6.92mm, and for vestibulo oral dimension 8.8mm.

The values for second upper premolars are: for occluso cervical dimension 9.95mm, for mesio distal dimension 6.77mm, and for vestibulo oral dimension 9.0mm.

By first upper molars the mean values are: for occluso cervical dimension 10.8mm, for mesio distal dimension 8.14mm, and for vestibulo oral dimension 9.2mm.

By second upper molars the mean values are: for occluso cervical dimension 9.5mm, for mesio distal dimension 8.3mm, and for vestibulo oral dimension 7.3mm (Table 1).

The mean getting values from this investigation for first lower premolars are: for occluso cervical dimension 9.55mm, for mesiodistal dimension 5.97mm, and for vestibulo oral dimension are 8.41mm.

The values for second lower premolars are: for occluso cervical dimension 9.45mm, for mesio distal dimension 6.48mm, and for vestibulo oral dimension 8.43mm.

By first lower molars the mean values are: for occluso cervical dimension 9.18mm, for mesio distal dimension 7.84mm, and for vestibulo oral dimension 9.38mm.

By second lower molars the mean values are: for occluso cervical dimension 9.04mm, for mesio distal dimension 6.81mm, and for vestibulo oral dimension 9.01mm (Table 2).

Table 2. Odontometric values of investigated variables of natural teeth of the control group and values of our study in Mandible.

	H						L							W						
	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7
L 4	8.5	9.0	8.75	9.55	+9.14	P<0.05	6.8	7.0	7.0	6.93	5.97	-13.86	P<0.05	7.4	8.0	8.0	7.8	8.41	+7.82	P<0.05
L 5	7.9	8.5	8.2	9.45	+15.24		6.9	7.0	7.3	7.06	6.48	-8.22		7.8	9.0	9.0	8.6	8.43	-1.98	
L 6	8.0	8.3	8.15	9.18	+12.63		11.5	11.5	11.5	11.5	7.84	-31.83		10.5	10.0	10.4	10.3	9.38	-8.94	
L 7	7.0	8.1	7.55	9.04	+19.73		10.6	11	10.7	10.76	6.81	-36.72		10.2	10.0	9.8	10	9.01	-9.9	

Legend: **H** - Ocluso-cervical dimension (variable of height); **L** - Mesio-distal dimension (variable of length); **W** - Vestibulo-oral dimension (variable of width); **1** - Lavelle; **2** - Lenhossek; **3** - Sicher-Tandler & De Yong-Cohen; **4** - Mean values of the control group; **5** - Our results; **6** - Difference in %; **7** - Statistics.

DISCUSSION

The results of our study from figure 5 showed that in a period from 2010 to 2013 year, for healing in Clinic for Prosthetic Dentistry “Protetika AG” in Tetovo the number of male patients has been almost doubled (62.25%), compared to females (37.75%).

This situation clearly showed that males suffer more than females from missing teeth, which is directly caused from oral diseases, in first place caries and periodontal diseases. In the other side, females take more care for oral and tooth hygiene [1].

Many authors, such as Ivanis et al. [11], and others, in their study ascertained that males need prosthetic appliances more than females.

Also in our earlier studies, the results showed that per cent of missing teeth is in a higher degree by males compared to females [1].

As we could see, the results of figure 6 concerning the per cent of crowns and pontic elements, showed a favorable percentage for males opposite females.

The bridge configuration must be modeled based on the geometry of the natural teeth[X4].

Different from bridges of building construction, dental bridges are often not tested for overloading, but are dimensioned in any case, which means that they are over dimensioned. That position gives us to understand that values of investigated variables could be different from values of natural teeth [1, 9, 13].

As we saw in table one, and table two, there were treated mean values of our results for ocluso –cervical, mesio – distal, and vestibule - oral variables by both jaws compared with mean values of control group, and the difference expressed in per cent.

For ocluso – cervical variable the results of above mentioned tables are:

In Maxilla (Table 1), the mean value of ocluso - cervical variable for upper first premolars according Lavelle (cited by Langladeu) [14], Lenhossek (cited by Scheeff) [15], Sicher – Tandler [16] and De Yong – Cohen [17] is 8.35mm, the result in our study is 9.36mm, and difference is +12.09% to the good of our result. For second upper premolars the mean value of control group is 7.45mm, our result is 9.95mm, and difference is + 33.55% to the good

of our result. For first upper molars the mean value of control group is 7.35mm, our result is 10.8mm, and difference is +46.39% to the good of our result. For second upper molars the mean value of control group is 6.85mm, our result is 9.5mm, and the difference is +38.68% to the good of our result.

In Mandible (Table 2), the mean value of control group [14, 15, 16, 17] for oclusocervical variable for first premolars is 8.75mm, our result is 9.55mm and the difference is +9.14% to the good of our result. For second lower premolars the mean value of control group is 8.2mm, our result is 9.45mm, and the difference is +15.24% to the good of our result. For first lower molars the mean value of control group is 8.15mm, our result is 9.18mm, and the difference is +19.73% to the good of our result. For second lower molars the mean value of control group is 7.55mm, our result is 9.04mm, and the difference is +19.73mm to the good of our result.

In both jaws the results of our variable are higher than control group. These data clearly showed that by patients with lateral fixed prosthetic metal ceramic appliances, teeth extraction was made long time ago, and substitution of extractioned teeth was delayed. As result, the resorption of alveolar ridge is more expressed.

The results for ocluso cervical variable given from authors Mehulic et al. [18], Kallay [21], are lower than them of control group.

Concerning the values for mesiodistal variable the results of above mentioned tables are:

In Maxilla (Table 1), the mean value of control group [14, 15, 16, 17] for mesiodistal variable for first upper premolars is 6.9mm, the result in our study is 6.92mm, and difference is +0.28% to the good of our result. For second upper premolars the mean value of control group is 6.83mm, our result is 6.77mm, and difference is -0.88% to the good of our result. For first upper molars the mean value of control group is 10.93mm, our result is 8.14mm, and difference is -25.53% to the good of our result. For second upper molars the mean value of control group is 9.46mm, our result is 8.3mm, and the difference is -12.27% to the good of our result.

In Mandible (table 2), the mean value of control group [14, 15, 16, 17] for mesiodistal variable for first

premolars is 6.93mm, our result is 5.97mm and the difference is -13.86% to the good of our result. For second lower premolars the mean value of control group is 7.06mm, our result is 6.48mm, and the difference is -8.22% to the good of our result. For first lower molars the mean value of control group is 11.5mm, our result is 7.84mm, and the difference is -31.83% to the good of our result. For second lower molars the mean value of control group is 10.76mm, our result is 6.81mm, and the difference is -36.72% to the good of our result.

In generally our results for mesiodistal variable show a reduction in comparison with results of control group. These data clearly showed that teeth extraction were made long time ago, and the substitution of extraction teeth was delayed. As a result of this, there we have a mesial migration of third molars after extraction of first and second molars.

Mehulic et al. [18] in their studies gave results which showed a reduction for mesiodistal dimension of pontic molars approximately for 1/3 of surface of natural teeth.

For values of vestibulo – oral variable the results of above mentioned tables are:

In Maxilla (Table 1), the mean value of control group [14, 15, 16, 17] for vestibulo - oral variable for first upper premolars is 8.93mm, the result in our study is 8.8mm, and difference is -1.46% to the good of our result. For second upper premolars the mean value of control group is 9.06mm, our result is 9.0mm, and difference is -0.67% to the good of our result. For first upper molars the mean value of control group is 11.73mm, our result is 9.2mm, and difference is -22.26% to the good of our result. For second upper molars the mean value of control group is 10.93mm, our result is 7.3mm, and the difference is -33.22% to the good of our result.

In Mandible (table 2), the mean value of control group [14, 15, 16, 17] for vestibulo - oral variable for first premolars is 7.8mm, our result is 8.41mm and the difference is +7.82% to the good of our result. For second lower premolars the mean value of control group is 8.6mm, our result is 8.43mm, and the difference is -1.98% to the good of our result. For first lower molars the mean value of control group is 10.3mm, our result is 9.38mm, and the difference is -8.94% to the good of our result. For second lower molars the mean value of control group is 10mm, our result is 9.01mm, and the difference is -9.9% to the good of our result.

Our results for premolars in Maxilla and in Mandible correspond with contemporary attitudes for this dimension, where is stated that; Pontic elements should be shaped

with equal dimension and size as natural teeth, meanwhile our results for molars of above mentioned jaws, correspond with classic attitude which says: Pontic elements should be shaped and dimensioned in vestibule oral dimension for 1/3 smaller than natural teeth [4, 10, 20].

Authors Kallay [21], Mehulic et al. [18] gave different values than our results;

- 40% for premolars and -50% for molars.

Conclusions

Based to examination of 151 patients, and according to accomplished studies of 455 pontic elements of fixed lateral metal ceramic dental bridges, and according to the obtained results, their statistical elaboration and their comparative analyzes, we can conclude that:

1. The frequency of fixed metal ceramic prosthetic appliances and the frequency of pontic element and crowns in dental bridges of lateral sector evidently is higher by males than females.

2. The total number of elements of lateral dental bridges by both jaws and both sexes gained as a result of our study shows statically suitable reports as a substitute for any two worked elements as abutment crowns in average are two.

3. The occlusion cervical dimension of pontic elements in our study is higher than natural teeth for 23.49%. This situation affects evidently to increase strength and sustainability of the bridge and at the same time the masticator pressure will be distributed in the appropriate manner.

4. In vestibule oral dimension the pontic elements of our study are for 8.82% narrower than natural teeth. Value that influence in protection of dental bridge from deformation and breaking.

5. In mesio distal dimension the mean value of length of pontic elements in our study is for 16.13% lower than natural teeth. This situation will significantly influenced the strength of the bridge and will increase its masticator efficiency.

6. Taking onto consideration these odontometric parameters in the construction of the pontic of fixed metal ceramic lateral dental bridge, there will be prolonged the longevity of prosthetic appliances, will be increased their preventive effect, and positively will influence on patients' oral hygiene.

7. Based to the value of T-test, and according to the value of coefficient of probability ($p < 0.05$), we can say that by our results the statistically significance is important and not by chance.

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