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Using of articulators in the construction Of crown and bridges work in Baghdad:(A survey study)

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Abstract

Articulators are surrounded by an aura of mystery, but at the end of the day they are a tool to help a dentist to give his patient a successful restoration, saving time money and hassle.

This study was conducted to obtain data from which some preliminary judgments could be made regarding the articulators being used for fixed partial denture laboratory procedure in dental practice. Data were collected from a questionnaire sent to 15 fifteen dental laboratories (which performed fixed prostheses only) in Baghdad, the number of the technicians employed by the laboratory were 55, the number of the dentists deal with the specified laboratory were 524 dentists including (Professional dentists 180, Post-graduate dental students 46 and Junior dentists 298), the type of the fixed-prosthodontics (cast metal, PFM, and All-ceramic) and the percentage of each type of work, the percentage of using articulators and the type of the articulators and the percentage of there uses included (simple hinge, semi-adjustable and fully-adjustable).

Results showed that the percentage of articulators being used was 16.66% in comparison to the percentage of hand articulation 83.33% distributed as 99.66% used simple articulators, 0.33% semi-adjustable articulators and 0% for fully adjustable articulators.

Key words: articulators, occlusion, occlusal interferences, dental laboratories, crown and bridges.

Introduction

The search for the optimal and preferred types of static and functional occlusions has occupied the minds of dentists for more than a century in different fields of dental science [1] periodontics [2-3] orthodontics [4-5], and removable and fixed prosthodontics [6-9].

Prosthodontic treatment demands competence from each member of the professional team; this includes the staff of the dental office and the dental laboratory [10, 11].

Effective communication and cooperation between dentists and dental technicians are essential in providing quality services [12].

Members of the dental team should understand their responsibility to each other and their patients to ensure optimal prosthodontic care. Knowledge of individual limitations is critical, as are two specific attributes of technical

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success, quality and communication. The dentist and dental technician should provide services in concert, practice mutual respect, and encourage each other to critique results [10].

The long – term successful restoration, particularly that of crown and bridges work is dependent on proper management of the occlusion, the maintenance of occlusal harmony, and avoid the creation of occlusal interferences [13-14].

Hand – held casts can be a very useful aid to examination and planning, and ease of obtaining a stable intercuspal position, but provide no information about excursive tooth contacts [15].

Most single crowns and simple fixed partial dentures are fabricated on simple hinge articulators that have limited ability to duplicate mandibular movements or non at all. While many of the inaccuracies produced by this type of instrument may be corrected in the patient mouth using valuable chair time and the end result is an occlusion that is less than optimal. Unfortunately, many of these inaccuracies are not recognized and are allowed to remain in the mouth as occlusal interferences which frequently produced symptoms of occlusal disease [15 -16].

Accurate casts of the dental arches mounted in a semi adjustable articulator are the most important tools of the trade when constructing artificial crown [15]. A semi – adjustable articulator can be invaluable in situation such as adhesive restorations, because it allows the technician to secure restoration onto the working cast and do the critical adjustments in the lab so that all you need to do is cement them with little or no adjustment afterwards. [15]

The department of restorative dentistry use semi-adjustable articulator in the teaching and clinical application of the basic principles of occlusion to instill within students, the importance of such instruments as an aid in providing the proper diagnosis and treatment of occlusion for there patients [17].

Fully adjustable articulator mainly used for full mouth rehabilitation, this instrument is expensive. The techniques required for its use demand a high degree of skill and are time consuming to accomplish [13].

Dentists are the specialists of occlusion; they are responsible for the physiological harmony of the TMJ, masticatory musculature and teeth. No body can seriously debate that occlusion does not have intimate relationship with the TM joints and muscles, but the question here: Are we doing our best to ensure that our specialty, occlusion, is providing physiologic harmony among teeth, muscles and TMJ? [18]

This study was conducted to obtain data from which some preliminary judgments could be made regarding the articulators being used for fixed partial denture laboratory procedure in dental practice in Baghdad.

Materials and Methods

Data were collected from a questionnaire of fifteen dental laboratories (which performed fixed prostheses only) in Baghdad.

The questionnaire for the survey was constructed to reflect:

1-The number of the technicians employed by the laboratory.

2-The number of the dentists deal with the specified laboratory including:
   A – Professional dentists
   B – Post-graduate dental students.
   C – Junior dentists.

3- The type of the fixed-prosthodontics (cast metal, PFM, Implant supported and All-ceramic) and the percentage of each type in there work.

4- The percentage of using articulators and hand articulation.
5- The type of the articulators and the percentage of there uses included (simple hinge, semi-adjustable and fully-adjustable).
6-The most common problems faced by the technicians during laboratory work of FPD construction.

The statistical analysis of the data depend the mean and percentages, the final percentages for comparison had been calculated for every laboratory based on the total number of the dentists.

Results

The data was collected from 15 dental laboratories in Baghdad, who deal with crown and bridges work. The number of the technicians employed in the laboratories was 55 and the number of the dentists was 524, distributed as juniors 298 dentists, 46 post – graduate student dentists and 180 specialist dentists as shown in table (1).

Table (1) also show the percentage of work type performed by the dental laboratories, that 80% of them (12 Lab.) performed cast with acrylic facing, 86.66% PFM (13 Lab.), and 20% All ceramic work (only 3 lab.).

Table (2) shows the percentage of articulators being used in comparison to the percentage of hand articulation. The highest percentage was 25% used articulators (lab. No. 2, 7, 10) and 75% hand articulation. The lowest percentage was 10% of using articulators (lab. No. 4, 5, 8, 10, 14, 15) and 90% hand articulation.

The total percentage mean for hand articulation was 83.33, and only 16.66 percentages mean for articulators (table 2).

Also table 2 shows the percentages of articulator types being used that 99.66% was simple articulators, 0.33% semi-adjustable articulators and 0% for fully adjustable articulators.

Discussion

This survey study was conducted in Baghdad the capital of Iraq, involved 15 dental laboratories that perform crown and bridges works distributed south-east (2 laboratories), north-east (2 laboratories), north-west (2 laboratories), mid-west (3 laboratories), mid-east (4 laboratories), and center (2 laboratories) of Baghdad, this distribution had been chosen to be more representative.

The data were obtained from responses to questionnaires sent to these laboratories as a list of questions; it was assumed that a survey of these laboratories number would produce more information about the use of articulators than might be obtained from a similar sample size of dentists.

The no. of technicians was 55 agonist 524 dentists indicating that one technician for each ten dentists which acceptable percentage in comparison to other researches in other countries [12].

Type of work:

Considering the type of work (as shown in table 1), majority of the dental laboratories performs the PFM (13 of 15 labs), and cast crown and brides (with acrylic facing) (12 of 15 labs), while only (3 lab of 15) perform the all ceramic work, this result of low performance of all ceramic work had been attributed to:

1-The coast of the all ceramic to the patients.
2-The extra equipments required by the dental laboratories.
3-The skilled experience required by the technicians.
4-The skilled experience required by the dentists, and this include: optimal preparations, good impression quality, separating die with dowel pin, ditching

done by the dentists and the use of semi adjustable articulators.

In reality all of these causes are not acceptable for performing the amazing results of the all ceramic work. Otherwise we do the cast and there is no necessary for the PFM.

Type of articulation:

Hand articulation could be used in simple restoration or even simple bridges when there are enough teeth to provide the centric occlusion of the patient. The result show (table 2) that majority percentage of articulation was hand articulation (83.33%) and only 16.66% use articulators. This result indicate either majority of the FPD work was simple cases and more chair time could be spend by the dentist for checking and correction of the occlusion, or there is a shortage in the work of the dentists, because the dentist is the responsible man about the final work and not the technician.

Type of articulators:

Different types of articulators could be used in the FPD work (the demand of the case) ranging from the simple hinge (articulators allows open – close movement), semi-adjustable (articulators contain condylar path angle and can be changed e.g. Hanau) and fully – adjustable articulators (sophisticated and complex instruments that attempt to record and duplicate the mandibular movements) [16-17].

The result show (table 2) that mainly simple hinge articulator had been used in the fabrication of FPD (99.66%), and 0.33% using semi adjustable, while fully adjustable articulators had not been used at all (0.0 %). This disappointed finding should be discussed, in addition to other finding that even this 0.33% of using semi adjustable articulator was carried out by the post graduate students, whom could be counted on the fingers (by the technicians in the dental laboratories and mentioned by there names) and not the specialist dentists.

In the placement of restorations, the dentist must strive to produce for the patient an occlusion that is as nearly optimum as his or her skills and the patient's oral condition will permit. The optimum occlusion is one that requires a minimum of adaptation by the patient.

There are three recognized concepts that describe the manner in which teeth should and should not contact in the various functional and excursive positions of the mandible they are:

1-Bilateral Balanced Occlusion useful in complete denture construction and not used in FPD.

2-Unilateral Balanced Occlusion such occlusal arrangement could be used in FPD construction.

3-Mutually Protected Occlusion this arrangement is the most widely accepted because of its ease of fabrication and greater tolerance by patients [19].

To construct a FPD according to any of these concepts articulators should be used [15, 17].

Simple articulator although it gives centric relation (reproducible intercuspal position) and rotatory hinge movement, but that is the limit of what a simple hinge articulator can do. It lacks the eccentric relations of lateral and protrusive and even the given (intercuspal position) relation is not true relation because of the discrepancy between the small articulator hinge axis (aha) and the mandibular hinge axis (mha) produces a larger discrepancy between the arc of closure of the articulator and the arc of closure of the mandible.

Under these circumstances, we can conclude that the long span bridges, complex bridges, resin bonded

restorations, implant supported prosthesis and the cases that required reorganized occlusion (make a new intercuspal position based on centric relation or terminal hinge position) had the possibility to be a successful restoration (and optimum occlusion) was less than or equal to 0.33% of the total work performed by the sample of this study (the dentists) which the percentage of using the semi adjustable articulators device (if we suppose that all works done by the users of semi adjustable articulator had been don perfectly), the remain percentage which 99.66% of the work performed was with different ranges of occlusal interferences.

Some dentists to overcome the problems of occlusal interferences made occlusal reduction during the different stages of checking, and that is not the solution of the problem because this reduce the occlusal cutting efficiency (with anterior and posterior teeth), and if such reduction done with porcelain restoration it doubled the problem due to the fact that the porcelain is a brittle material so the margins constructed more rounded to over come this disadvantage inconsequence more load would exerted on the prosthesis, the muscles of mastication and the TMJ resulted in a more occlusal and TMJ diseases.

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Table (1) the data including No. of technicians, No. of dentists and their distribution and the percentages of the work type performed by the dental laboratories.

Laboratory	No. of technicians	No. of Dentists			Type of work in %		
		Junior	Post graduate student	specialist	Cast	PFM	All ceramic
1-	5	30	0	8	100	0	0
2-	5	25	5	15	20	80	0
3-	5	25	2	5	65	35	0
4-	4	20	5	20	0	90	10
5-	4	35	8	20	0	85	15
6-	4	25	5	15	50	50	0
7-	4	20	2	12	0	90	10
8-	4	20	0	15	60	40	0
9-	4	20	2	10	55	45	0
10-	3	25	5	10	15	85	0
11-	3	10	5	15	45	55	0
12-	3	15	2	10	55	45	0
13-	3	15	4	15	60	40	0
14-	2	5	1	5	100	0	0
15-	2	8	0	5	75	25	0
Total	55	298	46	180			
		524					

Table (2) the percentages of the articulation type and the type of articulators used in percentage

Laboratory	Type of articulation in %		Type of articulators in%		
	Hand articulation	Articulators	simple	Semi-adjustable	fully-adjustable
1-	80	20	100	0	0
2-	75	25	100	0	0
3-	80	20	99	1	0
4-	90	10	100	0	0
5-	90	10	99	1	0
6-	80	20	100	0	0
7-	75	25	99	1	0
8-	90	10	100	0	0
9-	80	20	100	0	0
10-	75	25	100	0	0
11-	90	10	99	1	0
12-	80	20	100	0	0
13-	85	15	100	0	0
14-	90	10	99	1	0
15-	90	10	100	0	0
Percentage Mean	83.333	16.666	99,66	0.333	0