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RESEARCH ARTICLE

Coronal Restorations and Temporomandibular Joint (TMJ) Dysfunction: A Survey Among General Practitioners of the Town of Abidjan

Marie C. Avoaka-Boni^{1*}, Wendpoulomé A. D. Kaboré², Stéphane X Djolé¹ and Alain A. Kouadio³

¹Department of Conservative Dentistry and Endodontics, Félix Houphouët Boigny University, 22 BP: 612 Abidjan 22, Ivory Coast

²Department of Conservative Dentistry and Endodontics, Research Center of Health Sciences, Joseph KI-ZERBO University, 03 BP 7021 Ouagadougou 03, Burkina Faso

³Department of Prosthodontics, Félix Houphouët Boigny University, 22 BP: 612 Abidjan 22, Ivory Coast

Abstract:

Background:

The paper surveyed the knowledge of general practitioners to coronal restorations and temporomandibular dysfunction. The specific aim of this study was to evaluate the knowledge and therapeutic approaches of the general practitioners in terms of restoring occlusion, aesthetics and function after restorative treatments in order to make recommendations to prevent potential dysfunction of the temporomandibular joint.

Methodology:

A cross sectional descriptive survey was used. It was carried out on 86 dentists out of the entire population size of 152 dentists practicing within Abidjan's center municipality, randomly selected from the database provided by the National College of Dental Surgeons of Ivory Coast. A structured questionnaire was administered to collect data, which was subsequently collated and analysed.

Results:

The majority of the practitioners (95.4%) knew how to diagnose TMJ dysfunction. The etiological factors were stress for 55.2% of the practitioners and amalgam overhang for 49.4% of them. The precautions used to avoid TMJ disorders consisted of good control of the occlusion after having performed a restoration (55%) and taking into account the occlusal morphology (32%) at the time of shaping. Fifty-four percent of the practitioners systematically reevaluated the restorations undertaken.

Conclusion:

Impairment of occlusion results in improper muscular responses and leads to changes in pressure at the level of the temporomandibular joint. This study revealed that the general practitioners of the town of Abidjan have a good level of knowledge of the consequences of poorly carried out restorations on the initiation of masticatory apparatus disorders.

Keywords: Coronal restorations, Dental occlusion, Disorders, Temporomandibular joint, Recommendations, Ivory Coast, Survey.

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1. INTRODUCTION

The aim of dental restorations is to reconstitute the initial morphology of the teeth so as to allow them to again assume their various functions in the masticatory apparatus. They are an important component of daily practice and represent 40% of the procedures performed [1]. They involve the use of various entities such as composite materials with adhesive systems,

amalgams, and glass-ionomer cements that should allow re-establishment of function and occlusion [2]. Occlusion must be controlled and the normal function needs to be reestablished by a proper fit [3]. When occlusion is not reestablished, dysfunction can occur, particularly repeated fracture of obturations, occlusal trauma, enhanced looseness of the teeth, movement or dislocation of teeth, attrition of the hard dental tissues and of the restorations [3, 4]. Such dysfunction can also manifest as disorders of the masticatory muscles or of the Temporomandibular Joint (TMJ) [5]. Dental occlusion plays a major role in the functions of the masticatory apparatus [6, 7]. Indeed,

* Address correspondence to this author at the Department of Conservative Dentistry and Endodontics, Research Center of Health Sciences, Joseph KI-ZERBO University, 03 BP 7021 Ouagadougou 03, Burkina Faso; Tel: +22670211283; E-mail: dr_kabor@yahoo.fr

it influences the mandibular posture at rest, the mandibular kinetics, mastication, swallowing, the loads applied to the TMJ, and the trajectories play a major role during Maximized Intercuspal Occlusion (MIO) [8]. As stated by Orthlieba *et al.* (2016) [9], the TMJ and dental occlusion are “linked, for better or for worse” even if a direct correlation between all TMJ and occlusion is still controversial.

In light of this, it struck us that it would be important to evaluate the level of knowledge and the approaches of general practitioners of the town of Abidjan in terms of the quality of occlusion control after restorative treatment in order to be able to make recommendations to prevent potential TMJ disorders.

2. METHODOLOGY

2.1. Setting, Period, Population and Type of Study

This was a cross-sectional descriptive survey that took place at Abidjan in Ivory Coast from February to April 2014. It involved administering a structured questionnaire to 86 dentists selected independently of gender, and all of them were registered with the National College of Dental Surgeons of Ivory Coast. They were randomly selected. The sample size of 86 practitioners was used out of the population of 152. The respondents included dentists of less than 5 years practice experience, practicing both in private and in public facilities, within Abidjan center municipality. These localities were chosen because they have a high concentration of practitioners or representative of the dentists that practice in Ivory Coast. Dentists in training were not included.

2.2. Execution of the Survey

A survey form was designed with relevant and adequate requirements of the study, with three sections. The first was in regard to socio-professional data (the type of practice, the number of years of experience). The second section evaluated the knowledge of the practitioners regarding TMJ disorders (the manifestations, the causes, the treatment), and the third evaluated the precautions taken when carrying out direct

restorations (means of prevention). The survey then included self-administration of the questionnaires. The survey form was dropped off at the dental practice by the surveyor and filled out by the dentist. After manual inspection of the data to verify the forms had been filled out, analysis of the data was carried out using Microsoft Office Word version 2013 and Epi-info version 6.01 (Centers for Disease Control and Prevention, Atlanta, Georgia, United States of America) software. The results obtained were presented as tables using Excel and Word 2013 software with Windows XP professional.

3. RESULTS

3.1. Socio-professional Characteristics of those Surveyed

Of the 152 dentists questioned, 86 completed the questionnaires, amounting to a participation rate of 56.6% and a sex ratio of 1.68. Of the surveyed practitioners, 49.5% practiced in the private sector while 50.5% practiced in the public sector. Practitioners with more than 10 years of experience (48%) were the most represented (Table 1). The majority (89.7%) participated in continued post-university training.

3.2. Knowledge Regarding TMJ Disorders

The majority of the practitioners (95.4%) knew how to diagnose a TMJ disorder, although the frequency of the diagnosis was 59% for those who had encountered it only a handful of times (Table 2). The reported clinical signs were: joint pain according to 76% of the practitioners, joint noise according to 64.4%, and muscle pain for 69.9% of them (Table 3). The etiological factors noted by the practitioners were stress for 52% and overhanging amalgams for 49.4% of them (Table 4). For the practitioners, the treatment of TMJ disorders amounted to selective grinding (70.1%) and wearing a mouthguard (65.5%). Medication-based therapies with myorelaxants were also used (Table 5). In case of pain at the level of the TMJ following coronal restorations, 54% of the practitioners proceeded with correction and reevaluation. Nonetheless, 65.5% of the practitioners revealed that they referred patients to a specialist in this area, an occlusodontist or a maxillofacial surgeon.

Table 1. How long the dentists had been in practice.

Years of Practice	Number of Practitioners	Percentage (%)
< 5 years	21	24
5-10 years	24	28
> 10 years	41	48
Total	86	100

The above table shows that the practitioners have adequate practice experience considering the number of dentists that have practiced above 5 years (65).

Table 2. The frequency at which TMJ disorders were diagnosed by the practitioners.

Frequency of Diagnosis of the TMJ Disorder	Number	Percentage (%)
Rarely	23	26
Sometimes	50	59
Often	8	9
Never	5	6
Total	86	100

59 respondent agree with sometimes and often which is an indication of awareness and occurrence of TMJ DISORDER among dental practitioners.

Table 3. Manifestations of TMJ disorders according to the practitioners.

Manifestations of the Disorders	Yes		No	
	Number	Percentage (%)	Number	Percentage (%)
Toothache	14	16.1	72	82.8
Joint pain	66	75.9	20	23
Muscle pain	53	60.9	33	37.9
Back pain	12	13.8	74	85.1
Joint noise	56	64.4	30	34.5
Projections	32	36.8	54	62.1
Headaches	38	43.7	48	55.2
Other types of pain	4	4.6	81	93.1
Total	226		458	

8 types of manifestations were listed, the total number of practitioners that responded YES were 275 in cumulative to all the manifestations. While 412 practitioners responded with NO in cumulative to all the manifestations. 86 questionnaires were collated taking each of the manifestation one after the other. It shows that the practitioners have the knowledge of the different manifestations of TMJ disorder.

Table 4. The etiological factors for TMJ disorders according to the practitioners.

Etiological factors for TMJ Disorders	Yes		No	
	Number ()	Percentage (%)	Number	Percentage (%)
Stress	48	55.2	38	43.7
Inadequate protheses	28	32.2	58	66.7
Misaligned teeth	76	87.4	10	11.5
Overhanging amalgams	43	49.4	43	49.4
Insufficient amalgams	4	4.6	82	94.3
Overhanging composites	19	21.8	67	77
Insufficient composites	3	3.4	83	95.4
Other causes	5	5.7	77	88.5
Total	226		458	

The total number of practitioners that responded with YES to the 8 LISTED etiological factors is 226 in cumulative, while 458 practitioners responded NO to the factors also in cumulative. After the collation of 86 filled questionnaires taken the etiological factors one after the other .It shows that all the practitioners have adequate knowledge of the etiological factors and managed the disorders based on individual approach

Table 5. Treatment of TMJ disorders according to the practitioners.

Treatment of the Disorder	Yes		No	
	Number	Percentage (%)	Number	Percentage (%)
Mouthguard	57	65.5	29	33.3
Selective grinding	61	70.1	25	28.7
Renewed coronal restorations	36	41.4	50	57.5
Endodontic treatment	4	4.6	82	94.3
Restoration by a fixed prosthesis	19	21.8	67	77
Other	21	24.1	61	70.1
Total	198		314	

The number of dentists that responded with YES using 86 questionnaires is 198 in cumulative while NO is 314 also in cumulative. CONSIDERING THE 6 DISORDERS that was taken one after the other . it shows that the practitioners are all aware of the disorder but resulted into using suitable TMJ TREATMENT.

3.3. Quality of the Protocol for Carrying out a Restoration

The proportion of the practitioners who used clinical methods that consisted of an evaluation of the joint of the patient by asking them to clench their teeth until they achieved optimal comfort was 5.7%. The vast majority (94.3%) always used articulating paper to adjust the Maximal Intercuspal Occlusion (MOI). Most of the surgeons (82.8%) noted that they carried out the polishing of amalgam restorations in a subsequent session. The precautions used to avoid TMJ disorders comprised taking into account the occlusal morphology at the time of shaping of the restorations for 32% of them and rigorous control of the occlusion after having undertaken the restoration for 55%. The proportion of practitioners who systematically reevaluated the restoration in another session was 54%.

4. DISCUSSION

The repartition according to the type of practice, allowed us to show that the two sectors of practice were represented nearly equally, that is to say, 49.5% of the practitioners were in the private sector and 50.5% in the public sector, with a sex ratio of 1.68. Nearly all took part in continued training (89.7%). The sample was representative of all years of experience brackets and the most active categories were those that had more than 10 years of experience (48%). Similar results have been reported by other studies. Indeed, Kabore *et al.* in 2015 [10] and Fall *et al.* [11] in 2018, in Burkina Faso, also reported the same trends in terms of the public sector and continued post-university training. However, these authors had a high level (40%) of young practitioners in their sample, that

is to say, practitioners who had been in practice for less than 10 years. The work by Ndiaye *et al.* [12] in 2017 in Senegal and of Udoye *et al.* (2013) [13] in Nigeria also reported a predominance of males in the dental profession and a larger proportion in private practice.

The present study, although limited to the practitioners of the town of Abidjan, has allowed occlusion to be recognized as one of the foremost concerns of general practitioner dentists who perform restorative dentistry on a daily basis. Indeed, poorly suited restoration materials can impair occlusion and mandibular kinetics [14]. Conservative materials present great variability and they present different mechanical properties in terms of hardness [15], roughness [16] and elasticity modulus [17]. Additionally, some recently introduced conservative materials such as fiber reinforced composites [18] or CAD/CAM restoratives [19] present different hardness and flexural properties if compared with conventional conservative materials, thus leading to different possibilities of correlation with TMJ. For this reason, the knowledge about this topic has to be constantly updated.

When dysfunction manifest, the clinical signs most often reported by the practitioners were joint pain (76%) followed by cracking joint (64.4%) and muscle pain (69.9%). The etiological factors put forward were overhanging restorations for 49.4% of them. The objective of any occlusal restoration is to optimize masticatory function and to maintain dental health [20]. Occlusion is always involved to a certain degree in daily dental treatments [2]. By systematic screening, odontologists need to know how to recognize occlusion impairments, so as to at least avoid generating them by iatrogenic procedures [2]. Sudden occlusal changes can occur over the course of a restorative treatment with amalgam or composite resins that can lead to an overbite or an underbite [21]. When they are not tolerated, these changes in occlusion can lead to ineffective sensorimotor regulation [22, 23]. Occlusal surfaces, due to their shape, constitute the working part of a tooth. Occlusal and root morphologies affect the functional ergonomics [2]. Each tooth has an essential functional and stabilizing role. The occlusal morphology of human teeth comprises convex shapes, elevations that are cusp-shaped or that have free edges. The cusp shape constitutes the ergonomic response to the physiological requirements. The morphology has a direction and needs to be respected, restored, or reconstructed [24, 25]. When the occlusal alignment is perturbed, so are the abilities of the manducatory apparatus, which is harmful to the various structures [26, 27, 22]. Such one-off occlusal anomalies (one or two teeth), having appeared or worsened recently, can be corrected by a straightforward equilibration of the first intention with the aim of immediate optimization of occlusal functions [28, 29]. MAD can be clinically characterized by pain at the level of the TMJ and/or at the level of the masticatory muscles, as shown in this study. It can radiate to the eyes, the face, the shoulders, the neck, or the back. The patient may also state that they have headaches and otalgia [30]; which is also what practitioners have noted. Thus, while the symptoms of TMJ disorders can be unclear, they can be related to other pathologies [31 - 33]; whence the importance of a rigorous analysis that leads to a positive diagnosis. For the practitioners, the treatment of TMJ disorders amounted to

selective grinding (70.1%) and wearing an occlusal mouthguard (65.5%) in advanced cases. Indeed, a mouthguard provides pain relief by muscle relaxation and by repositioning of the condyles [34, 28]. This study has reported that the vast majority of the practitioners always used articulation paper (94.3%) to evaluate the TMJ and 82.8% polished the amalgam restoration that they had carried out at a prior appointment. Physiologically, the TMJ constitutes a reference mandibular position whereby the relationship of the teeth is characterized by a maximum of interarcade contacts [24, 35]. It should be noted that the term “intercuspatation” comprises the notion of displacement; it hence signifies, not the position, but the movement of the mandible resulting in the maximal intercuspidal position [36, 37]. The role of occlusion is, therefore, not trivial, and its regulation abides with definite rules. This is why in practice its control and its regulation need to be carried out with great thoroughness [38, 39]. When the skills of the practitioner are insufficient, the patient needs to be referred to a specialist, as indicated by more than half of the practitioners.

CONCLUSION

This study has shown that the general practitioners of the town of Abidjan have a good level of knowledge of the consequences of poorly carried out restorations? Such occlusion impairments typically produce improper muscle responses and lead to changes in pressure at the level of the temporomandibular joint. Hence, the need to follow the procedures for restoration so as not to generate them. Re-establishment of occlusal function, just like the sealing of coronal obturations, is indispensable for the longevity of restorations and thereby contributes to maintaining good-oro-dental health.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Not applicable

HUMAN AND ANIMAL RIGHTS

No animals/humans were used for studies that are the basis of this research.

CONSENT FOR PUBLICATION

Not applicable.

AVAILABILITY OF DATA AND MATERIALS:

Not applicable.

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CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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