

Realization of Bonded Restorations with Partial Anchorage: A Survey among Dentists in Private Practice in Casablanca Morocco

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ABSTRACT

Objectives: *The aim of this study was to assess the prevalence of realization of resin-bonded partial-coverage restorations and to determine the frequencies of reasons to indicate these restorations in dental office.*

Methods: *In this cross-sectional study, a 22-question questionnaire was sent to 309 practitioners randomly selected from a list provided by the South Regional Council of Dental Registry. Average significance and Chi-square tests were used to identify the frequency, pattern, and significance of the response variables identified.*

Results: *The response rate of our study was 79,6%. Our survey revealed that 52,4% of practitioners use resin-bonded prosthesis in their daily practice. For the 47,6% who avoided it, the principal reasons were lack of training and the high price of bonding products. 81,1% of dentists have reported the need of continuing training in adhesive prosthesis and the type of training the most chosen was practical workshops for 55,5% of practitioners. Also, veneers (73,6%), resin bonded fixed partial dentures (58,9%) and inlays (58,1%) were the more used types of resin-bonded partial-coverage prosthesis according to our study.*

Discussion: *Similarly to several studies on adhesive prosthesis, our study showed that resin-bonded partial-coverage restorations are not frequently used comparing to cemented restorations. This is due to the lack of training and practice. For that, the major part of practitioners of our study and of similar ones, reported the need of continuing training to stay updated with the new technics in dentistry and to provide quality services to patients.*

Conclusion: *The evolution of adhesive materials and the emergence of new techniques powered a change in the restorative adhesive dentistry. This requires practitioners to update knowledge and skills regularly to match the changing complexity of healthcare needs.*

Keywords

Resin-bonded prosthesis, Partial coverage, Private practice, Casablanca.

Introduction

With recent advancements in aesthetic dentistry, new treatments modalities have expanded the choices available to dentists.

While in the past the traditional fixed prosthesis were essentially based on mechanical principles, bonding techniques have the merit to be clearly more conservative. Nowadays, adhesive dentistry has expanded treatment options with stronger, longer-lasting materials that include both resins and porcelains. These progress developments have not only expanded the ability to treat disease but also have given dentists the ability to enhance the esthetic appearance of teeth. Concurrently with the development of these new modalities, researchers have produced information indicating that certain forms of traditional treatment may not be necessary [1]. In fact, the extensive removal of tooth structure associated with complete crown coverage preparation is seen as a disadvantage. Several studies [2-4] on endodontically treated teeth have shown that a high volume of remaining natural tooth structure has a significantly positive effect on fracture resistance independent on the type of tooth. By opting for a partial rather than a complete coverage restoration, more tooth structure can be saved [2]. That's why a conservative approach should be planned in terms of conserving tooth structure, vital tissues, and aesthetics to achieve clinical success of the prosthetic restoration and maintaining the patient's natural dentition longevity.

Thus, the dentist must be in perpetual theoretical and practical evolution in order to assure his patient the new techniques approved by science.

The aim of this study was to evaluate the prevalence of the realization of bonded restorations with partial anchorage by the Moroccan dentists practicing in Casablanca.

Materials and Methods

The survey was conducted among a sample of dentists, randomly selected by the SPSS software, from a list provided by the council of the order of dentists. The sample was 309 dentists out of a total of 1547. The study sample included general practitioners and specialists working in private practice in Casablanca (Morocco). However, non-respondents, orthodontists and pediatric dentists with exclusive practice were excluded.

A structured, self-administered and anonymous questionnaire composed of 22 questions was hand-delivered to participants. To maximize the responses obtained, participants were reminded to return their questionnaires three weeks and six weeks after the questionnaires were distributed.

The first part of the questionnaire consisted of questions related to clinician's gender, university and year of graduation, years of experience and specialty. The second part of the questionnaire

comprised 6 close-ended, multiple-choice questions which were related to extract the part of prosthodontics and partial adhesive prosthodontics in daily practice, the type of prosthodontics used in daily practice, causes of not providing adhesive partial prosthodontics, need of continuing training in adhesive restorations and the type of training desired.

The last part of the questionnaire contained 11 questions that were designed to identify the type, the indications, the prosthetic and the bonding materials used for adhesive partial restorations in daily practice, criteria's choice of prosthetic and bonding materials.

All the data were coded, checked and entered by a single operator into a personal computer. Statistical analyses were carried out by the Epidemiology and Biostatistics Laboratory of Casablanca Dental School using SPSS 22.0 program (Statistical Package for the Social Sciences for Windows; SPSS Inc., IL, USA). A p-value less than 0.05 was considered statistically significant.

Results

Of the 309 questionnaires that were distributed, 246 were returned. The response rate was 79,6%. Regarding the socio demographic characteristics, 62,2% of respondents were women, 69,9% graduated from Casablanca, between 1987 and 2018 and 36,2 % had less than 5 years of experience. 73,6% of the respondents were general dentists and 26,4% were specialists. For more than 50%, fixed prosthodontics occupied from 25% to 50% of their daily practice.

Cemented dental-supported prosthesis (95,7%) were the most performed type of fixed prosthesis in daily practice over resin bonded dental-supported prosthesis (52,4%) and the implant-supported ones (25,8%) (Table 1).

Table 1: Fixed prosthodontics in daily practice.

	Number	Percentage
Frequency use of FP		
-0-25%	68	29.2
-25-50%	118	50.6
-50-75%	37	15.9
-75-100%	10	4.3
Type of FP		
-Cemented dental-supported	223	95.7
-Resin bonded dental-supported	129	52.4
-Implant-supported	60	25.8
Frequency use of BP		
-0-25%	102	78.5
-25-50%	22	16.9
-50-75%	6	4.6
-75-100%	0	0

FP: *fixed prosthodontics*; BP: *bonded prosthodontics*

A large percentage of the population did not provide bonded restorations (47,6%). The non-use of these adhesive prosthesis was due to the lack of training of the practitioner, the expensive cost of the prosthesis and failure risks (Table 2).

Table 2: Participants' reasons for not using adhesive prosthodontics in their practice.

	Number	Percentage
Failure risk	47	43.5
Lack of training	68	63.6
Expense	48	44.4
Lack of request	34	31.5
Reduced stability	1	0.4
Patient's poor hygiene	1	0.4

Therefore, 81,8% of the respondents agreed that there is a need for continuous education programs. The type of training the most chosen was practical workshops with a percentage of 55,5% of the participants [Tab.3]. For the majority part of dentists (78,5%) who provided adhesive prosthesis, it occupied less than 25% of their daily practice (Table 1). Veneers (73,6%), resin bonded bridges (58,9%) and inlays (58,1%) were the most frequently used.

Majority of respondents preferred using preparation veneers (94,7%) on vital teeth. The most common type of ceramic chosen for veneers were feldspathic ceramics (45,6%), glass-ceramics (38,9%) and zirconia (40%). Dentists preferred performing inlays (57,6%) and onlays (70,8%) on vital teeth.

Table 3: Type of continuous education programs desired.

	Number	Percentage
-Master degree	65	34
-Academic degree	70	36.6
-Practical workshops	106	55.5

Ceramic (62%) was the most preferred material for inlays and onlays, followed by composite resins (50,6% for inlays, 45,8% for onlays). Precious alloys and non-precious alloys were the last choice for both inlays (14,1%) and onlays (19,4%) (Table 4).

The majority of the participants (73,3%) have chosen the resin bonded bridge (RBB) for anterior region, however (40,7%) have selected this prosthesis for posterior region. More than 68,6% used resin bonded bridges for replacing one missed tooth, whereas 12,8% used it for replacing more than one missed tooth (Table 4).

Regarding design associated with resin bonded bridges, more than 33% of dentists performed fixed-fixed resin bonded bridges. However, 16,3% opted for cantilevers (Table 4). A total of 60,5% selected ceramics as their first choice for resin bonded bridges' material, while 26,7% preferred non precious alloys, 9,3% used resin composite and less than 3,5% used precious alloys. Most commonly cited material choice's criteria were clinical situation (87%), dentist's preference (21,3%) and material availability among prosthetists. For ceramic bonding, more than 58% of respondents opted for resin composite bonding, 16,1% preferred self-adhesive bonding, 14,3% selected 4-META resin bonding and less than 11% chose phosphate monomer resin bonding. Whereas, for metal bonding, dentists preferred 4-META resin bonding (55,8%) and self-adhesive bonding (19,8%) over composite resin bonding (15,2%) and phosphate monomer resin bonding (9,3%).

These choices were principally based on the type of prosthesis (71,7%) and resistance to decohesion (62,5%) for an important number of respondents.

Table 4: Resin Bonded Prosthesis' type performed.

	Number	Percentage
Prosthesis' Type		
-Veneers	95	73.6
-Inlay	75	58.1
-Onlay	60	46.5
-RBBs	76	58.9
-Endocrowns	1	0.4
Veneers		
-No prep	31	33
-Prep veneers	89	94.7
-On vital teeth	85	90.4
-On non vital teeth	33	35.1
Inlays		
-On vital teeth	49	57.6
-On non-vital teeth	46	54.1
-In Ceramic	53	62.4
-In resin composite	43	50.6
-In precious alloy	12	14.1
Onlays		
-On vital teeth	51	70.8
-On non-vital teeth	38	52.8
-In ceramic	45	62.5
-In resin composite	33	45.8
-In alloy	14	19.4
RBBs		
-Anterior	63	73.3
-Posterior	35	40.7
-Replacing one missing tooth	59	68.6
-Replacing more than one missing tooth	11	12.8
-Cantilever	14	16.3
-Fixed-fixed	28	33.3

RBBs: *resin bonded bridges*

Discussion

The response rate for our survey was in line with others studies where the response rate has ranged from 55-78% [5,6].

The results of this study confirm that fixed prosthesis involved more than half of the daily practice of the majority of our respondents. This fact confirms the great need of Moroccan patients for this type of treatment. In fact, this was in line with a study conducted on 2011 which confirms that fixed prosthodontics is one of the major components of clinical activity for U.S. dentists [7].

The cemented prosthesis were the most used compared to the other prostheses. Reduced usage of implant supported prosthesis could be explained by their expense or the lack of training amongst practitioners. In fact, only 9,3% of respondents were specialized in implantology.

Regarding resin bonded partial coverage restorations, more than 47% were not using this type of prosthesis.

Generally, the most common reasons given for not using adhesive restorations were lack of training, expense of bonding material and

failure risk. According to an investigation conducted in Yemen on 2017 [5], a high percentage of participants avoided using resin bonded bridges due to the lack of training. Also, more than half of dentists who participated in a study conducted in Saudi Arabia on 2012 [6], felt that they lacked adequate training in the use of veneers.

In the Profile and Competences for the graduating dentist released by the Association for Dental Education in Europe [8], the competences, at the graduation, have been defined as the basic level of professional behavior, knowledge and skills necessary for a graduating dentist to respond to the full range of circumstances encountered in general professional practice. Consequently, the contemporary educational philosophy shows a competence fulfillment approach encompassing a wide spectrum of professional skills which is not limited to manipulative skills only. For dentists, to reach such level of skill, they must be exposed to enough number of cases of variable difficulty during their study. The dental practitioners, therefore, should be equipped with knowledge as well as experience in various modalities that are available for treating patients prior to working independently [5].

Effectively, in agreement with the results of the previous studies [5,9], the majority of our respondents confirmed that they are in need in continuing training in adhesive restorations to improve their skills and to offer quality services to their patients.

Apparently, the type of continuing education the most desired was practical workshops followed by academic certificates. Whereas master degree was the less desired type of training due to its expense and long period. In fact, the main reasons to select one course over the most likely include the organization providing the training, the individual practitioners' previous experience, the topic presented and sometimes the location where the course is offered [10].

The use of resin bonded partial coverage restorations among our participants was dominated by veneers in the first place followed by resin bonded bridges and inlays; onlays were less used. Similar results were found in a study carried out among dentists in Casablanca in 2017 [11]. Veneers were the most prescribed prostheses with a rate of 76.5%, followed by bonded bridges for 73.1% of practitioners and 38, 2% for inlays / onlays [11].

In addition, in terms of studies conducted in other countries, we note the following results:

- Regarding the realization of veneers, 91% of dentists in New Zealand prescribed them in 2019 [12], 70.3% of Saudi dentists prescribed them in 2012 [6], 77.5% prescribed them in 2017 [13]; 41% of dentists in the UK prescribed them in 2008 [14] and 90% prescribed them in 2015/2016 [15].
- Regarding the use of bonded bridges, according to a study carried out in 2014 in Yemen, only 23.2% of practitioners carried out bonded bridges [7].
- Regarding the clinical application of inlays / onlays, 16% of dentists in North America in 2004 performed inlays / onlays [16], 59.2% of dentists in Saudi Arabia performed them in 2017 [13].

Veneers were still the preferred choice for the restoration of anterior teeth.

The increased use of whitening techniques has largely reduced the need for veneer techniques but when indicated they are the least interventive restorations for the restoration of anterior teeth [14]. The increased use of veneers is partly due to patient demand and also because of the superior aesthetic result that can be obtained, possibly leading to practitioners selecting them more frequently.

Feldspathic ceramic was the material of choice for veneers followed by zirconia and glass ceramics. Due to its thickness, feldspathic porcelain has a high translucidity that gives a natural effect to restorations which require minimal tooth preparation [17].

When questioned about choice of material for inlays and onlays, mostly reported using ceramics due to their higher mechanical properties compared with resin composites. Also, resin composite was used by an important number of the respondents. Precious and non-precious alloys were the last choice amongst them, what is probably due to the increasing patient's desire for a metal free restoration or to the expense of precious alloys.

Otherwise, it was approved that there is a strong correlation between dental gold and both an increased risk of contact allergy to gold and increased gold blood levels [18].

By comparing the three materials in terms of stability, ceramics have the advantage of being more color stable regarding composite and having inferior stability than gold.

For one missing tooth replacement, a huge number of practitioners were more likely to prescribe resin bonded bridges.

Creugers et al. [5] reported that anterior resin bonded prostheses have higher durability. This may explain why, in the present study, the anterior region of the jaws (73,3%) was considered the most appropriate location for resin bonded prosthesis.

Regarding the number of teeth replacement, the majority of the participants used RBBs for one missing tooth replacement. In fact, Pröbster and Henrich indicated that the multi-unit (more than four units) had a smaller probability of survival than three-unit restorations [19].

Cantilever design was the preferred choice for respondents, with only 16,3% of dentists opting for a fixed-fixed design. Indeed, many dental professionals preferentially support the use of a cantilever due to differential abutment movement and partial retainer failure that has been associated with the fixed-fixed design [9] and their higher longevity [20].

Whereas, the longevity or prognosis of RBBs are thought to be influenced by various factors such as preparation, type of metal alloy, treatment of the adhesive surface, type of cement, number of

abutment teeth, number of missing teeth, location of the prosthesis, dentition, patient age, operator skill, and periodontal disease risk of the patient [19].

As to the material for RBBs, ceramics were still the preferred. Non precious alloys were less likely used since anterior RBBs were the most performed from our respondents. Also, the increased demand of metal-free restorations to achieve more aesthetic results and eliminate the metal shadow can explain these results.

When asking about factors that might influence their material choice, clinical situation was the most important. Practitioner's preference according to experience, material availability among dental technician were also taken into consideration.

A recent study [21] approved that the prosthetic material has to be chosen in terms of the clinical situation especially cavity extension and the mechanical resistance essential to guarantee the preservation of cusp anatomy and the durability of the restoration.

For bonding materials, composite resins were the most used for ceramic bonding; self-adhesive resins and 4-META resins were least likely used for this type of material. These choices can be explained by the fact that composites offer an excellent adhesion performance and high longevity. Indeed, the wide choice of shades make them the materials of choice when esthetic requirement is primordial [22].

Whereas, for metal bonding, 4-META resins were the first choice of our respondents. In fact, they have the advantage of retaining a part of elasticity after polymerization and partially absorbing mechanical stresses and thus limiting the risk of debonding [22]. Composite resins and self-adhesive resins were the last choice.

Many criteria might be taken into consideration for choosing bonding material. Type of prosthesis and decohesion resistance were the most important criteria for an important number of respondents; material cost, practitioner's preference according to experience and presentation form were least important.

Perhaps, further research is needed to investigate factors influencing decision making.

Conclusion

It is important to acknowledge that studies such as this one have a number of limitations. Data obtained in the current study are related to dental practitioners who responded to this study. Of the respondents of this study, 52.4% of dentists provided resin bonded partial coverage restorations in their daily practice. Lack of training, expense of bonding materials and failure risks were principal reasons cited by dentists for not using this type of prosthesis. Based on the data reported in this study, it appears that the majority of the participants are in need of continuing education in resin bonded prosthesis.

Within the limitation of our study, the following recommendations can be drawn:

- Introducing the aesthetic procedure in the dental school curriculum and having more training will help the new dentists to be more confident in applying aesthetic dentistry; also, having more training on aesthetic dentistry can increase the practice among dentists and also minimize iatrogenic failures.
- implementing continuing education programs among practicing dentists to stay updated improve their skills,
- introduction of more specialized training activities that aim at familiarizing the dentists with the use and advantage of new procedures,
- findings and conclusions reported can be applicable to other cities and regions with similar practicing arrangement.

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