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PROSTHODONTICS AND ENDODONTIC MAL-PRACTICE: PREVELENCE STUDY

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ABSTRACT

Aim: The aim of this study was to detect the prevalence of dental malpractice in the fields of prosthodontics, endodontics and restorative dentistry

Materials and Methods: 251 patients ≥18 years of age were randomly selected and clinically examined for substandard dental treatments done in the following fields:

Prosthodontics (substandard crown and bridge placement in relation to tooth preparation and crown adaptation, PFM crown and bridge placement on feather edge finishing line, substandard post and core)

Endodontics (substandard root canal (RCT) treatment), and Restorative dentistry (overhanging restorations: class II, III, IV, V)

The data obtained were documented in a patient examination form then statistically analyzed using Chi-Square Test.

Results: There was a significant difference in the percentages (number) of dental malpractice observations in all of the three types (prosthodontics, endodontics, restorative dentistry) p-value =0.001<0.05, and the dental malpractice observations were not equally distributed. Therefore, endodontics malpractice was of the first rank up to 40% followed by restorative dentistry malpractice of the second rank up to 33% then prosthodontics malpractice of the third rank up to 27%.

Conclusion: Dentists must consider ethical principles and acceptable standards and protocols of diagnosis and treatment. There is high need for improving the technical skills of practitioners in root canal treatments. Also, stressing on the importance of using wedges to avoid overhanging dental restorations is recommended. Social and economic factors in the society might play a role in the lower percentages of prosthodontics malpractice

INTRODUCTION

Dental Malpractice Dental treatments are carried out by a dental team, which often consists of a dentist and dental auxiliaries (dental assistants, dental hygienists, dental technicians, as well as dental therapists). Most dentists either work in private practices (primary care), dental hospitals or (secondary care) institutions (prisons, armed forces bases, etc.). Dental practice is the exercise of ethical treatment to the patient but if there is negligence in the treatment on part of dentist it is called the dental malpractice that leads to harm of the patient.

Crowns and Dental Malpractice

OVER-CONTOUR

Crowns should replicate the natural tooth being restored. If the crown is larger than the natural tooth it will trap bacteria, which can cause decay or periodontal gum disease. Symptoms of over-contour include bleeding gums around the crown or darkening of the gum margin around the crowns. Before turning bluish at the gum margin the gums at the crown margin may turn red and bleed. Healthy gums do not bleed either with or without crowns, bridges or veneers.

MALOCCLUSION

After cementing the crown the dentist may need to make slight adjustments in the bite. If properly done it is usually not necessary to grind the opposing teeth in the opposing jaw. For instance, slight grinding of the new crown may occur for an upper crown but grinding the opposite lower teeth to accommodate the new crown should not be needed. Excessive grinding can trigger TMD (temporomandibular disorder) with painful jaw spasms in front of the ear or temple region and/or tinnitus (ringing in the ear).

Inadequate embrasure space

New crowns and veneers should have adequate space to floss between the teeth. If floss shreds or flossing is difficult or inaccessible the embrasure space between the adjacent crown or veneer is insufficient.

Biologic width space

New crowns should not impinge upon the underlying bone and connective tissue fibers overlying the bone. If crowns or veneers are prepared too deep underneath the gum, the gum tissue in time will become red, inflamed, recede, bleed or develop pathologic gum pockets. Periodontal crown lengthening surgery is often necessary to provide proper separation distance between the crown or veneer margins and underlining supporting bone and connective tissue. If not done, the crown or veneer continues to impinge upon the connective tissue to cause chronic inflammation.

OPEN MARGIN

A common error is cementing a crowns or veneers with unsealed margins that subsequently leaks and traps bacterial plaque with resulting decay and/or periodontal gum disease. Dentists should check circumferentially the crown or veneer with a sharp explorer both before cementation at a try in visit, and also after cementation to check for open unsealed margins. If marginal opening is diagnosed, the crown or veneer should be returned to the dental laboratory for construction of a new crown or veneer and not cemented permanently until remade.

Shy margin of preparation

A crown or veneer which does not completely cover the prepared tooth surface over which the crown or veneer is designed to be cemented is defective and requires a new crown or veneer with margins that are not shy or short of covering the prepared tooth surface. Shy margins predispose to tooth sensitivity. Also the exposed dentin surface of the incompletely covered restoration preparation is vulnerable to decay.

Color of crowns or veneers

Patients with the dentist's assistance can preselect a shade to blend with existing teeth or create an entirely new smile if multiple teeth will be crowned or veneered. A natural tendency is for the patient to select the whitest shade in the shade guide. If too white

a shade is selected such as resembling refrigerator white, your teeth may not look natural. Whiter teeth can often be achieved with a reversible bleaching procedure rather than irreversible tooth reduction with crowns or veneers, which require periodic replacement over a patient's lifetime.

MIDLINE

Crowns or veneers should be centered so that the midline of the lips matches the centerline separating the right side from the left side. A disharmony between the crowns or veneers shifted to one side or another from the midline of the lips looks unnatural and un-esthetic.

CANT

The upper crowned teeth should be at the same level as a ruler level with the center of each eye. Otherwise the teeth will be tilted to one side and not level with facial features. A face bow device, similar to a carpenter's leveler, should be used to establish a level plane of occlusion. It should be used before impression molds are sent to the dental laboratory for crown fabrications.

LONGEVITY

Crowns or veneers are built to last for 10 or more years before wear or esthetic changes with adjacent teeth require new crowns or veneers. Veneer preparations do not invade sensitive dentin but instead are only drilled 0.3 to 0.5 mm into enamel. Veneers deep drilled into dentin and then bonded to dentin have a weak non-durable bond, which is subject to fracture and de-bonding, and thus are not built to last.

Bruxism

Patient grinding habits, which can cause excessive teeth wear or clenching predispose to TMD (temporomandibular disorder) muscle jaw pain. Night guards worn over the teeth at night protect against excessive teeth wear on the biting surfaces.

CROWN NECESSITY

Decay or wear is the primary reason for crowning teeth. Overtreatment with excessive number of crowns is tempting for some dentists. If in doubt, select another dentist or prosthodontist specialist for a second opinion after first obtaining a written itemized estimate from the first dentist.

ALTERNATIVES

Bleaching and/or orthodontics are the most conservative, least invasive and least expensive alternative to crowns or veneers done for esthetic reasons for either whiter teeth or to close open spaces between teeth. Bleaching can be done at home with bleaching trays provided by the dentist to lighten or whiten teeth color. Removable braces such as clear Invisiline provide a permanent solution without grinding the teeth down to stubs for crowns. Invisiline may be completed in months and avoids destructive teeth preparation reduction necessary for construction of crowns.

Other alternatives include adding plastic restorative materials such as the newer composites, which can be done in one sitting and avoids waiting weeks for the dental lab to construct crowns. For immediate esthetic needs, such as an upcoming wedding, plastic composites added onto existing teeth or crowns, which are often done in one visit, can provide a less expensive, quicker and yet long lasting result.

VENEERS AND ROOT CANALS

Porcelain veneers only remove a portion of the facial outer enamel and some of the tooth side but avoids grinding strong enamel off entirely or the backside of the tooth. There is approximately one percent or less chance of a root canal from grinding the entire tooth for a crown. Root canals can be avoided entirely with porcelain veneers if correctly prepared into enamel only. If drilling is extended beyond the enamel into the less dense underlying sensitive dentin tooth structure, the risk of a root canal results because drilling into dentin is closer to the pulp nerve.

Iatrogenic Damage to Periodontium by Restorative Treatment Procedures

Periodontal tissues play an important role in proper esthetics, function, and comfort of the dentition. The interplay between periodontics and restorative dentistry is present at many aspects. For instances, location of restorative margins, crown contours, and response of the gingival tissues to restorative preparations.[2]Black originally recognized the close relationship of iatrogenic factors with periodontal breakdown

Many studies have focused their attention on different aspects of the periodontal– restorative interaction such as position of the restoration with respect to the gingival margin, presence of overhangs, presence of marginal leakage, roughness of the surfaces, and the type of restorative material.[2,4]

Substandard Root Canal Treatment

It's known in the field of dentistry and proved in literature that substandard root canal treatments cause various kinds of peri-apical pathological conditions including granulomas, abscesses, or even cysts.[5]

Preparations for Full Coverage Crowns

Literature makes it clear that a shoulder preparation is the correct finishing line for full coverage metal ceramic crowns also called porcelain-fused-to-metal restoration (PFM) in addition to full ceramic crowns for the purpose of achieving correct adaptation, avoiding marginal gap and plaque accumulation.[6]

Post and Core

The length of the dowel (DL) should equal the crown length or two-thirds the length of the root. The length of the remaining apical fill (AF) should be at least 4.0 mm.[7]

Wedging for proper proximal contact

Literature clarifies the importance of using a wedge during preparation of interproximal areas, the benefits of using the wedge are summarized in serving as a guide to help prevent overextension of the gingival floor, helping in separating the teeth which is critical to establishing proper proximal contact subsequently, and compensating for the thickness of the matrix band (the matrix band must be in absolute contact with (touching) the adjacent contact area).[8]

It is clear that not abiding with the rules and instructions of using a wedge when preparing restorations in interproximal or interdental areas ends up with the creation of overhanging restorations that cause plaque accumulation as there isn't accessibility for the patient to clean properly thus periodontal irritation and inflammation

MATERIALS AND METHODS

251 patient's ≥18 years of age were randomly selected and clinically examined for substandard dental treatments done in dental premises (hospitals, polyclinics, and private clinics. After taking the patient consent on an informed consent statement form for clinical studies, each patient was clinically examined in the following fields: Prosthodontics (substandard crown and bridge placement in relation to tooth preparation and crown adaptation, porcelain fused to metal (PFM) crown and bridge placement on feather edge finishing line, substandard post and core), endodontics (substandard root canal (RCT) treatment), and restorative dentistry (overhanging restorations: class II, III, IV, V). The data obtained were documented in a patient examination form then statistically analyzed using Chi-Square Test (nonparametric statistics) to test. All statistical analyses were performed using the IBM SPSS Statistics 20 data processing software. The significance level was set at p-value < 0.05.

RESULTS

For the purpose of the study, we tested the null hypothesis o , which stated that the percentages of dental malpractice (prosthodontics, endodontics, restorative dentistry) were equal at a confidence level 95%. The results of the 251 patients were as the following:

Table 1: Descriptive study

SPECIALITY	N	MEAN	STD. DEVIATION	MODE
ENDODONTICS	251	.85	.359	1
RESTORATIVE	251	.69	.462	1
PROSTHODONTICS	251	.57	.497	1
VALID N VALUES	251			

Table 1 shows that the Mean of observed endodontics malpractice was 0.85, restorative dentistry malpractice was 0.69, and prosthodontics malpractice was 0.57. In addition, the standard deviation was 0.359, 0.462, 0.497 for the aforementioned three types of dental malpractice, respectively. Furthermore, Mode =1 which indicated that the existence of dental malpractice was more than the nonexistence of dental malpractice for all of the three types (prosthodontics, endodontics, restorative dentistry).

Table 2:
Shows that endodontics was of the first rank with 213 observations (40%), restorative dentistry was of the second rank with 174 observations (33%), and prosthodontics was of the third rank with142 observations (27%).

The question of this study was: Were dental malpractice observations distributed in equal proportions? In another word: Was the difference in the percentages of dental malpractice significant or insignificant?

Table 2: Observed Malpractice Frequency and Percentages Malpractice

	FREQUENCY	PERCENT	VALID PERCENT	CUMULATIVE PERCENT
ENDODONTICS	213	40.3	40.3	40.3
RESTORATIVE DENTISTRY	174	32.9	32.9	73.2
PROSTHODONTICS	142	26	26.8	100
TOTAL	529	100.0	100	

To answer this question, we tested the null hypothesis o versus the alternative hypothesis 1 which stated that there was a significant difference in the percentages (number of observations) of dental malpractice (prosthodontics, endodontics, restorative dentistry). Hypotheses:
o: p Restorative Dentistry = p Endodontics = p Prosthodontics = 1 3
1 : p Restorative Dentistry =p Endodontics = p Prosthodontics=0

Table 3 shows the observed and the expected endodontics number of dental malpractice, (prosthodontics, endodontics, restorative dentistry). We used 2 Chi-Square Test to test the contingency (test of goodness of fit) of the observed and expected number of dental malpractice. The expected number was equal for each of the three types of dental malpractice (176.3), and this was what the null hypothesis stated. So, was the hypothesis accepted or not?

Table 3:Chi-Square Test
MALPRACTICE FREQUENCIES

MALPRACTCE	OBSERVED N	EXPECTED N	RESIDUAL
ENDODONTICS	213	176.3	36.7
RESTORATIVE DENTISTRY	174	176.3	-2.3
PROSTHODONTICS	142	176.3	-34.3
TOTAL	529		

The answer came in Table 4, which contains the results of the study test. For taking the decision we recognized the following:

For degree of freedom (df)=2 and significance level of this study set at a=5% (one side test, right) with referring to Chi-Square statistical tables, the value of 2 tab=5.991. When comparing 2 tab with the actual value in Table 4 2 cal=14.340, we found that 2 tab < 2 cal with p-value (sig)=0.001<0.05. This result was the acceptance of H1 and the rejection of o. Chi-Square Test showed that there was a significant difference in the percentages (number of observations) of dental malpractice (prosthodontics, endodontics, restorative dentistry) p-value =0.001 < 0.05. 1

Therefore, Endodontics malpractice was of the first rank up to 40% followed by restorative dentistry malpractice of the second rank up to 33% then prosthodontics malpractice of the third rank up to 27%, and this was out of the total number of dental malpractice observations in the aforementioned three types (Table 2)

Table 4: Chi-Square Test Statistics Test Statistics

	MALPRACTICE
CHI –SQUARE	14.340
DF	2
ASYMP.SIG	.001

DISCUSSION

Comparison with LITERATURE

For the purpose of comparison with literature, we present Table 5, which contains the results of literature targeting the top three most frequent areas of malpractice cases in different countries.

1. Comparison with literature (Table 5) except (Hapcook to be compared later in details).
When comparing prosthodontics only with endodontics, we found that in literature the percentages of prosthodontics malpractice were higher than the percentages of endodontics malpractice. However, the percentages of prosthodontics malpractice were lower than the percentages of endodontics malpractice.

According to the data available in literature, endodontics and prosthodontics have been present in all reports and have been among the three most frequently listed complaint areas during the past decade (Table 5).[9,10]

Table 5: The top three most frequent areas of malpractice cases/complaint cases as described in actual references.[9]

REME & OWALL	PROSTHODONTICS (36%)	FORMALITIES 13%	ENDODONTICS 12%
MILGROM	ORAL SURGERY (21%)	PROSTHODONTICS (19%)	ENDODONTICS 18%
OZDEMIR	ORAL SURGERY (45%)	PROSTHODONTICS (36%)	ENDODONTICS 18%
HAPCOOK	PROSTHODONTICS (28%)	ENDODONTICS 17%	ENDODONTICS 16%
BJORNDAL & REIT	PROSTHODONTICS (30%)	ENDODONTICS 13%	ENDODONTICS 12%
KIANI	PROSTHODONTICS (27%)	ORAL SURGERY 23%	ENDODONTICS 16%
GIVOL	PROSTHODONTICS (28%)	ORAL SURGERY 16%	ENDODONTICS 13%
PINCHI	IMPLANT (25%)	PROSTHODONTICS (24%)	ENDODONTICS 19%

CONCLUSION

Dentists must consider ethical principles and acceptable standards and protocols of diagnosis and treatment. These results can alert the official authorities that there is high need for improving the technical skills of dental practitioners in performing root canal treatments through improving teaching curriculums and training methods at universities, continuing dental education, and benefiting from other countries experiments that have lower percentages in dental malpractice in endodontics.[11,12,13] In addition, it's advised to stress on the importance of wedging - using wedges- to avoid overhanging dental restorations in restorative dentistry.[14,15]

Concerning prosthodontics malpractice, social and economic factors in the society might play a role in the lower percentages of prosthodontics malpractice.

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