

Different Pontic design with fixed dental prosthesis in Misrata - Libya

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Article information	Abstract
<p>Key words: Dental, Pontics, Fixed prosthesis.</p> <p><i>Received 20 6 2023, Accepted 20 8 2023, Available online 26 8 2023</i></p>	<p>The endpoint of fixed prosthesis design is an esthetic and functional pontic that is compatible with soft-tissue health. The current study aimed to assess the knowledge and practice of Pontic design selection by the general dental practitioners (GDPs). This cross-sectional study was conducted among the GDPs of Misrata. A questionnaire was designed to collect data from 110 GDPs. The questionnaire included general/demographic information and an average number of fixed prosthesis constructed by the GDPs. The questionnaire was further categorized to evaluate the knowledge/practice of Pontic design selection and latest recommendations. For the maxillary anterior segment, the ridge lap Pontic was the most common (43%) followed by the conical (28%). In the maxillary posterior segment, the ridge lap Pontic was the most common (56%) followed by ovate design (23%). For the mandibular anterior segment, the ridge lap (44%) was the most common followed by modified ridge lap Pontic (27%). In case of the mandibular posterior segment, the ridge lap design (64%) was the most common followed by conical Pontic (18%). In the posterior segment, where esthetics is not as critical, a sanitary pontic form is most compatible with function and hygiene. In anterior region, esthetics is an important concern along with function and space management. In the maxillary anterior region, a properly contoured modified ridge-lap pontic design constructed of glazed porcelain most readily fulfills both the esthetic and physiologic requirements. The Pontic design selection for the fixed prosthesis is a neglected domain.</p>

Introduction:

Pontic is the artificial tooth in the fixed or removable partial dentures; that is, the suspended portion of the fixed partial denture (bridge) replacing the missing natural tooth or teeth [1]. The pontic may be fabricated from cast metal or combination of metal and porcelain. Designing a pontic is not simple; an exact anatomic replica of the tooth in the space would be difficult to manage [2]. The requirements of the pontic design include esthetics, biocompatibility, function, phonetics, patient comfort, and maintenance of healthy tissue on the edentulous ridge [3]. Pontic design selection depends on the location of the edentulous area. Controversies exist for the gingival embrasure space and design. Some considered less plaque accumulation with space closure while other proposed open embrasure space for oral hygiene maintenance Pontic [4].

Unfavorable relationships between the residual edentulous ridge, pontic, and gingival papilla may compromise the definitive result of a restoration. Pontic

resembles the tooth morphology and may be altered to meet extra demands in certain clinical scenarios such as in case of convex tissue surfaces and narrow occlusal table [5]. Decreasing the buccolingual width leads to decrease in interferences in eccentric movements [3]. Some authors considered normal size occlusal table, whereas others considered it to be of minimum importance. Pontic should be out of tissue contact when proceeding from facial to lingual [6].

Different shapes of Pontic are selected according to the position of the edentulous space, amount of bone resorption, and operator and patient's preferences. It is recommended that the prosthodontist or the dental practitioner should advise the dental laboratory about the shape of the desired Pontic for the fixed prosthesis [7]. There is a variety of Pontic designs (such as ridge lap, ovate, and conical) for mandibular and maxillary arches [Figure 1].

For instance, ovate and modified ridge lap is recommended for the anterior maxilla, sanitary and

modified ridge lap for the posterior maxilla, conical and modified ridge lap for the anterior mandible and sanitary for the posterior mandible, respectively [8]. These guidelines should be followed to provide the patient with an acceptable prosthesis. This survey- based study was undertaken to assess the knowledge and practice of Pontic selection by the general dental practitioners (GDPs) in the light of contemporary guidelines. Porcelain fused to metal fixed prostheses were included as these are most commonly used prosthesis by GDPs.

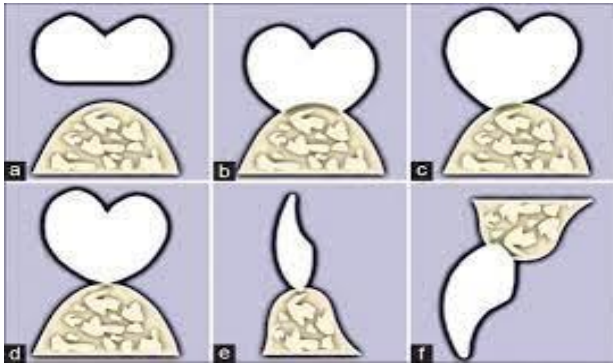


Figure 1: Schematic presentation of various pontic designs

(a) Sanitary pontic; has no contact with the edentulous ridge, (b) ridge lap pontic; forms a large concave contact replacing the contours of a missing tooth, (c) modified ridge lap; shows illusion of a tooth but it has all or nearly all convex surfaces for easy cleaning and minimize plaque accumulation, (d and e) bullet/conical; rounded and cleanable smaller tip in relation to overall size, (f) ovate; round end design currently in use where aesthetics is a primary concern

Materials and Methods:

This cross- sectional study was conducted among the GDPs of Misrata, Libya. The data were collected using a comprehensive questionnaire over a period of 9 months (April –December 2020). A total of 110 GDPs of Misrata were included in the study. A self- administered questionnaire with multiple choices was designed. Before its distribution, it was discussed thoroughly to ensure that the questions were clear. The questionnaire included general/demographic information related to the practitioner's education, experience and place of practice and an average number of a fixed prosthesis constructed by the GDP per month. The questionnaire was further categorized to evaluate the GDPs' knowledge/preference about the pontic design selection and latest recommendations. The questionnaire included various pontic designs [Figure 1] and their selection preferences according to the quadrants were enquired. Multiple options were given, and the participant had to mark maximum two options for every question. After getting

the consent to take part in the study the participants were given a clear and detailed briefing about the aims and objectives of the study. It was assured that the results obtained will be used for the study purposes only and the information will be confidential. The questionnaires were filled by the qualified dental practitioner only. Responses from the participants were evaluated in terms of numbers and percentages using the SPSS Version 20 (IBM, Illinois, USA). The statistical test (Chi- square) was applied to compare the statistical significance among groups, whereas $P < 0.05$ was considered as statistically significant.

Results:

Out of total 110 invited practitioners, 90 participants (34 males and 56 females) agreed to participate and completed the questionnaire. Therefore, 90 questionnaires were considered appropriate and included in the study. Only 10 (11%) participants reported to advise the dental laboratory about the type of pontic design while remaining 80 (89%) used to give no instructions to the dental laboratory and to accept the pontic design provided by their dental laboratory.

This survey showed a lack of communication between dentists and dental laboratories regarding the following: marginal design, pontic design. The participants' preference for choosing the pontic design for maxillary and mandibular segments shown in Table 1. For the maxillary anterior segment, the ridge lap pontic was the most common (43%) followed by the Conical (28%) and ovate (16%). In case of the maxillary posterior segment, the ridge lap pontic was the most common (56%) followed by ovate design (23%) and Hygienic design (11%). The modified ridge lap pontic remains the least common design for all kinds of maxillary restorations [Table 1].

For the mandibular anterior segment, the ridge lap (44%) was the most common followed by modified ridge lap pontic (27%) and conical (20%). In case of the mandibular posterior segment, the ridge lap design (64%) was the most common followed by conical pontic (18%) and ovate (10%). The Hygienic design pontic remains the least chosen (8%) for the mandibular anterior segment and modified ridge lap (0%) for mandibular posterior restorations [Table 1]. The collective data showed that the most popular pontic design among participant is the ridge lap pontic (184%) followed by conical (64%) followed by ovate (52%) and modified ridge lap (34%) pontic [Table 2]. Whereas, the Hygienic was the least popular pontic design.

Discussion:

This study investigated whether the practicing dentist follows the contemporary guidelines while selecting a

metal- ceramic pontic for fixed partial dentures. It is desired to match the physical and mechanical properties of casting alloy and ceramic. For instance, the gross mismatch in the thermal expansion properties of veneering ceramics and metallic core may induce residual stresses, crack formation and potentially chipping failure [9]. To avoid metal- ceramic interface failure due to residual stresses, an appropriate thickness of the veneering porcelain is recommended [10]. The majority of the participants were females corresponding to the higher ratio of practicing female dentists [11]. The majority of participants did not give instructions to the dental laboratory about the pontic design [11]. This result is very alarming in the sense that to prescribe the pontic design to the dental laboratory is a fact and it is the job and responsibility of the practitioner to advise and discuss the suitable pontic design with the laboratory technician [7]. Recommended guidelines for the laboratory prescription have mentioned pontic design as an integral part of the prescription [12].

The recommended designs for the anterior maxillary region are ovate and modified ridge lap pontics and anterior mandibular region are conical and modified ridge lap pontics.

Table 1: The preference of general dental practitioners for selecting Pontic design for maxillary and mandibular teeth; n (%); n=90

Pontic design	Maxillary		Mandibular	
	Anterior (%)	Posterior (%)	Anterior (%)	Posterior (%)
Ridge lap	36(40)	50(56)	40(44)	58(64)
Conical	21(23)	09(10)	18(20)	16(18)
Ovate	14(16)	21(23)	08(09)	09(10)
Modified ridge lap	10(11)	00	24(27)	00
Hygienic	09(10)	10(11)	00	07(08)

Table 2: Overall general dental practitioners' preference of Pontic design selection (n=90)

Pontic design	Preference (%)
Ridge lap	184
Conical	64
Ovate	52
Modified ridge lap	34
Hygienic	26

The ovate pontic has high aesthetic value, therefore, considered most suitable in the anterior maxillary region [8]. This gives the illusion that the replaced tooth emerges from the gingiva like a natural tooth. The modified ridge lap is the second commonly recommended pontic design. However, due to alveolar bone resorption changes need to be made in its design, which can compromise esthetic and function [5]. This study revealed that majority of the GDPs are not following the contemporary guidelines and relying on designs that may compromise esthetics in this highly esthetic zone.

The recommended designs in the posterior maxillary region are modified ridge lap and Hygienic pontics. The maxillary premolar areas are visible when viewed from the front. Modified ridge lap is the highly recommended design in the maxillary premolar region [5]. Maxillary molars are less visible having no esthetic value. Hygienic pontic is frequently used in the nonappearance zone [13 - 14]. as ~56% used ridge lap pontic that is highly unhygienic and may damage the ridge tissues, the dental technician can incorporate experience in designing the occlusion in the physical articulator. Therefore, digital bite registration still seems to be the critical point today [15].

The recommended designs in the mandibular anterior region are conical and modified ridge lap pontics. Mandibular anterior teeth are partially visible and only the occlusal/incisal two- thirds of the teeth can be seen in most of the patients. The gingival or cervical third is visible in very few patients having very thin lips or extremely wide smile [16]. The modified ridge lap pontic is also recommended in this region to complete the less esthetic demands. The results of the study showed that the practitioners are less aware of the conical pontic and only 20% used this type of pontic. There are many of participants (44%) used modified ridge lap pontic for the anterior mandibular region.

The recommended designs for the mandibular posterior region are Hygienic, modified ridge lap pontic and conical pontics. The mandibular posterior teeth have least esthetic values. Therefore, pontics in this region may ideally be out of gingival/tissue contact to provide good hygiene and cleansibility [14]. A narrow occlusal table and convex surface for easy cleaning can be used [9]. Thus, the Hygienic and modified Hygienic pontic designs are considered ideal for this region. Unfortunately, some dentists do not prefer sanitary pontic design due to an unnatural sensation of the restoration to the cheek and tongue. For such cases, conical and modified ridge lap pontics can be provided. These guidelines were followed by 26% of participants.

A considerable number of participants preferred saddle type of pontic [7]. The ridge lap pontic was preferred design in all areas of the mouth and no consideration was

given to the specific area. Saddle-shaped/ridge lap pontic has high esthetic value and least chances of food particles trapping. This design gives the illusion of a nonextracted tooth which is accepted by the patient [17]. However, this design is the most difficult to clean, because there will be food accumulation between the tissue surface of the pontic and the alveolar ridge surface which will lead to tissue inflammation and failure of restoration [18]. The contemporary guidelines are against the use of this pontic design [19]. Particular attention should be given in case of complications in the pontic area in relation to abutment crowns such as malalignment, narrow edentulous space, and excessive bone resorption.

Conclusions:

The current study concluded that the pontic design selection is a neglected domain in fixed partial denture provision. The contemporary guidelines are not followed with full spirit by the GDP participants hence reported a large variability in pontic design selection. Further studies on this topic are recommended to know the reasons for this disparity.

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