



## Pontic Design in Fixed Partial Denture Practised by General Dental Practitioners in West Bengal - A Cross Sectional Study (Original Research Article)

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KEYWORDS	ABSTRACT:
Pontic, General Dental Practitioners, Fixed Partial Denture	<p><b>INTRODUCTION</b> – Pontic is the artificial tooth replacing the missing natural tooth. Designing of pontic is very much crucial for the success of Fixed Partial Denture (FPD). For proper designing, the practitioners should have clear knowledge about it.</p> <p><b>AIMS</b> – In this study we will try to assess the knowledge of General Dental Practitioners (GDPs) about proper pontic design according to the contemporary guidelines.</p> <p><b>MATERIALS &amp; METHODS</b> – This study was conducted among the General Dental Practitioners of both cities and villages of West Bengal. A structured questionnaire, developed and validated by the Department of Prosthodontics and Crown &amp; Bridge, Dr. R. Ahmed Dental College and Hospital, Kolkata served as the primary tool for data collection.</p> <p><b>RESULT</b> – Only 25% of general dental practitioners have proper idea about pontic design and the remaining 75% do not.</p> <p><b>CONCLUSION</b> – The majority of the general dental practitioners have no clear idea of choosing proper pontic in a given situation leading to wide variation of pontic design practiced everywhere in West Bengal.</p>

### 1. INTRODUCTION –

Pontic is an artificial tooth on fixed partial denture that replaces a missing tooth, restores its function and usually fills the space previously filled by a natural crown<sup>1</sup>. The name was derived from the Latin word “pons” means bridge.

It should fulfill esthetics, function, phonetics, biocompatibility, strength to withstand occlusal load, preserve underlying mucosa and permits effective oral hygiene maintenance<sup>2</sup>.

Many types of pontic design are available to fulfill the requirement of a particular edentulous situation. (Fig1).



Pontic is selected according to the position of the edentulous space, amount of bone resorption, width of the ridge, and also efficiency of the patient to maintain oral hygiene<sup>3</sup>.

Sometimes patient's choice plays a role in selecting the pontic<sup>4</sup>.

Proper pontic selection plays an important role for the success of FPD<sup>5</sup>. Improper Pontic design may lead to plaque accumulation resulting in gingival inflammation followed by ulceration and alveolar ridge resorption<sup>6</sup>.

Maintaining oral hygiene is very crucial for success of FPD. Poor oral hygiene frequently leads to formation of root caries of the abutment tooth adjacent to the pontic<sup>7</sup>.

A properly designed pontic should have the tissue surface convex, smooth and properly finished<sup>8</sup>.

The available residual ridge to be surveyed properly to assess mesio-distal width, bucco-lingual dimension and a occluso-cervical distance. If the ridge is insufficient, then there may be problem of black triangle, unnatural esthetics and food impaction. Pontic design is crucial for managing these problems.

There are guidelines for proper pontic design –

*Biological Principles* – Tissue surface should be cleanable, easy access to the abutment and no pressure on the ridge.

*Mechanical Principles* –The connector should be strong enough to resist deformation under a occlusal load.

*Esthetic principles* – It should be natural looking, appearing to emerge from the ridge, should have space for porcelain to match the shade.

The pontic has multipurpose role in construction of FPD.

To choose proper pontic for a given situation, the practitioner should have clear knowledge about it. He will advise dental laboratory technician about the type of pontic<sup>9</sup>. He will also guide the technician about shape, size and shade of the replacing tooth.

Good communication between General Dental Practitioners and laboratory technician is necessary for preparing a well-designed FPD. Lack of which may lead to failure of the prosthesis in the long run<sup>10</sup>.

## 2. OBJECTIVES –

One of the main causes of failure of FPD is improper Pontic design. There are definite guidelines regarding Pontic design. Those guidelines should be followed by General Dental Practitioners to serve the patient better. They will guide the laboratory technicians according to the need for a given situation.

Apart from that, proper cleaning instructions should be given to the patient to maintain oral hygiene which plays an important role in the success of FPD in the long run.

In this survey based study, we will try to assess the knowledge and practice of pontic design by the general dental practitioners in the light of contemporary guidelines in West Bengal.

## 3. MATERIALS AND METHODS –

This is a cross-sectional survey conducted to assess the knowledge and practice of General Dental Practitioners in West Bengal.

A structured questionnaire developed and validated by the Department of Prosthodontics and Crown & Bridge, Dr. R. Ahmed Dental College & Hospital, Kolkata, will serve as primary tool for data collection. It was distributed to the study population through an electronic questionnaire sent via email and online platform and a printed version distributed to the participants manually.

This study was conducted for eight months after getting clearance from the institutional ethical committee in the year 2022.

80 General Dental Practitioners were included in the study.

### INCLUSION CRITERIAS –

- All General Dental Practitioners should have recognized dental degree by the Dental Council of India.
- Dental surgeon having master degree in the field other than Prosthodontics will be considered as General Dental Practitioners.
- All participants must practice within the state of West Bengal.

The questionnaires have two variables – *Dependent and Independent*



a) The dependent variable included general information about their educational qualification, period of practice, place of the clinic and average number of FPD done in one year.

b) Independent variables included to judge their knowledge of Pontic design. According to the latest recommendation various pontic designs were included in the questionnaire (Fig 1). We enquired their preference according to the quadrants.

We asked them whether they guide the dental laboratory technician to prepare pontic accordingly. We enquired whether they give preference to patient's choice. Whether they give proper cleaning instructions to the patients during delivery of the prosthesis. All the information were collected and analyzed statistically to get the result.

#### 4. STATISTICAL ANALYSIS –

The sample size calculation for this study was performed by using the Daniel formula where  $n = 80$  was obtained. (total sample size =  $n = 80$ )

The collected data was tabulated in a spreadsheet using Microsoft Excel and then statistical analysis was carried out in SPSS software. Statistical significance was  $P \leq 0.05$ .

#### 5. RESULTS –

- I. Out of 80 participants, 60 (75%) were male and 20 (25%) were female
- II. 52 General Dental Practitioners (65%) give no instructions to the dental laboratory and they accept pontic design done by the technician.
- III. Only 28 participants (35%) give instruction to the dental laboratory
  - Out of 28 general dental practitioner only 7 (25%) follow proper guidelines.
  - Rest 21 (75%) General Dental Practitioners give instructions to the laboratory according to their own choice which has no scientific reason.
- IV. Out of 21 General Dental Practitioners who give instructions to the lab but don't follow proper guidelines, 78% preferred ridge lap pontic, 56% modified ridge lap pontic and 32% sanitary pontic.

V. Most popular pontic design is ridge lap followed by modified ridge lab and sanitary pontic.

VI. No idea about Ovate and Conical Pontic.

VII. Considerable numbers (62%) of General Dental Practitioners do not give stress on proper cleaning manual. They only give superficial instruction of maintaining oral hygiene.

Table 1

Table 2

#### 6. DISCUSSION -

The pontic must be esthetic, hygienic, structurally durable and maintain integrity of the dental arch<sup>11</sup>.

The design, structure and hygiene specifications of the pontic are found more important than the material to be used to avoid inflammation of the mucosa in the long run.

There are various types of pontic design but no single design serves all the qualities of a pontic. Different pontics are proposed for different areas according to the prime need of that particular situation. For example, esthetics is the primary goal of the anterior teeth but not so much for posterior teeth. On the other hand, maintaining hygiene is difficult for posterior pontic than anterior one<sup>12</sup>.

For maintaining hygiene, the tissue surface of the pontic should be made convex so that the patient can keep it clean by using dental floss and proxa brush<sup>13</sup>.

Modified ridge lap and ovate pontic are recommended for anterior region. These two types of pontic are easy to keep clean because of its convex tissue surface.

For posterior region, hygienic pontic is advised where there is a gap of 3mm in between the mucosa and the tissue surface of the pontic. It facilitates to keep the area clean. As there is a space, it is un-esthetic and cannot be used in anterior region where aesthetic is of prime concern.

So for maxillary anterior region ovate and modified ridge lap is advised. For maxillary premolar region, modified ridge lap and sanitary is chosen for the molar area. (Table 1)



For mandibular anterior region conical and modified ridge-lap and sanitary pontic for molar region is recommended. (Table 2)

From this discussion, it is obvious that proper Pontic design is important for aesthetic and hygienic need for the patient <sup>14</sup>.

For reduction of occlusal forces, bucco-lingual width of the pontic should be reduced by 30% to reduce the stress on the prosthesis <sup>15</sup>.

So proper instructions should be given to the dental laboratory about the type of pontic to be used for the particular situation.

In this study we saw that majority of General Dental Practitioners are not aware of proper designing of pontic. It is very much alarming and may lead to failure of the prosthesis. The doctors should be more responsible in this matter and must discuss with laboratory technician to obtain proper pontic design <sup>16</sup>. Laboratory prescription should contain proper guidelines.

In our study we saw that 52 (65%) General Dental Practitioners do not give instruction to the dental laboratory only 28 (35%) practitioners guide the laboratory to prepare proper pontic.

Out of 28 General Dental Practitioners only 7 (25%) follow proper guidelines and have clear ideas about the pontic to be recommended for a given condition. Rest 21 (75%) participants do not follow proper guidelines and order for pontic without any scientific reason. Out of 21 participants 78% preferred ridge lap, 56% preferred modified ridge lap, and 32% preferred sanitary Pontic.

From the above result, we can assume that maximum number of General Dental Practitioners preferred ridge lap pontic because of its esthetic value. In this design there is less chance of food trapping and it gives emergence profile like a natural tooth which is very much accepted by the patients.

But this design creates difficulty in keeping the area clean and food particles can be gathered in between the tissue surface of the pontic and the alveolar ridge. This may lead to inflammation of the mucosa underlying pontic and may cause carries in the proximo-cervical region of the neighbouring abutment. So in the long run there is a high chance of failure of this prosthesis.

Contemporary guidelines do not suggest ridgelap design in any cases.

Modified ridge lap was the second commonly used pontic in the study. Perhaps the esthetic value is the main cause. In this design there is a chance of foot trapping in the lingual and palatal aspect which is difficult to clean especially in the posterior region.

Some General Dental Practitioners give preference to sanitary pontic in the posterior region mainly in the lower arch because of its un-aesthetic appearance and cannot be used in the anterior region.

General Dental Practitioners have no idea about ovate and conical pontics perhaps because these two types are indicated in special situations and are not commonly used in routine practice.

## 7. CONCLUSION –

- i. Designing proper pontic is the most neglected part in routine practice.
- ii. Maximum number of General Dental Practitioners does not give instruction to the dental laboratory.
- iii. Practitioners give preference to esthetics mainly.
- iv. Large number of practitioners has no clear idea about proper pontic design.
- v. Few practitioners are aware of pontic design and instruct the dental laboratory accordingly.
- vi. Sometimes pontic is chosen according to the patient's choice.
- vii. Large number of General Dental Practitioners does not give proper cleaning instruction to the patients during delivery of the prostheses.

## 8. LIMITATION OF THE STUDY-

- i. Small sample size.
- ii. We have not enquired about the reason of this malpractice.
- iii. We have not judged the knowledge of the dental technicians who will prepare the pontic in the laboratory.

## 9. REFERENCES-



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**Table 1**

Pontic	Maxillary		Mandibular	
	Anterior	Posterior	Anterior	Posterior
Ridge Lap	15 (71%)	15 (71%)	11 (52%)	15 (71%)



Modified Ridge Lap	06 (30%)	04 (20%)	10(44%)	00
Sanitary	00	02 (10%)	00	00
Ovate	00	00	00	00
Conical	00	00	00	00
Recommendation	Ovate & Modified Ridge Lap	Modified Ridge Lap (for premolars) and sanitary (for molars)	Conical and Modified Ridge Lap	Sanitary

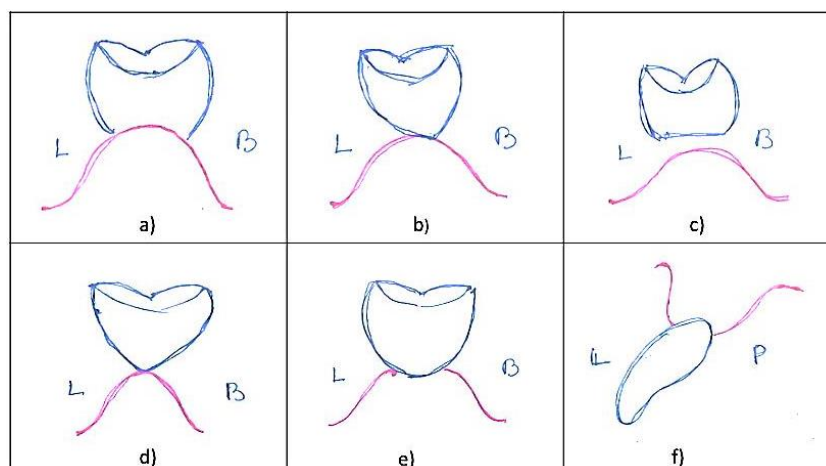
Table 1- n=21, General Dental Practitioners who give instructions to the lab but didn't follow guidelines

Table 2

Pontic Design	Preference (%)
Ridge Lap	78%
Modified Ridge Lap	56%
Sanitary	32%
Ovate	0
Conical	0

Table 2- n=80 Overall preference of pontic design

Figure - 1



Schematic presentation of various pontic designs

- a) Ridge Lap Pontic
- b) Modified Ridge Lap Pontic
- c) Sanitary Pontic/ Hygienic Pontic
- d) Conical Pontic/ Bullet Pontic
- e) Ovate Pontic (Posterior)
- f) Ovate Pontic Anterior