

The flat and step (F and S) pontics. Novel pontic designs for periodontally reconstructed sites

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Abstract

Objective

Fixed dental prostheses are a predictable treatment option to replace missing teeth. A periodontal-prosthodontic approach to rehabilitating those areas ensures a predictable way to achieve the desired esthetic and functional results. This is especially important in cases with high esthetic demand. An ideal esthetic result can be achieved by soft tissue overcorrection through periodontal procedures, which reduce the number of conditioning appointments of the pontic sites.

Many pontic designs have been described to enhance the appearance of the restored sites. The flat (F) and step (S) pontic designs are a modification of classic pontic approaches. These designs contact the mucosa in a wide area of a previously reconstructed ridge without exerting excessive pressure, reducing the possibility of inflammation, ulceration, and facilitating cleaning. This periodontal-prosthodontic procedure aims to achieve functional and esthetic prosthodontic results in a predictable manner.

Clinical Considerations

Understanding which pontic design is recommended in different clinical situations is key for a successful outcome. The F and S pontic designs are recommended to be used in a ridge with optimal soft tissue volume after periodontal reconstruction. The suggested designs provide the clinician with a solution to different clinical scenarios after the periodontal augmentation of the pontic site has been done.

Conclusions

The presented pontic designs are indicated in ridges where a previous soft tissue preservation or reconstruction procedure has been done to achieve an optimal soft tissue volume. Modifications to the designs can be done in the interim stage which is later replicated into the final restoration.

The combination of periodontal and prosthodontic techniques help to predictably achieve a natural looking pontic emergence profile.

1 INTRODUCTION

Fixed dental prosthesis (FDP) have been a widely used and successful therapy when a patient is missing one or more teeth. FDPs can have natural teeth or dental implants as abutments for the pontics replacing the missing teeth. The size, shape, color, position, and emergence profile of the pontic from the soft tissues must be addressed to achieve a successful esthetic and functional result.¹ Also, The pontic design should be cleansable to maintain periodontal health.²⁻⁵

A natural tooth's illusion can only be obtained in the pontic sites through an optimal interaction between the soft tissues and the pontic surface.⁶ Because of this, it is necessary to reduce the loss of volume that occurs after the extraction of a tooth, or implement ridge reconstruction techniques to re-establish lost volume.⁷⁻¹¹ Many different techniques have been described to minimize vertical and horizontal ridge changes such as the socket preservation technique,¹² full-thickness soft tissue grafts,^{13, 14} subepithelial connective tissue grafts (Figure 1),¹⁵⁻¹⁷ immediate pontics,¹⁸ and simultaneous augmentation of the tissues at the moment of implant placement.¹⁹ However, the ideal graft material and surgical-prosthetic protocol for all cases has not been defined.^{11, 19}

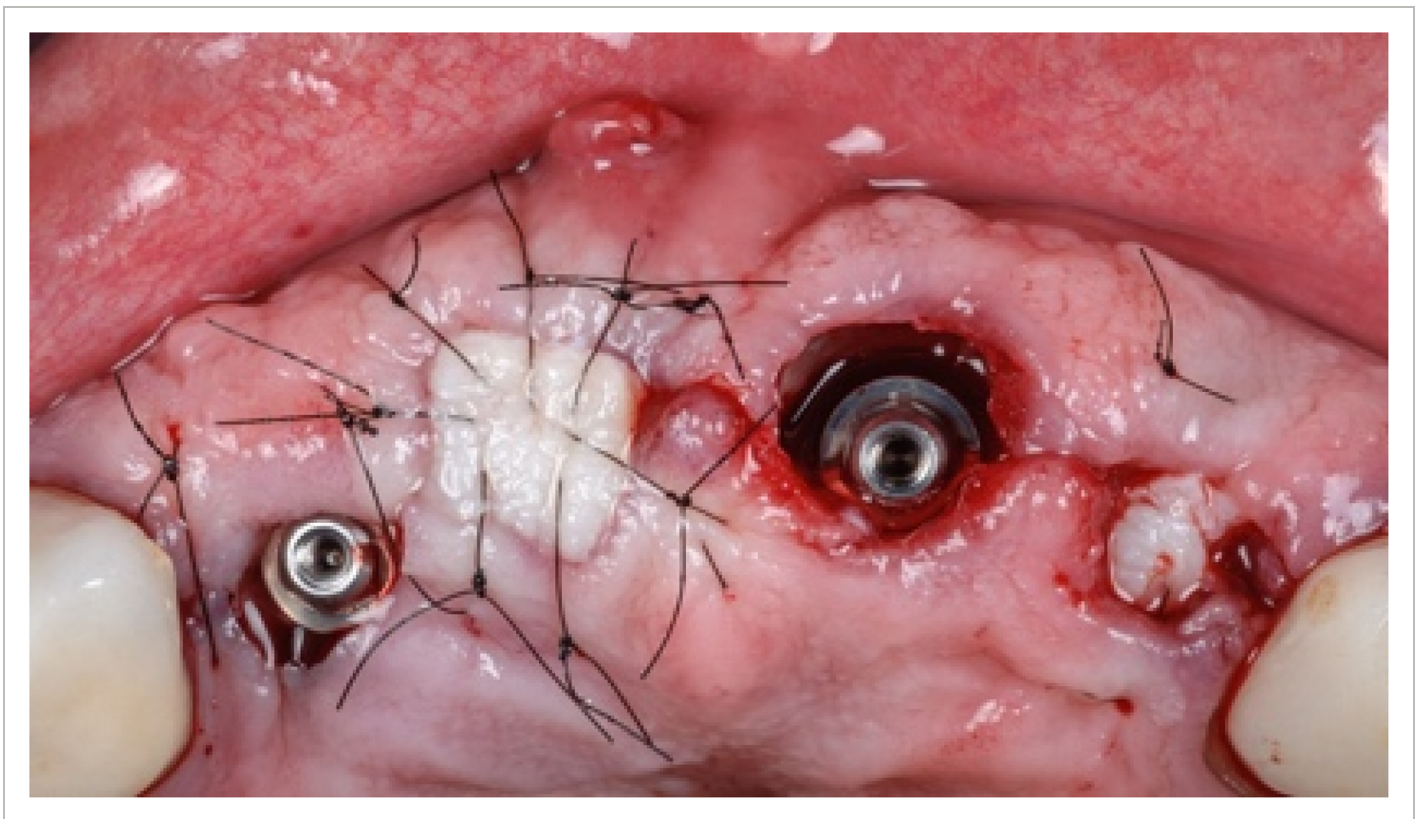


FIGURE 1

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Soft tissue augmentation techniques performed at the time of the extractions and implant placement

in the esthetic area is the “ovate pontic.”^{5-7, 20-23} The use of an ovate pontic in reconstructed sites sometimes forces the clinician to remove part of the previously gained tissue in order to seat the pontic without applying excessive pressure on the ridge.

The flat (F) and step (S) pontic designs are variations of classic pontic approaches. These designs contact the mucosa in a wide area without exerting excessive pressure on it, reducing the possibility of inflammation, ulceration and facilitating cleanability. The purpose of this article is to describe these pontic designs and specify their indications and technical approach.

1.1 Indications of use

Seibert classified the alveolar ridge defects after a tooth extraction and studied its reconstruction (Table 1).¹⁴ Abrams described that 91% of the edentulous anterior sectors of the jaw exhibited alveolar defects of various extents.²¹ The most predominant type of defect is the combined type (Class III).^{8, 21} Defects should be ideally reconstructed periodontally before designing a pontic to increase the chances of a natural emergence profile of the prosthesis.

TABLE 1. Clinical indications for F and S pontic designs

Pontic design	Indication
Flat pontic	Ideal vertical soft tissue volume (Seibert Class I)
Step Pontic	Shallow vertical ridge defect <1 mm (Seibert Class II)
Ovate Pontic	Vertical Mild ridge defect <2 mm (Seibert Class III)

The flat pontic (Figure 2) is indicated in sites with adequate tissue obtained through a previous preservation or reconstructive procedure. This design allows to adapt the pontic without applying excessive pressure on the pontic sites.

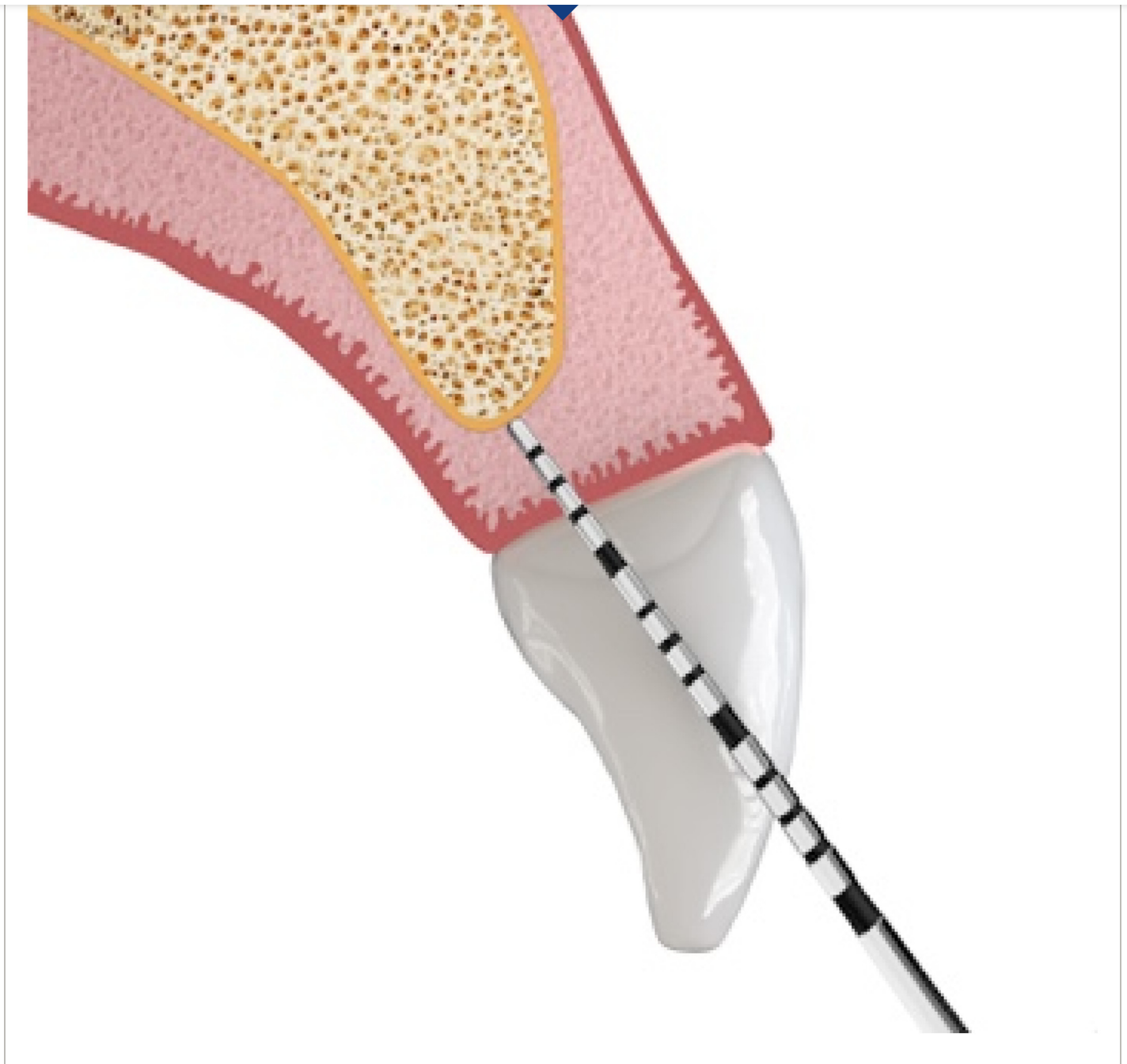


FIGURE 2

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F-pontic design: The F pontic is a modification of the ovate pontic where the convexity of the pontic can be reduced due to a previous soft tissue augmentation procedure

The step pontic (S) (Figure 3) is indicated in situations where previous preservation or reconstruction of the ridge has been done but a shallow soft tissue defect is still present due to tissue shrinkage. In this situation the use of the flat pontic would lead to a longer crown than desired which would lack an ideal emergence profile. In the S pontic design there is a concavity in the facial aspect of the pontic which allows the gingiva to migrate coronally, resulting in a shorter clinical crown with better stability of the gingival margin and a more natural emergence profile. This prosthodontic approach aims to avoid a second surgical soft tissue reconstruction of the pontic site when a shallow defect is still present after the previous periodontal procedure.

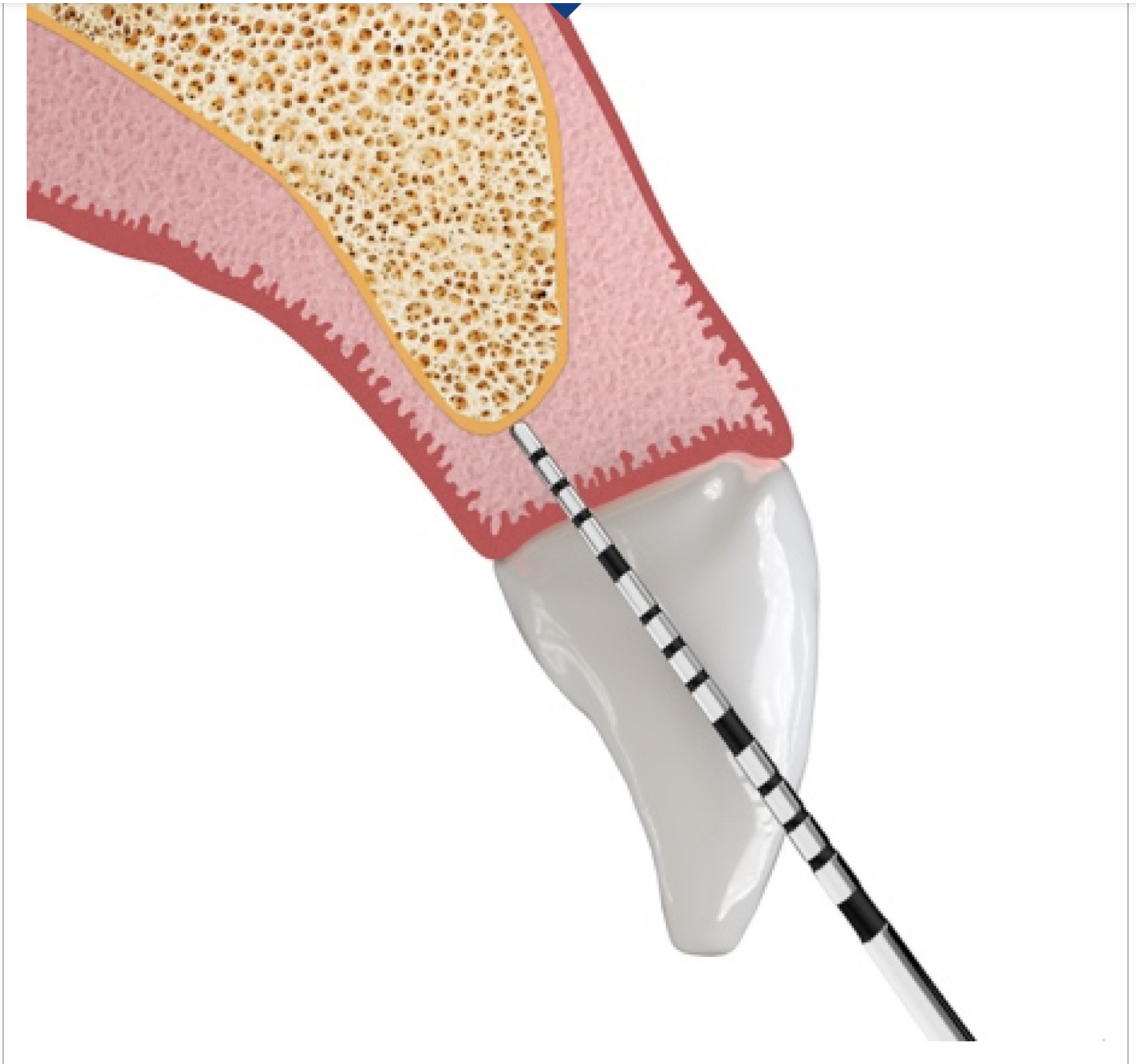


FIGURE 3

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The S-pontic design allows coronal migration of the enhanced soft tissue

2 CLINICAL TECHNIQUE

2.1 Flat pontic

The F pontic is designed with a flat basal surface. The laboratory technician has to consider the prosthesis's gingivo-facial line angle as the point of reference to design the flat surface, the pontic surface will slope palatally with an angle that varies depending on the ridge tissue availability. A flat pontic is a variation of the ovoid pontic; however, in this design a convexity present in the ovate design is not

The technical aspects of fabrication involve the following steps.

1. Fabricate an interim poly-methyl-methacrylate (PMMA) restoration with a pontic to replace the missing tooth structures.
2. For the F pontic design to be applicable, a microsurgical periodontal soft tissue preservation is done when the tooth is extracted. An augmentation technique is necessary in a healed ridge when a hard tissue, soft tissue defect, or a combination of both is present. The interim restoration is designed with a flat surface and an acute angle between the palatal and facial surface which allows enough space for the soft tissue overcorrection, the provisional restoration is delivered after the extraction and soft tissue preservation procedure.
3. After a 2-month healing period, a shrinkage of 25–45% of the soft tissues is present,¹⁷ and a relining of the basal area of the pontic is necessary, it is important to keep a flat surface, however, the angle between the facial and basal surface has to be changed making it perpendicular or even obtuse to the underlying tissues.

The highly polished provisional restoration should be introduced at least 0.5–1 mm into the overcorrected gingiva, causing the soft tissues to blanch. The blanching of the gingiva should disappear within 5 min. In situations where the ischemia last more than 5 min and a thick phenotype is present, a gingivoplasty with electrosurgery, laser, or a round bur can be performed to seat the interim restoration with the desired shape. Due to the excess of tissue present in the previously reconstructed site and the ease of fabrication of this pontic design, the gingival conditioning is frequently done in one session. However, the angle of the flat surface can be changed if needed. The flatter and wider the basal surface of the pontic design is, the more the soft tissues are pushed facially and proximally, supporting the papillae and shaping the crown's buccal sulcus imitating a natural tooth. The F-pontic design should be equi-gingival on the facial and subgingival in the interproximal areas, gradually sloping lingually where it is positioned on top of the tissue.

4. Patient recall should be done 2 months after delivery of the interim restoration and the pontic should be relined if needed.
5. After 3 months of stabilization, the final impression and final restoration can be made. The larger the site reconstruction procedure, the longer the clinician should wait for the maturation of the tissues before delivering the final prosthesis. In the esthetic sector, a 6-month waiting period is recommended before the final impression to ensure long-term stability of the reconstructed tissues. If any shrinkage and loss of ridge volume occurs during the interim stage, the F-pontic can be easily modified into a step pontic or an ovate pontic by adding composite to the basal area of interim restoration. The final restoration will be copy-milled from the interim restoration (Figure 4) to maintain the adequate contours which ensure esthetic and biologic stability of the prosthesis upon delivery (Figures 5 and 6).

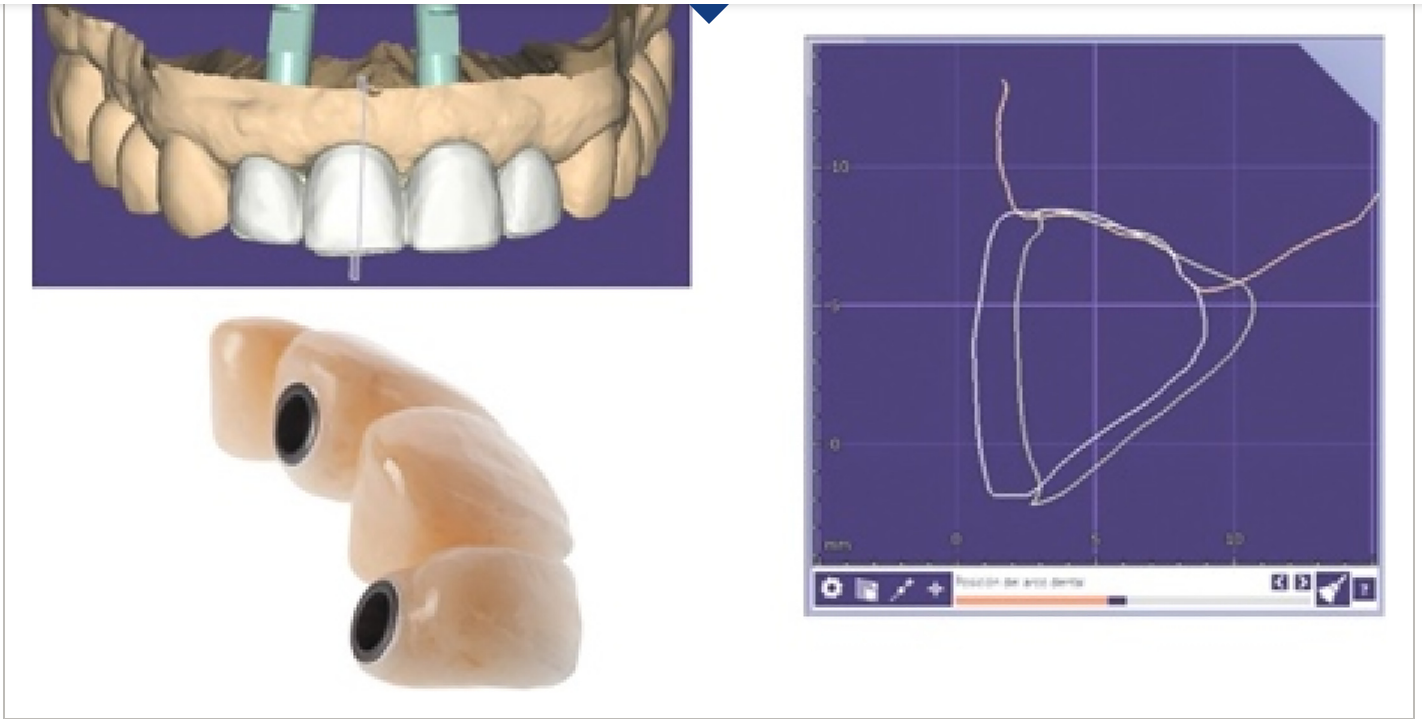


FIGURE 4

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Virtual design of the pontics and later fabrication into zirconia restorations



FIGURE 5

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Soft tissue scalloping with the F-pontic design. Note the shallow introduction of the pontic material into the grafted soft tissues

**FIGURE 6**[Open in figure viewer](#) | [PowerPoint](#)

Implant supported fixed dental prosthesis delivered with F-pontic design

2.2 Step pontic

The S pontic design is similar to that of the flat pontic however it has a modification in the facial aspect to allow the gingiva's coronal displacement, enhancing the stability in ridges where a shallow defect in the soft tissues is still present. The purpose of this step design is to avoid the apical displacement of the gingival margin resulting in a long and un-esthetic prosthesis (Figures 7-11). In the step pontic, the facial aspect of the pontic has a 1–1.5 mm deep carving and a wide sulcus into the dome of the ovate or flat design, which stabilizes a thicker band of gingival tissue on the facial aspect of the pontic.

1. The step pontic is designed by creating a 1–1.5 mm concavity in the subgingival facial aspect of the restoration with a flat or ovate design, just apical to the desired gingival margin location. This concavity will alleviate the pressure on the mucosa allowing the coronal migration of the gingiva. Its advantage is a more natural appearance and better stability of the marginal tissue. The S-pontic is an alternative for those cases with shallow defects where there is insufficient soft tissue quantity due to shrinkage after healing. Because of this, a thorough polishing ideally with pumice and high shine paste is crucial for the adequate response of the soft tissues when using this pontic design.
2. Two weeks after delivery of the interim restoration the clinical situation is re-evaluated to assess if any coronal migration of the soft tissues has occurred. The interim restoration should be kept in place for at least 3 months in cases where a healed ridge was present and a tissue reconstruction procedure was done.^{24, 25} A 6-month period is recommended in cases where a tooth was immediately extracted and the pontic site was reconstructed. The waiting period is important to

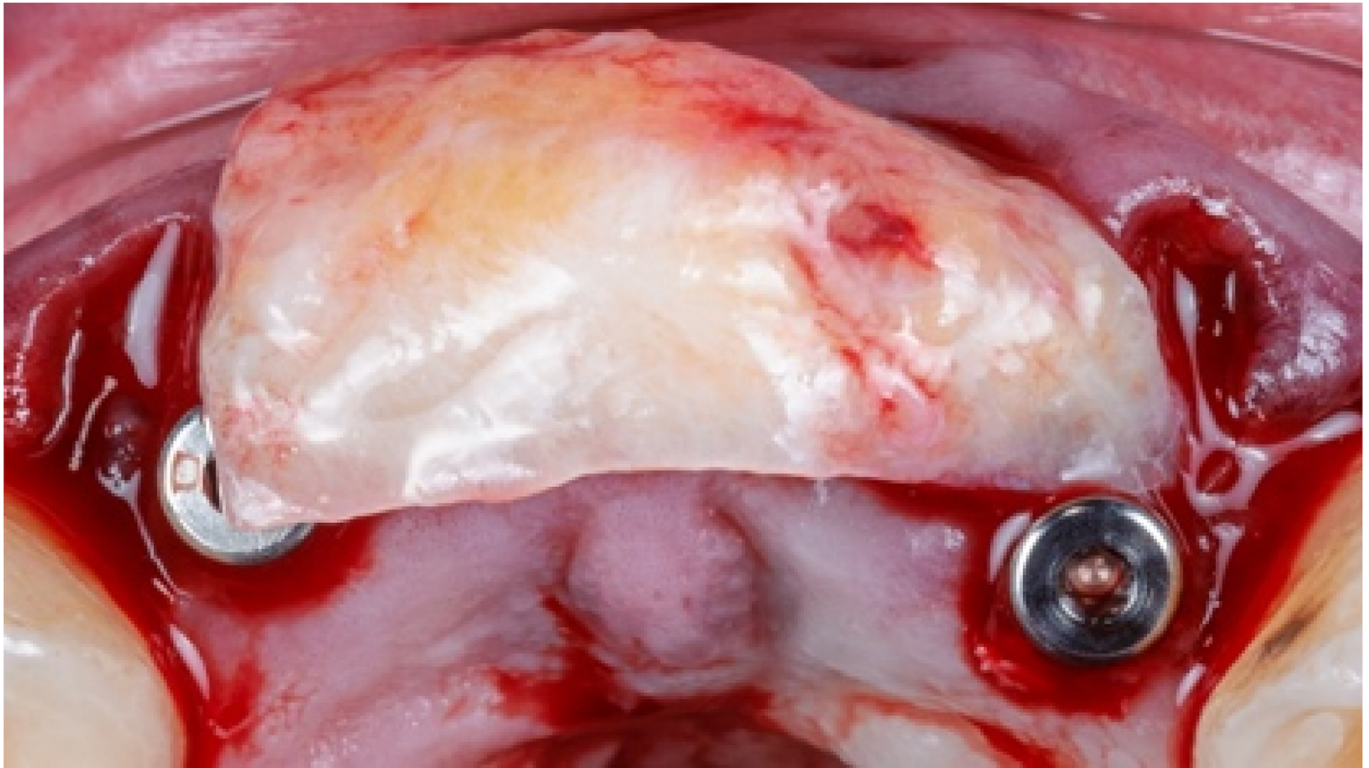


FIGURE 7

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Connective tissue grafting the implant and pontic sites increase the possibilities of esthetic outcome





FIGURE 9

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Lateral view of S-pontics, not the step in the cervical third of the facial aspect of the prosthesis



**FIGURE 11**[Open in figure viewer](#) | [PowerPoint](#)

Final result of the delivered implant supported fixed prosthesis

3 DISCUSSION

Many techniques for pontic site development have been proposed for the treatment of edentulous sites, with the aim of developing natural looking pontics which emerge from the facial mucosa emulating the emergence of a natural tooth. However, this only appears possible when sufficient soft tissue volume is present after post-extraction healing and remodeling of the site.⁷ This makes pontic site development often times cumbersome and a thorough understanding of soft tissue management becomes important. Integration of periodontal procedures and prosthetic protocols are essential to achieve this. The anatomy of the pontic is important to allow for an esthetic emergence and it should be understood by the clinician to achieve the desired outcomes. The Esthetic biologic contour concept (EBC) has been described to explain and predictably shape the three different zones of the emergence profile in an implant-supported restoration.²⁶ In a pontic, the bounded (B) and crestal (C) zones are not present. However, the esthetic (E) zone must be equally determined and designed to support the gingival margin providing a natural emergence profile.

The ovate pontic is the most common design used in the esthetic area to obtain optimal functional, biological and esthetic results. The F-pontic is a modification of the “dome design” of the ovate pontic. This design is easier to fabricate than the ovate pontic design and its intention is that the flat surface does not extend into the mucosa more than 0.5–1 mm which is considerably less than the 2–3 mm of extension present in the ovate pontic design. The amount of extension of the pontic into the mucosa will

support which is easily achieved and maintained through this design, this reduces the occurrence of “black triangles” due to papilla loss. It is also important to note that every pontic design should have a highly polished surface to optimize plaque control, it should have a flat or convex basal surface that will allow the floss to contact its entire surface.

The esthetic pontic design was published by Korman, this design has 90° line angles which are introduced into the soft tissues.²⁷ Contrary to Korman's design the F-pontic is not introduced into the soft tissues more than 0.5–1 mm allowing for easier cleansability. Also, the F-pontic design is tested in the provisionalization stage and not designed on a working cast as it has been described in the technique by Korman. Therefore, the communication with the laboratory is more precise as the interim restoration's shape will be replicated in the final restoration through copy milling.

Both the F and S designs allow good cleanability, functional and esthetic results, promoting support of the proximal tissues and allowing for appropriate air seal which prevents phonetic problems. Their main drawback is the need for a surgical augmentation of the hard tissues, soft tissues, or both to preserve or reconstruct the ridge, as advocated by multiple authors.^{15, 21, 22, 28-32} Also, fabrication of an S pontic design in a final restoration is more time consuming when compared with the ovate pontic because it usually requires a pick-up impression of the bisque try-in to communicate the final soft tissue status to the laboratory. Decision-making on the pontic design to use is dependent on the clinical situation and should be addressed on a case-by-case basis depending on the experience and preferences of the clinician.

4 CONCLUSION

The F-pontic is designed to achieve the proper functional, esthetic and biological result where the soft tissue volume has been overcorrected with soft tissue augmentation techniques. The technique is simple to use and is readily applied to the practice setting.

The flat design can be modified into the step design to avoid a second surgical procedure if a soft tissue contraction has occurred or in situations where a shallow ridge defect is still present. Moreover, the step design can be at the same time modified into an ovate pontic in those cases where too much tissue shrinkage has happened, and a mild ridge defect is still present. Proper selection of the pontic design is imperative to achieve an adequate esthetic result which promotes biologic stability. Enhancing the soft tissues before pontic site development will help the clinician achieve this. Even though each pontic design has a specific indication, modifications to these designs may need to be made as the soft tissues are conditioned during the interim stage.

DISCLOSURE

The authors declare that they do not have any financial interest in the companies whose materials are included in this article.

DATA AVAILABILITY STATEMENT

Research data not shared

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