

# **Functional and esthetic rehabilitation of the upper anterior edentulous jaw area using endosseous implants with two splinted crowns and a cantilevered ovoid pontic, Case Report.**

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## **Introduction**

The upper anterior area known as the esthetic zone is the one that poses the greatest challenge for the restorative dentist because of the patient's expectations. Performing implant-supported restorations to return the function and esthetics at the same time is often impossible. The preservation and reproduction of the gingival architecture around dental implants is a very big challenge, since this requires a proper treatment plan, consideration of multiple factors of the area to restore and a special handling during and after surgery.

The purpose of this paper is to report properly selected cases in which we decided the rehabilitation of two teeth using a large implants and two splinted crowns along with the use of cantilevered ovoid pontic, we discuss the different variables required in order to carry out rehabilitation and the appropriate restorative and surgical technique, in order to obtain more predictable esthetic results.

## **Historical development**

The ovoid pontic was first described by Dewey and Zugsmith in 1933, although until recent decades is when it has been given the aesthetic importance, as previously the extent of the pontics toward the alveolar ridges post-extraction was contraindicated, according to anecdotal studies made by Reichenbach in 1928. Brill used for many years, extended porcelain pontics made in bridges, post tooth extraction with good clinical results. The findings revealed during the experiment that there was a tendency of the epithelium to cover the wound and the margin of the pontic, not only in the post extraction alveoli but also in the empty alveoli after the extractions.

Stein was the first to show that the effect of flossing on tissues adjacent to the pontic could reduce inflammation and deterioration of the adjacent soft tissues.

Many articles refer to the passivity in contact that the pontics should have regarding the residual ridge. However recent data indicate that active contact could be better, Tripodakis and Constantinides evaluated the tissue response to pontic convex pressure, clinical and histological data report that the pressure due to well polished pontics and a good plaque control does not induce the inflammation of the surrounding tissue, however without proper hygiene the

inflammation is inevitable. Also, histological studies performed by Zitzmann in which he evaluated the mucosa of the alveolar ridge, adjacent to the ovoid pontics, in a follow-up study of 1 year, showed that these places were not associated with signs of inflammation.

Belser and colleagues noted that the soft tissues around unique dental implants are predictable because of the support of the tissues of adjacent teeth, but the tissues around multiple implants are usually compromised.

## **Body**

The restoration of the upper front area with implants is one of the biggest challenges in dentistry. The restorer must evaluate factors such as the patient's age, their aesthetic expectations, time for completion of the treatment, possible consequences, adjacent teeth, gingival architecture, interocclusal space, line of the smile, mesial distal space, quantity and quality of the bone, soft tissue, cost of the treatment, among others. At the time of the designing the pontic we should take into account factors such as the emergence profile, the esthetics and the access to hygiene. According to the glossary of the Academy of prosthodontics the pontic term is defined as "artificial tooth attached to a permanent prosthesis, which replaces a natural tooth, restores its function, and usually fills the space occupied by the clinical crown."

It was important to consider the comparison between tooth and implant in terms of duration of the treatment, the prognosis of adjacent teeth is much higher with implants than with any other option. Priest said that the teeth adjacent to implants have fewer cavities, less endodontic risk, less sensitivity and less plaque retention. There are many indications for the replacement of front teeth with implants, the most common causes are the loss of an incisor by trauma, or absence product of an agenesis, more commonly presented at lateral incisor level. In the field of implant dentistry, it is not currently sufficient to consider getting osseointegration alone, but we must also respect the biological contexts of tissue around the implant. Several parameters have been considered for a healthy front aesthetic restoration:

Tarnow et al measured the distance between the interproximal contact of the teeth and the interproximal bone crest, observing that from 3-5mm the interdental papilla always covers the space, at 6mm the papilla was absent in 45%, at 7mm it was absent in 75%.

Another factor to consider is the quantity and quality of the bone available for the insertion of the implant because it will directly influence the size of the implant, soft tissue, implant angulation and depth. The hard tissue must be as close to ideal as possible for good aesthetics in the restoration.

## Soft tissue contour

At the evaluation time for the dental implant placement it is required to observe carefully the crest-implant distance with x-rays or ideally by Cone Beam tests and thus evaluate the architecture of the hard tissues which will determine the gingival architecture and hence the aesthetics. If bone defects are found in the area where the implant should be placed, corrections by means of grafts and membranes must be made.

The ovoid pontic has been suggested for the restoration of pieces such as the pontic that best mimics the emergence profile of the natural teeth, providing better aesthetics to the final restoration. We must also take into account the great difficulty to keep the inter-proximal bone in cases where adjacent implants are placed in the upper front area without affecting the inter-proximal papilla and without leaving the black triangle syndrome.

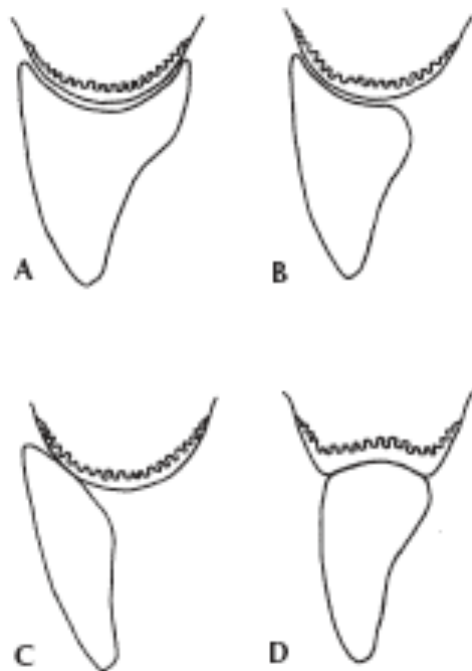


Fig. 1 Different types of pontics used over alveolar ridges: A. Saddle Pontic. B.

On the other hand, dental implants are subject to occlusal charges when they are put into function, the perioral forces of muscles, tongue, cheeks and parafunctional habits can influence in small but frequent forces. These forces can be modified according to age, sex, degree of edentulism and location within the oral cavity. The contact points in the prosthetic rehabilitation directly influences on the components distributed around the implant system. The dentist is required to view each occlusal contact to avoid overloading the implant system,

which could end in failure and loss of the same due to premature changes. The forces distributed on the implants are rarely distributed only on the longitudinal axis.

| <b>Force of the cortical human bone</b> |             |                            |
|---|-------------|----------------------------|
| Type of force                           | Force (MPa) | Direction                  |
| Compressive                             | 193         | Longitudinal               |
|   | 173         | 30 degrees out of the axis |
|   | 133         | 60 degrees out of the axis |
| Tension                                 | 133         |                            |
|   | 100         |                            |
|   | 60          |                            |
| Torsion                                 | 68          | Torsion                    |

Reilly. DT, Burstein, AH. The elastic and ultimate properties of compact bone tissue, J. Biomech 8:393, 1975.

### Length of the Cantilevers

In the area of implantology, the use of cantilevers or overhanged pontics has been contraindicated due to the harmful forces that they can have on the implant, especially because of the torsion forces on the implant. For example in the case of the hybrid prosthesis according to Misch, the length of the distal cantilever is determined by the amount of stress applied to the system. The stress caused to an implant system is defined by the formula introduced by Misch:

$$S=F/A$$

Where S is equal to the stress in the area given in pascals, F is the force given in newtons, and A is the area given in square meters. The stress caused to the implant and its biological surroundings compromise the longevity of the treatment. The magnitude of the force can be reduced by controlling variables such as the length of the cantilever, the length of the crowns and the parafunctional habits, such as severe bruxism, which contraindicated the use of cantilevers.

Some cases need a thorough analysis, for example, in places where there are two missing teeth and the space available to place the implants only allows one placement. We must analyze that the occlusion allows us to undertake such cases. The length and shape of the pontic should be determined by the phonetic, aesthetics and the occlusal requirements in centric, protrusive and lateral movements. The width is determined by the mesio distal space to the adjacent

teeth with an appropriate gingival scallop that ensures aesthetics and access to hygiene. The length and apical shape of the pontic is determined by the complex bone and soft tissue, the aesthetics, the proximity to the tissue, and the prevention of impacts of food debris or plaque.

### Clinical Case

The clinical case of a 19 year old male patient, with a history of congenital absence of the upper right canine and lateral, a study with Cone Beam and a diagnostic wax are performed. We determine that the mesio distal space is insufficient to place 2 implants, they may compromise the aesthetic and the implants, so we decide to perform the placement of an implant in the canine area and then, in rehabilitation, a bridge of 2 units with the upper right side piece in cantilever.

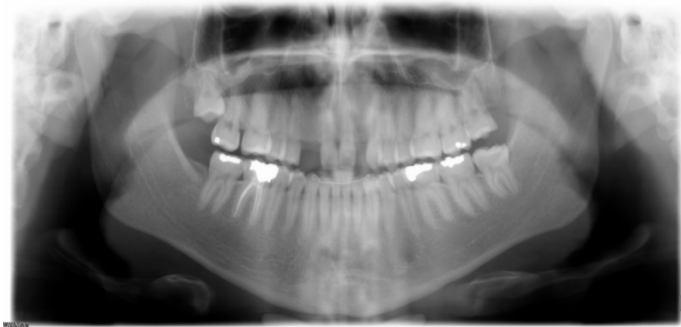
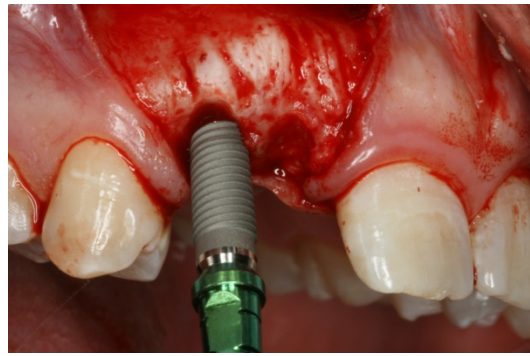
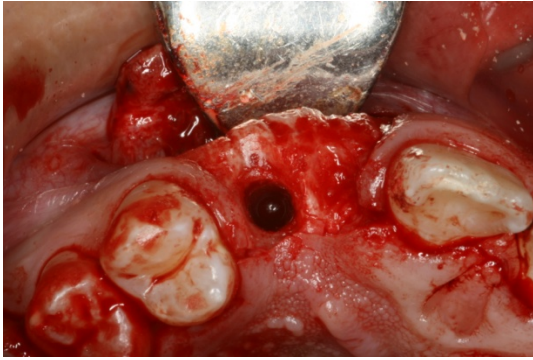


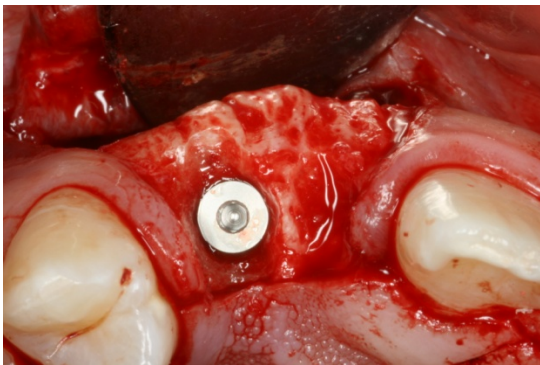
Fig 1-2 y 3 we observe the preoperative panoramic x-ray and the clinical views with the surgical guide.



Figs. 4 y 5 Incision and osteotomy using the surgical guide and osteotomes.



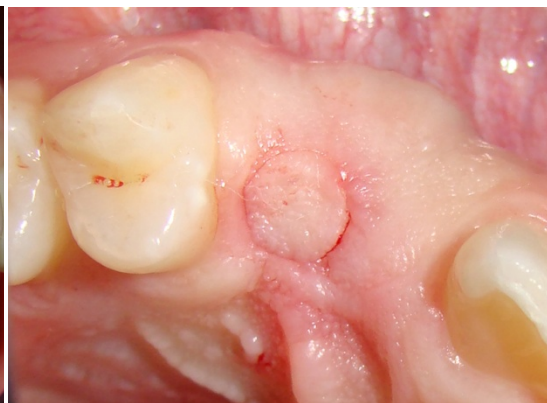
Figs. 6 y 7 Osteotomy completed and placement of a dental implant Zimmer TSV4B16 4.1 X 16 mm.



Figs 8 y 9 Occlusal view in the final position of the implant and final stitching.



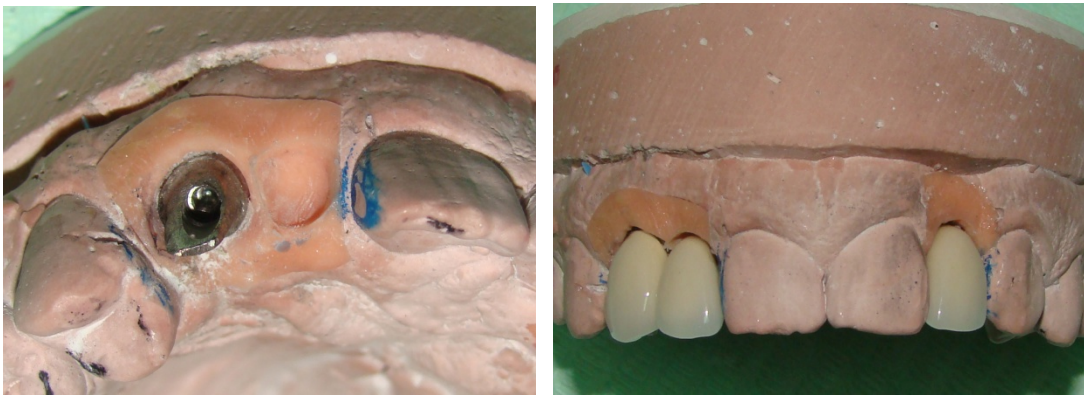
Fig. 10 Panoramic x-ray for post-operative control.



Figs. 11 y 12 Second phase surgery using the tissue punch.



Figs. 13 y 14 Placement of the healing button Zimmer THC54



Figs. 15 y 16 Manufacture of the plaster model and modified soft tissue, as well as final post using a UCLA Zimmer HLA3G post, and metal porcelain crowns, modifying to ovoid pontic the top right side piece.



Figs. 17 y 18 Final placement of the pole in mouth torqued to 30 Newtons, a soft tissue modification is made so the ovoid pontic will press and direct the gum..



Figs. 19 y 20 Final cementing with glass Ionomer and the one month soft tissue control.



Figs. 21 y 22 Control 6 months after the cementing of the crowns.

## Discussion

The prosthetic treatment plan is definitely critical for the success of each case of rehabilitation, if we start with a diagnostic wax, we can easily determine the available space in mesio-distal and interocclusal sense, besides of the size of the teeth to be restored in the edentulous area . With the help of a CT scan or Cone Beam, we performed the measurements of the case and we determine that we cannot place the two implants in the canine position and upper right side, this is because there is not the necessary 3mm distance between the implants, without this required distance, it would ultimately result in a loss of interproximal bone between lateral and canine leading to an area without a papilla with a black triangle, resulting in poor aesthetics for the case. On the contrary, we planned the placement of an implant in the canine area with a mesial cantilever to replace the side tooth, which will be oval shaped and while cementing we will make the modification to the gum tissue and the compression of the tissue in order to optimize the gingival architecture.

## Conclusions

Although within the parameters of restorative implant one must select with caution the use of cantilevers, the use of pontic instead of adjacent implants can

contribute to the aesthetics, reducing the possibility of finding a black triangle syndrome in the upper front area. This can be achieved by following the protocol of a good case planning, surgical guide, alveolar preservation, good surgical technique, proper emergence profiles of the post and crowns.

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