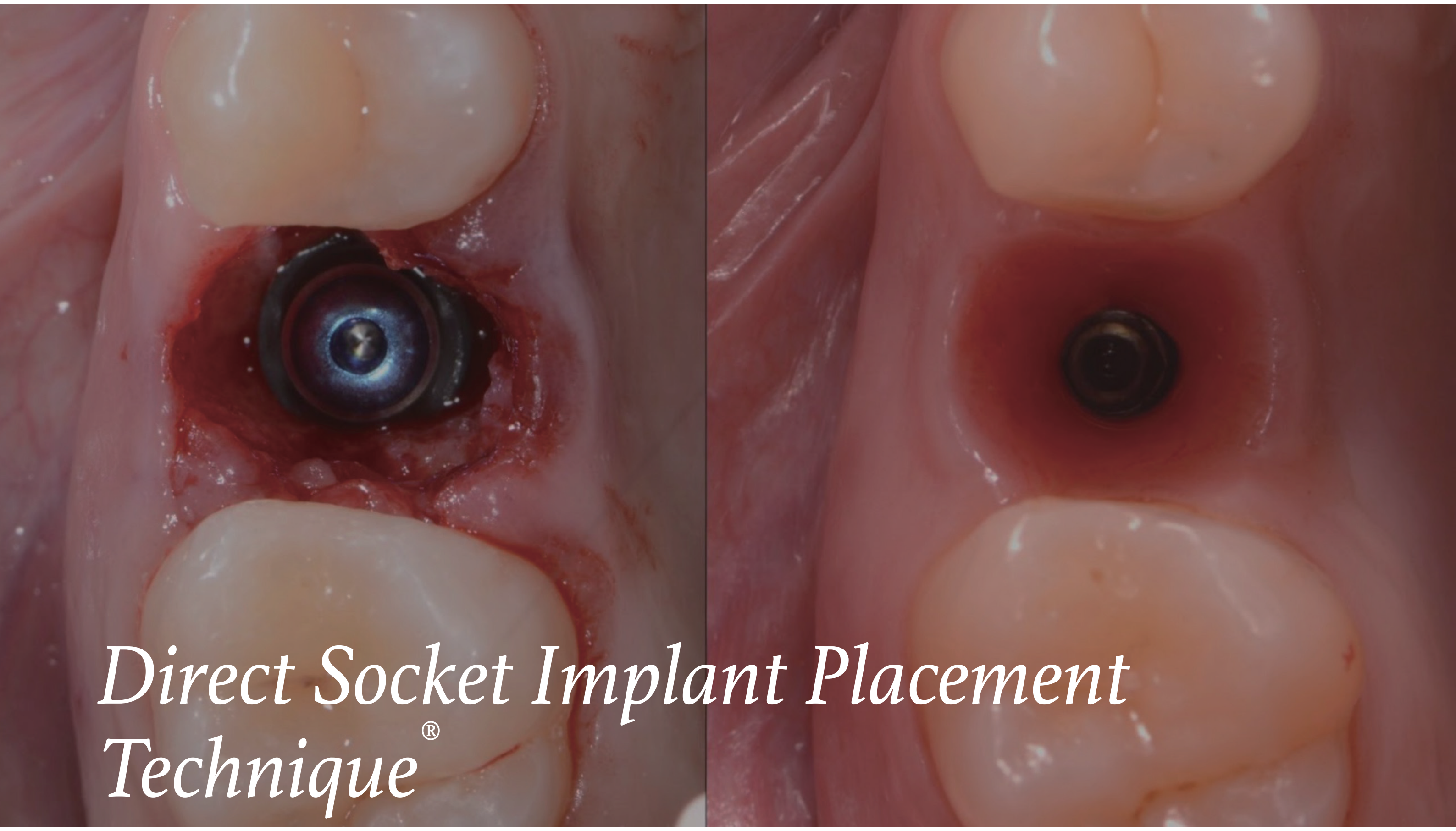

Direct Socket Implant Placement Technique®

An easy, simple, and predictable way to place implants in postextraction sockets

Nicolás Aronna Mallia

QR SAMPLE CASE

ABSTRACT

Immediate implant placement has become very popular over the last decade. While it is a very predictable technique, it is limited to certain conditions, as primary stability, the proper 3D position, and limited bone availability are some of the factors that need to be considered when performing this procedure. Guided surgery, a pre-extractive interradicular implant bed preparation technique, and direct to palatal-lingual bone drilling to achieve primary stability are some of the techniques that can be used to ensure a proper prosthetic guide, implant stability, and sufficient bone implant contact.

However, the Direct Socket Implant Placement Technique® (D.S.I.P) has been designed to avoid such limitations of immediate implant placement, ensure implant stability, and become more predictable by inserting the implant directly into the socket and providing primary stability using the mesial and distal bone to engage the implant threads from a specifically designed implant (in this case MegaGen AnyRidge®). A proper pre-analysis of the socket using CBCT must be conducted to prepare the surgery and avoid incorrect implant placement, plus the specific design of the implant can help to place a fixture even in critical situations with limited palatal and apical bone, where the presence of sufficient bone is normally mandatory to achieve primary stability.

D.S.I.P. involves certain rules for proper decision making and planning in order to use the right tools. For the socket analysis, diffierent perspectives must be analyzed using CBCT and periapical X-rays:

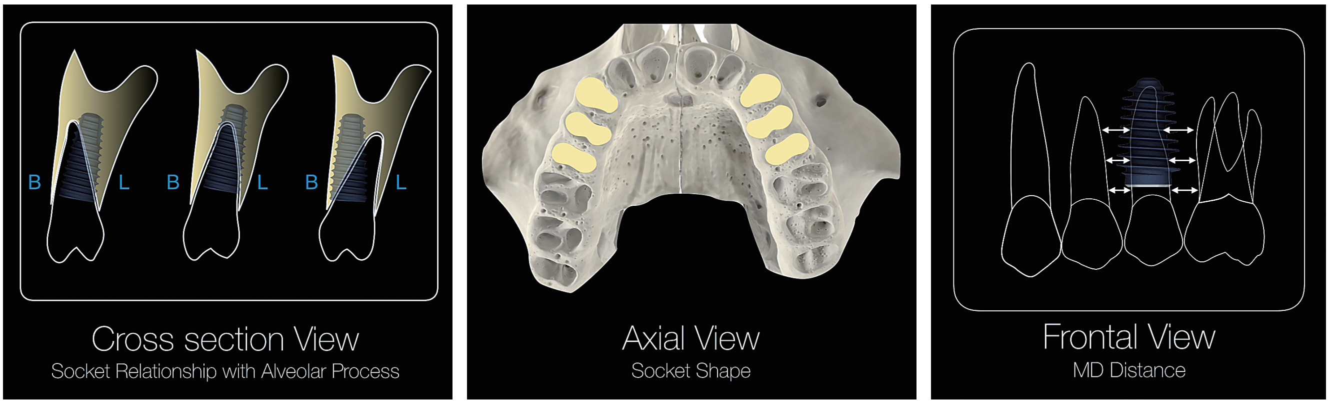

Fig 1.1) Cross section view, 2) Axial view, 3) Frontal view

1) **Cross section view:** To analyze the socket relationship with the alveolar process and the direction, and to detect if there is sufficient palatal bone for standard drilling as a back up if needed.
2) **Axial view:** To detect if there is sufficient mesial&distal bone around the socket and measure the size of the socket from palatal to buccal. This size is to to ensure a sufficient jumping distance from the buccal side of the implant to the inner part of the buccal wall.
3) **Frontal view:** To measure the distance to the adjacent teeth (mesial and distal). The interproximal bone measurement will determine the diameter of the implant.

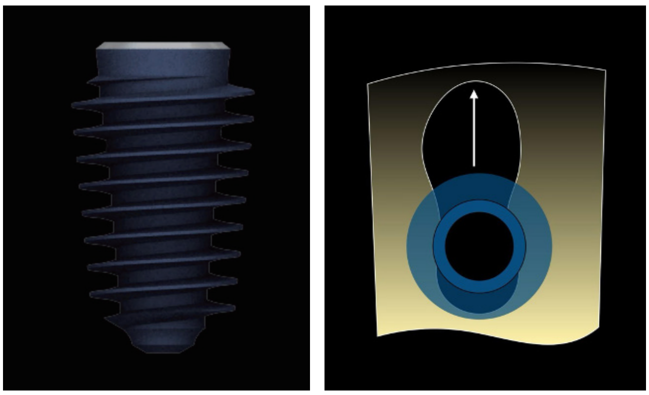

Fig 2.

The Direct Socket Implant Placement Technique® (D.S.I.P) should be performed using a specific implant design with a wide and progressive implant thread pattern that ensures mesial and distal bone anchorage, as well as primary stability as part of the planning (Fig 1, Fig 2).

The other factors for proper analysis and treatment planning when considering D.S.I.P are explained below:

1) **Socket length:** Shorter sockets require a shorter implant, as reaching the apex is not necessary. In fact, the apical limit can drive an implant in the wrong direction.
2) **Socket width:** (mesial-distal&buccal-lingual) Canines and premolars usually have ovoid-shaped sockets. Bicuspids maintain mesial and distal socket compression at the most coronal level. The buccal-lingual distance determines the jumping distance remaining according to the diameter of the implant used.
3) **Fixture selection and macro design:** The implant design requires wide threads to engage the bone on the mesial and distal aspects, along with a minimum diameter platform (4.0mm) to avoid consuming the biologic space at the most coronal level.
4) **Implant final depth position:** At least 2-3mm below the buccal crest, as reported in literature.

CASE PRESENTATION

A 25-year-old female was referred for implant placement at the upper right second premolar (#15) due to a cracked root with a long and old metal post, an insufficient tooth structure to ensure stability of a new crown, and recent continuous crown decementation (Fig 3).

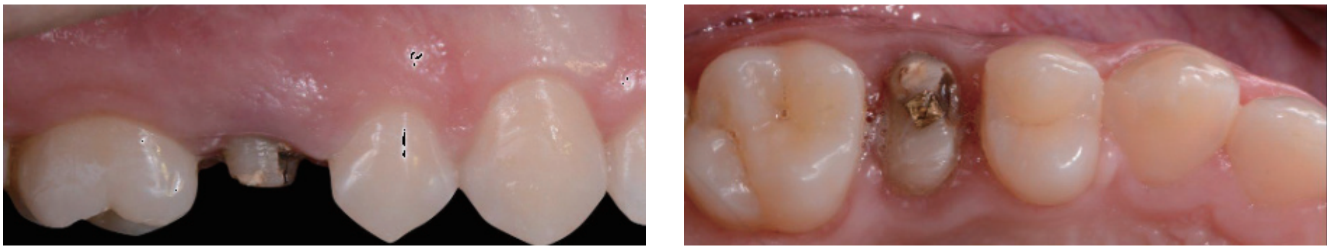

Fig 3. Initial examination of upper right second premolar

During the initial examination with CBCT, we analyzed the socket type (type I according to simplified socket classification, Tarnow&Smith 2007) and the relationship between the socket and the alveolar process to check the bone availability on the palatal side to ensure anchorage. However, there was insufficient bone on the palatal aspect to provide primary stability for an implant.

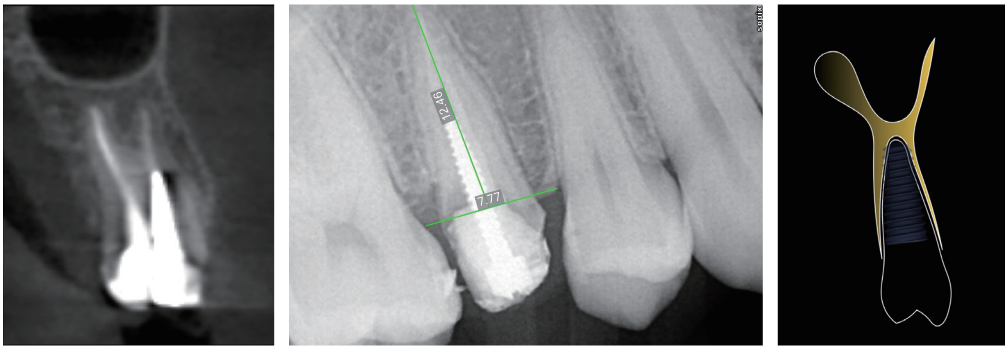

Fig 4. Periapical X-ray showing sufficient mesial-distal bone

However, the periapical X-ray showed sufficient inter-proximal bone (4mm or more) from the mesial and distal adjacent teeth, indicating that it was still possible to place an implant (Fig 4)

The axial view showed sufficient mesial and distal bone inside the socket (bone socket compression), as well as a proper jumping distance when planning the final position of the implant (Fig 5)

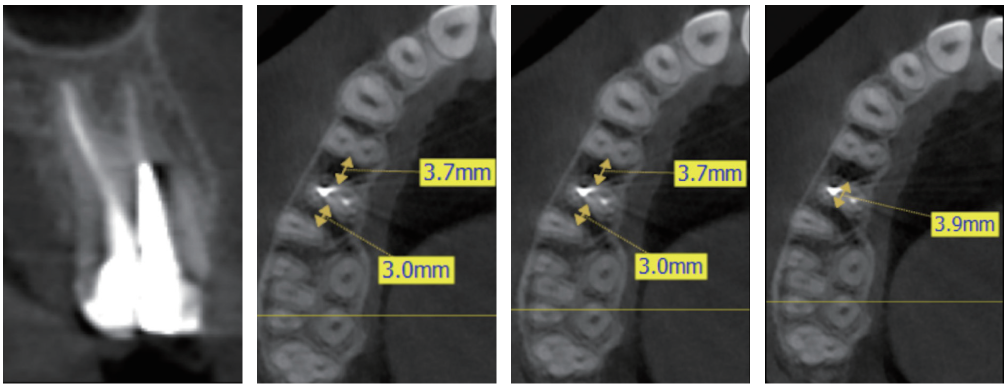

Fig 5. Axial view for proper socket analysis. Different volume measurements, including bone presence to mesial and distal adjacent teeth and buccal lingual socket distance

By analyzing this view we were able to measure the bone availability for implant insertion, bone implant contact, and jumping distance with the inner buccal wall in order to determine the fixture selection.

- **Pre-surgical analysis for fixture selection:**

We used all the radiological information to select the implant in terms of length and diameter.

The implant length was determined by the length of the socket, which is equal to the length of the root, while the width was determined by the available interproximal bone and the distance between the adjacent teeth and the socket (Fig 6).

Analyzing the length of the socket was critical, since this measurement determined both the length of the fixture and whether or not we would be able to perform the technique.

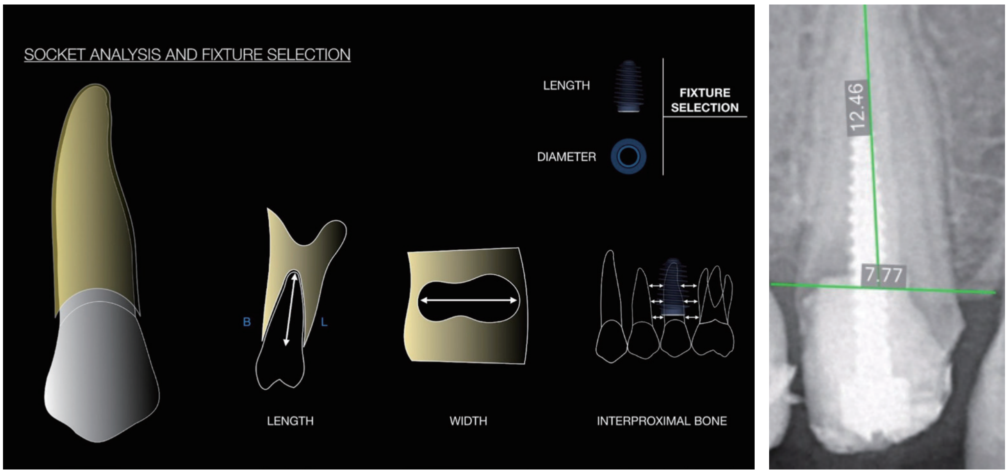

Fig 6. Socket analysis and fixture selection.

1) **Length measurement:** The crestal bone to the apex of the tooth measured 12.50mm, indicating the maximum length for inserting the fixture. Thus, to stay at least 2-3mm below the buccal crest, we selected a 10mm fixture length.

As mentioned before, a shorter socket indicates a shorter implant, since reaching the apex is not necessary. In fact, the apical limit can even drive the implant in the wrong path and direction. Thus, the final implant length was determined by the socket length and final implant depth position (Fig 7)

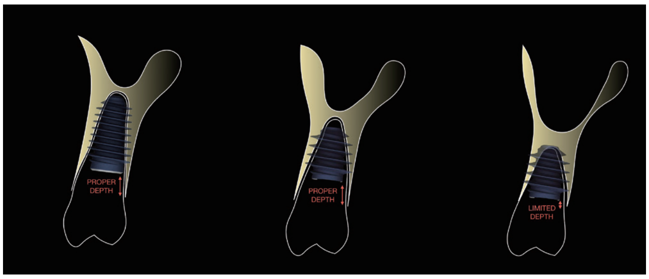

Fig 7. Fixture length selection according to socket depth and final implant position

2) **Diameter:** MegaGen AnyRidge uses diffierent thread widths to increase the primary stability even with a low bone density, especially in the upper maxilla. This means that softer bone requires a wider thread diameter with the same connection.

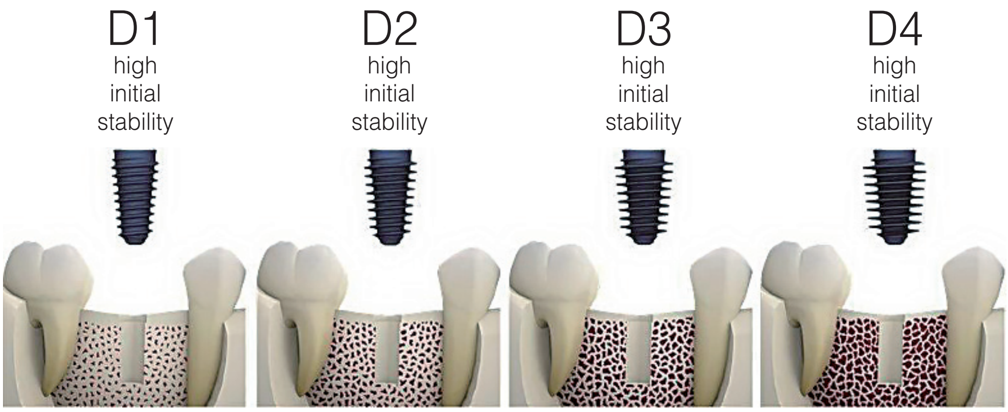

Fig 7-1.

In this case, since the mesial and distal walls of the socket were 3.9mm away from each other (Fig 8), we decided to use a wide thread diameter implant (5.5mm thread diameter, where widest thread diameter is 5.9mm) to ensure bone anchorage at the mesial-distal aspects.

We also applied the **2mm rule**, which means that we used an implant with threads (not the implant body) that were 2mm wider than the space available (Fig 9). Although there was no bone contact with the implant on the facial side, there was enough jumping distance to the inner buccal wall (buccal gap) that could be filled with a bone graft.

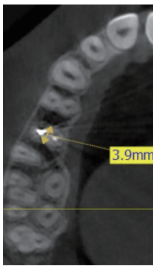

Fig 8. Mesial-distal space

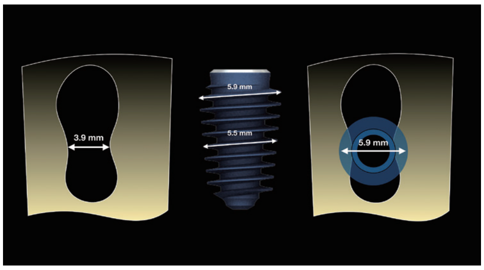

Fig 9. 2mm rule where implant thread diameter is 2mm wider than mesial-distal space to socket wall

The implant threads engage the bone to provide sufficient primary stability for an immediate loading option (with ISQ values >70) or a healing abutment connection for proper emergence profile management. In this case, the mesial-distal socket distance was 3.9mm and was to be occupied by a 5.5mm diameter fixture with a maximum thread diameter of 5.9mm. Thus, the 2mm of horizontal thread insertion would guarantee proper implant stability.

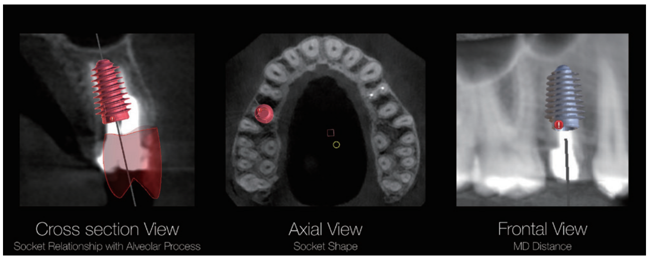

Fig 9-1.

Atraumatic extraction with atraumatic elevators was used to preserve the buccal wall intact. An intrasulcular incision was performed to detach the supracrestal fibers, while a periotome was used to mobilize the tooth inside the socket and facilitate the extraction. The use of specific elevators and atraumatic forceps were required to avoid damaging the periodontal tissues and protect the buccal wall from fractures (Fig 10).

Fig 10. Atraumatic extraction

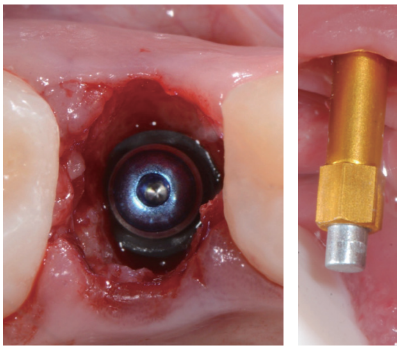

Fig 11. Final implant position.

Once the tooth was extracted, the apical aspect was curetted to ensure complete debridement of all granulation tissue.

Without any pre-surgical drilling, the 5.5x10mm AnyRidge MegaGen® implant was inserted into the socket with slight pressure on the palatal aspect to ensure the most palatal position of the implant and compensate for any buccal migration of the fixture due to circumferential motion at 50Ncm (maximum setting) and 20 r.p.m (Fig 11)

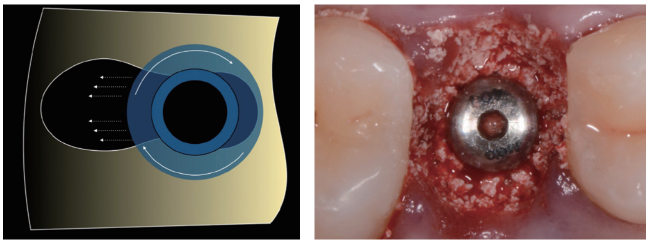

Fig 12. Sufficient jumping distance and expected buccal migration during insertion.

A centered implant is the perfect position according to prosthetic guidance and screw access. (Fig 12)

The implant was inserted 2mm below the buccal crest to ensure sufficient hard and soft tissue presence above the platform, as well as to induce a proper emergence profile with at least 3mm of soft tissue.

The ISQ values were measured on the mesial, buccal, palatal, and distal aspects using a MegaGen Ostell (Ostell ™), and the results are shown in the table below:

MESIAL	BUCCAL	PALATAL	DISTAL
74	68	71	73

An expanded healing abutment (4mm long&4mm wide) was used to support the tissues when grafting the buccal and palatal gaps and avoid any tissue particle migration into the fixture.

Particulate Xenograft medium size Cerabone, Botiss® was used and packed towards the apical aspect using a periodontal probe for the most apical part, while a surgical condenser was used to pack the coronal portion of the gap. An immediate loading protocol was performed using a chairside second premolar polycarbonate crown with a chrome cobalt provisional abutment and flowable composite, and adapted to the coronal aspect of the socket to create the emergence profile. (Fig 13)

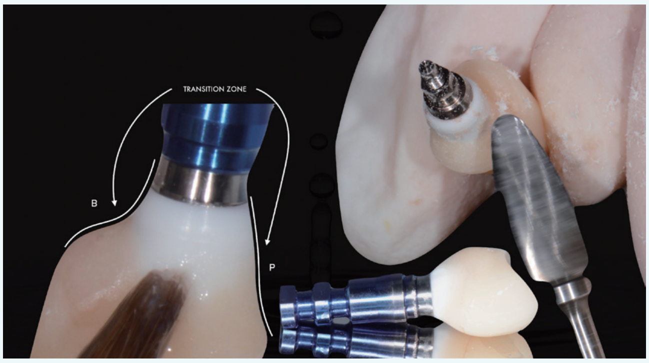

Fig 13. Chairside polycarbonate crown elaboration for immediate loading protocol

The crown connection was polished and varnished with a bonding solution to create a smooth crown surface in contact with the soft tissue and avoid bacterial proliferation during the healing period. (Fig 13)

The crown was screwed at 20Ncm&2Nylon 5/0 sutures were used on the mesial and distal papilla to ensure good soft tissue adaptation over the polycarbonate provisional crown (Fig 14).


Fig 14. Polycarbonate crown screwed and adjusted to site. 5/0 nylon sutures at level of mesial and distal papilla

Occlusal adjustment to avoid antagonistic contact was performed to avoid any micromovement of the crown and implant during the osseointegration period of 6 weeks.

The final crown was delivered after the osseointegration period with successful results. A PFM screw-retained crown was placed at 30Ncm and occlusal adjustment was performed to avoid overloading (Fig 15). Periapical X-rays were taken to check the amount of bone in contact with the restoration.


Fig 15. Final crown on implant #15 (upper right premolar)

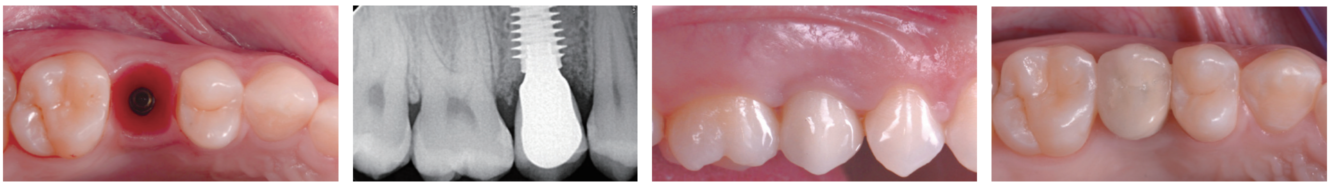
Fig 16. 6-year follow-up.

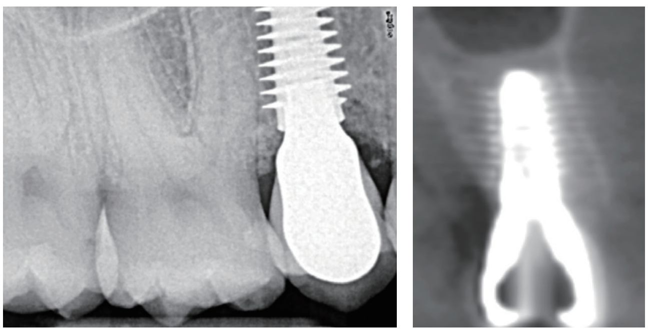
Fig 16-1.

After 6 years of function, clinical pictures were taken to observe the soft tissue stability as well as the emergence profile (Fig 16).

CBCT and periapical X-rays were taken to analyze the bone stability around the implant, and revealed a fully preserved buccal plate and bone mineralization around the platform of the implant.

CONCLUSION

Immediate implant placement can be a tedious treatment when there is no available bone after tooth extraction in contrast to drilling into native and remodeled bone. We have learned and been trained to drill into the available bone, usually located palatally from the socket, however, a careful 360° bone availability analysis combined with an implant design that includes a progressive horizontal thread pattern can help us take advantage of "invisible" bone thread engagement, resulting in an implant with excellent primary stability that respects the jumping distance and achieves the most prosthetically guided position.

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