Drill through the tooth technique for molar implant placement

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The immediate placement of a “conventional” (4-6 millimeter diameter) dental implant into a molar extraction socket poses a number of difficulties. Most significantly is the size and shape of the multi-rooted molar socket. It is not suited for optimal placement of a typical dental implant and often results in compromised implant positioning, poor primary stability or the inability to place an implant at all. This may result in the need for a waiting period of 3 to 6 months, to allow for healing of the socket unit bone formation prior to attempting implant placement.

This waiting period often ends in reduced bone volume (height and width), which is inadequate for implant placement and the resulting need for bone augmentation procedures, especially in the posterior maxilla. This necessitates longer treatment times with increased cost and complexity. An alternative approach has been to place a 5-6 millimeter diameter implant into one socket of a multi-rooted extraction site, typically the palatal socket of a maxillary molar. Problems associated with the latter approach include adverse biomechanical forces resulting from the implant being off-center and off-axis to the application of load. Poor emergence profile and difficult plaque control also result from the unavoidable buccal overhang of the restoration.

The ability to place an implant immediately into a fresh molar extraction site embodies a major advantage in molar tooth replacement. This modality is however critically dependent on the preservation of the peri-implant bone walls of the socket at extraction. In the case of a multi-rooted molar tooth, it is recommended not to attempt a conventional extraction, but to plan for the individual removal of roots in order to avoid potential fracture of the buccal plate. If the crown of the molar is cut off horizontally (Fig.1), preparation of the osteotomy site can be initiated through the pulpal floor (Fig.2) and into the interradicular bony septum (Fig.5).

It is important to consider the periodontal biphase of the patient when applying this protocol. Medium-to-thick periodontal biotypes are the most suitable cases. Thin biotypes are contra-indicated for this treatment approach and it is recommended that “traditional delayed protocol” are followed for thin biotypes.

Preparation of a pilot hole through the pulpal floor (Fig.2) of a decoronised molar (Fig.1) should specifically be directed slightly toward the lingual aspect (Fig.5) in the case of a mandibular molar and slightly toward the mesial aspect (Fig.6) in the case of a maxillary molar. Maxillary molars often have more space available on their mesial aspects (between the first molar and the second premolar) than on their distal aspects (between the first and second molars – Fig.4).

It is of the utmost importance that these initial preparation guidelines are followed in order to ensure that the final osteotomy preparation is away from the buccal root (in the case of a maxillary molar where the bucco-lingual dimensions are critical) and away from the mesio-buccal root of the maxillary second molar (in the case of an upper first molar replacement). The aim is to initiate preparation in the following positions:

- Mandibular first molar (Fig.5)
- Maxillary first molar (Fig.6)

The roots can then be sectioned and carefully removed taking care NOT to remove any bone in the process (Fig.7a). It is essential to then inspect the socket walls and to ensure that all 4 walls are present and intact. If any of the required 4 walls are absent or significantly damaged, immediate implant placement becomes contraindicated and a delayed protocol is then advised. Once the roots are removed, further preparation of the socket is carried out to create a suitable tapered shape (Fig.12) that could receive the implant. Incremental preparation is used (Fig.7b) before finalizing the site.

Finalization of the placement site is achieved with a dedicated Max drill (Fig.8) specially developed for hard bone. These drills match all the available implant lengths and diameters in the range of the Max implant. In softer bone the pre-placement preparation can be finalized with a dedicated Max tap (Fig.9). Lateral compaction of soft bone is enhanced by the use of this instrument, as is the accuracy of osteotomy site finalization in terms of position and angle.

These taps again, match all the available implant lengths and diameters in the range of the Max implant. They can be hand driven using a surgical wrench as demonstrated in Fig.10 & 11. The taps are specifically designed with a strengthened portion on the driving shaft, near the neck of the instrument. This contains a hexed collar, which slots into a sleeve, allowing connection to a surgical handpiece. Potential instrument fracture and damage to surgical handpieces, are significantly reduced by this innovation.

A third finalization instrument can be used in situations where the interradicular bony anatomy

Fig. 1. Mandibular molar decoronised at cervical level
Fig. 2. Pilot hole preparation through pulpal floor
Fig. 3. Drill through pulpal floor into interradicular bone septum
Fig. 4. More bone available on the mesial than on the distal of an upper first molar
Fig. 5. Preparation started slightly toward the lingual in the case of a maxillary molar
Fig. 6. Preparation started slightly toward the mesial in the case of an upper molar
Fig. 7a. Careful removal of roots without any bone removal
Fig. 7b. Incremental preparation with conventional drills
Fig. 8. Dedicated Max drill
Fig. 9. Dedicated Max tap
Fig. 10. Dedicated Max tap driven with surgical wrench
Fig. 11. Dedicated Max tap driven with surgical wrench
Fig. 12. Preparation of centrally located interradicular bone septum
Fig. 13. Osteotome in place to assess preparation before implant placement
Fig. 14. Osteotome in place
Fig. 15. Osteotome design
Fig. 16. Osteotome in molar socket used in finalization of preparation
Fig. 17. Max implant for molar extraction sockets
Fig. 18. The 2x2 position rule
Fig. 19. Laser markings on fixture mount at platform level and at 3mm
Fig. 20. Healing abutment connection and soft tissue adaptation with sutures
Fig. 21. Healing abutment connection and radiographic evaluation
Fig. 22. Restoration immediately after placement
Fig. 23. Follow up at 1 year
is thin or ill defined. The Max osteotome (Fig.15) also match all the available implant lengths and diameters in the range of the Max implant. It doubles up as a profile gauge which can be used in the osteotomy site to assess the preparation depth and position prior to committing to placement (Fig.15). It is useful to confirm the preparation position radiographically, once preparation finalisation has been reached (Fig.14). This instrument has a central stalk with a concave profile. The concave dimples on the base of the instrument are used to steer the osteotomy in different directions, while the central dimple on the stalk serves as the main driving point. A rod shaped “chisel” is placed into these concave hollows, which in turn is driven by a surgical mallet. The central stalk is used to retrieve the instrument after use (Fig.16).

The Max range of implants are designed specifically for immediate placement into molar extraction sockets. They are available in 7, 9 and 11mm lengths and in 7, 8 and 9mm diameter. The tapered design makes them ideal for immediate placement in fresh molar extraction sites (Fig.17). They have a moderately rough surface which is created by sandblasting and chemical conditioning with solvents of a grade 4 c.p. titanium. The restorative connection is available in an external hex, tri-nex or internal octagon design. The wide diameter of these implants enables platform switching of at least 0.25mm in the horizontal plane and a further 0.35mm if the 45 degree bevel at the implant shoulder is included.

Accurate and correct placement position and depth is vitally important for the long term success of this treatment protocol. The golden rule is termed the 2x2 position (Fig.18). The implant should always be 2mm below the lowest point of the buccal wall crest and 2mm in (palatally or lingually) from this point. The implant should NEVER touch the buccal bone plate when it reaches its final placement position. Primary stability in the case of a tapered wide diameter implant can be extremely positive and can reach values that are much higher than those we are accustomed to, when using “conventional” diameter dental implants.

The fixture mount on the dental implant has stripped laser markings at the implant platform height and at 5mm (Fig.19). These can be used to assist with depth determination during implant placement. Impressions for a temporary or permanent restoration can be completed during implant placement surgery and a wide diameter healing abutment can be placed. Soft tissue adaptation around the healing abutment can be assisted with sutures (Fig.20). A final radiographic assessment ensures a comprehensive assessment of the implant position (Fig.21).

Restoration of the implant can be completed as an immediate protocol or once integration is considered to be complete (Fig.22).