Immediate Implant Placement & Restoration of Single Implants in the Anterior Maxilla: What Do We Know?

Tooth loss in the aesthetic zone can be a distressing experience for patients. The use of immediate implant placement & Restoration (IPR) in the pre-maxilla must be viewed from a long-term perspective, since the long term stability of hard & soft tissue is the most important outcome. Secondary objectives were able to make implant therapy more attractive for patients includes one surgical procedure as tooth extraction & implant placement will be carried-out at the same time, the convenient of an immediate tooth replacement, reduced overall treatment time & to deliver the treatment with good cost effectiveness. However, these secondary goals should not jeopardize the primary objectives & cause more complications long-term. The success of IPR is influenced by a number of site & patient related factors, the aim of this paper is to address another site related factor namely the palatal bone.

Part II – Palatal Bone:

The tooth is anchored to the jaws via bundle bone into which periodontal ligament fibres insert. Tooth in function & its supporting tissues (cementum, periodontal ligament & bundle bone) play a crucial role in the maintenance of the dimensions of the alveolar process. The physiological & structural changes following tooth loss jeopardized the integrity of the hard & soft tissue dimensions. The removal of the tooth from its socket involves a mechanical trauma to the periodontal ligament, the bundle bone & the alveolar process. This mechanical trauma results in the disruption of the blood supply from the periodontal ligament, which subsequently leads to significant bone resorption. Generally, the extraction socket heals uneventfully. However, even with uneventful healing the alveolar defect that results as a consequence of tooth extraction will only become partially restored. Bone resorption in the horizontal & vertical dimensions, which has been described to be less pronounced on the palatal bone, this phenomenon has been attributed to the thickness of the palatal bone of the socket in comparison with the facial bone. This resorption process results in a narrower & shorter ridge & the effect of this resorptive pattern is the relocation of the ridge to a more palatal position. Anatomically, the palatal bone of an extraction socket in the anterior maxilla is thicker & more cortical in nature than its facial counterpart, making the former a more suitable foundation for implant placement. Not much of the research was directed toward the palatal bone changes & its impact on the long-term success of implant therapy.

A 3D CBCT is most often used to assess the details of the local anatomy like the height/thickness of the palatal bone wall, bone volume available palatally & the sagittal root position of the failing tooth in the alveolar bone. Four different classes of the sagittal root positions (SRP) could be identified based on CBCT study of 600 human samples. In Class-I SRP, the root is positioned against the facial bone with a considerable amount of bone present on the palatal aspect for implant engagement to attain primary stability; this class is optimal for IPR. Primary implant stability is a prerequisite for IPR & is usually achieved by engaging the palatal wall & the bone beyond the apex of the extraction socket. 81.1% of the 600 samples had class-I SRP. In general, this palatal implant engagement leaves the facial bone intact & results in a small gap between the implant & the facial bone, this gap is usually filled with bone grafting material so that the contour of the residual ridge can be maintained both vertically & horizontally. In the case of Class-II SRP, the root is centered in the middle of the ridge, this class present challenging conditions for IPR as available bone is mainly on both the palatal & facial aspects is inadequate, implant stability relies primarily on the amount of available bone beyond the apex of the extraction socket. Only 6.5% of the 600 samples were Class-II SRP. Generally,

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The volume of bone available surrounding the extraction socket on both the palatal & facial aspects is limited. This amount of bone, while it may be sufficient to prevent facial/palatal bone fenestration, may not be adequate to ensure implant stability. Therefore, when a clinician is considering IPR in a site with Class-II SRP, the amount of available bone beyond the apex of the extraction socket must be critically evaluated, as the stability of the implant relies primarily on it. In the case of Class-III SRP, the root is positioned against the palatal bone with the entire length of the root engages the palatal cortical plate, this type present challenging conditions for IPR. The implant stability must rely on its engagement with the facial bone, which can potentially lead to a higher tendency for facial bone resorption. The frequency of Class-III SRP was only 0.7%. In the case of Class-IV SRP, at least two-thirds of the root is engaging both facial & palatal bone, these cases with a limited amount of bone for implant engagement is a contraindication for IPR. In the Class-IV SRP, which comprised 11.7% of the cases, the existing tooth root occupies the majority of the alveolar volume.

In the case of flapless approach, Implant bed preparation into the sloping anatomy of the palatal bone structure is difficult due to impaired visual access during surgery with high risk of damaging the roots of the adjacent teeth & other vital structures in the area. The final implant diameter should be within the confines of the tooth socket but, in order to help prevent perforation, should not engage the usually thin coronal portion of the facial bone. The final implant position facio-palatally should be placed along the palatal wall of the extraction socket for primary stability. Too far palatally placed implants are a concern; both mechanical & biological complications might be an issue long-term.

IPR is considered a complex procedure & should only be performed by master clinicians, when ideal anatomic conditions are present. This includes but not limited to presence of sufficient volume of palatal bone of the extraction site to allow implant insertion in a correct 3D position with sufficient primary stability. The importance of CBCT as vital adjunct to IPR, precise assessment & preoperative planning will allow clinicians to appropriately recognize sites that are favourable for IPR (Class-I SRP), sites that are more technique sensitive & entail additional attentions (Class-II & Class-III SRP), & sites that are contraindicated for IPR (Class-IV SRP).
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