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

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In the early times implant placement was conducted in healed sites of fully edentulous patients with the aim to improve quality of life & function. Since that time the installation of implants expanded into partially edentulous patients. Today, these indications are very common in daily practice, in particular replacing missing single teeth in the aesthetic zone. However, implant placement into healed sites has lost its dominance and is not really attractive to some patients. Thus, the timing of implant placement has become critical issue. Immediate implant placement and restoration (IPR) of a single tooth in the aesthetic zone is considered a predictable treatment option for replacing failing teeth when established clinical guidelines are followed. In the pre-maxilla, the aesthetic outcome & its long term aesthetic stability is of paramount importance. It is well accepted that the level of bone support and dimensions of the surrounding soft tissue are key factors in determining the aesthetic outcome of the implant restoration. The aim of this paper is to address another site related factor, namely the apical bone.

Part 3: Apical Bone

Following tooth extraction the alveolar process will undergo a change. In the apical and middle portion of the extraction socket minor dimensional changes occurred while in the coronal portion significant alteration of the hard tissue is observed with the most marked changes affecting the facial wall of the socket. Findings from studies in man disclosed that after single-tooth extraction, the major tissue alterations occurred in early stages (3–6 months), although apparently various amounts of additional changes of the ridge could occur long term. Furthermore, bone loss in the single extraction site was more prominent in the facial than in the lingual/palatal bone walls, and tissue loss was more pronounced in the horizontal direction than apico-coronal direction hence, the edentulous ridge acquired a smaller outline.

In one humans study, 3D CBCT reconstructions were used to determine dimensional changes that had occurred in single extraction sites that had been edentulous for more than one year. The measurements made in the scans revealed that although most hard tissue reduction had occurred in the marginal portion of the edentulous site, significant reduction of the cross-sectional area also occurred in more apical portions of the ridge (up to 30%). This indicates that the edentulous site, in comparison with the corresponding tooth site, was not only markedly smaller but had also assumed a triangular shape. This observation is only partly in agreement with findings from experiments in animal that indicated that during extraction socket healing, the reduction of the hard tissue was confined to the marginal portion, while more central and apical portions of the edentulous ridge remained
unchanged. In other words, even if the marginal portion in the current study was most exposed to resorption, the entire ridge apparently underwent diminution. The study disclosed that the cross-sectional area, height & width of the alveolar process had become significantly reduced at the one year mark of the study. At the apical portion of the extraction socket, despite the bone loss during healing a new bone formation will take place. Presence of sufficient bone apically of the extracted root to allow for correct 3D implant placement with good primary stability is very important.

To ensure successful IPR primary implant stability must be achieved by engaging the implant with the bone approximately 4 to 5 mm beyond the root apex. Unfortunately, because the available bone around the failing tooth may not always be sufficient to achieve primary implant stability, alternative treatment options should be considered. Factors such as root length, sagittal root position (SRP), and the morphology of the osseous housing are important in determining the feasibility of IPR and must be evaluated via the use of CBCT. The effect of root length on the IPR is easily understood as the longer the root, the less available bone beyond the root apex and less chance for IPR. Four different classes of the sagittal root positions (SRP) could be identified based on a study of 600 human samples, the influence of the relationship between the SRP and its osseous housing on IPR has been covered in this series (please see Part 2: Palatal Bone). In Class-I SRP, a considerable amount of bone presents on the palatal and apical 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. Only 6.5% of the study samples were Class II SRP, in which the root was centred in the middle of the alveolar housing without engaging either the labial or palatal cortical plates at the apical third of the root. This amount of bone, while it may be sufficient to prevent labial/palatal bone fenestration, may not be adequate to ensure implant stability. Therefore, when a clinician is considering IPR procedures 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.
For references please visit www.nkperio.com and look under Dr Nabil’s publications


