RESTORATIVE

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Technological advances in recent past have provided the much needed impetus to the clinicians to provide an immediate implant solution to the patients immediately after extractions, thereby truncating the overall treatment time while providing a biologically safe and esthetically impeccable result.

Based on the time at which the implant is placed after extraction of the offending tooth, implant placement protocols are classified as Immediate placement (T1), Early placement (T2) and Late placement (T4).

T1 protocol involves immediate placement of implant in extraction socket and has been a matter of discussion in literature for several years. The shortened treatment time and the immediate gratification that this protocol can offer to the patients is its greatest advantage. Although literature has shown, beyond doubt that the bundle bone is lost on average by 1mm irrespective of whether implant is placed in extraction socket or extraction socket is left as it is, there are several other advantages of immediate placement, this greatest being, the ability to support the soft tissues with an immediate provisional abutment. For this protocol to work predictably, it is mandatory for the clinicians to place the implant in a perfect 3-dimensional position such that the screw access hole of the final abutment is compatible with the cingulum area. An error in placement is catastrophic and it results in maligning of the protocol. When done right, in a wisely chosen case, immediate extraction and placement is a huge asset in managing implants in the esthetic zone.

Once the implant is inserted in its correct, prosthodontically driven position, customized abutments can be used to take the result to an accurate, predictable end-point that looks seamless when compared to natural teeth and soft tissues. There are a large number of abutment options available to clinicians today, however an abutment that is customized to the gingival architecture generated by a well-contoured provisional restoration, is by far the most desirable in terms of achieving a perfect emergence profile for the implant restoration in the esthetic zone. This customization can be done with metallic as well as ceramic abutments.

Titanium and other grey metals are a distinct disadvantage in thinner biotypes, as they cast a dull shadow, imparting a distinct disadvantage in thinner biotypes, as they cast a dull shadow, which is already deficient. The prognostic value of this bone sounding is evident in such cases on high bone crest situation the tendency to loose interproximal tissue is higher.

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Fig 1. Pre-Operative View of offending tooth #12
Fig 2. Pre-Operative X ray tooth #12
Fig 3. Pre-Operative View of #12 after removal of faulty restoration
Fig 4. Implant placed in correct 3 dimensional position

A. Free Gingival Margin Level of Implant

The higher the lip line the more challenging the case becomes. When all these six factors are favourable the chances of a successful esthetic outcome with immediate extraction and implant placement protocols are great.

The Case Profile

The patient (Fig. 3) reported with discolouration of gingival aspect of #12 region. The existing coronal restoration on #12 had a leaky margin and was not in sync with the overall esthetic appearance of the adjacent tooth. Radiographic examination revealed that the failing tooth was endodontically treated with a metallic post (Fig 2). On removal of faulty crown on #12, it was found that the coronal structure of tooth was totally destroyed and saving the tooth was not possible (Fig 1). After the preoperative analysis we finalized the use of immediate extraction and implant placement protocol as the patient presented with clinical factors in this favour, especially, the interproximal height of bone, that was within normal limits. In cases of immediate implant placement after extraction in this region we need to have a plan for immediate provisionalization. A provisonal abutment on the implant was planned that would be used in fabrication of a screw retained provisional using a putty matrix generated from the preoperative casts. This can be done only when implant is placed with good primary stability.

The Provisional

Our choice of provisionalization in this case was to use a permanent metallic abutment to fabricate the immediate provisional crown. A putty matrix of the provisional cast will aid in making the provisional with Systemc crown #12, which is then finished extraorally to give perfect contours (Fig 5). The screw retained provisional is kept out of central as well as eccentric contacts to prevent any loading and micro motion of the implant in its healing period (Fig 6).

The Surgery

The extraction is gently carried out without undue damage to the adjacent tissues. The socket is cleaned well and the integrity of the buccal cortex is assessed. Only if its intact, immediate placement may be considered, else it’s better to defer it by 6-8 weeks. Raising the flap and the periosteum is strictly avoided to prevent mucosal recession from surgical trauma.

The implant site preparation is begun on the palatal wall with the pilot drill, such that at the end of drilling protocol we do not touch the buccal wall with any drills. The diameter and mesiodistal position of the implant in this region should be chosen such that at least 2mm bone is left on both sides between implant and the adjacent tooth. Apicocoronally the implant platform must be 2mm deeper than the CEJ of the adjacent tooth. When done with the implant placement, the screw access hole should be ideally accessible from the gingival of the proposed final crown. These principles are universally applicable to all implant placement protocols in anterior maxilla. Using these principles, an implant was placed in #12 region (Fig.4).

Clinical Case Assessment

Before finalizing on the decision of doing immediate extraction and placement in the esthetic zone few parameters need to be assessed:

A. Free Gingival Margin

B. Tooth Shape

A triangular tooth margin is more prone to recession when compared to a thicker one and requires precautions to be taken to prevent show through of the final abutment colour.

C. Gingival Biotype

A thin biotype is more prone to mucosal recession as compared to a thicker one and requires precautions to be taken to prevent show through of the final abutment colour.

D. Scallop of Gingival Margin

A high scalloped gingival architecture is more prone to recession as the thin bone that accompanies the high scallop may be too fragile to hold on to in position once the extraction is done.

E. Interproximal Height of Bone

A greater than 5mm probing depth to bone in preoperative assessment means that the interproximal bone is already deficient. The prognostic value of this bone sounding is evident in such cases on high bone crest situation the tendency to lose interproximal tissue is higher.

F. Upper Lip Line

In cases where the patients upper lip is longer the chances of success with esthetic immediate implant placement are better as the crucial peri-odontal infrastructure will not be readily visible when patient smiles.

G. Crown Length

The crown length is more predictable when compared to the corresponding contralateral tooth. The height and width are more predictable when compared to the corresponding contralateral tooth.

H. Marginal Stability

The marginal stability of the adjacent tooth is a significant factor in the overall esthetic outcome. When all these six factors are favorable the chances of a successful esthetic outcome with immediate extraction and implant placement protocols are great.

Customized Lithium Disilicate Abutments for Implants in the Esthetic Zone

Fig 5. Provisional Restoration contoured to mimic natural tooth form
Fig 6. Provisional Restoration delivered on the stable implant
Fig 7. Gingival architecture formed by provisional at 4 months
Fig 8. Customized impression coping for implant crown impression
Fig 9. Soft tissue mask to reproduce gingival contour on stone model
Fig 10. Full contour wax-up for customized E-max abutment
Fig 11. Cut-back of full contour abutment for receiving E-max veneer
Fig 12. Finalized E-max abutment wax-up on stone model
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The Finalization of Esthetic Restoration: At the prosthetic phase after 16 weeks, the provisional crown was removed to find the gingival architecture created by the provisional coping (Fig 9). A Ti-base abutment is used from the implant manufacturer on which a customized IPS e.max framework is fabricated. This IPS e.max framework is designed to receive an IPS e.max veneer on the labial aspect. In this step the screw access hole of the implant emerged favorably from the gingival architecture. During final impressions a customized IPS e.max abutment was used. The impression containing both natural and implant crowns is held with better retention compared to the provisional crown (Fig 10). Once the customized coping impression is processed with a soft tissue cast fabrication, a Ti base abutment is selected and a wax up to final contour is done based on the gingival architecture created by the provisional (Fig 10). A try in of this situation is made.

The wax up is then cut back from the facial surface using the putty index as a guide for reduction (Fig 11).

The cutback is made in a manner to mimic a veneer preparation as the final design for the IPS e.max abutment, with the implant access hole favorably placed on the palatal side (Fig 12, 13). This way we have maximum strength for the abutment design as well as a good stump shade which can be customized with IPS e.max stains and sufficient space for an IPS e.max veneer. Two veneers of slightly differing value are fabricated for two veneers, one veneer to identify the value that matches best introradially. The abutment is then invested and pressed using a MO Tinig (Fig 14). After carefully fitting, the abutment is then checked and polished by the light curing (Fig 18). The restoration is checked for fit with the implant access hole and then light cured for final polymerization. Thereafter, the IPS e.max abutment and veneer margin junction is finished with silicone polishers. The restoration is then delivered by torquing the abutment screw to 30 Ncm inversely. The palatal cervical access hole is finished with a light cured composite material and finished to a high polish using silicone intraoral polishing. The final result showed excellent healing of the soft tissues around the implant (Fig 17). The post-operative radiograph revealed a well-integrated restorations and implant (Fig 18).

Discussion: The greatest advantage of the Ti protocol is that once one surgical procedure is needed and the overall treatment time is reduced. There is no doubt that in certain cases this protocol renders excellent short term results especially if all the clinical assessment factors mentioned above are favorable. However caution has to be exercised by clinicians as there are several pitfalls of Ti protocol such as challenges with irregular Socket Morphology and increased risk of mucosal recession especially in thin biotypes. Adjunct soft tissue surgery such as a connective tissue graft may be necessary for a successful esthetic outcome. Using an IPS e.max customized abutment provides several advantages; such as ability to etch and bond the final restoration thereby providing a stable long term result, and with the same color translucency, the customized IPS e.max abutment will provide a better substrate for the final esthetic restoration and a scaffold for excellent gingival healing due to its outstanding biocompatibility.

Conclusion: Optimization of tissue support with customized lithium disilicate abutments is a viable treatment option for single and multi-implant restorations in the anterior zone. With the sufficient strength and better translucency that it offers over zirconia abutments, it makes a strong case to be chosen as the first line of restorative options in cases with high demand from implant restorations in the esthetic zone.