

Customized Lithium Disilicate Abutments for Implants in the Esthetic Zone

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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 with soft tissue healing (T2- 6-8 weeks), Early placement with partial bone healing (T3- 8-12 weeks) and Late placement (T4 - >12 weeks).

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 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; the greatest being, the ability to support the soft tissues with an immediate provisional. 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 would emerge from the cingulum area. An error in placement is catastrophic and it results in malaligning 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, prosthetically 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 term 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, leading to a show through of the abutment in the final result. Although zirconia has been the 'go-to' material for customization of abutments in the anterior zone, recently lithium disilicate abutments have been introduced that provide several additional benefits over zirconia as abutments.

This article describes a case of implant placement with T1 protocol and use of customized IPS e.max abutment to provide a road map to achieve an esthetically good result.

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 Level of in-

involved tooth

The more coronal the free gingival margin of the affected tooth as compared to adjacent teeth the better the chance of getting a good esthetic result. In such cases slight mucosal recession will not affect the esthetic outcome of the case adversely.

B. Tooth Shape

Rectangular/Square teeth forms are better replaced with immediate extraction protocols. A triangular tooth means that the sharp interdental soft tissue peak may be lost due to trauma from extraction and prosthetic procedures leading to a dark triangle in the end result that will need exacting prosthetic protocols to be employed to salvage the situation.

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 its 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 as in such cases on high bone crest situation the tendency to loose interproximal tissue is higher.

F. Upper Lip Line

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

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 placement protocols are greater.

The Case Profile

The patient (Fig 1) 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 3). 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 Inter-proximal height of bone, that was within normal limits. In cases of immediate placement after extraction in this region we need to have a plan for immediate provisionalization. A provisional 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 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 teeth. When done with the implant placement, the screw access hole should be ideally accessible from the cingulum 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).

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 preoperative cast will aid in making the provisional with System c&b II, which is then finished extra-orally to give perfect contours (Fig 5). The screw retained provisional is kept out of centric as well as eccentric contacts to prevent any loading and micro motion of the implant in its healing period (Fig 6).

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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



Fig 5: Provisional Restoration contoured to mimic natural tooth form



Fig 6: Provisional Restoration delivered on the stable implant

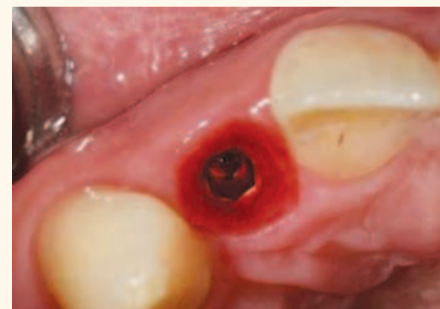


Fig 7: Gingival architecture formed by provisional at 4 months



Fig 8: Customized impression coping for implant level 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

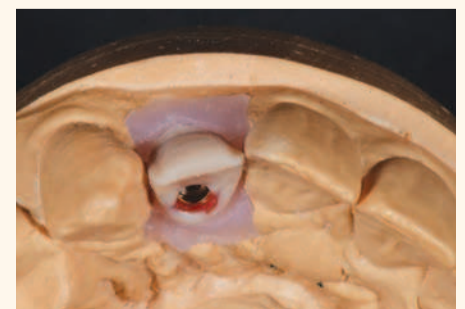


Fig 12: Finalized E-max abutment wax-up on stone model

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Fig 13: Finalized E-max abutment wax up with Ti base abutment



Fig 14: E-max abutment wax-up with sprue for pressing protocol



Fig 15: E-max veneer with custom E-max Abutment and sandblasted Ti-base abutment



Fig 16: Customized E-max abutment with pressed veneer



Fig 17: Final Result with excellent tissue response



Fig 18: Post-operative X ray

The Finalization of Esthetic Restoration:

At the prosthetic phase after 16 weeks, the provisional crown was removed to find the gingival architecture sculpted by its shape (Fig 7). During final impressions a customized impression coping (Fig 8) is used to capture the already perfected soft tissue emergence profile and a stone cast is fabricated with ideal soft tissue contours (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 case the screw access hole of the implant emerged favourably from the cingulum of 12. Although it was possible to fire veneering ceramic directly to the core abutment, we preferred to make multiple thin veneers of differing values on the underlying core and hence chose this method of fabrication where the veneer of IPS e.max is bonded to the underlying customized IPS e.max core extraorally before delivering the restoration. After trial the veneer was bond-

ed on etched IPS e.max framework and then the restoration was delivered with a final torque of 35 Ncm.

The Technical Protocol for Customized IPS e.max Abutment:

Pressed ceramics (IPS e.max, Lithium Disilicate) have proved to be an extremely successful and reliable mode of fabricating esthetic and accurate restorations for implants. Creating a durable bond with Titanium base abutments using luting composites opens new opportunities such as customized IPS e.max abutment concept, wherein the ability to lute extraorally and deliver a screw retained restoration intraorally proves to be a distinct advantage. 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 putty index of this situation is made.

The wax up is then cutback 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 favourably 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 customised with IPS e.max stains and sufficient space for an IPS e.max veneer. Two veneers of slightly differing value are fabricated for crucial cases in esthetic zone, to identify the value that matches best intraorally.

The abutment is then invested and pressed using a MO ingot (Fig 14). After carefully divesting, the abutment is then checked for fit to the Ti base. The abutment is checked for sufficient space on the facial surface for an IPS e.max veneer. Palatal contacts are fine tuned to provide a good occlusal contact with the lowers teeth.

The customized IPS e.max abutment is then stained and characterized as required. This allows the colours to be built-in from within, as found in natural teeth. The surface of the abutment that is in contact with the soft tissue is finished to a high glaze. Using the putty index as a guide the veneer is then waxed up and pressed to final contour.

Once the veneer fit is verified, it is cut back facially on the incisal 1/3 to create space for micro layering of ceramics and create internal characterizations using the wide range of IPS e.max Ceram incisal effects, and essence powders. In this case we fabricated two veneers, one veneer with standard IPS e.max Ceram Incisal effects and the 2nd veneer was done with the new IPS e.max power incisal to increase the brightness level (Fig 15, 16).

A try in is done at chairside to check for fit and form of the restoration to provide a good emergence profile. Thereafter the veneer is stained and characterised and polished.

The IPS e.max Abutment is then cemented to the Ti-base. The Ti base is screwed onto a spare Implant replica. The surface of the Ti base in contact with the soft tissue and the screw access hole of the Ti base is protected with wax. The area of the Ti base that is to receive the IPS e.max abutment is gently sandblasted to achieve a surface that is matt grey and its surface conditioned to receive the IPS e.max abutment.

The wax is then steam cleaned from the abutment. Monobond Plus is applied to the cleaned Ti base surface for 60 sec and the surplus is dried with air that is water and oil free. The internal surface of the IPS e.max abutment is then treated with an etching gel for 20 sec only. The etchant is then removed and cleaned. Monobond Plus is applied to the internal surface of the IPS e.max abutment for 60 secs and the surplus is dried with air that is water and oil free.

Multilink Implant is used to bond the IPS e.max abutment to the Ti base. A glycerine gel is used at the cervical joint between the IPS e.max abutment and Ti base to prevent the formation of an inhibition layer and this is then cured in a light curing unit.

The abutment is then finished with silicone polishers to achieve a

smooth surface and remove any cement residue.

The IPS e.max abutment is now ready to receive the pressed veneer for bonding.

The facial surface of the IPS e.max abutment is etched and so is the internal surface of the IPS e.max veneer for 20 seconds each. The fact that there can be such predictable bonding on IPS e.max abutments is a distinct advantage over Zirconia abutments.

Monobond plus is applied to both the bonding areas on the IPS e.max abutment as well as the IPS e.max veneer.

Variolink 2 is used to lute the IPS e.max veneer to the IPS e.max abutment. Excess luting material is removed and the veneer margins are covered with a glycerine gel 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 intraorally. The palatal cingulum access hole is finished with a light cured composite material, and finished to a high polish using silicone intraoral polishers.

The final result showed excellent healing of the soft tissues around the implant (Fig 17). The post-operative radiograph revealed a well-integrated restoration and implant (Fig 18)

Discussion

The greatest advantage of T1 protocol is that only 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 six clinical assessment factors mentioned above are favourable. However caution has to be exercised by clinicians as there are several pitfalls of T1 protocol like challenges with irregular Socket Morphology and increased risk of mucosal recession especially in thinner biotypes. Adjunct soft tissue surgeries 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 better colour & 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 short span 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.

References available from the publisher. [11](#)

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