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Comparative Evaluation of Socket Sield and Immediate Implant Placement

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Abstract

➢ ***Background and Objectives***

Residual ridge resorption is the main drawback of the tooth extraction. One of the techniques to preserve the ridge dimension is socket preservation procedure. However, the limitation of these procedures could not completely preserve the facial part of the root. Implantology in visible frontal region demands extreme precision due to the high aesthetic requirements of patients. The main aim is to assess the aesthetic zone and the bone level of the implant site with SST (Socket Shield Technique) along with immediate implant and conventional immediate implant placement, by using PES (Pink Esthetic Score) and radiographs.

➢ ***Method***

An in-vivo study was conducted in 10 patients with single rooted maxillary anterior teeth. Pre-operative radiographs (CBCT, OPG, IOPAR) were taken to assess the bone level or any periapical pathologies. The Patients were divided into two groups of 5 each: Study group (SST with immediate implantation) and Control group (conventional immediate implantation). In the study group, the buccal root fragment kept intact in the socket and the implant was placed. In the control group, the whole tooth was atraumatically extracted and implant was placed. Immediate post-operative radiographs were taken and the patients were recalled after 3, 6 and 12 months for the follow up. PES and Radiographs were used as parameters, for evaluating the peri-implant soft tissue and the bone level. Statistical analysis was performed on the data obtained using Chi Square test, Fischer's exact test, students unpaired t test and students t test.

➢ ***Result***

The mean PES in socket shield technique was 12.2 ± 0.837 contrary to the conventional implantation after 12 months follow up which was 10.8 ± 0.837. Hence, it was statistically significant and the mean bone loss was 0.68 ± 0.836 in case of socket shield and 0.88 ± 0.836 for conventional implantation which also showed a significant difference. The Socket Shield Technique was beneficial in preserving the buccal bone plate.

Keywords:- *Socket Shield Technique, Immediate Implant, Pink Esthetic Score, Radiographs.*

I. INTRODUCTION

Loss of tooth in aesthetic zone is a traumatic experience with or without compromise in phonetics. Hence in the aesthetics zone, implant supported single tooth replacement is one of the most challenging situations[1]. In order to circumvent the problem of post-extraction and implant-related bone resorption, the concept of immediate implants was introduced in the late 1970s [2] . Implants placed in the fresh extractions sockets minimizes the need for angled abutments and facilitates the positioning of the final restoration[7] . Its success rate in maxilla is 66% - 95.5% and in mandible 90% - 100%.[1]

The implant site is evaluated under three parameters such as tooth position and shape , form and biotype of the periodontium and the position of osseous crest to predict the peri-implant aesthetic outcome [1]. The preservation of existing intact oral structures requires execution of a careful and conservative treatment. Dental implant selection criteria are contextually dependent on the following factors: achieving predictable osseointegration, anatomical considerations, restoring function, maximizing esthetic results and soft tissue maintenance[4].

Hürzeler et al. have reported a novel approach to preserve the soft and hard tissues following tooth extraction without the use of biomaterials by retaining the buccal root segment during immediate implantation to prevent alveolar bone loss following tooth extraction[5]. This procedure stabilizes the coronal and buccal bundle bone and the retention of the periodontal membrane by retaining a coronal tooth fragment ("socket shield"), including adequate blood supply[6]

The main aim of this study is to compare and evaluate socket shield technique along with immediate implant and conventional immediate implant placement using two parameters which includes: PES to assess the peri-implant soft tissue and Radiographs to determine bone level.

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II. METHODOLOGY

The study sample consisted of 10 individuals with fractured central and lateral incisors (failed root canal treated case) with age ranging from 25-60 years. They were clinically and radiographically (IOPAR/OPG/CBCT) examined and assigned into 2 groups. In the study Group - 5 Subjects were treated with 'Socket Shield Technique' with immediate Implant placement. In control group - 5 subjects were treated with Immediate Implant placement alone after immediate extraction.

In the study group, the teeth were decoronated and sectioned mesio – distally from cervical to the apical part. The palatal root segment was atraumatically extracted and implant osteotomy were done. Implants were placed by preserving the buccal shield and provisional restoration was done. In control group, atraumatic extraction was done by keeping the socket wall intact. Proper curettage and implant osteotomy were prepared. Implant placement with alloplastic graft material were inserted in the defected site. Provisional restoration was prepared immediately. Post – operative IOPAR and digital radiographs were taken. Soft tissue and hard tissue re – evaluation was done after 1 week, 3, 6 and 12 months respectively. PES Score was recorded to assess the peri – implant soft tissue aesthetic evaluation and radiographs were taken immediately after implant placement; 3, 6 and 12 months follow up radiographs were taken.

In the prosthetic phase, the gingival former was placed for all the patients at third month follow for desired gingival contour. Impression coping was placed and an implant level impression was made in preparation for the definitive restoration. The definitive metal ceramic restorations were placed. Immediate post operative digital radiograph and OPG was taken to assess crestal bone height and peri apical bone healing.

The statistical analysis was performed using SPSS version 17 was used for statistical analysis and statistical significance was defined as $p \leq 0.001$. The demographic analysis for comparison of mesial papilla, distal papilla, soft tissue contour, soft tissue texture in socket shield and immediate implant placement was performed using chi-square. The comparison of soft tissue colour by fishers exact test and the comparison of PES and bone level in socket shield technique and immediate implant placement was done using students unpaired t test and students t test respectively .

Fig 1 :- Pre-Operative Opg

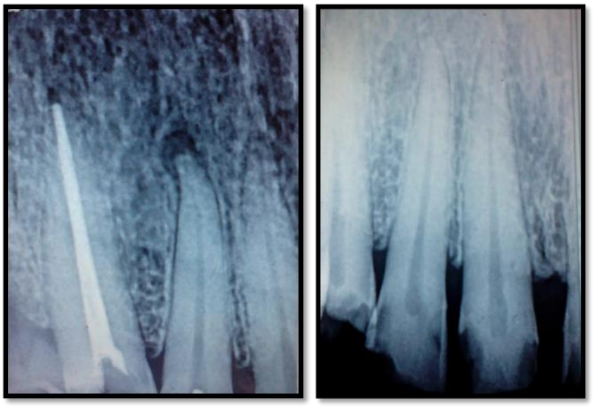

Fig 2 :- Pre Operative Iopar

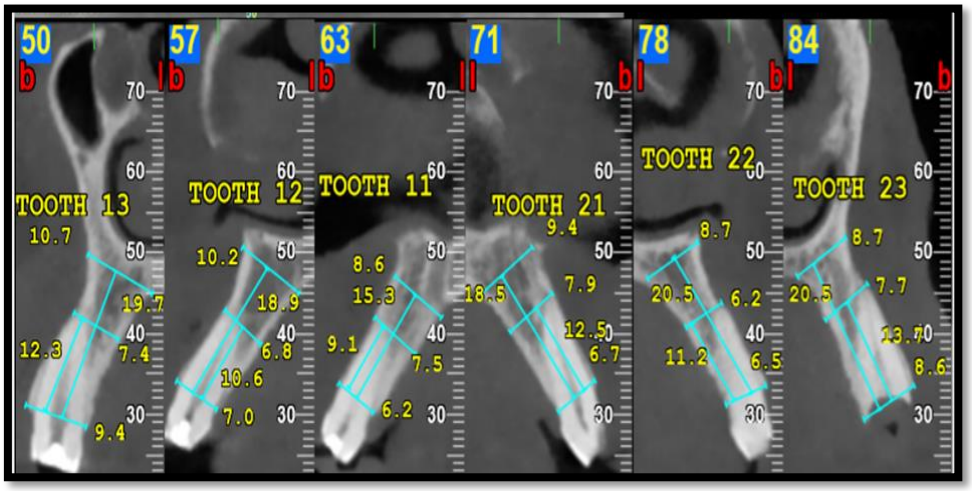

Fig 3 :- CBCT IMAGE

Fig 4 :-Pre-Operativephotograph

Fig 5 :- Retained Root Fragment

Fig 6:- Complete Removal of 21 For Conventional Immediate Implant Placement

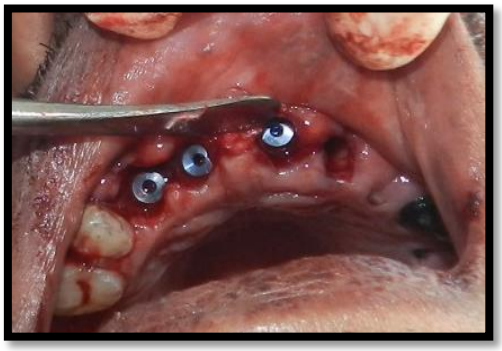

Fig 7:- Implant Placement

Fig 8:- Post Operative Opg

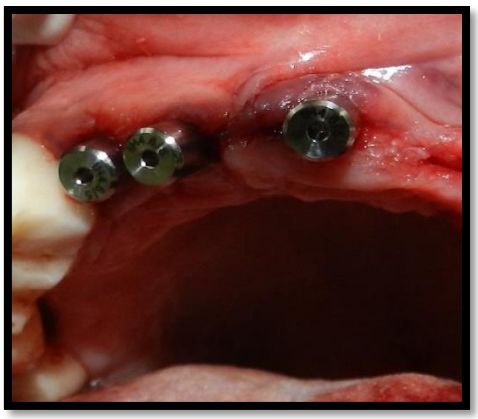

Fig 9:-Placement of Gingival Former

Fig 10:-Placement of Impression Coping

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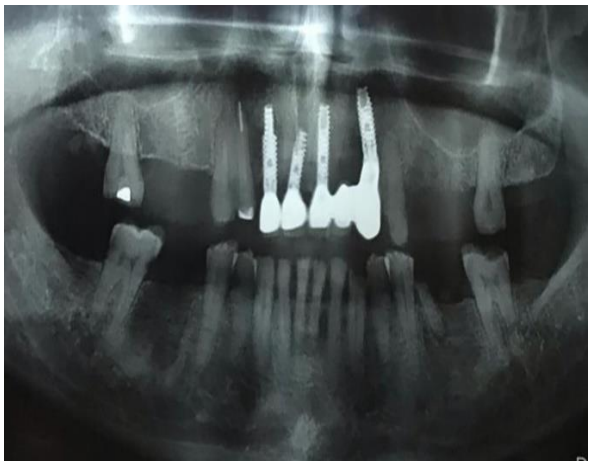


Fig 11:-Post Op Opg

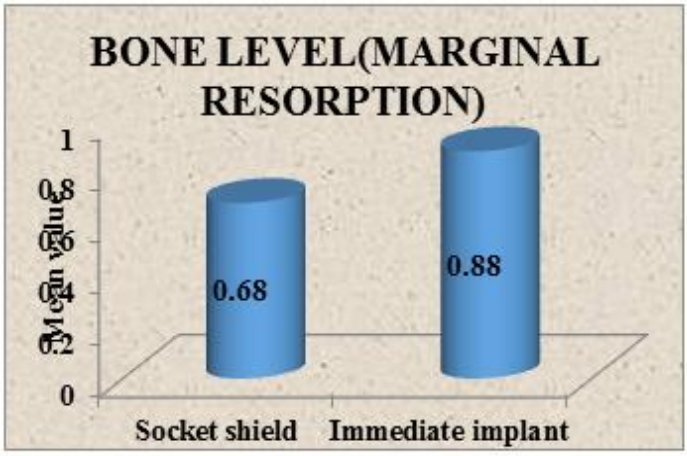
Fig 12:- After Metal Ceramic Crown Cementation

III. RESULTS

group	N	Mean	Std. Deviation	t
Socket shield	5	12.200	.837	2.646
Immediate implant	5	10.800	.837	p=0.029 sig

Fig 13

Mean Pink esthetic score of Socket shield is 12.2 whereas in the immediate implant the score was10.8. While applying students unpaired t test the difference was found to be statistically significant. (p=0.029)



group	N	Mean	Std. Deviation	t
Socket shield	5	.680	.0836	3.78000
Immediate implant	5	.880	.0836	p=0.005 hs

Fig 14

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Mean bone level in Socket shield is 0.68 whereas the mean value in Immediate implant is found to be 0.88. Students t test proved this difference as statistically significant (p=0.005). The Mean bone resorption is more in the Immediate implant compare to Socket shield.

IV. DISCUSSION

The most ideal method for the prevention of alveolar ridge resorption should be cost effective, minimally invasive and with minimal material requirements. Various techniques which are documented does not fulfil the above criteria[7]. Socket Shield Technique (SST) makes a unique procedure by preserving the entire attachment apparatus, for the complete preservation of alveolar ridge that helps in maintaining Pink eisthetics[8]. Retaining the vital tooth as well as maintain the buccal root fragment of endontically treated tooth have been recommended to prevent excessive resorption of the residual ridge[9]. Histologically it was proposed by **Hurzeler** and co-workers in 2010, where he demonstrated that the buccal plate crest showed absence of osteoclastic activity, which leads to resorption. The histological analysis suggested that the buccal bone plate was preserved and showed successful osseointergration at the implant site[7]. Various alterations in the SST have been documented for the regeneration of deficient buccal bone, like socket grafting materials, barrier membranes, use of tissue engineering and the use of autogenous soft tissue grafts from the palate to cover the socket[10]. The disadvantages of the use of these substitutes are increase number of surgical sites, wait for healing phase and success rate.[11]

Bharakat et al [12] did a randomised control clinical trial study, which compared immediate implant with SST and conventional implant placement. All implants were evaluated clinically and radiographically to evaluate bone loss at intervals of 1, 4 and 7 months. The result showed that the horizontal and vertical bone loss in SST group was very minimal contrary to the conventional implantation.

The main aim of SST is to preserve the part of the root which help in maintaining hard and soft tissue contours.[8] The presence of the buccal root fragment helps to maintain the blood supply from the preserved periodontal ligament seems to be one of the etiological factor in the dimensional stability of hard and soft tissues, thus reduces the rate of resorption.[11] Even in case with adjacent implants the interdental papilla can be preserved by preparing interdental socket shield. This procedure helps in maintaining pink aesthetics and provides a solution for aesthetically critical cases such as high lip line and maxillary anteriors.

The 2 parameters used to evaluate the esthetic zone and bone level were PES and IOPAR. The PES is a suitable instrument for reproducibly evaluating soft tissue around single tooth implant crowns. PES is mainly influenced by the local anatomy and the applied surgical procedure to regenerate the peri-implant bone defects routinely present in post extraction implant sites[13]. The height of the peri implant papilla primarily depends on the bone level height at adjacent root surfaces.

The limitations of this study were, the number of patients were comparatively less and they were followed for only 1 year after implant placement. It is certainly necessary to have a longer follow up period to be able to draw most specific conclusion on the reliability of this socket shield technique. This study concluded that SST technique had better aesthetic scores and soft tissue healing/ adaptation giving a near natural tissue contour compared to the peri implant soft tissue of conventional immediate implant placement with 12 months follow up.

V. CONCLUSION

Long term clinical studies are needed in order to prove positively the extreme importance of preserving buccal root fragment to assure high aesthetic results as well as maintenance of the buccal bone level for long lasting implant success outcomes. The more we imitate and preserve natural vital tissues, the more aesthetically pleasing and acceptable results are achieved. In this study the result shows that, after one year follow up the SST prevents the soft tissue changes and hard tissue resorption.

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- Conflicts of Interest: None declared

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