“EVALUATION OF CLINICAL AND RADIOGRAPHIC OUTCOMES IN IMMEDIATE IMPLANT PLACEMENT WITH AND WITHOUT SOCKET SHIELD IN SINGLE ROOTED TEETH – A RANDOMIZED CONTROLLED TRIAL”

Dissertation submitted

toMaharashtraUniversityofHealthSciences,Nashik

inthePartialFulfillmentofRegulationsfor

theaward oftheDegreeof

MDS

IN

ORAL AND MAXILLOFACIAL SURGERY

BRANCHIII

2022

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LISTOFABBREVIATIONS

Table No.	ShortForm	FullForm
1.	2D	2- Dimentional
2.	3D	3- Dimentional
3.	ARRIVE	Animal Research Reporting of in vivo experiments
4.	BPH	Buccal plate height
5.	BPW	Buccal plate width
6.	CAD-CAM	Computer-aided design and computer-aided manufacturing
7.	CBCT	Cone beam computed tomography
8.	DNS	Dynamic navigation system
9.	IIP	Immediate implant placement
10.	IPR	Interproximal reduction
11.	ISQ	Implant Stability Quotient
12.	mSBI	Modified sulcus bleeding index
13.	PD	Probing depth
14.	Pdl	Periodontal ligament
15.	PES	Pink esthetic score
16	PET	Partial extraction therapy
17.	PRISMA	Preffered reporting items for systematic reviews and Meta-Analysis
18.	RCT	Randomized Controlled trial
19.	SD	Standard deviation
20.	SLA	Sandblasted, large grit, acid-etched implant surface
21.	SR	Systematic Review
22.	SRMA	Systematic review and meta-analysis
23.	SST	Socket shield technique
24.	WES	White esthetic score

INTRODUCTION

The decrease in the dimensions of the bones of alveolar socket vertically and horizontally were verified by numerous publications as a sequelae of tooth extraction[(1)]. Reconstruction or retaining of the surrounding soft and hard tissues of implant supported reconstruction at the aesthetic site can be managed in selected cases. Esthetic appearance compromised in peri-implant tissue can manifest as vertical bone loss, horizontal bone loss, vertical and horizontal gingival recession, change in tissue surface texture and color[(2)].

Several etiologic factors may be the probabilities for dimensional deficiencies after tooth extraction such as decreased periodontal blood supply due to flap elevation, mechanical trauma, deleterious habits like smoking and/or tobacco consumption, risk factors such as plaque accumulation, micro-organism in the exposed socket of oral cavity[(3)], thickness of buccal bone and loss of periodontium[(4)]

In view to eliminate or minimize the physiologic consequences of tooth extraction affecting the clinical and functional outcomes of implants various techniques are being considered. These includes Ridge preservation procedure[5], augmentation procedures, immediate temporization, and flapless implant placement. Implementation of these procedures were found to minimize the negative consequences and maintained peri-implant hard and soft tissue to a certain level but were not able to completely prevent it[6, 7, 8].

Numerous studies have revealed that root preservation attributed to the alveolar bone preservation avoiding the loss of periodontal ligaments particularly of the buccal bone which was considered that retention of root can influence post-extraction resorption of either vital or non- vital teeth[9].

A technique named "Socket shield technique" (SST) introduced by Hurzeler et al in 2010. This technique works on the principle of maintaining the periodontal attachment of cementum, periodontal ligaments with bundle bone as well as formation of new cementum between root fragment and implant. Case reports and preclinical studies published on these topics showed positive results but bringing into a conclusion was difficult due to less number of trials and sample size record[10, 11].

Based on these positive finding and scarcity of the study trials, this study with the main objective to compare by evaluating the clinical and radiographic results with and without socket shield followed by immediate implant placement and immediate temporization. Such a trial would contribute in concluding the reliability of the safety, efficacy and complications of the technique and would help in proving the reliability of this procedure.

Gluckman et al in 2016 proposed a classification inorder to guide the clinicians and suitable indications for each procedure[12].

Partial extraction therapies (PET) and its indications	
Root submergence	Unrestorable tooth crown or tooth indicated for extraction
	Absence of apical pathology
	Healthy amputed pulp or endodontic therapy completed
	Intention to preserve the alveolar ridge
	Planned removable full or partial prosthesis
	Cantilever pontic site as an alternative to two adjacent implants
	Actively growing young patient planned for implant treatment later
	Ridge preservation in conjunction with other PET
Socket-shield	Unrestorable tooth crown or tooth indicated for extraction
	Tooth root with or without apical pathology
	Intention to preserve the alveolar ridge, specifically to prevent buccopalatal collapse
	Immediate implant placement
	Ridge preservation in conjunction with other PET
Pontic shield	Unrestorable tooth crown or tooth indicated for extraction
	Tooth root with or without apical pathology
	Intention to preserve the alveolar ridge
	Planned pontic site(s) beneath fixed prosthesis
	Cantilever pontic site as an alternative to two adjacent implants
	Ridge preservation in conjunction with other PET
Proximal socket-shield	Unrestorable tooth crown or tooth indicated for extraction
	Tooth root with or without apical pathology
	Intention to preserve interdental papillae
	Planned immediate implant placement sites of two ormore adjacent implants
	Papillae preservation in conjunction with other PET

Kumar et al, 2018 Classification of SST[13].

Type I	Buccal Shield
Type II	Full C buccal shield
Type III	Half C buccal shield
Type IV	Interproximal shield
Type V	Lingual / palatal shield
Type VI	Multiple buccal shields

AIMAND OBJECTIVES

The study was aimed to evaluate and compare Socket shield technique and Conventional technique followed by immediate implant placement and temporization, clinically and radiographically in single rooted teeth.

Also,attachedtothisaimwerecertainobjectives:

1. Toevaluate the horizontal bone loss at the level of crest immediately, 6 and 12 months post-surgery.

2. To evaluate difference in the horizontal bone loss at the level of crest immediately post-surgery with 6 and 12 months post-surgery.

3. To evaluate the horizontal bone loss at 5 mm apical to the crest immediately, 6 and 12 months post-surgery.

4. To evaluate difference in the horizontal bone loss at 5 mm apical to the crest immediately post-surgery with 6 and 12 months post-surgery.

5. To evaluate the horizontal bone loss at 10 mm apical to the crest immediately, 6 and 12 months post-surgery.

6. To evaluate difference in the horizontal bone loss at 10 mm apical to the crest immediately post-surgery with 6 and 12 months post-surgery.

7. To evaluate the vertical bone loss at the level of crest immediately, 6 and 12 months post-surgery.

8. To evaluate difference in the vertical bone loss at the level of crest immediately post-surgery with 6 and 12 months post-surgery.

9. To evaluate the aesthetic results using Pink esthetic score index at varied interval such as preoperative, immediately, 3 months, 6 months and 12 months post-surgery.

REVIEWOFLITERATURE

Amler et al, 1960[14]

A study undertaken to understand the histochemical and histological study of alveolar socket healing taken place post-removal of tooth by taking biopsies from normal human tissue at the intervals of two to three day for a period of 50 days. Approximately 75 biopsies were obtained from around the circumference of the socket. The study concluded the following sequence in healing of an alveolar socket after exodontia: a) clot formation, b) Granulation tissue formation, c) Young connective tissue, d) Bone formation, e) epithelization.

Bouticelli et al, 2003[15]

When a tooth is extracted, the socket frequently has dimensions that are much larger than the diameter of a normal implant. The study looked at the healing process

around implants that were implanted in placement sites with a large marginal defect. A total of 4 Labrador retrievers were employed. Four experimental sites on the right side of the jaw were prepared for titanium implants. The usual implant placement was done in a single location. A drill was employed to enlarge canal's periphery 5 mm in the remaining three places (test). A peripheral gap of 1 to 1.25 mm wider and 5 mm depth was present laterally to implant after it was placed in a test site. Two locations had a resorbable barrier membrane covering the bone and the implant, while the third site was kept exposed. Ground sectioning of the block biopsies of each implant was done four months after the implants were installed.

The big marginal defect has been occupied with freshly produced bone after four months of healing. At all test locations, the bone-to-implant contact degree between newly generated tissue and the SLA surface was high and comparable to that seen at control sites. Barrier membrane application after the implant was installed had no effect on the healing process. They concluded that a marginal defect larger than 1mm can be mended with newly formed bone and a higher degree of osseointegration to a SLA-surfaced implant.

Furhauser et al, 2005[(2)]

A study for analysis of soft tissue in periphery of single tooth implant prosthesis were assessed using PES. Twenty observers (5 oral surgeons, 5 orthodontists, 5 prosthodontists and 5 dental students) were given 30 single tooth implant crown photographs. The seven variables were evaluated i.e.soft-tissue level, color and texture, soft-tissue contour,distal papilla, mesial papilla, and alveolar

process deficiency. On first assessment, the mean PES was 9.46 (± 3.81 SD), and 9.24 (± 3.8 SD) of the second one. The difference between both were not statistically significant (p = 0.6379). Mean PES for single tooth implants varied from 2.28 to 13.8, with standard deviation between 0.46 and 3.51.

Vanderweijdan et al, 2009[16]

To analyse the degree of alteration in the width and height of the remaining ridge following teeth removal by reviewing the literature. Up to March 2009, the CENTRAL and MEDLINE-PubMed were searched. Appropriate papers were considered that gave data on dimensions alterations in alveolar breadth and height following tooth removal. The outcome variables were approximate mid-lingual variation, mid-crestal variation, mid-buccal variation, height variation, socket fill and alveolar width change. The mean values and SD, if available, was retrieved. We estimated weighted mean changes. Twelve studies satisfied the qualifying criteria after a review of the abstracts and titles of 1244 MEDLINE- 106 Cochrane papers and PubMed. The breadth of the alveolar ridges was reduced by 3.87 mm. The average clinical decrease of mid-labial height was 1.67 mm. On the radiographs, the mean height variation in crest was 1.53 mm. The average socket fill height, measured in relation to the original socket floor, was 2.57 mm. The mean weight variation based on analysis generated from the selected individual studies demonstrate that the clinical loss in height is lower than the loss in width , as measured in both radio graphical and clinical aspect, throughout the post-extraction healing period.

Hurzler et al, 2010[(10)]

The labial piece of the distal root was kept at approximate 1mm coronal to the labial bone in third and fourth mandibular premolars of one beagle dog where hemisection was done and the labial fragment of the distal root was preserved about 1mm coronal to the labial bone plate. A titanium implant was inserted after applying enamel matrix derivate, palatal to that root segment, either with or without contact with the labial root segment, with attached abutment for healing. Backscatter scanning electron microscopy and histological assessment were done four months following implant insertion. The tooth fragment was free of resorption process and osteointegration was seen in all four implants without any pathologic response. A periodontal ligament connected the tooth fragment to the buccal bone plate on the buccal side. Newly produced cementum could be seen on the palatal side of the fragment. Newly produced cementum was seen right on the surface of implant in the locations where the implant was implanted into the fragment. Retaining the labial bone plate by retaining the labial portion of the root along with implant insertion did not appear to impede osseointegration.

Cosyn et al, 2012[(17)]

Soft tissue recession after single implant therapy has been linked to a variety of variables. However, given the majority of these studies' cross-sectional design and basic relationships based on univariate analysis, these characteristics should be regarded risk predictors. The goal of this retrospective cohort research, which used multivariate analysis, in order to find recession predictors. Single implant was placed

in the front maxilla by two periodontists and two prosthodontists in 2006 and 2007 were again examined in 2009, and the records were analysed. The researchers looked at patients who had with and without ridge re-contouring flap surgery. Inter-proximal and midfacial recession were the outcome factors. Demographic details, a variety of local characteristics and surgical technique were radiographically examined which was acquired before to surgery or during permanent crown placement as explanatory variables (baseline). The data for 97/115 patients (37 men, 60 females) were available for analysis. Between baseline and re-examination, significant bone loss was seen at the surface of implant and at the surface of tooth. When correlated to without ridge re-contouring surgeries, With ridge re-contouring surgery resulted in 0.2 mm more distal surface bony loss ($p = 0.034$). A discrepancy in probable papilla-opening methods might explain this (three versus one or two).

As a consequence, regression analysis revealed that ridge re-contouring surgery ($OR \geq 3.4$) is evaluation of inter-proximal recession. Inter-proximal recession was also predicted by tooth surface pre-operative bone level ($OR \geq 2.1$). The gap between the contact point and bone peak ($OR = 2.9$), the implant-to-tooth distance ($OR = 0.3$) and a missing contact point ($OR = 221.9$) all influenced distal papilla retraction. Midfacial recession was linked only to buccal shoulder location ($OR = 17.2$). Clinicians should restrict papilla-opening operations and focus on implant and contact point location to improve soft tissue levels surrounding single implants.

Brugnami and Caiazzo, 2013[18]

On recommendation, excision of a left central incisor with root cracked for the 66-year-old male patient was done. The treatment approach includes immediate provisionalization and reconstruction with an implant-supported restoration with immediate insertion following extraction. The patient had no relevant medical background, and he had adequate dental hygiene. After extraction, the ridge's look and outlines were effectively preserved. A prominence on the buccal aspect of the postextraction region was obtained, providing the appearance of root prominence and creating the foundation for a satisfactory cosmetic and functional rehabilitation of the lost tooth with an implant-supported prosthesis. The buccal bone preservation method depicted in this study may maintain or improve the esthetics and convexity of the buccal plate following tooth extraction, paving the way for a good aesthetic and functional efficiency of the missing tooth by an implant-supported prosthesis. When implant insertion and loading are recommended soon after tooth extraction, the surgery can also improve the soft tissue look. Although the results of using this method was positive, more research was needed to conclude its efficacy, deep understanding of the biology, and identify factors that may affect it, such as the thickness of the labial bone postextraction, absence or presence of adjacent tooth, type of graft, used with or without membrane, and the implant's position.

Glocker et al, 2014[19]

A minimally invasive and cost-effective approach for preventing alveolar ridge resorption is ideal. Various GBR procedures had been developed to keep the bone's natural dimensions following extraction. All of these processes are costly and technique-dependent. **B**uccal root segment (socket shield) is left in situ, the reported cost-effective yet technique-sensitive socket shield approach prevents bundle bone resorption. This procedure has also been discussed in the context of quick implant implantation. Three examples in which a different technique was used as part of a delayed implant placement are described in this case report.

After six months, the latter was done, and the new bone development around the alveolar socket was clinically examined as biological principle upon re-entry. With this approach, it was proved that the bone was clinically maintained. The possibilities and constraints are examined, as well as future research areas.

Baumer et al, 2015[11]

The socket shield technique had demonstrated ability to preserve peripheral tissues. Anterior teeth, on the other hand, were frequently extracted due to vertical buccolingual fractures. The SST was not been tested to see if it worked only on intact roots or if it can also be utilised with a different design that indicates fracture lines. The aim of this research was to see how splitting the remaining labial root into 2 pieces affected histology, clinical outcomes, and volumetric results before implant

insertion. So that a labial piece of tooth structure retained, the material was placed into the distal root. This segment was then divided vertically into two parts and implants were put lingually. The specimens were processed for analysis after 4 months postoperative. The same technique was used in a clinical situation, with volumetric examination via digital superimposition.

On the labial side, the root segments showed healthy periodontal ligament. In-between the implant and root segment, also inside the vertical drill, new bone was apparent. The coronal section of the buccal plate did not show any osteoclastic remodelling. In the labial direction, the clinical volumetric analysis revealed 0.88 mm as a mean loss, with a minimum of 0.15 mm and a high of 1.67 mm. This modification does not appear to interrupt implant osseointegration and also allow the buccal plate to be preserved. It can be a viable therapeutic technique for teeth that are vertically cracked.

Khzam et al, 2015[(20)]

A total of 19 trials were considered, all of which used single implants that were put into newly maxillary extracted alveolar sockets and tentatively sorted in the esthetic zone. After a year of follow-up, many studies reported a gingival recession with mean 0.27 mm and loss of height of papilla with mean of 0.23 mm. In 11% of instances, advanced buccal recession (more than 1 mm) was seen. The interdental papillae demonstrated a propensity to recover over time in follow-up studies (> 2 years). Satisfaction of patient with the outcomes of IPR therapy was excellent in the

few trials that analyzed on patient-centered outcome analyses. The IPR technique produced generally satisfactory soft tissue and cosmetic results, with sub-optimal outcomes resulted low-risk patients of approximately 11%. The use of a connective tissue graft or flap, as well as pre-operative tissue biotype, had no effect on soft tissue and aesthetic results. To uncover characteristics that may impact the aesthetic results associated with the IPR procedure, long-term prospective controlled clinical studies are required.

Gluckman et al, 2016[(12)]

A classification of partial extraction therapies was clinician friendly in order to choose the particular therapy based on the clinical situations. This article had the first collaborative term and classified these methods. The root submergence therapy for clinical situations such as healthy amputed pulp or endodontic treatment completed, intentions to retain the alveolar ridge, SST was used for root with or without apical and/or periapical pathology, to retain the segment of the root piece in order to prevent collapse of buccal aspect of the alveolar ridge. Pontic shield is indicated in clinical situations like planned pontic site beneath fixed prosthesis. Proximal socket shield for planned pontic site as asubstitute to two neighboring implants and in relation with other partial extraction therapies.

Gharpure and Bhatavadekar, 2017[21]

The socket-shield approach, which has lately gained popularity, includes retaining a piece of the residual root after rapid implant implantation to prevent resorption of the buccal or proximal bone. This systematic review had a goal to examine the present research on SST, weigh its biological validity, and estimate its clinical long-term prognosis. Up to April 2017, a systematic search for clinical/animal research was conducted in PubMed-Medline, Cochrane Central, Google Scholar, Web of Knowledge, and Embase. A total of 23 studies were evaluated, including one clinical case-control study, four histology reports, one clinical abstract, and 17+2* case reports.

The length of 18 of 23 investigations was shorter than or equal to 12 months. Using the modified ARRIVE standards, a quality review of five research (one clinical case-control and four animal histologic) found that 4/5 studies received poor ratings. In four animal histology examinations, 58/70 (82.86 percent) implants developed problems, the most prevalent of which were loss of buccal crest bone (54.55 percent) and osseointegration failure (27.27 percent). From 19+2* clinical investigations, 33/136 (24.26 percent) implants had problems, with loss of buccal crest bone (78.78 percent) and shield failure or exposure (12.12 percent) being more prevalent. Cementum and PDL development on peri-implantitis, mucositis, inflammation, pocket formation and implant surfaces were among the other problems noted. However, several clinical data showed that after a year, the effects remained constant. Until highly reliable evidence are concluded, it will be impossible to predict the viability of the strategy.

Chappuis et al, 2017[22]

The cosmetic success of implant-supported rehabilitation is significantly influenced by dimensional soft and hard tissue changes of the front maxilla followed by tooth extraction. Significant bone modelling occurs within the first two weeks of recovery, according to research. The middle aspect of the facial bone is mostly modelled at single extraction sites, although the proximal portions are preserved by the pdl of neighboring teeth.

The amount of bone remodeling in flapless was determined by the width of the labial bone wall. Thicker bony plate (> 1 mm) exhibit very restricted resorption pattern, whereas thinner bone plate (< 1 mm) displayed a highly resorbed bone with considerable loss of vertical alveolar socket bone. When it comes to quantitative soft tissue changes, the thickness of buccal soft tissue does not always correspond to the measurements of the underlying bone wall. Extraction causes spontaneous soft tissue thickening by a factor of seven in thin bone wall phenotypes, but no significant alterations in thicker bone wall. Finally, in thinner bone wall, soft tissue thickening may obscure the real size of the underlying lesion, leading to clinician misinterpretation during the clinical evaluation. After tooth extraction, neither ridge preservation procedures nor quick implant insertion inhibit physiological bone modelling activity. As a result, tooth extraction should be done with the expectation of ridge decrease, and additional clinical procedures should be explored to correct for such alterations when replacing the excised tooth with an implant-supported repair.

Baumer et al, 2017[23]

A retrospective case series with clinical, radiographic and volumetric data of 5 years of 10 patients of SST for immediate implant placement between maxillary first premolars. Patients were followed up for mean 58 months. Healing took place without any complications and No deleterious events resulted during the follow-up visits. Physiological probing depth and no case of peri-implant mucositis were registered. 3-5 mm of keratinized mucosal width of buccal aspect was present. Mean loss of orofacial direction of buccal tissue was found to be -0.37 ± 0.18 mm.

The mid-facial recession was -0.33 ± 0.23 mm and at the neighboring teeth 0.38 ± 0.27 mm. At the mesial aspect of implant, the average mid-facial recession was 0.33 ± 0.43 and 0.17 ± 0.23 mm recession was found at the distal aspect of it. All the cases showed positive results during evaluation with PES with mean score of 12.

Pour et al, 2017[24]

A case report of 38 years old patient with failed endodontic treatment canine showed external resorption which laid down the chances of tooth preservation in the socket. A CAD-CAM surgical guide was manufactured through which a diagnostic implantation took place over a study cast and custum healing abutment and interim prosthesis was formed. Socket shielding was performed followed by immediate implant placement using surgical guide, the primary stability was achieved followed by placement of healing abutment and custom interim prosthesis.

The author did not require any augmentation procedure or reconstruction surgical treatment. The final prosthesis were placed three months post-implant placement. It resulted in good functional and esthetic outcomes.

Gluckman et al, 2018[25]

The goal of these cases was to evaluate the survival of implant in a larger cohort of patients at follow-up of mid-term utilising this approach. Patients who got SST in combination with immediate implant insertion were found in a private practise patient database. One hundred and eighty-eight of the findings matched the inclusion criterion of being twelve months from the failing or restoration date before final rehabilitation. Up to 4 years after treatment, these patients were returned for an examination of the repaired implants. Fifty-eight instantaneous SST were implanted in male patients and seventy in female patients, having age range from 24 - 71. (Mean 39 yrs). The incisors of maxilla (64%) were most commonly treated, followed by premolars (22%), canines (14%), and the maxilla (89.9%). (10.1 percent). Following restoration, 123 out of 128 implants had osseointegrated and lasted for 1 to 4 years (rate of survival 96.1 percent). 25 out of 128 implants had a cumulative complication rate of 25%. (19.5 percent). Five implants were removed because they failed to osseointegrate. The remaining 20 problems were all treated or monitored without treatment, and the implants were found to be functional at the mid-term follow-up. Despite method sensitivity and the necessity for RCTs, these cases revealed that the SST outperforms survival of implant rates in both traditional delayed and immediate implant insertion.

Esteve Pardo and Esteve-Colomina, 2018[26]

An old man of 76-years who visited the office in 2014 to discuss treatment options for his damaged central incisors. There was no information concerning his medical condition that was deemed to be relevant. The therapy was carried out in a step-by-step manner. To summarise, we used the SST to remove the lateral incisors and inserted two instantaneous implants. The four remaining teeth were then prepped to serve as abutments for a temporary bridge to maintain the patient's aesthetics and function during the early stages of osseointegration. There is presently insufficient clinical data to advocate the SST as a routine choice. The SST appears to have the potential to reduce buccal tissue resorption after tooth extraction provided the required clinical parameters are satisfied and the operator's technical management is suitable. In some circumstances, rapid implant implantation with the SST appeared to be a valuable aspect for tooth rehabilitation, particularly in cosmetic region.

Han et al, 2018[27]

Patients referred for management with dental implants were involved in the inclusion criteria of this research throughout a two-year period. To avoid buccal resorption, the particular section of the root was kept; the shield was 1.5 mm thick, with the coronal portion of the shield at the bony crest. Patients were then implanted right away. No graft material was used in the patient who had a jumping gap between the shield and the implant. All implants were repaired with single crowns right away

and were monitored for a year. Complications, stability, and Implant survival were the key outcomes. Thirty patients (15 females, 15 males; mean age 48.2) were included in the trial and given 40 implants right away. Implants were functional after one year, resulting in a 100% survival rate; good stability of implant was found. There were no known biological issues, and complications of prosthetic was minimal (2.5 percent). Because the root segment had no interference with osseointegration and can be favorable for aesthetics, shielding the labial bone resorption, the "modified" SST appears to be a reliable operation which was paired along implant insertion.

Chen et al, 2018[(28)]

The cosmetic result of a single implant prosthesis is determined by teeth of the anterior region of maxilla. The WES/PES index was indicated to investigate the esthetics of teeth in the maxillary anterior region. In addition, intrinsic weak regions in high-risk prosthetic factors and natural teeth were taken into account. Photographic analysis was used to conduct this cross-sectional investigation. The study involved 306 teeth and 102 participants.

The WES and PES had grand means of 8.75 and 12.92, respectively. Soft tissue shape, tissue margin and crown outline/volume had much lower scores than the other factors. The PES and WES both exhibited a declining tendency as people became older. The majority of the females PES/WES scores were higher than the males. In the WES and PES assessments, the average level of natural teeth was about 9 & 13, respectively. The soft tissue boundary, tissue shape, & crown outline/volume were all high-risk factors for implant reconstructive aesthetic results. The aesthetics of natural teeth changed as a result of underlying variables such as age and gender.

Kumar et al, 2018[13]

Post-extraction buccal bone loss results in vertical and horizontal bone loss. In such circumstances, significant hard and soft tissue repair is required to create aesthetically attractive outcomes. The root is bisected in the socketshield method (SST), and the buccal two-thirds of the root is maintained in the socket, preserving the periodontium, bundle bone, and buccal bone. Based on the location of the shield in the socket, a categorization of SST techniques is provided. This classification is necessary in order to better understand the preparatory design and the role of the shield, as well as to maximise the shield's use in order to obtain the best potential aesthetics in rapid implant insertion sites. The SST is becoming increasingly popular among therapists throughout the world. In circumstances of quick implant placement after extraction, the approach had a lot of promise to preserve the soft and hard tissues. The suggested categorization would allow physicians to design the shield based on the clinical circumstance and obtain the greatest possible aesthetics, especially in cases when the implant is being placed right away.

Bramanti et al, 2018[29]

The objective of this RCT was to compare and evaluate two post-extraction implant techniques with immediate temporization: the conventional method and the SST, in order to assess the aesthetic, marginal bone level, and survival rate results of implants placement in aesthetic zone at three years' follow-up. The avulsion of a

dental element has been linked to vertical and horizontal changes in both hard and soft tissues at the post-extractive site, according to several clinical studies. The "SST" has been done to improve the aesthetic outcomes. The vestibular root section is preserved, and the dental implant is inserted immediately in closer to the root. Patients in the research were randomly assigned to undergo a post-extraction aesthetic zone implant using either the socket shied approach or the traditional insertion technique. The outcomes assessed were survival rate, marginal bone level, and the pink aesthetic score of dental implants. At three years, both groups had a 100% implant survival rate. Implants placed using the SST had higher marginal bone levels and a higher PES ($P < 0.05$).

Although future research was needed to validate these preliminary findings, the socket shield approach appeared to be efficient and safe surgical procedure that enabled for rehabilitation using implant with superior cosmetic outcomes.

Schwimer et al, 2018[30]

The SST was initially reported in 2010 as a way to avoid tissue modification during extraction. Prevention or regeneration of postextraction ridge alterations in the posterior area remains a problem. Wherever feasible, the socket shield seeks to counterbalance these ridge alterations, conserving the patient's remaining tissues at the time of immediate implantation. The molar socket-shield is described in detail in this technique report. In recent years, the SST has attracted a lot of attention as a partial extraction procedure for preserving buccofacial tooth anatomy and maintaining

the ridge at anterior implant sites. The relevance of ridge collapse in posterior places, on the other hand, is frequently underestimated. Socket-shields may assist preserve the alveolar ridge at immediate molar implant insertion locations, according to the approach described in this research. Additional reports are urgently encouraged by the authors in order to better understand the technique.

Schwimer et al, 2019[31]

The socket-shield approach, first reported seven years ago, has increased in popularity as a reliable means of ridge preservation during rapid implant implantation. Large clinical cohorts with up to four years of follow-up have been reported to date. In addition, the animal model revealed indications of histology of tissue at the shield and implant. However, human histologic data is still lacking, thus the clinician's concerns about the tissues that can grow between the shield and implant can go unaddressed for the time being. The histologic evidence of 1st human that bone can completely fill the area between an implant osseointegrated surface and root dentin was shown in this case report. The area between a shield and implant and can be occupied by bone, which is the consequence of an implant osseointegration.

Toit et al, 2018[32]

The shields were preserved at a thickness of 1.5 mm, according to the authors. The tiniest nuances, like with any medical treatment at the micro and millimetre level, necessitate accuracy. It's possible that reporting that all socket-shields were created

with a thickness of 1.5 mm is erroneous. We've found that preparation varies a lot, and that perfection isn't always possible. The root canal/pulp chamber was established as a reference point in our own technical preparation standards issued in May 2017, and the shield was reduced to nearly half the thickness of the face root section from this point. Overreduction of 1.5 mm may result in flexure and fracture of the socket-shield, both of which are undesirable qualities in our experience.

Gluckman et al, 2019[33]

Author described the SST for single root with some amount of modifications. After cutting the coronal aspect socket shielding was done. Internal beveled chamfer was cut inorder to make the required prosthetic space for an S-shaped prosthesis with natural emergence profile. It was advised to skip the grafting procedures, if the space between the shield and implant is small. Author concluded it by adding that a known complication of socket shield, internal exposure of shield can be corrected by decreasing the coronal portion of it.

Sun et al, 2019[34]

The goal of this research was to correlate the aesthetic and clinical effects of implant placed immediately utilizing the traditional flapless procedure with the SST.Thirty patients who had their front teeth re-placed and met the pre-defined criteria were included in this study. The SST (n = 15) and traditional flapless (n = 15, control grp) groups were assigned at random. The degree of pink aesthetic ratings and soft-tissue recession were used to measure the aesthetic outcomes (PESs). The implant

stability quotient (ISQ), probing depth (PD), modified plaque index and modified sulcus bleeding index (mSBI) were all evaluated clinically. The height (BPH) and width (BPW) of the buccal plate were also measured. All of the participants in both groups had a clinically effective implant. When the control group was compared, the SST had decrease in the borders of mucosa and distal and mesial papillae height, as well as greater BPW and BPH values (p.001).

The ISQ values for the SST group were 76.01 ± 1.31 and 75.56 ± 1.07 (p >.05), indicating that both groups had appropriate initial stability. When the control group was compared, SST patients exhibited statistical significance reduced PD, mSBI, and mPLI levels at the 24-month follow-up. For both the groups, there were no significance variations in total and individual PES values. By preserving peri-implant tissues and alveolar bone volume, SST may improve functional and cosmetic results. SST seemed to be a reliable therapeutic option for aesthetic zone.

Tiwari et al, 2019[(35)]

In the aesthetic region, evaluate the effectiveness of implant placed immediately following extraction without SST vs SST. Sixteen patients with poor prognosis of anterior teeth of maxilla and < 2 mm thickness of labial bone on preoperative CBCT were recruited for the study and random allocation of 1 of 2 groups: SST patients or immediate implant implantation without SST patients. At specific followup periods to a period of 12 months following the treatment, the labial bone thickness was assessed using a CBCT scan throughout its whole length. After a year of follow-up, Group B showed a statistical significant decline in the thickness of

the labial bone at the crestal level after the 8th and 12th months after implantation. The 2 approaches need to be compared further, but our findings show that the socket-shield technique preserves bone better, obviating the need for any bony replacements.

Chen, 2019[(36)]

A 23-year-old woman arrived with upper left first premolar having poor prognosis due to extensive caries and a non-contributory medical history. After the impression the preliminary cast was made and a diagnostic wax-up was done. Post scanning the study cast was converted to STL data (Standard Tessellation Language). Significant was been offered by dynamic navigation system (DNS) when compared to static surgical stents. The DNS can be employed in locations of restricted vertical space, like 2nd molar, or in patients who have restricted mouth openings.

The dynamic approach permits direct sight of the surgical zone and static surgical guides prevents observation of the operative zone. The implant and drill motions may be watched in real time, and the procedures precision can be checked at any moment. Static surgical guides' guide cylinders have specific diameters and may be too broad for locations with limited mesio-distal space. Because frictions between guide cylinders of static surgical guides and implant drills interfere with tactile 4 sense, judging density of bone while the process of drilling is difficult. During preparations of osteotomy, the DNS improves tactile sensation. Surgical plans can be changed during procedures thanks to the DNS. Surgery and CBCT scan may be performed on the same day thanks to the DNS. There is no need to wait for surgical guidelines to be made.

Calvo-guirado et al, 2019[37]

The aim of this study was to see how root piece position and length affected buccal bone breadth and socket preservation while using the SST. 48 dental implants were placed in six dogs. Teeth P2, P3, P4, and M1 had their clinical crowns removed horizontally from the roots.

Among the roots, the mesial was excised, and distal was deteriorated with a hand-piece and round bur, resulting in a concave shell of periodontal ligament (PDL), cementum and dentin attached to the buccal face of the alveolar socket.

The osseointegration of all 48 implants was satisfactory. The coronal root segment was linked to the labial bone by pdl on both labial and palatal sides, resulting in less crestal bone loss than the middle and entire root groups for implant placement. The findings show that a little radicular portion in the coronal section of the alveolar socket can preserve the distal, mesial and the buccal bone crest following the implantation immediately, within the constraints of this study. The combined thickness of the residual radicular segment and the peri-implant bone will be greater than 2 mm. The procedure appears to be very predictable, since it preserves bone volume while lowering the danger of crestal bone resorption.

Mourya et al, 2019[38]

The study had purpose to evaluate the efficacy of the SST for face gingival and osseous architecture stability. SST for the placement of implants articles were included. Non-English abstracts and articles were not accepted. The initial literature search yielded 113 papers that addressed the issues mentioned. One more study was discovered through a manual search of implant journals SST within the chosen papers were linked to cross referencing. Finally, the current systematic review includes 20 complete texts and an abstract from 1 article: Eleven case reports, six case series, one human RCT, two animal RCT and one technical report. Present changes to SST, as well as extensive follow-up studies with larger sample sizes, have yielded positive outcomes.

SST should not be indicated for normal clinical practice until a higher evidence is achieved, according to this systematic review. More RCTs on SST are needed to determine the technique's clinical effectiveness.

Nguyen et al, 2019[39]

The SST has demonstrated promising clinical outcomes in terms of preserving natural ridge shape, and hence might be utilized as a substitute for the traditional instantaneous implant insertion in the aesthetic zone. Three instances of the SST combined with rapid implant insertion in the front maxilla are presented by the authors. The hard and soft tissue surrounding implants were tracked for 2 to 6 years, and the progression of the hard and soft tissue around the implants was reported. With relatively less invasive surgical operations and shorter treatment times, the SST provides essentially no change in the soft and hard tissue dimensions.

The current clinical case series demonstrates that the SST induces essentially no change in hard and soft tissue dimensions while requiring relatively few invasive surgical operations and a shorter treatment period. The technical technique appears to produce outstanding cosmetic outcomes and steady short-term results, as it is modelled after rapid implant implantation. Long-term effectiveness of the SST, however, requires more proof.

Saravana et al, 2019[40]

Implant dentistry has evolved into a prosthetically driven technique with the goal of producing the best possible cosmetic result. Imitating teeth by harmonising the structural components surrounding the implant might be one of these features. To achieve the best result, the prosthetic and/or surgical aspects of the operation should be completed. Socket preservation procedures were introduced to minimize the resorption of soft and hard tissue that surrounds the new extracted socket—to form a original emergence profile of implant-supported prosthesis—but hard and soft tissue procedures are used in ridge deficiency cases. In this paper, we offer a case study employing the SST, a novel approach to preserving the socket ridge (partial root retention). There is presently insufficient clinical data to advocate the SST as a routine choice. The SST appears to have the potential to reduce buccal tissue resorption after tooth extraction provided the required clinical parameters are satisfied and the operator's technical management is suitable. The quick insertion of implants post-SST appears to be a beneficial technique for restoring the missing tooth in some circumstances, particularly in the cosmetic area.

Dayakar et al, 2019[41]

A case report of a 40 year old male patient with endodontic failed upper lateral incisor with healthy gingival tissue, SST was done by retaining buccal fragment of 2 mm as a shield followed by immediate placement and filled the jumping distance with bone graft. No complications were noticed post-operatively and uneventful healing took place. The temporization was done after 10 days and permanent restoration was placed after 3 months.

Zhang et al, 2020[42]

A case report of 45 years old women with a fracturedright maxillary central incisor which had post and core failure.Planned for SST with immediate implant placement. 2 different templates for guide were planned and made to prepare the root segment and placementof implant. After theintraoral scan of the dentition and CBCT, the first template was fabricated to form the root segment.

The rootsegment was reduced to 1 mm above the crest. The second surgical technique was useful for accurate implant placement. The emergence profile was preserved by the interim restoration and after 6 months a ceramic crown was delivered.

The author suggested a tapered implant as a better choice because minor bone perforation took place at implant apex while placement of the implant palatally. Author concluded that 2 surgical templates avoids or minimizes complications like improper socket shield preparation and implant placement.

Yanes et al, 2020[43]

An old man of 50-years had come with a bridge which was decemented ranging from 1.2 to 2.2, as well as insufficient ferrules and each root containing metal posts (1.1 and 2.2), both of which were cracked. Given the roots' poor health and prognosis, it was suggested that the region be rehabilitated with permanent prosthesis supported by two implants. To reduce resorption and remodeling of the bony crest in pontics and implants, the SST was used on central incisors and the pontic shield technique was used on lateral incisors. In 1.2 and 2.2, hemostatic collagen sponges were used, and immediate implant insertion was done in 1.1 and 2.1.

The conclusion made from this case report along its literature analysis is that PET, such as the pontic shield and the SST are methods that can be explored in oral restoration in some circumstances. This type of implementation is dependent on the surgeon's surgical skill, and its repeatability must be determined.

Zuhr et al, 2020[44]

An old patient of 60 yrs reported with a vertical fracture of the maxillary left central incisor that had been endodontically treated. A treatment plan was created to move forward with extraction using the socket shield approach for rapid implant insertion. This case study demonstrates that a long-term failure in socket shield technology is possible, but the consequences are tolerable. This is clearly a developing technique with a steep learning curve. In order to reduce the danger of probable failures, further research and clinical control studies are needed to continue using this

approach in implant therapy. The socket shield technique's effective use in today's implant therapy depends on the identification of possible risk factors and consequences.

Abd- Elrahman et al, 2020[(45)]

The RCT was to compare SST and conventional immediate implant placement with immediate temporization. 20 implants each was placed in both cases and all patients reported CBCT immediately and postoperatively 6 months to evaluate the dimensional variations of the labial bone. In study group, the bony loss horizontally was 0.11 to 0.55 mm. In control group, the horizontal bony loss was 0.25 to 1.51 mm.

The bone loss horizontally and vertically for study and control group was found to be statistically significant. The mean implant stability quotient (ISQs) for the SST group has raised from 68.6 ± 3.81 to 76.7 ± 3.49 where as in the control group it has raised from 66.4 ± 5.64 to 75 ± 4.4. Mean pink esthetic score for SST group raised from 11 to 12, which in control group it has declined from 13 to 9. Hence, SST was proved to be more reliable as compared to the conventional technique.

Blaschke and Schwass, 2020[(46)]

A literature review on SST with the aim to assemble and evaluate the knowledge in association to the SST as explained by Hurzeler et al, 2010. After screening the initial data base of 229 studies, 13 studies were further read and 12 studies met the exclusion and inclusion criteria and were involvedin the review. The SST offers great results, decreasing the use of invasive grafts surrounding implants at

the esthetic site, having very limited clinical data to support. The data available are qualitatively low due to lack of properly designed prospective RCT. The case reports was of very low scientific value. Retrospective studies are very few in number but are of incompatible design. At this stage, it is unclear whether the SST will provide a steady long-time results.

Dash et al, 2020[47]

The major concern of a substantially decaying right maxillary central incisor brought a 40-yr-old, nonsmoking, and healthy male patient. The insertion of dental implants in the esthetic zone of maxilla, as well as the rehabilitation process, is a complicated surgery in which any error can result in poor aesthetics and alter the patient's look. As a result, we have no margin for mistake. In this case report of rapid implant insertion using the SST, the thin buccal bone and postextraction tissue were successfully preserved while the implant was successfully restored. The socket shield approach has shown to be effective in preserving postextraction sockets and is useful in implant and cosmetic dentistry. There aren't enough long-term clinical trials on the socket shield approach to endorse it as a routine therapy strategy.

The systemic evaluations revealed 3–5 years of documentation, including case reports and case series. The doctor must analyse and select when and how to use this approach for implant placement based on their own knowledge.

Oliveira et al, 2021[48]

The goal of this study was to see if the SST might reduce alveolar ridge resorption without requiring rapid dental implant insertion. There were 27 subjects in this randomized controlled trial: The SST was used to partly remove 14 maxillary non-molar teeth (test group) and atraumatic extraction method was used to extract 13 maxillary non-molar teeth (control group). CBCT was recorded after surgery, immediately and 100 days later were used to assess changes in the thickness and height of the bony ridge. There was little resorption in the height of the palatal and labial plates, but there was no difference between the intergroup ($p \geq 0.10$). The labial-to-palatal crest dimension was substantially better preserved in SST group ($p \leq 0.05$). The width of the labial plate was considerably preserved ($p \leq 0.05$) in the control group, but vertical resorption in intragroup of the labial plate and decrease in the labial-to-palatal crestal dimensions were significantly larger.

In comparison to minimally traumatic extraction, the SST without rapid implant implantation revealed higher maintainance of the labial-to-palatal crestal distance and lesser maintainance of buccal wall thickness. It also maintained the baseline labial height better. The modified SST is a reliable method, however elements may skew the findings was to be looked at.

Bohorquez et al, 2021[49]

To correlate the SST and the usual procedure for instant implant insertion in the aesthetic zone in terms of marginal bone loss, failure rate, and pink aesthetic. A systematic review and meta-analysis of studies that scales the marginal bone loss, pink aesthetic, and failure rate with the SST for immediate placed implant at the aesthetic site was done, based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) recommendations. To conduct literature search, four databases were used: PubMed-MEDLINE, Scopus, Web of Science and Embase. Following the removal of same articles and following exclusion and inclusion criteria, sixteen studies were chosen for the quantitative and qualitative analysis. The meta-analysis included 4 randomised controlled studies, 5 prospective investigations, 4 retrospective studies and 3 case-series. The SST for immediate implant insertion had a failure rate of 1.37 percent; nevertheless, statistically no significance were detected when compared SST with usual technique.

Marginal bone loss for the SST had calculated mean difference of -0.5 mm and high significance ($p < 0.01$), with high heterogeneity. The Pink aesthetic was found to have mean score of 12.27. For immediate implant placement, the pink aesthetic difference between socket-shield ($n = 55$) and conventional ($n = 55$) procedures was 1.15. The PES for the socket shield approach, the follow-up duration had significance. No difference was found in failure rate when the conventional technique was compared with SST for immediate implant insertion at the aesthetic site, within the limits of this systematic study and meta-analysis. The socket-shield technique, on the other hand, was reported to have higher pink aesthetic scores and lesser marginal bone loss than the standard procedure.

Tribest et al, 2021[50]

The stress, displacement, and microstrain distribution in the bone were examined according to the surgical approach (traditional or SST) and assessment time (After the implant placed immediately or after healing). With a cemented prosthesis and a morse-taper implant, Modelling for each stage of finite element analysis was done, comprising 4 groups. During the immediate stage, the maximum dis- placement, bone microstrain and von Mises stress all gave higher values, with no difference between conventional and SST. The employment of the SST has no detrimental influence on the bio-mechanical behaviour of an implant-supported restoration right after the healing of implant.

Atieh et al, 2021[51]

AnSRMA on SST for immediate implant placement. The review included randomized controlled trials (RCTs) that compared SST with IIP with conventional IIP. Out 982 studies identified, 7 RCTs were included with 206 immediate implant placement in 191 patients. It resulted that the SST showed greater esthetic results as compared to the immediate implant without SST. Meta-analysis showed statistically significant differences in the changes in labial bone width and height with SST.

Atef et al, 2021[52]

A RCT with the objective to compare clinically and radiographically the dimensions of the hard and soft tissue around immediate implant in the anterior site with SST versus xenograft. 42 patients were indicated for extraction of single rooted tooth in anterior region and followed by immediate implant placement with SST (test group) or xenograft placement (control group). The outcomes of the study reflected that the horizontal and vertical labialbone resorption was comparatively and statistically less significant i.e 0.29 (± 0.34) mm and 0.35 (± 0.62) mm in the test group compared to 1.45 (± 0.72) mm and 1.71 (± 1.02) mm and in control group respectively.

The midfacial mucosal recession in the control group was found to be comparatively greater of 0.466 (± 0.58) mm and 0.45 (± 0.75) mm in SST.PES and patient satisfaction in both groups were not statistically different. It was concluded that the SST was reliable in maintaining the peri-implant hard and soft tissue followed by immediate implant placement.

Saez-Alcaide et al, 2021[53]

A systematic review on socket shield technique was done accordingly to PRISMA recommendation. The studies in which tooth extraction was indicated and was performed was replaced by immediate implants. The efficacy of SST with usual technique was compared with the main aim to analyze the medium- and long- term clinical results of SST.

After initial search, 823 articles were found and after eliminating same and discarding the studies due to many other reasons, 6 articles were selected for inclusion. The study reported lower rates of vertical and horizontal alveolar bone resorption, better preservation of the labial plate, better esthetic results andless marginal bone loss than conventional IIP. They also found lacking homogeneity on analyzing methods with different results, procedures for surgeries, and prosthetic rehabilitation.

MATERIALSAND METHOD

Patients who arrived to the Department of Oral and Maxillofacial Surgery with maxillary teeth having poor prognosis in the aesthetic zone were randomly selected for the study. Patients ranged in age from 18 to 50 years old. The width of the labial cortical plate was measured using CBCT imaging. Our study comprised patients who had an intact labial cortical plate with a thickness of < 2 mm on CBCT. A total of 36 patients were chosen based on these criteria. Randomization was done to assign the patients into one of the two groups: Group A received immediate implant and temporization with socket shield, and Group B received immediate implant and temporization without socket shield. The "Institutional Ethical Committee,"(IEC/VSPMDCRC/16/2019) approval was received and the study was carried out.

INCLUSIONCRITERIA

1. Patients between the ages of 18 and 50 years were chosen from both genders.
2. Patients who had their anterior teeth extracted while the labial cortical plate was still intact and the width on CBCT was less than 2 mm.
3. Patients who accepted to take part in the research.

EXCLUSIONCRITERIA

1. Patients who are medically ill.
2. CBCT showing a perforated labial cortical plate.
3. Pregnant women and mothers who are nursing.
4. Patients who have had chemo-radiation therapy or have had chemoradiation in the previous 2 years.
5. Patients who have a history of psychiatric illness or who are allergic to the anaesthesiaor drugs.
6. Patients refused to take part in the trial or return for follow-up.

PRESURGICALTHERAPY

All the selected patients were subjected to presurgical hygiene therapy andreceived thorough scaling and root planning session, oral hygiene instructions, and anyocclusal adjustment and impressions prior to surgery. After the initial therapy the patientswere re-evaluated to assess the plaque control and overall oral hygiene.

Recording ofclinical data of such as pink esthetic score index was carried out by the same examiner in all the patient.Theseparameterswereevaluatedat baseline,3and6monthspost-therapy.

RANDOMIZATION AND ALLOTMENT

Thirty-six individuals were enlisted and examined for implant placement indications. The study population (n = 36) consisted of fifty sites that were delineated within the aesthetic zones of the chosen patients. Using lottery method for randomization, the allotted sites were separated into 2 groupsequally (study and control groups). The patients were informed about the study's aim, nature, and precise surgical process, as well as any potential consequences, and their written consents were explicitly stated and signed. All patients had CBCT scansimmediately after surgery, 6 months after surgery, and 12 months after surgery to measure labial bone thickness and height.

SURGICALARMAMENTARIUM

Instruments were arranged in a definite order on a sterilized drape placed on asurgicaltrolley.Allthe equipment's were autoclaved.

Thesurgicalarmamentariumconsistedof –

- Mouthmirrors.
- UNC-15periodontalprobe(Hu-Friedy, USA).
- Straightprobe.
- Explorernumber23 andnumber17.

- Tweezer.
- Disposablegloves.
- Disposablefacemasks.
- Disposablesyringe–5ml and2ml.
- Disposabletest tubes10ml
- Localanaesthetic(2%Lignocainewithadrenaline1:200000).
- Bardparkerhandles.
- No.11,12,and15blades.
- Periostealelevator(24GHu-Friedy,USA).
- Periotomes
- Maxillary anterior or premolar extraction forceps
- Tissueforceps.
- Bioline implants
- Bioline Implant kit
- Physiodyspensor kit
- Needleholder.
- Mersilksuturematerial.
- Cottonswabs.
- Kidneytraywithsalineandirrigationsyringe.
- Normalsaline.
- Denaturedspirit.
- Povidone- Iodinemouthwash.

SURGICALPROCEDURE

The gingival edge was meticulously reflected in Study Group A, and minor periosteal scoring was used to produce a tiny flap. The gingiva was stripped as little as possible to keep the bundle bone's blood supply intact. The crown portion was gently dislodged and removed with forceps after the tooth was broken horizontally 1mm supra-gingivally. Using Mani Carbide bur M15ZB (199/15) long tapered tungsten, the tooth was sectioned vertically.(Figure 3 & 4.) To sever the periodontal ligaments were severed due to the wedging of fine periotome between the palatal alveolar plate and palatal root section, and careful extraction of the separated palatal section was carried out and the patent labial segment was not disturbed.(Figure 5.) Elevators and forceps were used to carefully detach the palatal side of the root piece.(Figure 6.) The labial fragment was cut coronally almost to the level of the extractionsocket crest, then thinned carefully in an apical-coronal and mesiodistal direction using around diamond bur (Mani diamond bur- BR_40) that moulded the shield contour concave.(Figure 7.) To ensure the shield's immobility, gentle probing was performed. At 40 Ncm and 800–1000 RPM were used to prepare the osteotomy site palatal to the retained labial root fragment using osteotomy drills, leaving a gap of about 2mm. The Bioline® implant was then placed approximately 2 to 3 mm apical to the bone crest in this osteotomy site, engaged into the extraction socket's palatal and apical bone.(Figure 10.)

With the use of a pre-operative imprint that supported maximum soft tissue, the temporary prosthesis was constructed on the temporary abutment(Figure 11.) and instant temporization was performed.(Figure 12.) Immediate temporization was performed, followed by suturing of the mesial and distal aspects.

To maintain the surrounding bone, the Mucoperiosteal flap was raised and using periotomes and forceps was performed using atraumatic extraction in the Control Group B. Palatally, the osteotomy was created, and the implant was immediately implanted 2 mm palatally to the labial bone. The implant is positioned 2-3 mm apical to the crestal bone, engaged into thepalatal and apical bone of the socket. With the use of a pre-operative imprint that supported maximum soft tissue, the temporary prosthesis was constructed over the temporary abutment and instant temporization was performed. Immediate temporization was performed, followed by suturing of the mesial and distal aspects.

For both groups, all the temporaryprosthesis were trimmed out of occlusion with an appropriate clearance of 1 mm, and thefunctional overloads were advised to be avoided.

POST-SURGICALCARE

Postoperative treatments comprised an oral antibiotic [Amoxicillin + Clavulanic acid (Amoxyclav 625 mgtablet, Abbott, India)] and an oral analgesic [Aceclofenac (Zerodol100 mg, ipca, India)] in twice daily for 3 days.

For two weeks, the patients used advised oral hygiene measures and rinsed with mouthwash[Povidone – Iodine Germicide Gargle 2 percent w/v (Betadine, Win-Medicare, India)]. Patients were seen next day,then the first week, then the first month, then third month, then sixth months and 12 monthsafter surgery.

CLINICAL AND RADIOGRAPHIC EVALUATION

A) Clinical Evaluation:

PINK ESTHETIC SCORE (PES):

The soft tissue response for an esthetic evaluation is assessed by the Pink Esthetic Score (PES) according to seven variables scored from 2 to 0: (Figure 25,26,27 and 28)

i. The mesial papillae are assessed for a complete papilla (score 2), incomplete papilla, (score 1), or absence of a papilla (score 0).
ii. The distal papillae are assessed for a complete papilla (score 2), incomplete papilla, (score 1), or absence of a papilla (score 0).
iii. The Tissue contours is scored by the natural (score 2), virtually natural (score 1) or unnatural (score 0).
iv. The Gingival level is evaluated as < 1 mm (score 2), 1 – 2 mm (score 1), or > 2 mm (score 0).
v. The alveolar process is evaluated as no difference (score 2), slightly resorbed (score 1), or a clearly resorbed (score 0).
vi. The coloring is evaluated asno difference (score 2), slight difference (score 1), or clear difference (score 0).
vii. The texture is scored as no difference (score 2), slight difference (score 1), and clear difference (score 2).[(2)]

PINK ESTHETIC SCORE (PES):

	Pre op		Immediate		3 months		6 months		12 months	
	SST	Control	SST	Control	SST	Control	SST	Control	SST	Control
avg (range)										
Median										
Mean ± SD										
PES ≤ 10 (%)										
PES 11-12 (%)										
PES 13 - 14 (%)										
Statistical analysis by the independent sample t-test.										

B) RADIOGRAPHIC EVALUATION

CBCTANALYSIS

CBCTmeasurementsweretakenforeachGroupi.e.theGroupA (SST) andthe Group B (Conventional) at immediate, at 6 months and 12 months postoperative. The CBCT analysisincluded the measurement of horizontal bone loss, vertical bone loss width in sagittal view.

CBCTMEASUREMENTS

(1) At the alveolar crest – 0 mm.

(2) Apical to the alveolar crest – 5 mm.

(3) Apical to the alveolar crest – 10 mm.

CBCT scans advisedimmediately and again 6 months and 12 months post-surgery assisted in the evaluation of vertical and horizontal bone loss, which was the study's primary endpoint.

The measurement of the bone dimensional changes were plotted on the sagittal views as follows:

A) For measuring the dimensions of horizontal bone:

A line is drawn parallel to the long axis ofimplant and an additional reference line perpendicular to it so the width of the labial bone is measured at the interval of 0 mm, 5 mm and 10 mm apical to the crest by drawing lines parallel to reference line. (Figure. 13 – 18)

B) For measuring the dimensions of vertical bone:

A line is drawn parallel to the implant shoulder and an additional reference line perpendicular to it so the height of the labial bone is measured at the level of the crest by drawing line parallel to reference line. (Figure. 19 – 24)

The horizontal bone loss was measured by the difference in horizontal bone levels immediately,6 months and 12 monthspostoperative. To calculate vertical bone loss, the same methodology was used again.(Color plate II, III, IV& V.)

The cases were clinicallyrecorded preoperatively, immediately, 3rd, 6th, and 12th months postoperatively in addition to the normal follow-up appointments.(Color plate VI& VII) At the end of the forth month, the final prosthesis was placed.

The CS 9300 Select Dental CBCT machine for 2D and 3D diagnostic imaging with high resolution (200 µm voxel),tube voltage 84 kV, current 8 mA, standard exposure time (14 s) andfrequency 140 kHz was used to assess buccal cortical thickness at the above mentioned levels. The data was collected as a volume and reconstructed in multiple planes. 1-mm cross sections of the labial cortical thickness were employed to analyze the maxillary anterior area in a rebuilt quadrant anterior maxillary scan. The thickness of the labial cortical plate was measured in the labio-palatal direction with a distance measuring equipment.

In the evaluation and assessment of alveolar bone loss, CBCT has a sensitivity of 80–100%, whereas traditional radiography techniques have a sensitivity of 63–67%. CBCT (3D) is more sensitive than conventional X-ray (2D) for finding dental structures and identifying locations of early resorption, according to Alqerban et al[54].

COLORPLATE I

Figure 1: Front profile of maxillary anterior teeth

Figure 2. Maxillary Occlusal view

Figure 3. Vertical sectional of the tooth

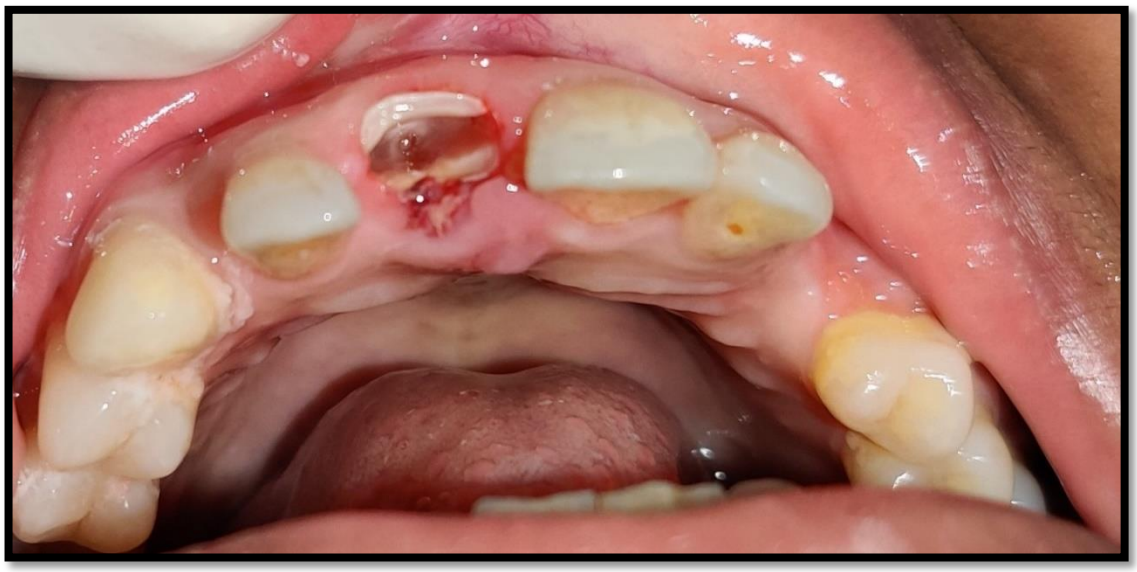

Figure 4. Vertical sectioning done

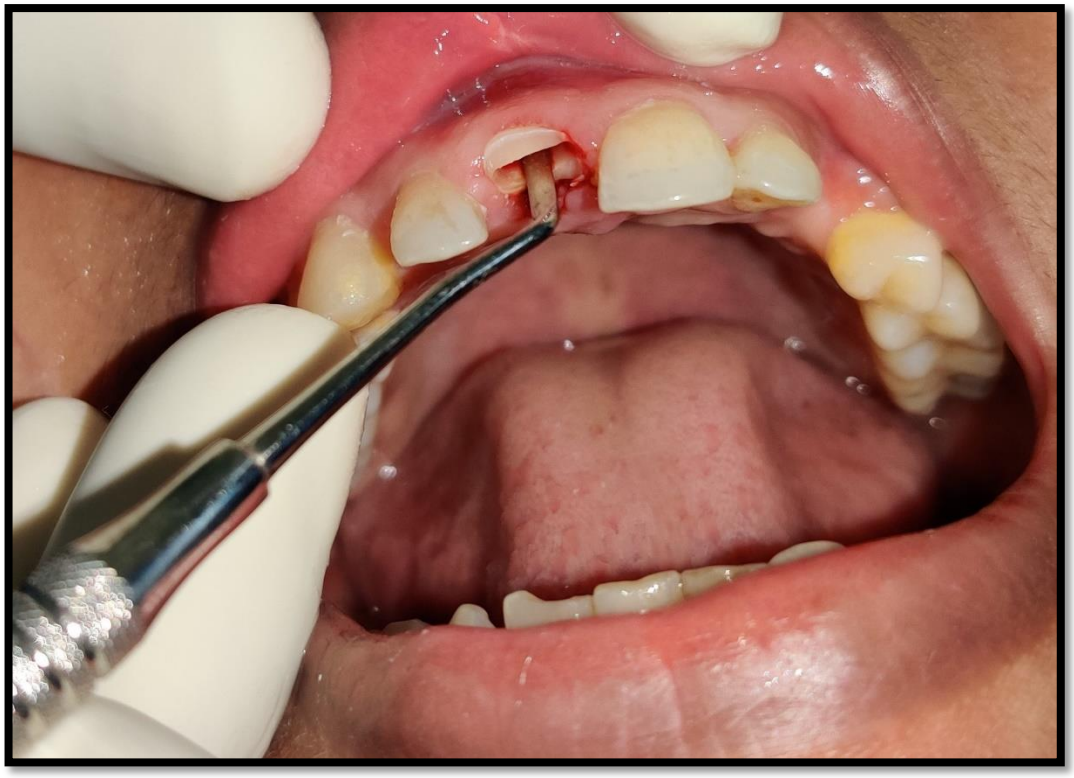

Figure 5. Periosteal wedging

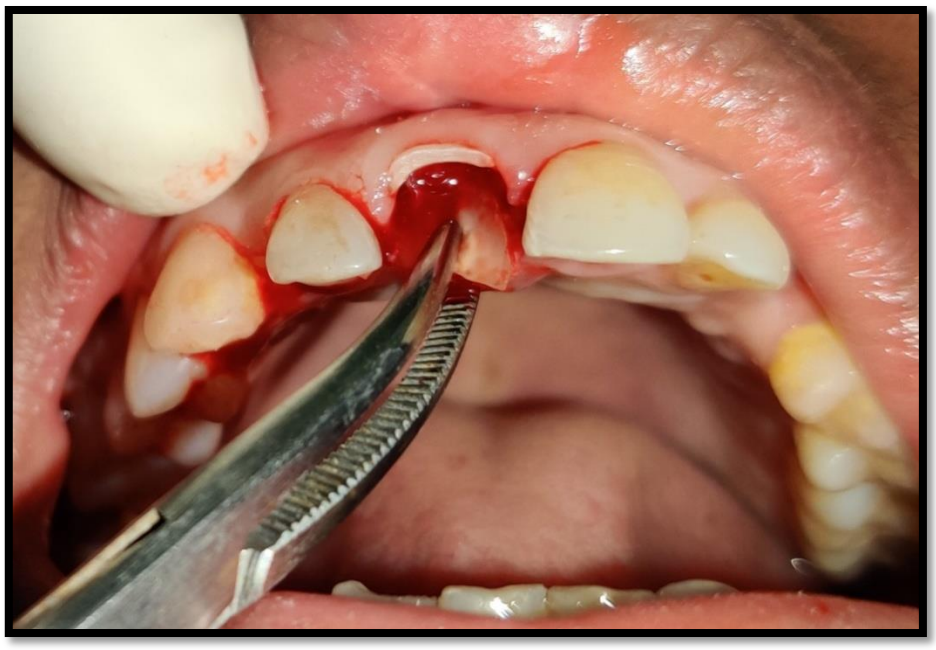

Figure 6. Extraction of palatal root fragment.

Figure 7. Coronal view of socket-shield post-extraction

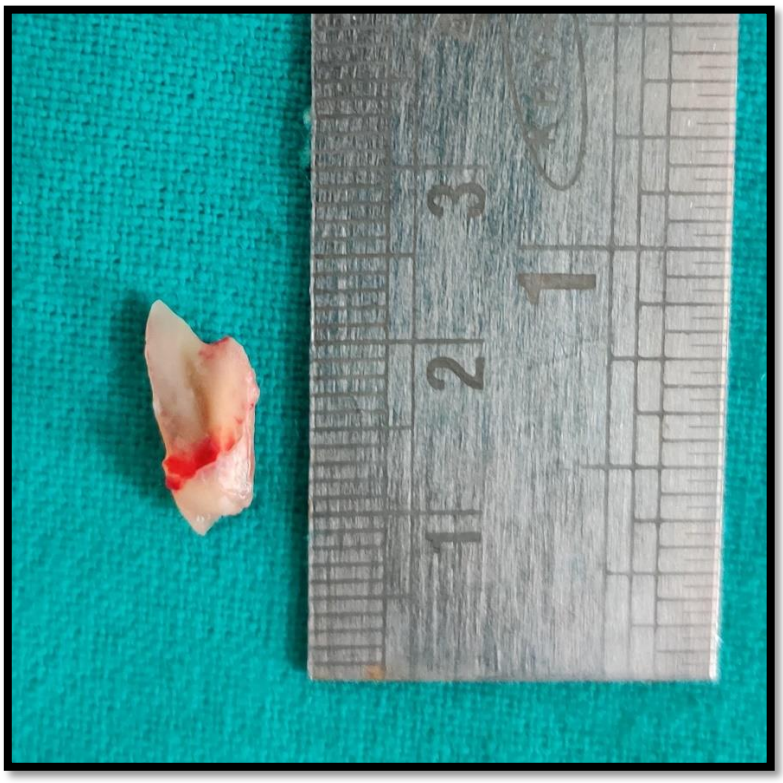

Figure 8. Labial view of the extracted palatal rootfragment.

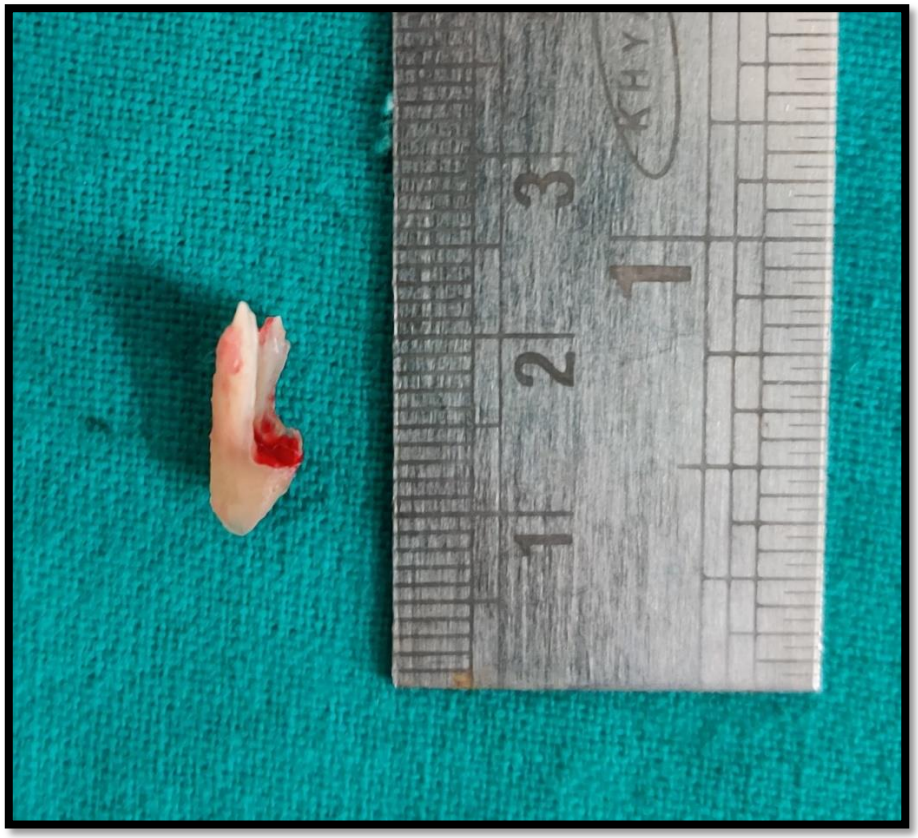

Figure 9: Mesio-distal view of extracted palatal root fragment

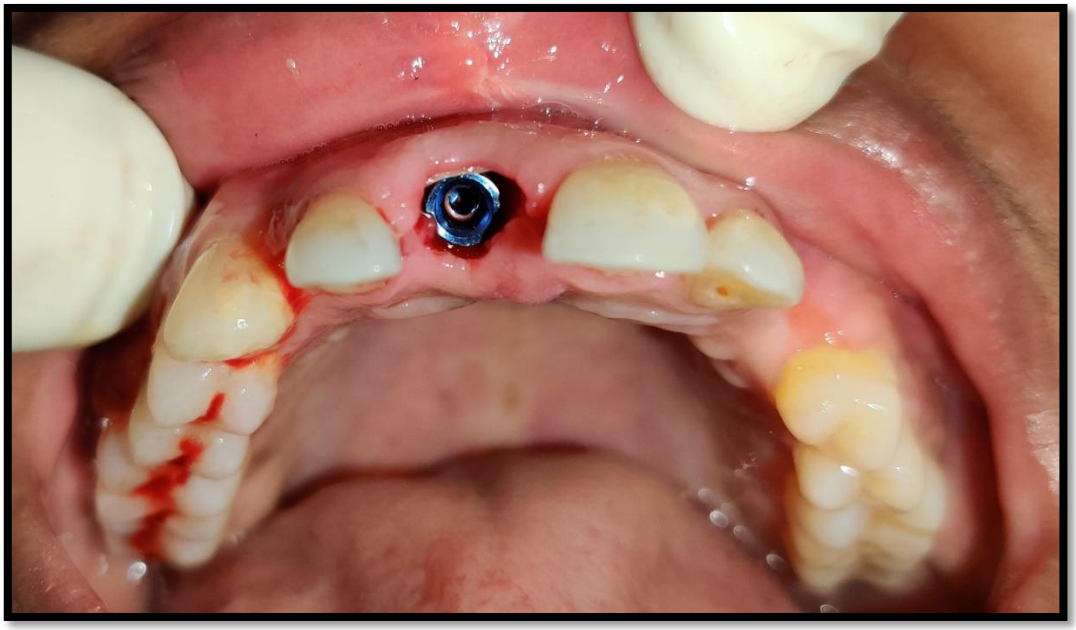

Figure 10. Implant placed after osteotomy drills.

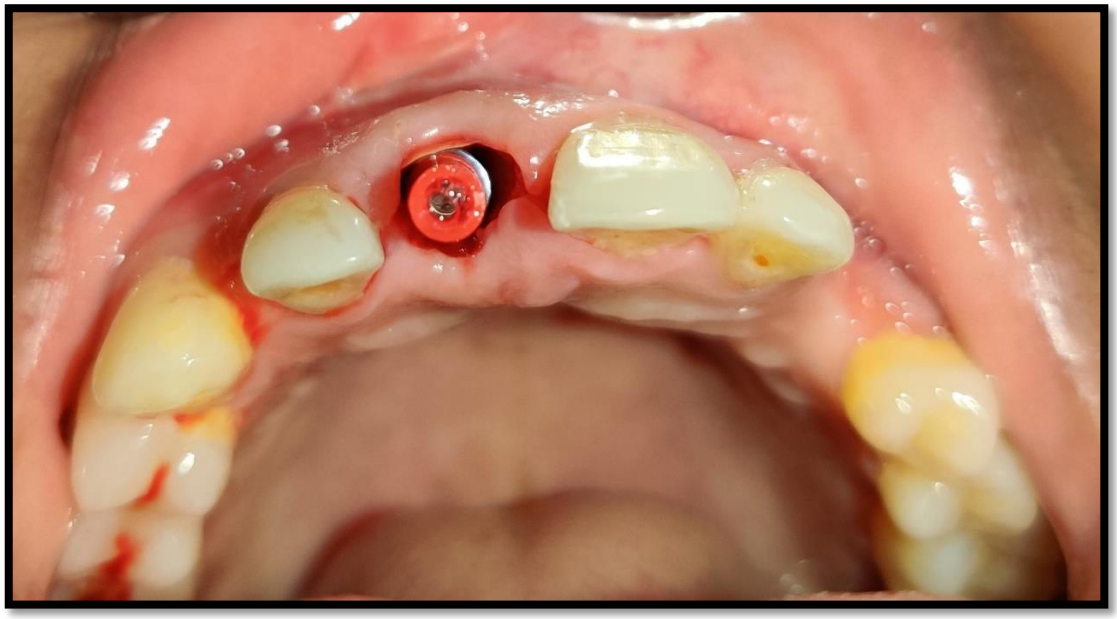

Figure 11. Placement of Temporary abutment.

Figure 12. Temporization

COLORPLATE II
HORIZONTAL BONE LOSSFORGROUPA(SST)

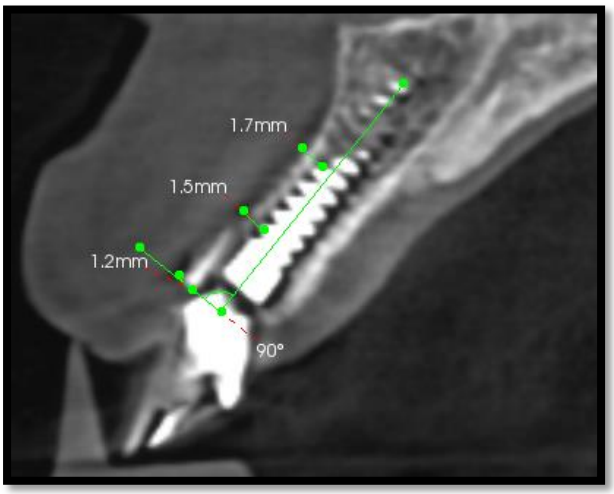

Figure 13. Immediate CBCT (SST)

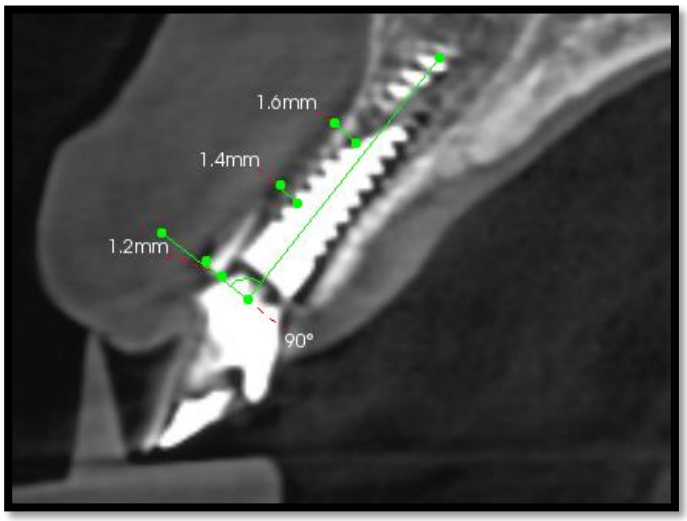

Figure 14. 6 months postoperative CBCT (SST)

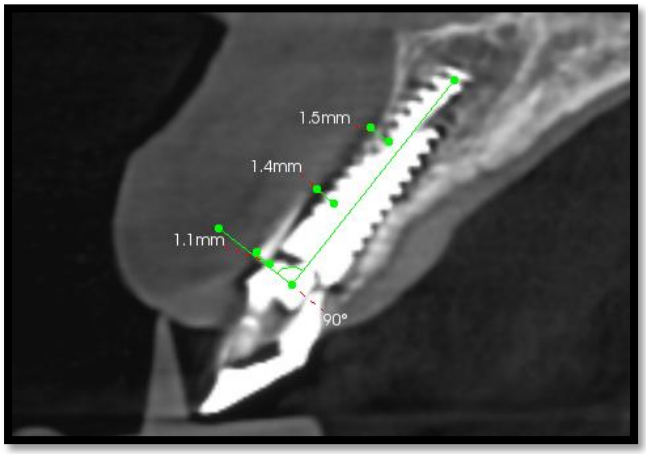

Figure 15. 12 months postoperative CBCT (SST)

COLORPLATEIII
HORIZONTAL BONE LOSS FORGROUPB(CONVENTIONAL)

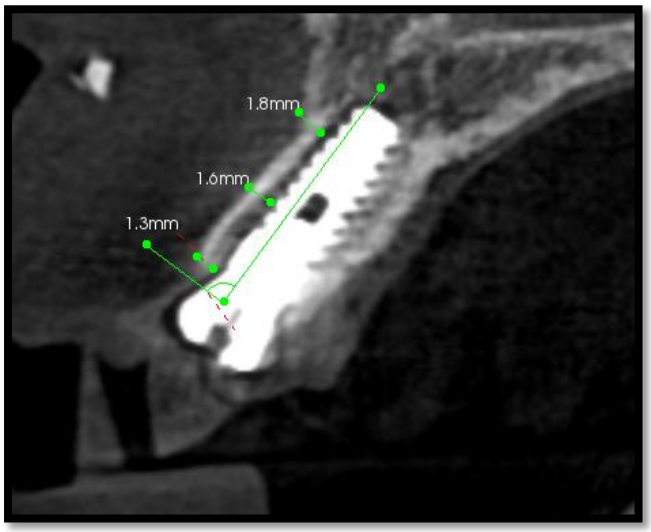

Figure 16. Immediate CBCT

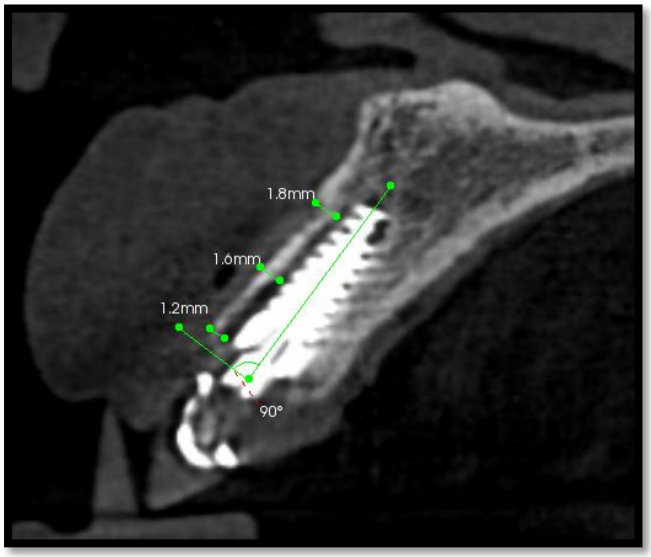

Figure 17. 6 months CBCT

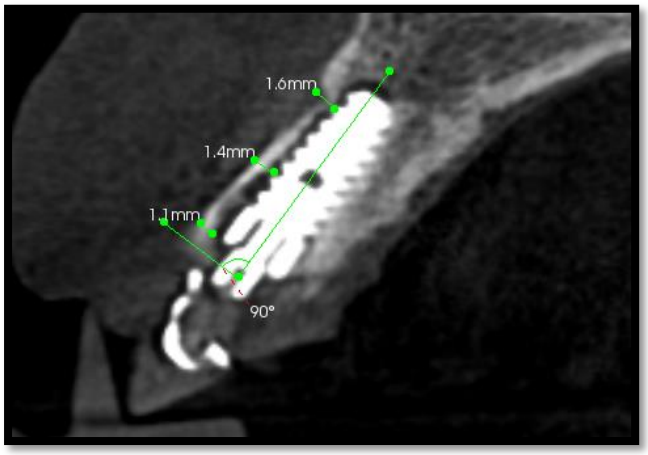

Figure 18. 12 months CBCT

COLORPLATE IV
VERTICAL BONE LOSSFORGROUPA (SST)

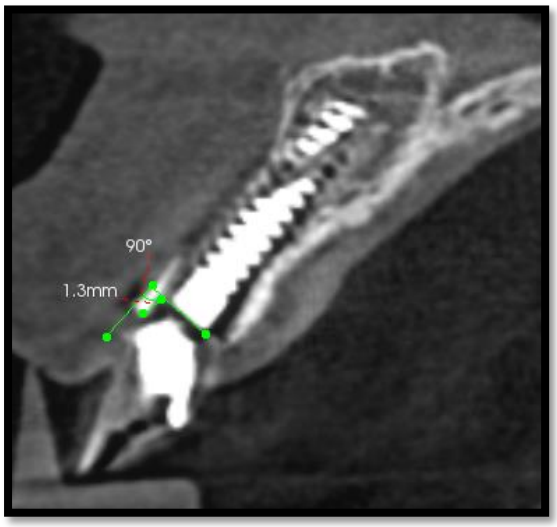

Figure 19. Immediate CBCT (SST)

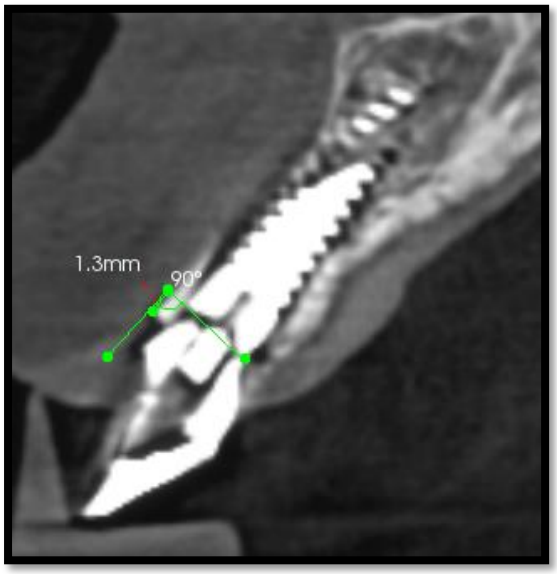

Figure 20. 6 months postoperative (SST)

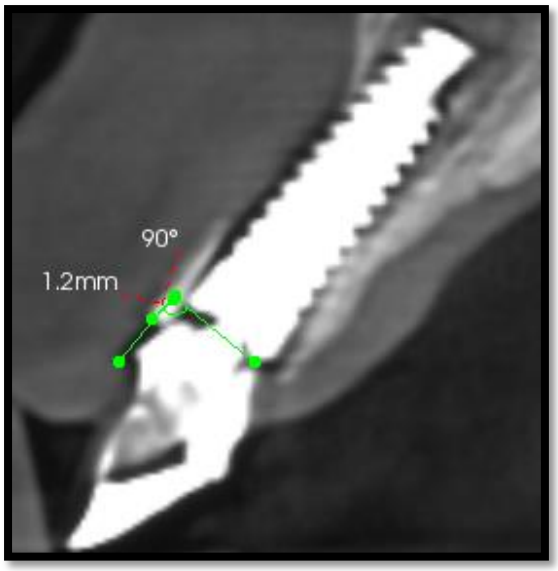

Figure 21. 12 months postoperative (SST)

COLORPLATEV
VERTICAL BONE LOSSFORGROUPA (CONVENTIONAL)

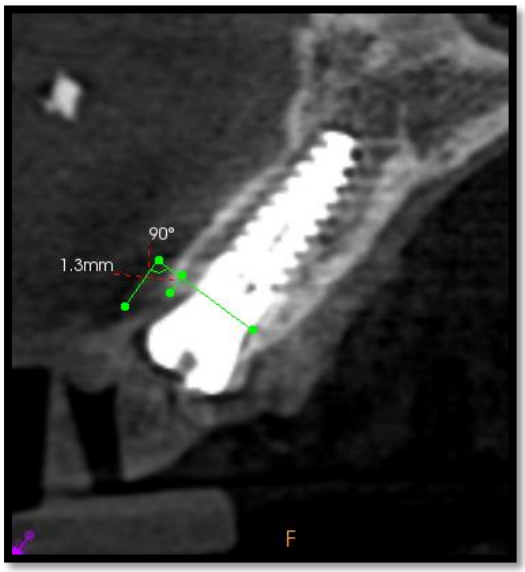

Figure 22. Immediate CBCT

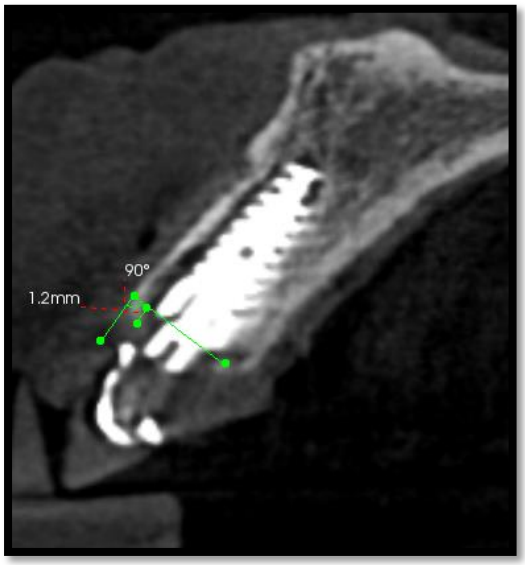

Figure 23. 6 months postoperative

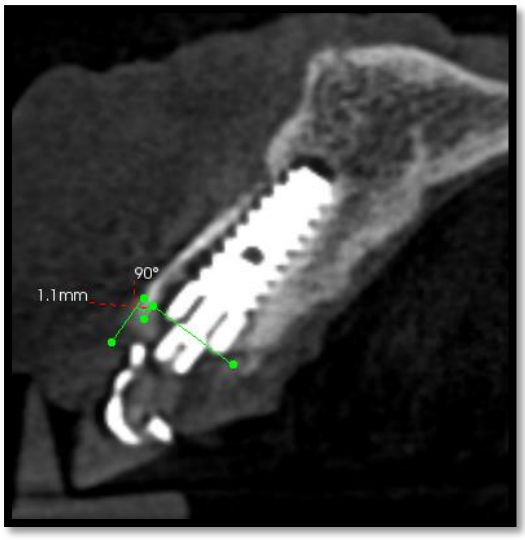

Figure 24. 12 months postoperative

COLORPLATEVI

PINK ESTHETIC SCORE FOR GROUP A (SST)

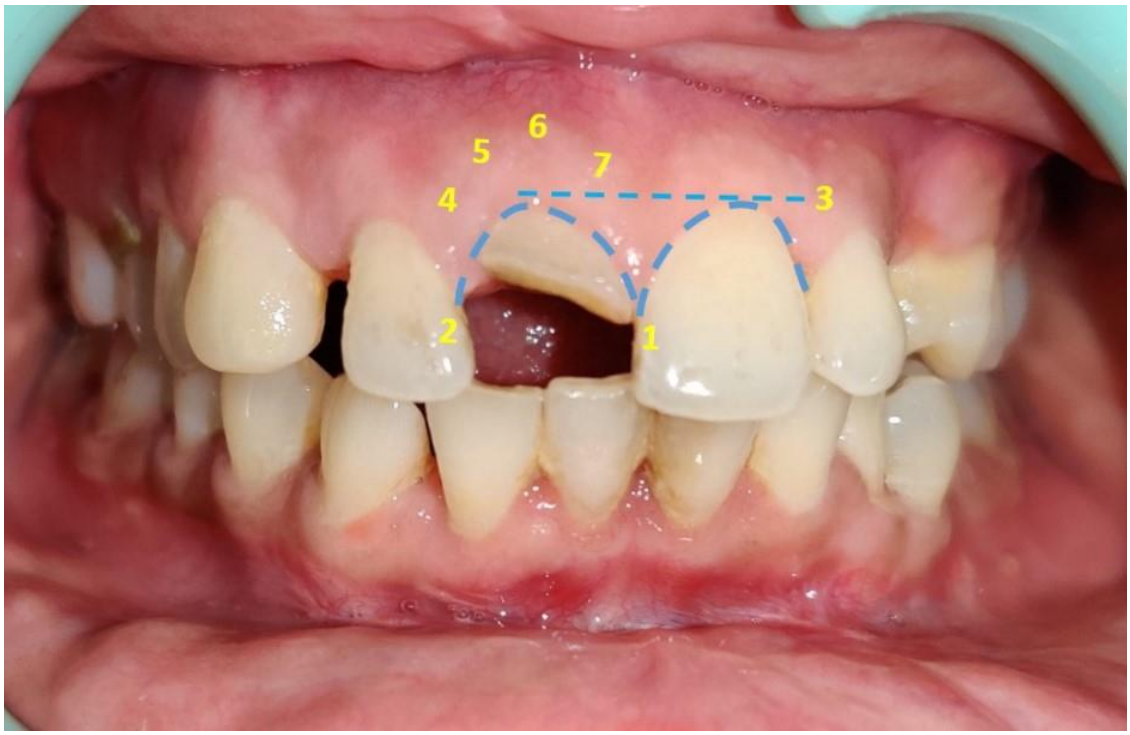

Figure 25. Preoperative PES (SST)

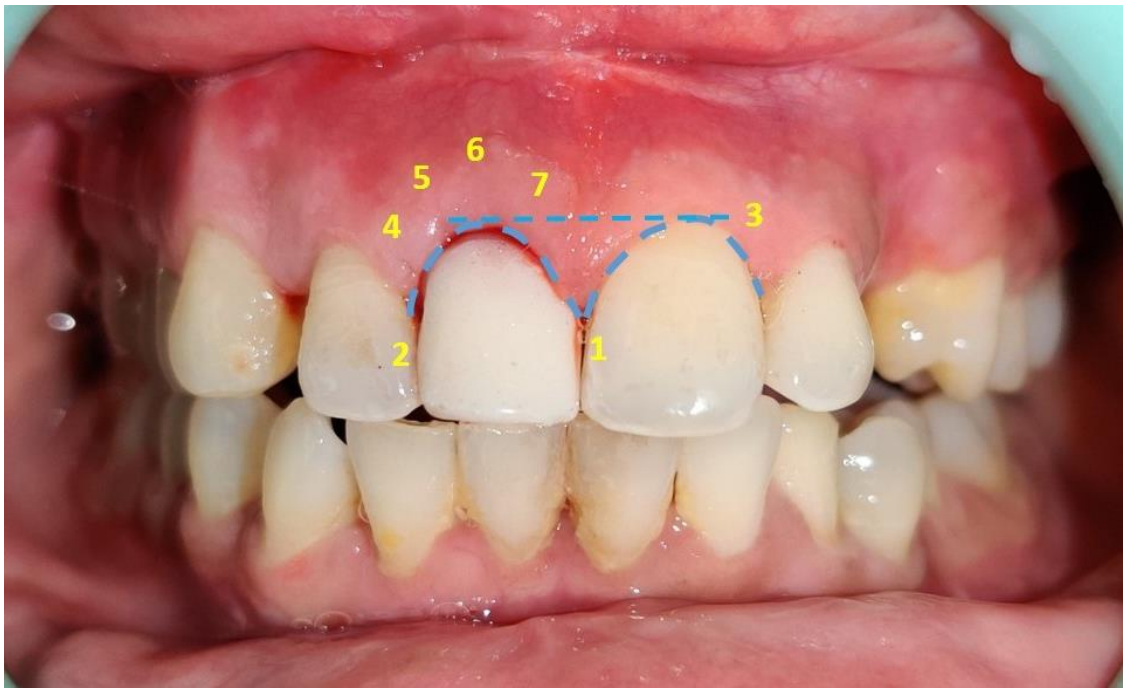

Figure 26. Postoperative postoperative (SST)

COLORPLATEVII
PINK ESTHETIC SCORE FOR GROUP A (SST)

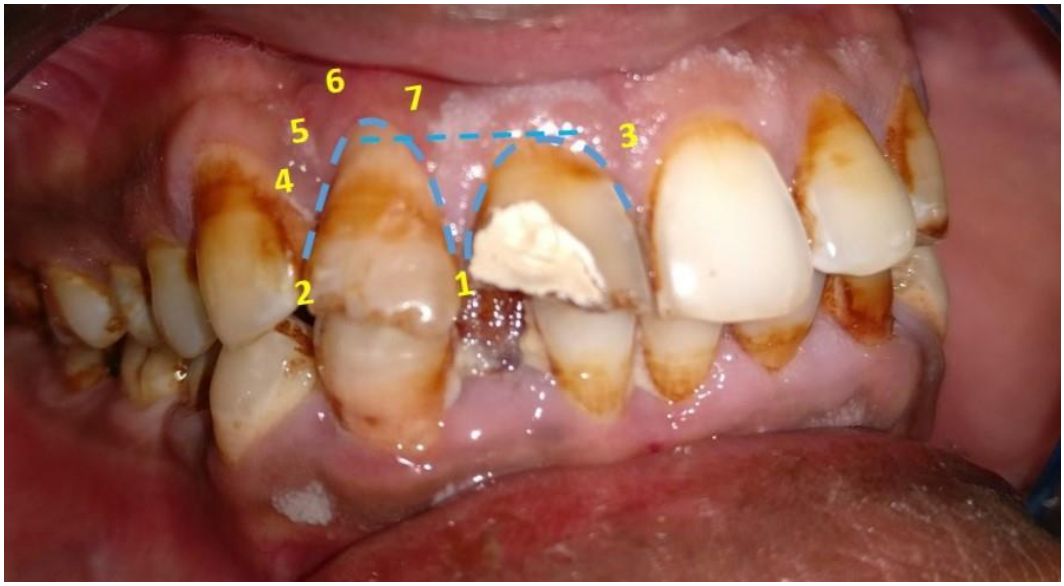

Figure 27. Preoperative PES

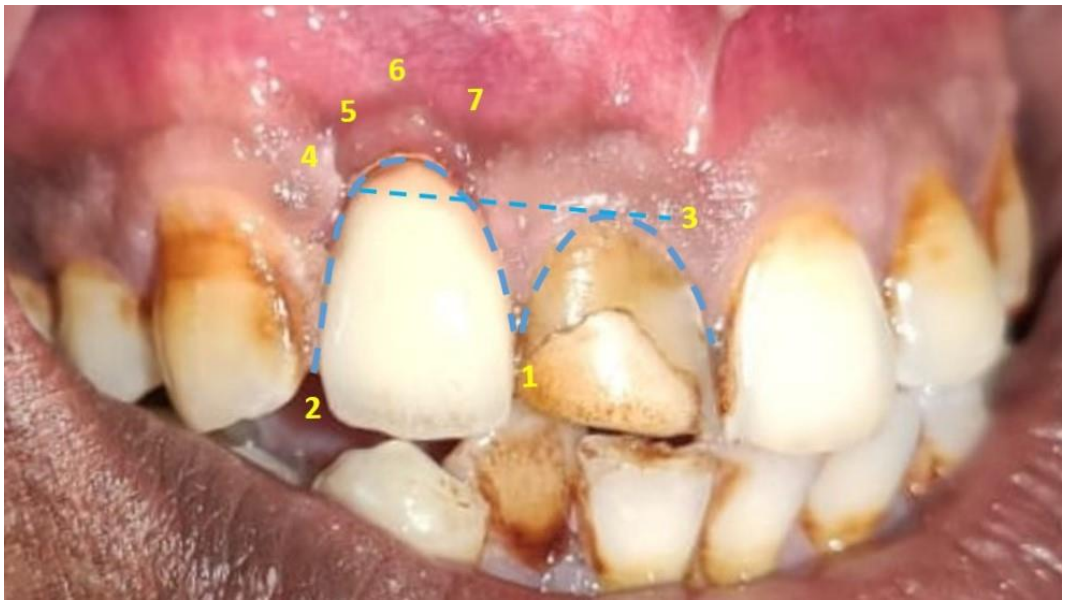

Figure 28. Postoperative PES

RESULTS

At baseline, the parameters assessed were Horizontal bone loss, vertical bone loss and pink esthetic score index wasmeasured at all recall visits (preoperatively, immediately, 3 months, 6 months and 12 months).

STATISTICALANALYSIS

Table 1 and Graph 1 shows gender wise distribution of study participants. There were 19 (52.78%) males and 17 (47.22%) females in the study with statistically no significant difference between the groups (χ^2= 0.111, p=0.739 NS).

Table 2 and Graph 2.1 to 2.4 shows baseline demographic details of study participants. Mean age of study participants was 30.480±6.764 years and control group was 30.880±6.469 years and the difference between the groups was not

significant (p=0.836). Gender distribution shows that there were 13 male and 10 female participants in study group as compared to 12 male and 11 female participants in control group and the difference between the two groups was not statistically significant (p=0.777). Tooth wise distribution shows that there were 21 anterior and 4 posterior teeth in study group as compared to 24 anterior and 1 posterior teeth in control group and the difference between the two groups was not statistically significant (p=0.349). In study group the frequency of missing teeth requiring replacement due to trauma, failed RCT, decay, severe attrition and others were 14, 5 , 2, 2 and 2 respectively whereas in control group it was 1, 4, 3, 0 and 2 respectively with no significant difference between the two groups on comparison (p=0.777).

Table 3 and Graph 3shows comparison of horizontal bone loss at 0 mm position between two groups at various follow-ups. Immediately postoperative, the mean horizontal bone loss was 1.208 ± 0.116 mm and 1.212 ± 0.126 mm in study group and control group respectively and the difference between the two groups was not significant (t=-0.140,p=0.890). At 6 months, the mean horizontal bone loss was 1.180 ± 0.121 mm and 1.069 ± 0.119 mm in study group and control group respectively and the difference between the two groups was not significant (t=-0.328, p=0.002). At 12 months, the mean horizontal bone loss was 1.169 ± 0.119 mm and 1.032 ± 0.109 mm in study group and control group respectively and the difference between the two groups was not significant (t=4.24, p<0.001).

Table 4 and Graph 4 shows within-groupcomparison of horizontal bone loss from baseline (immediate) at 0 mm position at variousfollow-ups for the two groups. In study group, the mean horizontal bone loss was 0.027 ± 0.014mm at 6 months and 0.038 ±0.017 mm at 12 months and the difference between the two groups was statistically highly significant (t=-5.418, p<0.001). Similarly, in control group the mean horizontal bone loss was 0.143 ± 0.029mm at 6 months and 0.180 ±0.063 mm at 12 months and the difference between the two groups was statistically highly significant (t=-3.977, p=0.001).

Table 5 and Graph 5 shows comparison of horizontal bone loss at 5 mm position between two groups at various intervals. In study group the mean horizontal bone loss at 5 mm position was 1.641 ± 0.136 mm, 1.627 ± 0.131 mm and 1.620 ± 0.131mm at immediately, 6 months and 12 months respectively. In control group the mean horizontal bone loss at 5 mm position was 1.609 ± 0.097mm, 1.493 ± 0.104mm and 1.490 ± 0.103 mm at immediate, 6 months and 12 months respectively. The difference between the two groups was statistically highly significant at 6 months (t=3.992, p<0.001) and 12 months (t=3.865,p <0.001).

Table 6 and Graph 6shows within-groupcomparison of horizontal bone loss from baseline (immediate) at 5 mm position at variousfollow-ups for the two groups. In study group, the mean horizontal bone loss was 0.014 ± 0.012mm at 6 months and 0.021 ±0.014 mm at 12 months and the difference between the two groups was statistically highly significant (t=-4.884, p<0.001). Similarly, in control group the

mean horizontal bone loss was 0.116 ± 0.025mm at 6 months and 0.119±0.024 mm at 12 months and the difference between the two groups was statistically highly significant (t=-2.281, p=0.032).

Table 7 and Graph 7shows comparison of horizontal bone loss at 0 mm position between two groups at various follow-ups. Immediately postoperative, the mean horizontal bone loss was 1.835 ± 0.076 mm and 1.836 ± 0.079 mm in study group and control group respectively and the difference between the two groups was not significant (t=-0.054,p=0.957). At 6 months, the mean horizontal bone loss was 1.782 ± 0.083 mm and 1.720 ± 0.074 mm in study group and control group respectively and the difference between the two groups was statistically significant (t=-2.802, p=0.007). At 12 months, the mean horizontal bone loss was 1.781 ± 0.084 mm and 1.718 ± 0.075 mm in study group and control group respectively and the difference between the two groups was statistically significant (t=2.754, p=0.008).

Table 8 and Graph 8 shows within-groupcomparison of horizontal bone loss from baseline (immediate) at 10 mm position at variousfollow-ups for the two groups. In study group, the mean horizontal bone loss was 0.052 ± 0.038mm at 6 months and 0.054 ±0.039 mm at 12 months and the difference between the two groups was not significant (t=-1.693, p=0.103). Similarly, in control group the mean horizontal bone loss was 0.116 ± 0.036mm at 6 months and 0.118 ±0.036 mm at 12 months and the difference between the two groups was not statistically significant (t=-1.809, p=0.083).

Table 9 and Graph 9 shows comparison of vertical bone loss at various follow-ups. Immediately postoperative, the mean vertical bone loss was 1.204 ± 0.070 mm and 1.211 ± 0.051 mm in study group and control group respectively and the difference between the two groups was not significant (t=-0.639,p=0.529). At 6 months, the mean vertical bone loss was 1.157 ± 0.065 mm and 1.149 ± 0.064 mm in study group and control group respectively and the difference between the two groups was statistically significant (t=5.603, p<0.001). At 12 months, the mean horizontal bone loss was 1.149 ± 0.064 mm and 1.064 ± 0.037 mm in study group and control group respectively and the difference between the two groups was statistically significant (t=8.047, p<0.001).

Table 10 and Graph 10 shows comparison of Pink Esthetic Index score (PES) between two groups at various follow-ups. The mean PES preoperatively in study group was 13.16 ±0.746 as compared to control group it was 13.240 ±0.663 and the difference between the two groups was not statistically significant (t=0.768,p=0.113).Preoperatively both the study group and the control group had the median (interquartile range) as 13 (12-14). Preoperatively the frequency distribution of number of teeth in study group according to PES in the groups PES ≤ 10, PES 11-12, PES 13 – 14 was 0 (0%), 5 (20%) and 20 (80%) respectively whereas for control group it was 0 (0%), 3 (12%) and 22 (88%).

Immediately after implant placement the mean PES was 12.240 ± 0.723 and 11.960 ±0.789 in study group and control group respectively and the difference between the groups was not significant statistically (t=0.363, p=0.370). The study

group and the control group had the median (interquartile range) as 12 (12-13) and 12 (11.5-12.5) respectively. The frequency distribution of number of teeth in study group according to PES in the groups PES ≤ 10, PES 11-12, PES 13 – 14 was 0 (0%), 15 (60%) and 10 (40%) respectively whereas for control group it was 1 (4%), 18 (72%) and 06 (24%) respectively.

Three months after implant placement the mean PES was 11.680 ± 0.556 and 9.640 ±0.810 in study group and control group respectively and the difference between the groups was statistically highly significant (t=2.936, p<0.001). The study group and the control group had the median (interquartile range) as 12 (11-12) and 10 (9-10) respectively. The frequency distribution of number of teeth in study group according to PES in the groups PES ≤ 10, PES 11-12, PES 13 – 14 was 0 (0%), 24(96%) and 1 (4%) respectively whereas for control group it was 23 (92%), 2 (8%) and 0 (0%) respectively.

Six months after implant placement the mean PES was 11.680 ±0.556and 9.200 ±1.118in study group and control group respectively and the difference between the groups was statistically highly significant (t=4.060, p<0.001). The study group and the control group had the median (interquartile range) as 12 (11-12) and 9 (8-10) respectively. The frequency distribution of number of teeth in study group according to PES in the groups PES ≤ 10, PES 11-12, PES 13 – 14 was 0 (0%), 24(96%) and 1 (4%) respectively whereas for control group it was 24 (96%),0 (0%) and 1 (4%) respectively.

Twelve months after implant placement the mean PES was 11.560 ±0.583 and 8.520 ±0.585 in study group and control group respectively and the difference between the groups was statistically highly significant (t=18.388, p<0.001). The study group and the control group had the median (interquartile range) as 12 (11-12) and 8 (8-9) respectively. The frequency distribution of number of teeth in study group according to PES in the groups PES ≤ 10, PES 11-12, PES 13 – 14 was 0 (0%), 24(96%) and 1 (4%) respectively whereas for control group it was 25 (100%),0 (0%) and 0 (0%) respectively.

DISCUSSION

At the crestal level, bone resorption is assessed (0 mm)

The labial bone in the maxillary anterior teeth has been reported to be thin in several investigations (less than 2 mm). This study's findings on the width of the labial bone at the alveolar crest match those of Shen et al. 2012[55], who used CBCT images to quantify the width of the labial wall of upper anterior teeth and premolars. Shen discovered that the width of the ridge bone of upper anterior teeth varied from 0.5 - 1.5 mm, implying that thin facial bone walls are frequent in the anterior maxilla.

In their investigation, Bjarni et al. 2010[56], found that the majority of buccal bone walls had a thickness of less than 1 mm in the anterior locations (87.2%), with only 2.6 percent having a thickness of more than 2 mm. From canine to canine, the maxillary front area had an average thickness of 0.80 mm, according to their research. The thickness of the premolars was measured at 1.1 millimetres.

A research by Gupta et al. 2017[57], indicated that the alveolar crest width (mean) in the maxillary anterior was 0.82 mm. Prior to implant insertion, Cho et al. 2011[58], discovered a width of 1.91 ± 0.45 mm. After the second operation, Spray et al. 2000[59], noticed a variation in the buccal bone width. The average width of the buccal bone was 1.7 mm at implant, according to their findings. The average bone resorption during the second operation was 0.7 mm. In a research by Abadzhiev et al. 2015[60], SST patients lost an average of 0.8 mm over two years, whereas the immediate implant group lost an average of 5 mm over two years. In their investigation, Baumer et al. 2017[23], discovered a mean loss of 0.88 mm in the buccal direction, and histological examination indicated no osteoclastic alterations at the crest. Mean buccal bone width was determined at the alveolar crest after a time period (mean) of 47±12.01 months after establishing the abutment in a CBCT research comparing IIP with delayed implant placement. The thickness was measured to be 0.48±0.67 mm. Engelke et al. 2015[61], found a mean width of bone crest of 1.11 mm pre-operatively and a mean buccal bone width of 1.40 mm immediately post-operatively in a research after atraumatic internal root fragmentation on fifteen patients.

At a distance of 5 mm apical to the crest

Janua 'rio et al. 2011[62], assessed the buccal bone in the maxillary front teeth at 1 mm, 3 mm, and 5 mm apical to the crest to determine the mean loss of bone at this level. They discovered that the facial bone was B 1 mm width in most places in all tooth sites studied, and that almost half of the zones had a bone that was B 0.5 mm width.

At 3 mm apical to the crest, the values were in the range of 0.6 ± 0.4 to 0.7 ± 0.4. In a CBCT investigation of alveolar bone architecture in the maxillary anterior area in 80 adults, the diameter at 3 mm from the crest was found to be rather small. They calculated that the thickness of the labial bone at this level is around 1 mm. In their investigation, Alsaffar et al. 2016[63], discovered that the values in the centre of the root ranged between 0.9 ± 0.86 and 1.4 ± 1.23 mm for varied age groups. After 47.12 months of abutment setting, the mean buccal bone width at the central part was determined to be 1.19 ± 0.60 in a research on immediate implant insertion. In a case report by Toit et al. 2016[64], follow-ups were performed at various time intervals, and healing was judged to be satisfactory.

At 10 mm Apical to the Crest

At this point, Group B had a somewhat larger loss, but it was not statistically significant. Alsaffar et al. 2016[63], showed that the mean labial bone thickness in the apical area ranged from 1.7 ± 1.41 to 2.27 ± 7.36 millimetres. In the research by Engelke et al. 2015[61], higher loss in labial bone thickness was noted at the apical level after atraumatic internal fragmentation of the root, equal to a mean of 0.26 mm.

CONCLUSION

Our work documented the loss of labial bone thickness at various levels from the crest at various follow-up intervals, resulting to the conclusion that the socket-shield approach better protects< 2 mm labial bone thickness of the maxillary anterior teeth when compared to the conventional technique of immediate implant placement and temporization. Along with the preservation of the hard tissue, it was concluded that the soft tissue preservation was done enhancing the esthetic results of the patient.

SUMMARY

Reconstruction or retaining of the surrounding soft and hard tissues of implant supported reconstruction at the aesthetic site can be managed in selected cases. Esthetic appearance compromised in peri-implant tissue can manifest as vertical bone loss, horizontal bone loss, vertical and horizontal gingival recession, change in tissue surface texture and color. Socket shield technique and conventional technique of immediate implant placement followed by temporization was randomly allocated into two equal groups. Clinically and radiographically, Hard tissue examination includes the horizontal bone loss and vertical bone loss and soft tissue examination includes Pink esthetic index was measured at various distance interval and at varied time period. Socket shield technique resulted to be safe, reliable with good outcomes when compared to the conventional technique followed by immediate implant placement and temporization.

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I) Case Record Form

DEPARTMENT OF ORAL & MAXILLOFACIAL SURGERY.

CASE HISTORY PROFORMA.

CASE NUMBER:

DATE:

NAME:

AGE/SEX:

REGISTRATION NUMBER:

ADDRESS:

OCCUPATION:

CHIEF COMPLAINT:

HISTORY OF PRESENT ILLNESS:

PASR MEDICAL HISTORY:

PAST DENTAL HISTORY:

FAMILY HISTORY:

HISTORY OF ALLERGY:

DIET:

HABITS:

EXTRA-ORAL EXAMINATION

FACIAL SYMMETRY:

TMJ:

LYMPH NODES:

INTRA-ORAL EXAMINATION

TEETH PRESENT:

MISSING TEETH:

ROOT PIECE:

OCCLUSION:

CARIES/ATTRITION/ABRASION/EROSION/ABFRACTION:

MOBILITY:

OTHERS:

DIAGNOSIS:

PROCEDURE:

A) Clinical Evaluation:

PINK ESTHETIC SCORE (PES):

Pink Esthetic Index					
Time	**Pre-op**	**Immediate**	**3 months**	**6 months**	**12 months**
Study Group					

Pink Esthetic Index					
Time	**Pre-op**	**Immediate**	**3 months**	**6 months**	**12 months**
Control group					

B) Radiographic Evaluation:

CONE BEAN COMPUTED TOMOGRAPHY (CBCT)

Baseline Demographic Details						
Treatment Group	**Site No.**	**Patient No.**	**Age**	**Gender**	**Tooth Restored**	**Etiology**
Socket shield group						

Demographic Details						
Treatment Group	**Site No.**	**Patient No.**	**Age**	**Gender**	**Tooth Restored**	**Etiology**
Conventional technique						

Horizontal Bone loss (0 mm)					
Study Group (n=25)			**Control Group (n=25)**		
Immediate	**6 months**	**12 months**	**Immediate**	**6 months**	**12 months**

Horizontal Bone loss (5 mm)					
Study Group (n=25)			**Control Group (n=25)**		
Immediate	**6 months**	**12 months**	**Immediate**	**6 months**	**12 months**

Horizontal Bone loss (10 mm)					
Study Group (n=25)			**Control Group (n=25)**		
Immediate	**6 months**	**12 months**	**Immediate**	**6 months**	**12 months**

Vertical Bone loss (0 mm)					
Study Group (n=25)			**Control Group (n=25)**		
Immediate	**6 months**	**12 months**	**Immediate**	**6 months**	**12 months**

II) Informed Consent Forms:-

(गोपनीय)

माहितीपूर्णसंमतीफॉर्म

‘"EVALUATION OF CLINICAL AND RADIOGRAPHIC OUTCOMES IN IMMEDIATE IMPLANT PLACEMENT WITH AND WITHOUT SOCKET SHIELD IN SINGLE ROOTED TEETH – A RANDOMIZED CONTROLLED TRIAL"

नाव: श्री/चि./श्रीमती/कु. ._____

निवासी: _____

वय_____वर्ष.

माझ्याइच्छेच्या / निवडीचाकोणत्याहीस्वरूपाचाकोणताहीदबाव / प्रोत्साहननलावता, याद्वारे

डॉ. _____

नेप्रकल्पाचेआयोजनकरण्याचीमाझीमंजुरीदेतो/देते.

मी "रुग्णाच्यामाहितीपत्रकाची" पावतीस्वीकारतआहेआणिडॉक्टरांनीमलायासंशोधनप्रकल्पाबद्दलयोग्यआणिसूचनेबद्दलमाहितीदिलीआहे. मीमाझ्यामौखिकपोकळीतवापरकरण्याचीअधिकृतीदेतो.मीमाझ्याएक्स-रे, छायाचित्रे, आवश्यकतेनुसारइतरतपासण्याकरण्याससहमतआहे.

मीयाप्रकल्पातभागघेण्याससहमतीदेतोआणियाचाचणीच्याकाळातकोणतीहीइतरयोजनाएकत्रितकरणारनाही.

मीडेन्टलहॉस्पिटलमध्येकिंवाइतरठिकाणीदिलेल्यानियोजिततारखाआणिवेळांचेपालनकरीन.

मीप्रमाणितकरतोकीमीयाफॉर्मचीमाहीतीवाचलेलीआहेकिंवाकोणाकडूनवाचवूनघेतलीआहे.

_____दिनांक___

_____रुग्ण / कायदेशीरपणेअधिकृतप्रतिनिधी

स्वाक्षरी

(Confidential)

Informed Consent Form

"EVALUATION OF CLINICAL AND RADIOGRAPHIC OUTCOMES IN IMMEDIATE IMPLANT PLACEMENT WITH AND WITHOUT SOCKET SHIELD IN SINGLE ROOTED TEETH – A RANDOMIZED CONTROLLED TRIAL"

NAME:

Mr./Master/Mrs./Miss._____

Resident of: _____

_____aged _____ years, exercising my free will/choice, without any pressure/lure of incentive in any form, hereby give my consent for the project to be conducted by

Dr._____.

I acknowledge the receipt of "patient's information sheet", and also the doctor has informed me about this research project suitably and sufficiently to my satisfaction.

I agree to undergo this procedure to be taken as part of study

I agree to let my X-rays, photographs, other investigations to be taken as required.

I agree to take part in this project and will not mix any other projects during the period of this trial. I shall report to the dental hospital or other place where called on given appointment dates and time.

I certify that I have read or had read to me the contents of this form.

_____

_____Date _____

Patient /legally authorized representative signature

INFORMED CONSENT FORM

"EVALUATION OF CLINICAL AND RADIOGRAPHIC OUTCOMES IN IMMEDIATE IMPLANT PLACEMENT WITH AND WITHOUT SOCKET SHIELD IN SINGLE ROOTED TEETH – A RANDOMIZED CONTROLLED TRIAL"

वैयक्तीक माहिती

रूग्णाचे नाव : दिनांक :

वय/लिंग :

पत्ता :

मोबाईल नंबर :

मी कबूल करतो की डॉक्टरांनी मला या संशोधन प्रकल्पाबद्दल समाधानकारक माहिती दिली आहे. मी माझ्या एक्स-रे, छायाचित्रे, इंप्रेशन आणि आवश्यकतेनुसार अन्य तपासण्या करण्यास सहमत आहे. मी या प्रकल्पात भाग घेण्यास सहमती देतो आणि या चाचणीच्या कालावधीत कोणतेही अन्य प्रकल्प एकत्रित करणार नाही. मला डेन्टल हॉस्पिटल किंवा इतर ठिकाणी दिलेल्या भेटीची तारीख आणि वेळ सांगितली आहे. मी डॉक्टर आणि पॅरामेडिकल कर्मचा-यांना सर्व बाबतीत सहकार्य करेल. या अभ्यासात मी माझ्या सहभागाचे निकाल प्रकाशित करण्यास परवानगी देतो. मला कोणतीही नुकसान भरपाई दिली जाणार नाही. असे करण्यासाठी कोणतेही कारण न देता मला कोणत्याही वेळी या संशोधन प्रकल्पातून बाहेर पडण्याचा अधिकार मिळालेला आहे. मी या अन्वये केलेल्या चाचणीत सहभागासाठी माझी संमती नोंदवित आहे.

_____	_____	_____	_____
१) रूग्णाचे नाव	स्वाक्षरी	तारीख	वेळ
_____	_____	_____	_____
२) साक्षीदाराचे नाव	स्वाक्षरी	तारीख	वेळ
_____	_____	_____	_____
३) डॉक्टरचे नाव	स्वाक्षरी	तारीख	वेळ