Original Article

Is socket shield technique a reliable technique in immediate dental implant placement

การใช้ส่วนของรากฟันเพื่อเป็นโล่เบ้าฟันในการฝังรากฟันเทียมทันที

ปราโมทย์ สุชนสำราญ, ทองนารถ คำใจ

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Abstract The socket shield technique (SST), or partial tooth extraction (PET), is an intentional leaving a fragment of the tooth being extracted, especially the facial aspect of the root, to preserve of the surrounding hard and soft tissues. The dentist can select the proper size of the implant, and place it in the proper position and angulation. The SST is clinically beneficial but technically sensitive. The objective of the study was to review of literatures studying clinical outcomes of this technique. From selected 12 scientific articles, the clinical outcomes, including success rate, marginal bone loss, pink esthetic score (PES), and patient reported outcome measure (PROM), of this technique were favorable.

Keywords: dental implant, immediate implant placement, partial tooth extraction, Socket-Shield Technique

บทคัดย่อ เทคนิคโล่เบ้าฟันหรือการถอนฟันบางส่วน เป็นการจงใจทิ้งส่วนของรากฟันโดยเฉพาะด้านชิดริมฝีปากโดยมีวัตถุประสงค์เพื่อคงสภาพทั้งเนื้อเยื่อแข็งและเนื้อเยื่ออ่อนบริเวณนั้นและสามารถใช้รากฟันเทียมที่มีขนาด ตำแหน่งและมุมที่เหมาะสมได้ แม้จะเป็นการใช้โล่เบ้าฟันจะมีประโยชน์อย่างมากแต่ก็เป็นเทคนิคที่ละเอียดอ่อน จึงเป็นที่มาของการศึกษาครั้งนี้ที่จะทบทวนวรรณกรรมเกี่ยวกับผลลัพธ์ทางคลินิกของเทคนิคนี้ จากการทบทวนรายงานจำนวน 12 ฉบับ ซึ่งศึกษาทั้งในแง่อัตราประสบความสำเร็จ การสูญเสียกระดูกรอบรากฟันเทียม คะแนนความสวยงามของเนื้อเยื่อเหงือก รวมทั้งผลลัพธ์จากการประเมินของผู้ป่วย พบว่าเทคนิคดังกล่าวให้ผลลัพธ์การรักษาเป็นที่น่าพึงพอใจ

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INTRODUCTION

With the world moving at fast pace, dentistry has been catching up with its trends. This ranges from the recent technologies to new innovations to better serve and live up to today's needs. Dental extraction has been known to cause various volumetric changes to the surrounding tissues. The facial bone on the anterior teeth is thin in nature[1]. In some reports, there is a complete absence of labial bone, causing the surrounding morphology to collapse. This is quite challenging when a clinician attempts to mimic the natural characteristics of a tooth, especially when it involves the esthetic zone.

Various techniques have been suggested in the literature, including selecting the size of the implant, the position of the implant, its angulation, using bone and soft tissue grafting materials and techniques, etc. Another promising technique, which has been introduced since 2010 by Hürzeler et al. is called socket shield technique (SST). This technique features the preservation of the surrounding tissues by intentionally leaving a fragment of the tooth being extracted, especially the facial aspect of the root, so the bone is undisturbed. Socket shield technique goes by various names like partial tooth extraction (PET), root submergence technique (RST), etc[2].

With preservation of the partial root leaves the surrounding soft and hard tissues untouched, hereby maintaining blood supply and postoperative complications. In some circumstances, the chances of additional grafting procedures are greatly reduced. This increases the chances of patient comfort, satisfaction and acceptance and decreases morbidity.

However, SST is technique sensitive. The disadvantages of SST include technical difficulty, risk of root fragment migration, resorption or infection, etc[3]. A skilled clinician with careful planning and case selection is required to increase the chances of success and survival rates. Socket shield technique has also been combined with other techniques to increase successful outcomes like digital planning to increase the precision during implant placement, bone and soft tissue grafts to better mimic natural dental and soft tissue characteristics.

SST has shown promising results when performed on the day of tooth extraction. The tooth is sectioned and prepared to support the facial surrounding structures and an implant is placed immediately. This saves time, cost and reduces patient's morbidity. The minimal change in the overall morphology provides a great advantage, especially in patients with high esthetic demands.

A lot of experiments were done with the size and position of the root remnant. Some suggested to preserve the labial aspect to keep the hard and soft tissues intact. This saved time, cost and reduced patient's morbidity. The minimal change in the overall morphology provided a great advantage, especially in patients with high esthetic demands.

The working of the process following tooth extraction performed by Araújo and Lindhe has shown the activation of osteoclastic activity. This activation causes a resorption of bundle bone. It was found that there was an abundance of bundle bone at the labial aspect when compared to the palatal aspect. Therefore, the loss of bone is more pronounced at the facial surface. The cascade following hard tissue loss is soft tissue defect, whereby various things like apical migration of the gingival margin, loss of interdental papilla and a formation of black triangle, while affecting overall esthetic outcomes. However, some of the factors that affect the volume of bone and soft tissues are the initial bone level, the progression of bone loss and the gingival phenotype.

Following dental extraction or tooth loss, a series of changes occurs at the surrounding soft and hard tissues. A study was conducted on the morphology of the upper anterior zone, where the thickness of the labial bone was measured at different locations. The crest of the alveolar ridge was used as the marker where the measurement was taken beneath at 1, 3 and 5 mm intervals. It was found that the thickness of the bone was less than 1 mm[4]. This coincides with another study where the

maxillary bone thickness of central and lateral incisors was measured 4mm from CEJ. The result showed the bone thickness to be less than 1 mm[4].

Having a limited supply of bone have shown a higher risk in bone loss during and after tooth extraction, which causes the shape of the alveolar ridge to change. This may eventually compromise the success and survival rate of the implant placement.

The introduction of maintaining or compensating the loss of the surrounding hard and soft tissues is an ongoing process. A lot of research has been conducted to attempt to preserve the remaining structures following dental extraction or tooth loss. Grafting of hard tissues, soft tissues or a combination of the two to compensate the loss have shown promising results. The hard tissue substitutes that aid in preservation of the surgical site include autogenous, allogenic, xenogenic and alloplastic grafts. These grafting materials have different properties and are selected according to its properties and clinician's preference. Soft tissue grafting can either come from the patient or widely selected from the manufacturers.

An immediate implant placement following dental extraction can help preserve the alveolar bone and soft tissue contour. Various factors, such as bone volume and quality, soft tissue thickness, and esthetic outcomes should be kept under consideration before deciding on placing implant immediately.

MATERIALS AND METHODS

Although socket shield technique is an acquired skill, which requires learning curve, there have been a lot of experienced clinicians taking on the challenge in coming up with various techniques to section the tooth in such a way that best preserves the neighboring vital structures. The surgical site chosen is a failing tooth with healthy periodontal tissues with an absence of any acute infection and no external or internal root resorption. As suggested by Hürzeler et al. in 2010, the tooth sectioned must have a labial coronal portion supporting the surrounding labial bone structures. The implant immediately placed must be in contact to the tooth fragment. The temporary abutment with crown is then fabricated and immediately loaded. This technique has a major advantage and is widely accepted by a patient.

The crown portion of the tooth is sectioned at bone level (Fig. 1 and 2)[5]. The remaining root remnant's root canal hole is widened with a bur to ease in further sectioning. Then, the tooth is further sectioned in a mesiodistal fashion until the root length (Fig. 3). The palatal portion of the tooth is split from the labial portion and is removed. The periapical portion is curetted, and cleaned thoroughly. The remaining portion of the labial aspect of the tooth is made sure to still be immobile and intact with the labial structures (Fig. 4). The thickness of the root shield should have a labio-palatal thickness of 1.5-2 mm with the length of two thirds of the total root length. The inner surface of the root remnant is then beveled to support the implant platform. Then the socket is prepped apicopalatally for the implant engagement. Once the implant preparation site is ready, the implant is inserted into the socket (Fig. 5). The clinician should be aware to not disturb the root shield to prevent migration. Subsequently, the prepared temporary abutment with attached crown is then inserted (Fig. 6). The illustration of Fig. 7 showed that the inner surface of the root shield is beveled to support the implant platform. The patient should be prohibited from using this tooth, since it can cause failure. After 3 months, the patient is recalled and assessment of the soft and hard tissue is made. Finally, a definitive crown is fabricated and inserted for the patient.

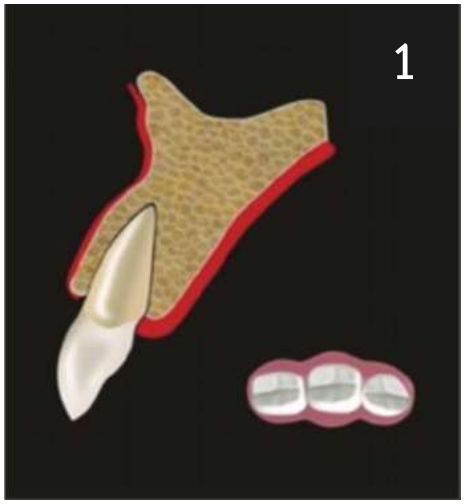


Fig. 1 The tooth is assessed before sectioning.

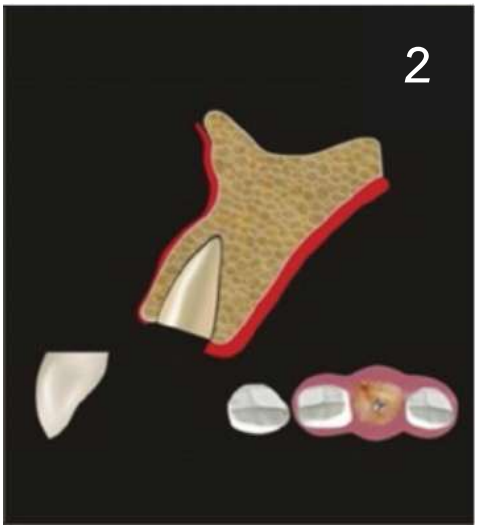


Fig. 2 The crown is sectioned at bone level.

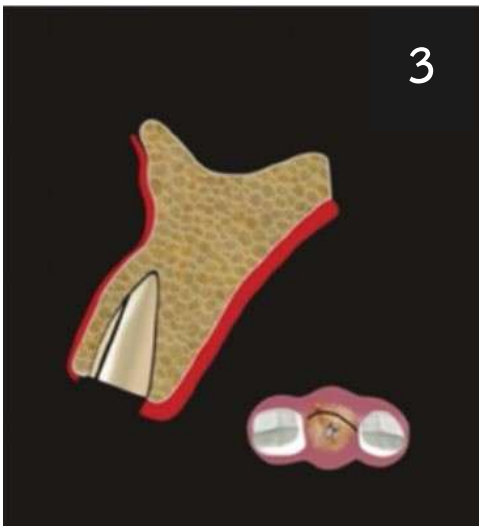


Fig. 3 The tooth is sectioned mesiodistally.

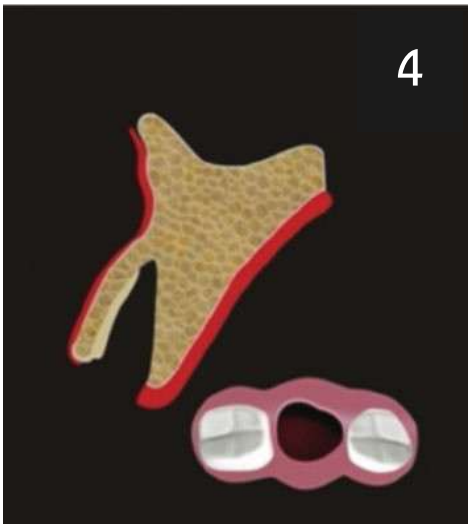


Fig. 4 The split is made and the labial root portion is left intact.

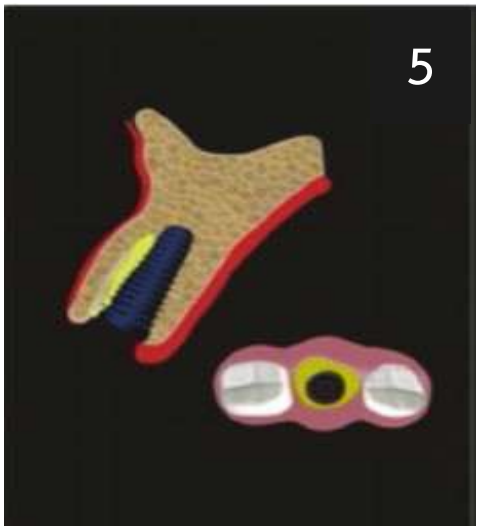


Fig. 5 The implant is placed palatal to the root shield.

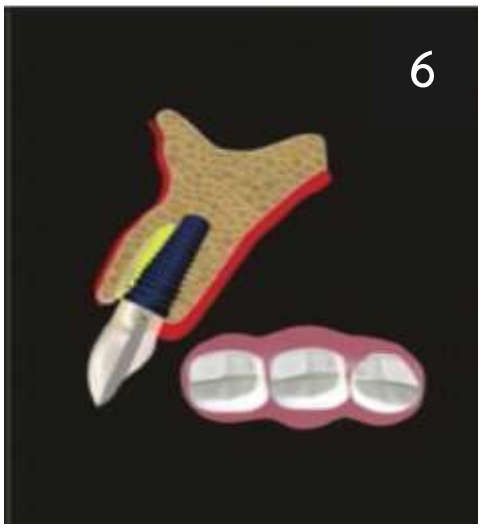


Fig. 6 The temporary abutment and temporary crown are loaded.



Fig. 7 The root shield has an inner bevel chamfer-like finish to take on the implant platform.

Some clinicians have come up with an alternative by changing a few key things. The implant placement leaves a gap between the root remnant and the implant. If the gap is more than 2 mm, then the gap is filled with a biomaterial of choice. If the gap is less than 2 mm, then the clot is expected to aid in new bone formation. Additionally, the types of sectioning have been categorized by Kumar and Kher (2018). It consists of six types, each having its own unique purposes (Fig. 8). Type I is done where the clinician preserves the buccal portion of the root to ensure minimal changes to the surrounding tissues. Type II called the full C preserves the buccal and the interproximal aspect of the root. This procedure is chosen when the clinician intends to preserve the anterior region and the interproximal bone. Type III is called the half C due to its inclusion of the buccal aspect and one of the interproximal faces. This is done with the intention of preserving only one of the interproximal surfaces. This is useful when the adjacent tooth is an implant and the clinician don't want to disturb that particular zone. Next is type IV where only the interproximal root surfaces are preserved. The risk of damaging the thin walls calls for this method of preparation. Type V being called the lingual or palatal can be helpful when there is a thin bone wall on the palatal aspect. It is highly unlikely that this technique is chosen since the buccal walls have more resorption rate. The last type has multiple buccal shields, which is useful when extra measure needs to be taken to prevent buccal morphological change. Several other literatures have suggested other techniques all in favor of preserving the surrounding periodontium.

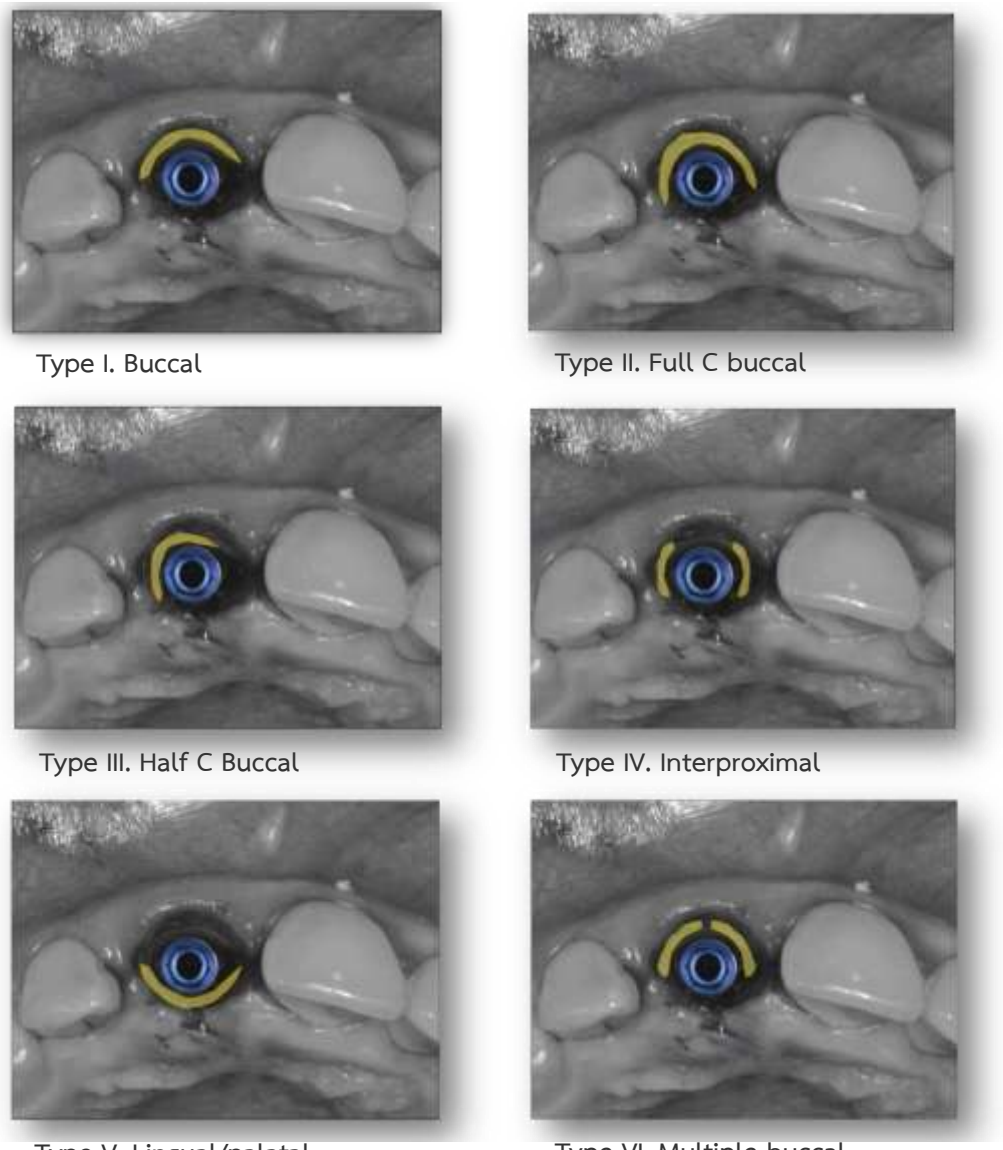


Fig.8 Six techniques of tooth sectioning, described by Kumar and Kher (2018).

Study design

PICO question was used to evaluate the outcomes in soft tissue and bone change. Population was concentrated on the immediate implant placement. The intervention for this study was the socket shield technique for immediate implant placement in esthetic zone. This study compared socket shield technique to the conventional Type I immediate implant placement in esthetic zone. The outcome measures would look into the changes in soft tissues and bone change, which consisted of implant survival /failure rate, marginal bone loss, Pink Esthetic Score (PES) and Patient Related Outcome Measures (PROM).

Inclusion criteria

This study was focused on human findings only. The study included only those implants placed in the esthetic zone with the follow up more than 6 months. The study included prospective clinical trials, randomized controlled trials and retrospective studies.

Exclusion criteria

Studies done on animals were excluded from this study. The implants placed in animals were excluded as well. The posterior teeth had not been included in this study. Any follow up that had not reached 6 months were out of this study.

RESULTS

I. Implant failure rate

Table 1. Implant failure rate

Author/Year	Study type	Sample (n)	F/U time (months)	Implant failure rate
Xu et al., 2019[6]	Prospective clinical trial	24 implants (24 patients)	12	IIP: 0/12 SST: 0/12
Barakat et al., 2017[7]	RCT	20 implants (20 patients 20–50 years old)	7	IIP: 0/10 SST: 0/10
Bramanti et al., 2018[8]	RCT	40 implants (40 patients)	36	IIP: 0/20 SST: 0/20
Tiwari et al., 2019[9]	RCT	16 implants (16 patients)	12	IIP: 0/8 SST: 0/8
Sun et al., 2020[10]	RCT	30 implants (30 patients)	24	IIP: 0/15 SST: 0/15

Five studies with a total of 130 implants with a follow up time ranging from 7 to 36 months were analyzed in this study group. This included prospective clinical trials and randomized controlled trials (RCT). When comparing the immediate implant placement groups to the SST group, none of the groups had implant failure.

Table 2. Implant failure rate in socket shield technique cases

Author/Year	Study type	Sample (n)	F/U time (months)	Implant failure rate
Siormpas et al., 2018[11]	Retrospective study	250 dental implants (182 patients 18–83 years old)	120	SST: 5/250
Siormpas et al., 2014[12]	Retrospective study	46 dental implants (46 patients 28–70 years old)	24–60	SST: 0/46
Baumer et al., 2017[13]	Retrospective study	10 dental implants (10 patients)	51–63	SST: 0/10

Nguyen et al., 2019[14]	Case series	4 dental implants (3 patients 62–87 years old)	24–72	SST: 0/4
Kher et al., 2018[15]	Prospective clinical trial	10 dental implants (10 patients)	12–42	SST: 0/21
Mitsias et al., 2020[16]	Prospective clinical trial	10 dental implants (10 patients)	42	SST: 0/10
Han et al., 2018[17]	Prospective clinical trial	40 dental implants (30 patients 20–82 years old)	12	SST: 0/40

Additional of seven studies conducted only on SST groups ranging from retrospective studies to case series and prospective clinical trials were selected where a total of 324 implants were placed in 245 patients. The patients' age varied from 18 to 87 years. It was found that a study conducted by Siormpas et al. in 2018, where 250 implants were placed, the implant failure rate was at 2% with a total loss of 5 implants.

II. Marginal bone loss

Table 3. The studies with marginal bone loss outcomes

Author/Year	Study type	Sample (n)	F/U time (months)	Marginal bone loss
Barakat et al., 2017[7]	RCT	20 implants (20 patients 20–50 years old)	7	IIP: 1.61 ± 0.78 mm (VBL) SST: 0.44 ± 0.24 mm (VBL)
Bramanti et al., 2018[8]	RCT	40 implants (40 patients)	36	IIP: 1.11 ± 0.13 mm SST: 0.60 ± 0.06 mm
Tiwari et al., 2019[9]	RCT	16 implants (16 patients)	12	IIP: 0.188 ± 0.013 mm SST: 0.030 ± 0.025 mm

Three randomized clinical trial studies were chosen to evaluate marginal bone loss, where 76 implants were placed on 76 patients. the follow up time ranged from 7 months to 3 years. Vertical bone loss was measured in the study conducted by Barakat et al. in 2017. The immediate implant placement group had a mean vertical bone loss (VBL) of 1.61 ± 0.78 mm. SST group had a mean VBL of 0.44 ± 0.24 mm. Bramanti et al. had similar findings where the marginal bone loss measured at IIP group was at 1.11 ± 0.13 mm, whereas SST group had a mean marginal bone loss of 0.60 ± 0.06 mm. Tiwari et al. conducted a study with 0.188 ± 0.013 mm marginal bone loss in IIP group and 0.030 ± 0.025 mm in the SST group.

Three studies that were conducted in SST group only. The report done in 59 patients with a total of 60 implants. All the studies had minimal bone loss, which had no significant difference.

Table 4. Marginal bone loss in SST

Author/Year	Study type	Sample (n)	F/U time (months)	Marginal bone loss
Siormpas et al., 2014[12]	Retrospective study	46 dental implants (46 patients 28–70 years old)	24–60	0.18 ± 0.09 mm mesial and 0.21 ± 0.09 mm distal marginal bone loss
Baumer et al., 2017[13]	Retrospective study	10 dental implants (10 patients)	51–63	0.33 ± 0.43 mm mesial and 0.17 ± 0.36 mm distal marginal bone loss
Nguyen et al., 2019[14]	Case series	4 dental implants (3 patients 62–87 years old)	24–72	0.1 ± 0.2 mm marginal bone loss

III. Pink Esthetic Score

Table 5. The studies with Pink Esthetic Score outcomes

Author/Year	Study type	Sample (n)	F/U time (months)	PES
Bramanti et al., 2018[8]	RCT	40 implants (40 patients)	36	IIP: 10.3 ± 2.53 SST: 12.2 ± 0.76
Sun et al., 2020[10]	RCT	30 implants (30 patients)	24	IIP: 11.3 ± 1.76 SST: 12.1 ± 1.62

The RCT study performed on IIP and SST groups showed that the SST group had higher PES, but there was no significant difference.

Two studies were chosen from year 2017 and 2018 with a total of 20 implants, where the study was conducted on SST groups only. Both achieved PES of 12.

Table 6. Pink Esthetic Score in SST group

Author/Year	Study type	Sample (n)	F/U time (months)	PES
Baumer et al., 2017[13]	Retrospective study	10 dental implants (10 patients)	51–63	12
Kher et al., 2018[15]	Prospective clinical trial	10 dental implants (10 patients)	12–42	12

IV. Soft and hard tissue changes

Table 7. The studies with soft and hard tissue change outcomes

Author/Year	Study type	Sample (n)	F/U time (months)	Soft and hard tissue change
Barakat et al., 2017[7]	RCT	20 implants (20 patients, 20–50 years old)	7	IIP: 2.12 ± 0.64 mm (PD) SST: 1.73 ± 0.28 mm (PD)
Tiwari et al., 2019[9]	RCT	16 implants (16 patients)	12	IIP: Labial bone thickness: 0.988 ± 0.173 mm SST: Labial bone thickness: 1.145 ± 0.277 mm

In two studies, the soft and hard tissues were compared between the IIP and SST groups. The probing depth of IIP group was 2.12 ± 0.64 mm whereas SST group was 1.73 ± 0.28 mm. Labial bone thickness was also measured in both the groups and none had any significant difference. Studies conducted on SST groups alone had a loss of labial tissues ranging from 0 to -0.37mm. The maximum mid-facial recession was measured to be 0.23 mm.

Table 8. Soft and hard tissue changes in SST

Author/Year	Study type	Sample (n)	F/U time (months)	Soft and hard tissue change
Baumer et al., 2017[13]	Retrospective study	10 dental implants (10 patients)	51–63	SST: −0.37 ± 0.18 mm loss of buccal tissue and −0.33 ± 0.23 mm mid-facial recession
Nguyen et al., 2019[14]	Case series	4 dental implants (3 patients 62–87 years old)	24–72	SST: No changes in soft tissue dimensions
Mitsias et al., 2020[16]	Prospective clinical trial	10 dental implants (10 patients)	42	SST: 0.19 mm (0.10 – 0.28 mm) mid-facial recession

V. Implant survival rate

Table 9. The studies with implant survival rate outcomes

Author/Year	Study type	Sample (n)	F/U time (months)	Implant failure (n)	Grafting	Survival rate (%)
Barakat et al. 2017[7]	RCT	10 IIP 10 SST	7	-	No mention	100
Bramanti et al. 2018[8]	RCT	20 IIP 20 SST	36	-	Allograft in control group	100
Xu et al. 2019[6]	Prospective nonrandomized controlled study	12 IIP 12 SST	12	-	Bio-Oss bone powder	100

Two RCT and a Prospective nonrandomized controlled study were chosen to compare the implant survival rate of both the groups. The survival rate was found to be at 100%.

Eleven studies from year 2014 to 2019 were conducted on SST groups with a follow up time ranging from 1 year to 10 years. Gluckman et al. in 2017 had an implant survival rate of 96.1%, whereas Siormpas et al. in 2018 had an implant survival rate of 96.5%. All the remaining studies showed an implant survival rate at 100%.

This section compares PROM mean of IIP with xenograft group versus SST group. The sum total of WES, PES and function had higher values in SST groups, but showed no statistical difference.

Table 10. Implant survival rate in SST

Author/Year	Study type	Sample (n)	F/U time (months)	Implant failure (n)	Grafting	Survival rate (%)
Siormpas et al., 2014[12]	Retrospective study	46 SST	24-60	-	No	100
Lagas et al. 2015[21]	Retrospective study	16 SST	15	-	No mention	100
Abitbol et al. 2016[22]	Retrospective study	23 SST	12	-	Xenograft / allograft	100
Gluckman et al. 2017[23]	Retrospective study	128 SST	48	5	No mention	96.1
Baumer et al. 2017[13]	Retrospective study	10 SST	51-63	-	Enamel matrix protein	100
Han et al. 2018[17]	Prospective study	40 SST 34 max, 6 man	12	-	No	100
Siormpas et al., 2018[11]	Retrospective study	250 implants SST 230 max, 20 man	120	5	No	96.5
Zhu et al. 2018[20]	Prospective study	10 SST	12-48	-	No mention	100
Kher et al. 2018[15]	Retrospective study	21 SST	12-42	-	No	100
Yan et al. 2019[19]	Prospective study	10 SST	12	-	Bio-Oss bone powder	100
Walid and Alkhodary, 2019[18]	Prospective study	18 SST	12	-	Bioactive glass	100

VI. Patient-reported outcome measure (VAS)

Table 11. Patient-reported outcome measure (VAS) comparing between SST and IIP with xenograft groups

PROM	SST group Mean	IIP with xenograft group Mean	*p*-value
WES	9.37 +/- 0.91	9.25 +/- 0.70	0.606
PES	9.62 +/- 0.51	9.25 +/- 0.70	0.263
Function	9.12 +/- 0.99	9.25 +/- 0.70	0.866
Total	9.37 +/- 0.80	9.25 +/- 0.70	0.602

DISCUSSION

This individual study mainly focused on comparing the implant failure rate, marginal bone loss, PES, soft and hard tissue changes, implant survival rate and patient related outcome measures of the conventional immediate implant placement groups versus the proposed socket shield technique. The results showed that there was no statistical difference in both the groups when various comparisons were performed. However, when the implant failure rate in the SST groups was performed alone, Siormpas et. al. (2018) had an implant failure rate of 2%.[11] This study has a strong follow up of 10 years. Of the five failure cases reported, two had failure in osseointegration and three had untreatable peri-implantitis. Three randomized clinical trial studies were chosen to evaluate marginal bone loss, where 76 implants were placed on 76 patients. The follow up time ranged from seven months to three years. Vertical bone loss was measured in the study conducted by Barakat et al. in 2017.[7] The immediate implant placement group had a mean vertical bone loss (VBL) of 1.61 ± 0.78 mm. SST group had a mean VBL of 0.44 ± 0.24 mm. Bramanti et al. (2018) had similar findings, where the marginal bone loss measured at IIP group was at 1.11 ± 0.13 mm, whereas SST group had a mean marginal bone loss of 0.60 ± 0.06 mm. Tiwari et al. (2019) conducted a study with 0.188 ± 0.013 mm marginal bone loss in IIP group and 0.030 ± 0.025 mm in the SST group.[9] Three studies that were conducted in SST group only. The report done in 59 patients with a total of 60 implants. Siormpas et al. in 2014 had a mesial and distal marginal bine loss of 0.18 ± 0.09 mm and 0.21 ± 0.09 mm respectively.[12] Baumer et al. in 2017 had a mesial marginal bone loss of 0.33 ± 0.43 mm and a distal marginal bone loss of 0.17 ± 0.36 mm.[13] Nguyen et al. reported in 2019 to have a marginal bone loss of 0.1 ± 0.2 mm[14]. Two RCT studies conducted by Bramanti et al.[8] and Sun et al.[10] with the follow up ranging from two to three years compared pink esthetic scores in both IIP and SST groups. The PES values for IIP group in the study conducted by Bramanti et al.[8] were 10.30 ± 2.53 and 12.15 ± 0.76 for the SST group. Sun et al. had similar higher values for SST group when compared to the IIP group[10], with the values 12.07 ± 1.62 for SST group and 11.33 ± 1.76 for IIP groups. Although, the SST group had higher values, there was no significant difference among the two groups. In two studies, the soft and hard tissues were compared between the IIP and SST groups. The probing depth of IIP group was 2.12 ± 0.64 mm whereas SST group was 1.73 ± 0.28 mm. Labial bone thickness was also measured in both the groups and none had any significant difference. Three studies were conducted on SST group only. Baumer et al, 2017 performed a retrospective study on 10 patients using 10 implants with a follow up time of 51 – 63 months. There was a 0.37 ± 1.18 mm loss of buccal tissue and 0.33 ± 0.23 mm mid-facial recession. Nguyen et al., 2019 did a case series on 3 patients with age 62-87 years. A follow up was done on for two to six years where they found no changes in soft tissue dimensions.[14]

Mitsias et al., 2020 performed a prospective clinical trial in 10 patients and did a follow up for 42 months and found 0.19 mm (0.10–0.28 mm) mid-facial recession.[16] Two RCT and one Prospective nonrandomized controlled study was conducted to compare the implant failure rate on both IIP and SST groups. All were in agreement where Barakat et al. 2017[7], Bramanti et al. 2018[8] and Xu et al.[6] 2019 had a 100 percent survival rate for both the groups. Studies done solely on SST group to evaluate the implant survival rate by Gluckman et al. 2017 showed a survival rate of 96.1%.[3] The implants failed to osseointegrate and had to be removed. A retrospective study done by Siormpas et al., 2018 had five implants failing, affecting the implant survival rate to 96.5%.[11] The last comparison section for IIP and SST groups was patient related outcome measures. The total mean values for WES, PES and function in SST group was 9.37 +/- 0.80, whereas the total group mean for IIP with xenograft group mean was 9.25 +/- 0.70. The *p*-values was 0.602, showing no statistical difference.

Socket shield technique in the esthetic zone is an

ongoing experimental procedure where clinicians are finding new ways to preserve the natural biological characteristics.

CONCLUSION

The current reports on SST has a wide variety of studies like retrospective studies, case series, case reports and prospective randomized controlled trials with short to long-term follow-ups. Additionally, the indications, contraindications and limitations of PET should be clearly understood and authenticated. SST is a promising technique that offers a chance to preserve the natural biological characteristics as opposed to the conventional implant placement techniques, but more research is needed to establish its clinical applicability and predictability.

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