

## Evaluation of Soft tissue around Single-tooth Implant Crowns, Immediate placement versus Conventional placement.

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### Abstract

**Aim:** To compare the soft-tissue esthetic outcome of single implants placed in fresh extraction sockets versus those placed in healed sockets. **Materials and Methods:** This descriptive, analytical, and cross-sectional study was conducted on 22 patients including 12 males and 10 females with a mean age of 36 years (range 22–50 years); of which, 12 underwent immediate and 10 underwent conventional (delayed) implant placement. Outcome assessments included clinical and radiographic examinations. The esthetic outcome was objectively rated using the pink esthetic score (PES).

**Results:** The mean PES was  $7.54 \pm 1.27$  and  $7.10 \pm 1.62$  in the immediate and conventional groups, respectively. This difference was not statistically significant ( $P > 0.05$ ). **Conclusions:** Immediate and conventional single implant treatments yielded comparable esthetic scores.

**Key words:** Immediate implant placement, Pink esthetic score, Single implant

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### I. Introduction

Single-tooth implants have become a standard in dentistry and are considered state of the art (Tarnow & Eskow 1995) and standard care (Newman 1999). As implant survival and success rates are high (Avivi-Arber & Zarb 1996; Scheller et al. 1998; Haas et al. 2002), the esthetic outcome has become the main focus of interest in esthetically sensitive areas. To achieve an optimal esthetic outcome, implants must be placed in an optimal position and inclination (de Lange 1995; Phillips & Kois 1998). Ideally, successful implant-supported restorations should imitate the appearance of natural teeth (Belser et al. 2004). The condition of the peri-implant soft tissue appears to be the critical determinant (Garber 1996). The level of the peri-implant soft tissue, which influences the crown length, and its color and texture are decisive for the 'natural' appearance of implant-supported single-tooth replacements (Chang et al. 1999). Several indexes have been proposed for esthetic assessment of implants. The papilla index, pink esthetic score (PES), implant-crown esthetic index, and PES/white esthetic score are among the most reliable indexes for this purpose. Considering the significance of esthetic outcome of peri-implant soft tissue, especially in the anterior region, this study aimed to compare the esthetic outcome of single implants placed in fresh extraction sockets versus those placed in healed sites.

### II. Materials and Methods

Patients who received single implants by immediate or delayed placement in Dept of Periodontics, Govt Dental College Srinagar were involved in the study after written voluntary consent. This study was approved by the ethical committee, Govt Dental College, Srinagar. Inclusion criteria – (1) The presence of at least one natural tooth at each side of the respective implant, and (2) minimum of 6 months had to be passed since prosthetic delivery and loading of implant. Exclusion criteria – (1) History of periodontal disease, (2) soft- or hard-tissue grafting before or during implant placement, (3) systemic diseases affecting periodontal conditions such as diabetes mellitus, (4) severe smoking, and (5) pregnancy.

**Non surgical periodontal therapy:** All the patients received NSPT before the start of surgical procedure.

**Surgical technique employed**

The implant placement was planned based on clinical and radiographic evaluation. All surgeries were performed using a midcrestal incision following local xylocaine anesthesia. No releasing incisions were used. After full-thickness flaps were elevated labially and lingually to expose the bone ridge. Next, in both groups, implant placement site was prepared by specific drills under continuous irrigation, and implants were placed 0.5–1 mm beneath the bone crest according to the principles of 3D placement of implants. In both groups, implants were submerged and loaded after 6 months.

**For immediate implant placement:**

The flap was conventionally elevated. The teeth were gently luxated, and lateral forces were avoided to prevent damage to buccal and lingual plates. After atraumatic extraction of tooth, the extraction socket was debrided and rinsed with saline. Implant was then placed in the fresh socket after ensuring the presence of four intact bony walls without dehiscence or fenestration. In immediate implant placement, none of the patients received bone graft to fill the gap.

**For conventional implant placement:** Patient presented 6 months after extraction.

**Clinical and radiographic examination:**

The patients were recalled for a radiographic and clinical examination 6–8 months after crown placements (follow-up) and were carried out by an experienced periodontist who was not involved in the process of implant placement or prosthetic restoration. Clinical examination of each patient included measurement of PES.

**Pink esthetic score<sup>1</sup>**

For assessment of esthetic outcome, PES was determined for each patient. PES included five parameters of mesial papilla, distal papilla, facial mucosa curvature, facial mucosa level, and last parameter including three components of root surface convexity, soft-tissue color, and soft-tissue texture. Scores 0, 1, or 2 were allocated to each parameter.

Variables of pink esthetic score

Variables		0	1	2
Mesial papilla	Shape vs. reference tooth	Absent	Incomplete	Complete
Distal papilla	Shape vs. reference tooth	Absent	Incomplete	Complete
Level of soft-tissue margin	Level vs. reference tooth	Major discrepancy > 2 mm	Minor discrepancy 1–2 mm	No discrepancy <1 mm
Soft-tissue contour	Natural, matching reference tooth	Unnatural	Fairly natural	Natural
Alveolar process	Alveolar process deficiency	Obvious	Slight	None
Soft-tissue color	Color vs. reference tooth	Obvious difference	Moderate difference	No difference
Soft-tissue texture	Texture vs. reference tooth	Obvious difference	Moderate difference	No difference

Mesial and distal papilla parameters were scored 2 in case of complete presence of papilla, 1 in case of partial presence of papilla, and 0 in case of absence of papilla. Facial mucosa curvature was defined as visibility of implant restoration margins over the facial soft tissue and scored 2 in case of complete adaptation, 1 in case of presence of small difference, and 0 in case of presence of significant difference. Facial mucosa level was assessed by comparing the level of mucosa relative to that of a control tooth and scored 2 in case of similarity, 1 in case of difference ≤1 mm, and 0 in case of difference ≥1 mm. Regarding the last parameter, color and appearance of soft-tissue indicate presence or absence of inflammatory process which affects the appearance of implant restoration. In case of complete adaptation of all three factors with those in a control tooth, this parameter was scored 2, adaptation of two factors scored 1, and no adaptation was scored 0. The total score of 10 (2 × 5) for PES index was considered optimal. The acceptable score was ≥ 6. Clinical photographs ( Nikon, Tokyo, Japan) of the implant crowns and soft tissue, including at least one adjacent tooth on each side, were obtained after the scoring each PES parameter. The photographs were taken by the same nurse.

**Radiographic parameters**

Parallel radiographs were requested for each implant to assess the presence of radiolucency around implant and bone loss. Radiographs were scanned, and bone loss was quantified by measuring the distance between the implant shoulder and bone crest with 0.1 mm accuracy. Radiographic findings were used to determine implant success rate according to the Alberktsson's criteria.

**III. Results**

This descriptive, analytical, and cross- sectional study was conducted on 22 patients including 12 males and 10 females with a mean age of 36 years (range 22–50 years); of which, 12 underwent immediate and 10 underwent conventional (delayed) implant placement. The assessment of outcome was done 12.42 ± 8.37 months after treatment in the immediate group and 12.25 ± 7.10 months after treatment in the conventional group. The difference in this regard between the two groups was not statistically significant (P > 0.05).

**Treated sites**

All teeth treated in this study were maxillary anterior teeth. Table 1 shows the distribution of implant sites.

**Bone loss**

The mean bone loss was  $0.59 \pm 0.44$  mm in the immediate and  $0.43 \pm 0.39$  mm in the conventional group. The difference in this regard was not statistically significant between the two groups ( $P = 0.779$ ).

**Pink esthetic score**

Table 2 compares the peri- implant soft- tissue esthetic outcome in the two groups. As shown in Table 2, the mean PES was 7.54 (range 5–10) in the immediate and 7.10 (range 5–10) in the conventional group. The difference in this regard was not statistically significant between the two groups ( $P > 0.05$ ). No implant showed unacceptable PES in any of the two groups.

**Table 1:** Distribution of implant sites in the two groups

Treatment strategy	Central incisor	Lateral incisor	Canine	Premolar	Total
IIP	4	1	1	6	12
CIP	2	1	1	6	10

IIP- Immediate implant placement, CIP- Conventional implant placement.

**Table 2:** Esthetic outcome

	IIP n = 12			CIP n = 10		
	0	1	2	0	1	2
Mesial papilla	0	4	8	0	4	6
Distal papilla	0	6	6	0	5	5
Midfacial level	1	1	10	0	2	8
Midfacial contour (alveolar process)	0	2	10	0	2	8
Soft tissue color (soft- tissue texture)	0	6	6	2	5	3
Pink esthetic score, mean±SD	7.54±1.27			7.10 ± 1.62		

**IV. Discussion**

The esthetic peri-implant tissues, including health, height, volume, color and contour must be in harmony with the healthy surrounding dentition. Our study focused on the peri-implant tissues and a new defined PES was applied. The PES integrates seven variables for a simple and clinically practiced evaluation with a 2–1–0 score rating system. Furhauser et al. first carried out an evaluation of soft tissue around 30 single-tooth implant crowns with PES in 2005.<sup>1</sup> Their result revealed that PES was a suitable instrument for reproducibly evaluating soft tissue around single-tooth implant crowns.

In the current study, both groups acquired acceptable score with no significant difference between the two, which was in line with the findings of similar previous studies.<sup>2-5</sup> Also according to the Systematic Review in 2016, no significant difference of the esthetic outcomes was reported following immediate as compared with conventional implant placement.<sup>6</sup>

PES did not show any significant difference between the two groups regarding papillary height. This finding was in line with that of previous studies that found no significant difference in the papilla score between the two groups.<sup>7,8,9,10</sup> This finding was also in agreement with that of previous studies showing that papilla fullness is independent of the time of implant surgery relative to tooth extraction.<sup>11,12</sup> In other words, based on several studies, interdental papillary height depends on the bone peak of adjacent tooth, and time of implant placement has no effect on bone level.<sup>13</sup>

Midfacial gingival level has gained increasing attention in the recent studies, current study showed no significant difference in facial mucosa level between the two groups. Based on Felice *et al.* study, soft- tissue levels score was significantly better at immediate implants as compared with delayed implants.<sup>8</sup> Some studies have reported that thin gingival biotype is an important factor responsible for midfacial gingival recession.<sup>3,14</sup> The presence of labial bone with adequate thickness and height is an important factor affecting long- term stability of gingival margin around implants.<sup>15</sup> Moreover, implant shoulder position also affects mid- facial gingival recession such that buccal shoulder of implant can increase the risk of gingival recession by three times. Therefore, accurate patient selection is the most important factor in this respect.<sup>4,16</sup> In the current study, the three- component parameter of PES was not significantly different between the two groups either. In

detailed assessment of findings, the most important factor responsible for not acquiring a complete score in most cases was found to be absence of adequate alveolar prominence.

## V. Conclusions

This study showed immediate and conventional single implant treatments yielded comparable esthetic scores, although immediate implants show better esthetic outcome.

**Conflicts of Interest: None**

**Source of Support: Nil**

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