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# Assessment of Allograft and Bioresorbable Xenograft in Immediate Implant Placement

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**Abstract---Background:** Use of grafts helps in healing and successful outcome of immediate dental implants. **Materials & Methods:** The study comprised a total of twenty four individuals in the age group between 20 and 56 years with at least one tooth indicated for extraction. The twenty four subjects were divided into two groups; Group A-allograft with implant and Group B-xenograft with implant. The participants were evaluated both clinically (plaque, probing depth) and radiographically for 3 months, 6 months, and 1 year. The level of significance was set at  $P < 0.05$ . **Results:** Xenograft in immediate implant site showed excellent osseointegration around the immediate

implant site. However, the difference between the groups was not statistically significant. *Conclusion:* Both synthetic allograft and bioresorbable xenograft are promising and equally potential in bone formation around the immediate implant site.

**Keywords**---Allograft, Plaque index, gingival index, Xenograft.

## Introduction

The immediate implant procedure compensates the delayed implant placement first because it preserves alveolar bone height and width. Second, it avoids a second surgery with an added advantage of less operator time. Third, it causes less trauma to the tissues and discomfort to the patient. To achieve an optimum treatment outcome with dental implants, adequate bone should be available to support and stabilize them. For enhanced osseointegration, and to prevent buccal plate resorption in an extracted socket, the space between the implant and the socket needs to be filled with a biocompatible material such as a graft. The autogenous bone graft is considered the gold standard because it has got an excellent osteogenic, osteoinductive, and osteoconductive properties without the risk of graft rejection or adverse reactions. However, because of its donor-site morbidity and unpredictable resorption, a range of biomaterials, primarily bone xenografts and allografts, are used in the immediate implant site. PerioGlass is an alloplastic material with osteoconductive properties. It acts as a scaffold for bone formation.<sup>1</sup>

Allografts are tissues taken from genetically non-identical members of the same species, i.e. from another human. Cancellous and cortical allografts of various particle sizes are regularly used for bone regeneration procedures with minimal risk of disease transmission. Xenografts are graft tissues obtained from non-human species, i.e. animals and are usually osteoconductive with limited resorptive potential. Hydroxyapatite (HA). This is a commonly used calcium phosphate biomaterial for bone regeneration applications due to having a composition and structure similar to natural bone mineral. <sup>2</sup>Adell et al obtained good results with osteointegrated implants on long term followup.<sup>3</sup>

Brugnami et al stated that clinically, buccal plate preservation (BPP), by placing a bone graft overlying the buccal plate after extraction may help to maintain or augment the soft tissue appearance compared to nontreatment.<sup>4</sup> The present study compared xenograft graft material with allograft in immediate dental implant patients.

## Materials and Methods

A comparative clinical study was conducted in department of Prosthodontics after obtaining ethical clearance from institutional ethics committee and informed consent was obtained from participants. Twenty four patients were selected to place immediate implant from OPD department of Prosthodontics and these participants were divided into group A (synthetic allograft material (PerioGlas)) and Group B(xenograft- (Bio-Oss).) Group based on graft material used. All

participants who underwent extraction and BPP, followed by immediate implant placement using standardized clinical and laboratory protocol after considering inclusion and exclusion criteria.

### **Surgical procedures**

Following local anesthesia administration, teeth indicated for extractions were removed atraumatically. The sockets were then further evaluated and full-thickness subperiosteal labial and palatal flaps were reflected. A pilot drill, usually 2 mm in diameter, was drilled at the implant site to establish the depth and axis of the implant recipient site. The implant was placed with its axis parallel to the occlusal forces. Sequential drilling at 800–1000 rpm was carried out until the desired dimensions depended on the required size of the implant. Furthermore, the implant (genesis) of size (4.0 mm × 11 mm and 3.5 mm × 11 mm) was placed, later respective bone graft was placed in the created surgical pouch. The membrane was placed over the graft, and 3-0 vicryl sutures were used to close the surgical wound. Oral hygiene instructions were given to patients and were followed up periodically both clinically and radiographically for 1 year.

### **Soft-tissue evaluation criteria**

Evaluation of the soft tissue was done at four sites (mesial, index, gingival index, and by measuring the probing depth). Probing depth was measured using a calibrated probe at both the full-mouth (FM) site and the immediate implantation site (IMP). Radiographic evaluation criteria Intraoral periapical (IOPA) radiographs were taken using the long-cone paralleling technique. The radiograph was assessed at 3 months, 6 months, and 1 year.

**Statistical analysis:** IBM SPSS version 21.0, Chicago was used for the study. A less than 0.05 was regarded as considerable.

### **Results**

Table 1 shows the comparison between mean plaque index values between Groups A and B in different periods at different sites. At the end of 1 year, the plaque index values for Groups A and B were 0.68 and 0.7, respectively.

Table 2 indicates the comparison between mean gingival index values between Groups A and B for different sites (FM and IMP) 3 months, 6 months, and 1 year. In Group A, the FM gingival index was as follows:  $0.63 \pm 0.32$  at 3 months,  $0.59 \pm 0.12$  at 6 months, and  $0.62 \pm 0.13$  at 1 year. Similarly, in Group B, the FM was  $0.62 \pm 0.17$  at 3 months,  $0.75 \pm 0.14$  at 6 months, and  $0.73 \pm 0.56$  at 1 year. However, in the IMP site, the plaque index of Group A was as follows:  $0.68 \pm 0.21$  at 3 months,  $0.70 \pm 0.22$  at 6 months, and  $0.69 \pm 0.16$  at 1 year, and in Group B, the IMP gingival index was  $0.74 \pm 0.3$  at 3 months,  $0.73 \pm 0.24$  at 6 months, and  $0.70 \pm 0.18$  at the end of 1 year. Clinically excellent healing was observed after placement of the implant with both allograft and xenograft.

Table 3 indicates the values of probing depth in mesial, distal, buccal, and lingual sites at 6 months, and 1 year. The results showed that the probing depth was further decreased over a period of 1 year, suggesting that the implant has good stability. Table indicates bone resorption in both groups on mesial and distal side at 3, 6 and 9 months. There was decrease in bone resorption at 3 months to 1 year in both the groups. It indicates successful outcome of grafts.

## Discussion

Bone graft are helpful in healing of immediate implant placement and its success rate. The present study was done to evaluate the effectiveness of allograft over xenograft in immediate implant placement.

Serrano Méndez et al assessed allografts and xenografts used for alveolar ridge preservation. They concluded that both grafting materials are suitable for the preservation of the alveolar ridge.<sup>5</sup> Schwartz-Arad and Chaushu assessed success of autogenous bone chips in immediate implant placement and stated that immediate implant placement in the anterior maxilla can be successful for replacing a single tooth even without primary closure.<sup>6</sup>

Paolantonio et al assessed clinical and histological aspect after immediate implantation in fresh extraction sockets. They found that clinical outcome and degree of osteointegration does not differ from implants placed in healed, mature bone.<sup>7</sup>

Shirmohammadi et al evaluated the efficacy of Anorganic Bovine Bone (Bio-Oss) and Nanocrystalline Hydroxyapatite (Ostim) in Maxillary Sinus Floor Augmentation. They concluded that Ostim and Bio-Oss are useful biomaterials in sinus augmentation and Ostim seems to be even more effective in new bone formation.<sup>8</sup>

Stacchi et al assessed histologic and histomorphometric comparison between Sintered Nanohydroxyapatite and Anorganic Bovine Xenograft in Maxillary Sinus Grafting. They concluded that implant survival rate in NHA group after 12 months of loading was 96.4%, showing no statistically significant differences.<sup>9</sup>

Blaggana et al evaluated the relative efficacy of demineralized freeze-dried bone allograft (DFDBA) vs anorganic bovine bone xenograft (ABBX) in the treatment of human infrabony periodontal defects. They concluded that Both the materials were found to be equally effective in all respects except the gain in attachment level, which was found to be more with DFDBA.<sup>10</sup>

It has been stated that Autogenous bone and a variety of xenogenic graft materials have been employed in conjunction with immediate implantation, with many of them showing successful results.<sup>11</sup> Daniel et al compared the efficacy of synthetic bioactive glass allograft and dried freeze bovine bone grafts in the immediate implant site.<sup>1</sup> The drawback of the present study was smaller sample size. Further studies are needed to verify the results on larger sample size.

## Conclusion

The present study concludes that both the synthetic allograft (PerioGlas) and xenograft (Bio-Oss) have equal potential in bone forming around the implant procedures.

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Conflict of interest: Nil

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### **Legends of illustrations**

**Table 1: Comparison of gingival index at different intervals in both groups**

<b>Parameters</b>	<b>Duration</b>	<b>Group A</b>	<b>Group B</b>	<b>P value</b>
Full mouth gingival index	3 months	0.82	0.78	0.56
	6 months	0.80	0.76	0.56
	1 year	0.78	0.72	0.67
Implant site gingival index	3 months	0.89	0.77	0.78
	6 months	0.81	0.72	0.78
	1 year	0.76	0.70	0.56

**Table 2: Comparison of plaque index at different intervals in both groups**

<b>Parameters</b>	<b>Duration</b>	<b>Group A</b>	<b>Group B</b>	<b>P value</b>
Full mouth plaque index	3 months	0.63	0.62	0.67
	6 months	0.59	0.75	0.87
	1 year	0.62	0.73	0.56
Implant site plaque index	3 months	0.68	0.74	0.56
	6 months	0.70	0.73	0.76
	1 year	0.69	0.70	0.34

**Table 3: Comparison of probing depth in both groups**

<b>Duration</b>	<b>Site</b>	<b>Group A</b>	<b>Group B</b>	<b>P value</b>
6 months	Mesial	2.34	2.28	0.78
	Distal	2.13	2.18	0.56
	Buccal	2.14	2.16	0.78
	Lingual	2.34	2.14	0.67
1 year	Mesial	2.26	2.15	0.45
	Distal	2.21	2.14	0.67
	Buccal	2.18	2.12	0.86
	Lingual	2.06	2.03	0.56

**Table 4: Comparison of bone resorption in both groups**

<b>Duration</b>	<b>Side</b>	<b>Group A</b>	<b>Group B</b>	<b>P value</b>
3 months	Mesial	4.04	4.56	0.11
	Distal	4.56	4.98	0.13
6 months	Mesial	3.34	3.45	0.18
	Distal	3.34	3.23	0.23
1 year	Mesial	3.23	3.12	0.67
	Distal	3.12	3.23	0.16