Treatment of Localized Gingival Recession with Alloderm®, An Acellular Dermal Matrix Allograft: A Six Month Clinical Study

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Abstrct: Aim: Evaluation of root length coverage obtained clinically following use of acellular dermal matrix allograft (alloderm®) in the treatment of class I recession. Methods: The present study included ten individuals who had class I gingival recession on the labial aspect of anterior teeth. Acellular matrix allograft (Alloderm®) was used in this study for gingival recession coverage. Lengh of gingival recession was recorded preoperatively at the time of surgery and post-operatively at 2nd, 4th, 12th and 24th week. Obtained data was statically analyzed. Results: When comparison of mean preoperative and post-operative length of recession (in mm) was done at 180 days all patients showed highly statically significant ($p< 0.01$) decrease in length of recession from preoperative value. When comparison of mean length of recession was done at 90 and 180 days there was no statically significant ($p>0.05$) difference in length of recession at 180 days from 90 days. Conclusion: Within the limits of this clinical study the Acellular dermal matrix allograft Alloderm®, is a useful and predictable surgical technique for treatment of gingival recessions. [M Patel, Natl J Integr Res Med, 2018; 9(3):37-42]

Key Words: Alloderm, Gingival recession, Mucogingival surgery

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Introduction: Gingival recession is a response of the periodontium to mechanical, bacterial and chemical aggressions, which can permanently deform the gingival and vitiate the smile of the patient. It not only poses one of the major esthetic problems but also creates a functional deformity by destruction of attached gingiva. Once the recession transverses the mucogingival line, the non- keratinized mobile alveolar mucosa does not lend itself to the maintenance of a healthy marginal complex. These concerns have given rise to numerous approaches to covering denuded root surfaces and differences of opinion concerning what procedures are most effective. Modern dentistry calls for attention to aesthetic consideration by performing mucogingival corrective surgery. Root coverage is one of the procedure that falls within the definition of mucogingival surgery. A myriads of periodontal surgical procedures that have demonstrated predictable root coverage include various pedicle grafts like lateral (Graupe and Warren 1956)[1], oblique (Pannel 1965)[2], double papillae (Cohen and Ross 1968)[3] and semilunar (Tarnow, 1986)[4], subepithelial connective tissue grafts (Langer and Langer 1985)[5] and guided tissue regeneration. Gingival deficits are usually corrected with autografts from either the palatal mucosa or buccal gingival. It involves a certain degree of discomfort for the patient because of two surgical sites, increasing the risk of pain and hemorrhage post-operatively. Recently an acellular matrix allograft (Alloderm®) was introduces as a substitute for autogenous connective graft material in various periodontal and peri implant surgical procedures. Acellular matrix allograft exhibits undamaged collagen and elastin matrices and does not initiate inflammatory response by the host recipient tissues. Many studies (Dodge JR[6], Harris RJ[7], Aichelmann et al[8], Haim et al[9]) shows that use of alloderm offeres the advantage of an unlimited supply of grafting tissue, elimination of a second surgical site, handaling characteristics similar to connective tissue, non immunogenic character and provides excellent esthetic results. In present study an attempt has been made to clinically evaluate the efficacy of acellular dermal matrix graft (Alloderm®) in the treatment of class I gingival recession and to propose a simple and predictable technique to surgically manage the shallow recession defects.

Method: The present study included ten individuals (6 male and 4 female) who demonstrated isolated class I gingival recession on the labial aspect of anterior teeth. The individuals belonged to age ranged from 18 to 45 years.

Criteria for patient's selection: No systemic disease which contraindicates the periodontal surgery, Isolated class I recession areas on labial aspect of

anterior teeth according to miller's classification, Absence of severe cervical abrasion or root caries. No loss of interdental bone or soft tissue, the teeth involved should be vital. No habit of tobacco chewing or smoking and no previous root coverage procedure at the site

Selection Of Clinical Parameters: All the experimental teeth were measured for gingival recession length. The measurement were recorded pre-operatively (figure 1) at the time of surgery and post-operatively at 2^{nd}, 4^{th}, 12^{th} week and 24^{th} week. Initial therapy consisted predominantly of oral hygiene instruction, use modified stillman's brushing technique, scaling and root planning was done prior to surgical therapy. An appointment for the surgical procedure was generally arranged 7 to 10 days after the initial procedures.

Surgical Procedure: The surgical area was prepared with adequate anesthesia using 2 percent lignocaine hydrochloride containing 1:80,000 epinephrine. A trapezoidal flap was designed using primary incision, sulcular incision and two vertical incisions. After elevation of flap root was thoroughly planed and any convexities of the root were reduced. The intact papillae, mesial and distal to the recession were deepithelized. A measurement of the approximate length and width of the allograft required was obtained with the use of a university of north Carolina probe.

Rehydration And Application Of Alloderm®: The alloderm® with the attached backing was placed in the first dish which was filled with at least 50 ml of rehydration fluid (normal saline). The alloderm® was completely submerged and allowed to soak for 5 min. using sterile gloves and forceps, the backing was removed and discarded. Then alloderm was aseptically transeferred to the second dish which was filled with at least 50 ml of rehydration fluid (normal saline) for 5 min. And graft was transferred to recipient site in such a way so that basement membrane side was placed adjacent to the defect according to Harris (1998)[7]. Firm pressure was applied on the graft with sterile moist gauze pack for 3 to 5 min to adapt and adhere the graft to the recipient wound bed and secured to the wound bed with 5-0 vicryl sutures. (figure 2) The pedicle was then coronally positioned to completely cover the alloderm® and secured with 3-0 silk sutures.(figure 3) A periodontal dressing was applied after tin foil application and post-operative instructions were given.

Table 1: Preoperative and Post- operative Length of Recession (in mm)

Patients	Preoperative	Site	Post operative				
Sr. No.			0 days	10days	30days	90days	180days
1	4.5	Max Rt. 3	0.5	0.6	0.7	0.8	0.8
2	3.2	Max Rt. 3	0	0.1	0.2	0.2	0.2
3	4.5	Mand Lt. 1	0.5	0.5	0.6	0.7	0.7
4	4	Max Rt. 4	0.1	0.3	0.7	0.8	0.8
5	4.3	Max Lt. 3	0.3	0.5	0.9	1	1
6	4	Max Lt. 4	0.4	0.6	0.6	0.7	0.7
7	5.5	Max Lt. 5	0.9	0.9	0.9	1	1
8	6.5	Max Rt. 4	1.4	1.4	1.5	1.5	1.6
9	6	Mand Lt. 1	2.5	2.7	2.9	2.9	2.9
10	5.1	Mand Rt. 1	0.7	0.8	0.9	0.9	0.9

Table 2: Comparison of Mean Preoperative and Post-operative (at 180 days) Length of Recession (in mm)

	Preoperative	0 Day	10 Days	30 Days	90 Days	180 Days	T Value
Mean	4.76	0.73	0.84	0.99	1.05	1.06	18.10**
SD	0.6437	0.740	0.742	0.717	0.726	0.733	
Patients	10	10	10	10	10	10	

P< 0.01

Table 3: Comparison of Mean Length of Recession at 90 and 180 days (in mm)

	Preoperative	0 Day	10 Days	30 Days	90 Days	180 Days	T Value
Mean	4.76	0.73	0.84	0.99	1.05	1.06	1.0 NS
SD	0.6437	0.740	0.742	0.717	0.726	0.733	
Patients	10	10	10	10	10	10	

P>0.05

Figure 1: Preoperative view of surgical site

Figure 2: Placement of alloderm and suturing with 5-0 vicryl sutures

Figure 3: Coronally positioning of the flap and suturing with 3-0 silk suture

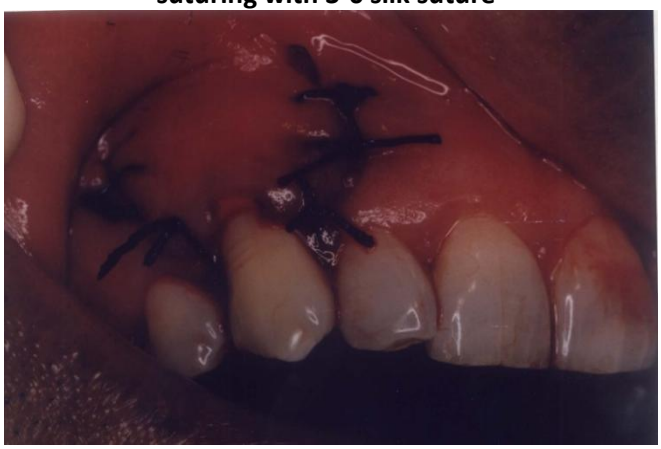
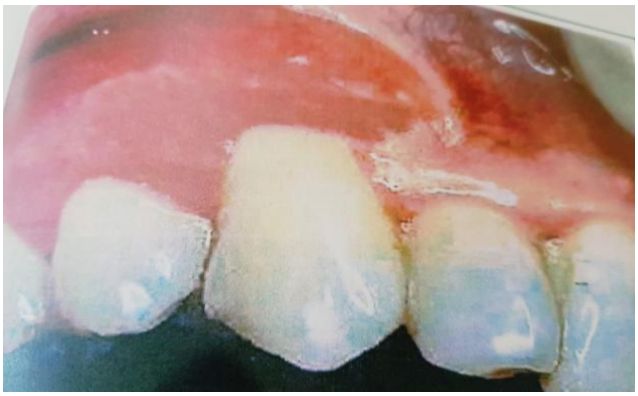


Figure 4: Post operative view of the surgical site at 10 days

Figure 5: Post – operative view of the surgical site at 6 months.



Result: Table 1 showing preoperative and post-operative length of recession (in mm) at 0 days, 10 days (figure 4), 30 days, 90 days and 180 days (figure 5). When comparison of mean preoperative and post-operative length of recession (in mm) was done at 180 days all patients showed highly statically significant (p< 0.01) decrease in length of recession from preoperative value.(table 2) When comparison of mean length of recession was done at 90 and 180 days (in mm) there was no statically significant (p>0.05) difference in length of recession at 180 days from 90 days. (table 3)

Discussion: Obtaining predictable and esthetic root coverage has become an important part of

periodontal therapy. Fueled by desires for cosmetic dentistry and improved esthetics, patients are requesting and at times demanding root coverage procedures. There are many more reasons for which root coverage may be required, such as elimination of the plaque trap, decreasing sensitivity and root caries. Many different surgical procedures have been used to achieve root coverage. These concerns have given rise to numerous approaches to covering denuded root surfaces and differences of opinion concerning what procedures are most effective. Of utmost importance in handling these cases is establishing a correct diagnosis and proper utilization of indicated techniques.

Alloderm®, an acellular dermal matrix graft is an allograft skin recently developed and marketed by Life cell Inc, Tx . It was developed to act as a substitute for connective tissue grafts in the treatment of burn patients. It eliminates the need for any donor site & offers unlimited tissue availability. It is totally non-immunogenic and safe. It consistently integrates with the host tissue and thus does not have to be removed. Clinically it is much like autologous connective tissue to handle, trim, adapt and suture. The purpose of this study was to investigate the success of Alloderm®, an acellular dermal matrix allograft in root coverage when combined with a coronally advanced flap.

The technique originally described by Harris (1998)[7] and used in this study is a sensitive procedure and requires coronal positioning of the flap and total coverage of Alloderm®. But the Alloderm® being a thick material and due to inadequate amount of tissue present at the surgical site, it is not always possible to cover the Alloderm® fully with the flap and some part of it may at times remain exposed. Previous surgical experience indicated that exposed Alloderm® was often lost and caused incomplete root coverage. In this study itself, coverage could not be completely obtained in some cases and loss of exposed Alloderm® was evident in those cases. Thus the most critical part of the procedure is to prevent flap retraction and exposure of the acellular dermal matrix allograft.

Only 10 patients participated in the present study. Patients with isolated class I gingival recessions were selected for the study. This was similar to the study employed by Harris(2002)[11]. Age of the selected patients ranged from 18-45 yrs. The incidence of recession is very low below this age and after 45 yrs of age, periodontal disease or inadequate zone of attached gingiva or recession in multiple adjacent areas was found. In the present study, root preparation was limited to mechanical scaling and root planing to avoid any possible influence of the acid on the healing of the Alloderm®. In the present study for determination of clinical success, length of recession (in mm) from cementoenamel junction to free gingival margin clinical parameters was used. Length of recession was measured at 0, 10, 30, 90 and 180 days with a University of North Carolina probe. These clinical parameters and time intervals selected were in lieu of studies done by Harris (2002)[10], Mary E. Aichelmann-Reidy et al. (2001)[11], Robin D. Henderson et al (2001)[12] on treatment of gingival recession by acellular dermal matrix allograft.

The acellular dermal matrix was hydrated in normal saline washes and trimmed to fit the recipient bed. The surgical procedure was designed according to the study by Harris(1998)[7]. Harris (1998)[7] in his case report noted that the healing dynamics of root coverage and gingival augmentation are different. So he suggested placing the membrane in the reverse manner i.e. the basement membrane side of the acellular dermal matrix graft is placed towards the defect. In the present study the connective tissue side of the Alloderm® was placed facing the flap while basement membrane side was placed facing the defect. Robin D. Henderson et al (2001)[12] in his study showed that orientation of an acellular dermal matrix allograft, Alloderm® basement membrane side against the tooth or connective tissue side against the tooth did not affect the percent root coverage. Haim Tal (1999)[9] reported an increase of 2.0mm in keratinized tissue when the basement membrane of the acellular dermal matrix was placed facing the flap's connective tissue.

After proper positioning & suturing of Alloderm® with resorbable sutures a coronally positioned flap as described by Bernimoulin et al (1975)[13] was utilized to cover the Alloderm®. The grafted sites were followed up for a period of 24 weeks in order to (i) verify the effectiveness of an acellular dermal matrix graft in terms of primary root coverage (ii) minimize the risk of confounding the interpretation of results with secondary root coverage due to the creeping attachment & finally, (iii) to avoid influence due to possible damages of the gingival margin caused by traumatic tooth brushing.

The mean root coverage values at 90 days remained stable for the next three months. At 180 days there is no statistically significant difference in length of recession form 90 days value (P > 0.05) (Table 3). This study shows results which remained stable from 3 months to 6 months with no creeping attachment noted. This is similar to that obtained by Henderson, Greenwell et al (2001)[12] in which creeping attachment was minimal and recession values at 8 weeks were similar to those found at 12 months. In this study the mean reduction of 3.7mm is the length of recession was achieved which is highly significant (P<0.01) (Table 2). In this prospective clinical study the mean root coverage with acellular dermal matrix graft is 77.73% for class I recessions after 180 days. This is a statistically significant result and implies that the surgical procedure has definite therapeutic utility in clinical practice. These results are in direct correlation with the findings of Randall J. Harris (2000)[14], Robin D. Henderson et al (2001)[12], Mary E. Aichelmann Reidy et al (2001)[11], Arthur B. Novaes Jr. et al (2001)[15], Randall J. Harris (2002)[10] , Haim Tal (1999)[9]. Arthur B. Novaes et al reported a mean recession reduction of 2.10 + 1.00mm at 6 months which was statistically significant.[15] Aichelmann Reidy et al reported 65.9 + 46.7% root coverage at 6 months.[8] Randall J. Harris reported mean root coverage of 91.7% at 4 months and 87% at 18months post operative.[10] Robin D. Henderson noted percent defect coverage of 95% and greater than 90% coverage in 80% of the time.[12] Dodge et al found defect coverage of 96% in a 6 case report[6]. Harris (1998) reported 94% defect coverage[7] and Aichelmann Reidy et al (1998) obtained 86%.[8] Haim Tal (1999) in his case report obtained root coverage of more than 3.5mm that is (80%).[9]

The final results of the present study were esthetically pleasant with proper colour blending. These results were similar to the study done by Harris (2001)[16] who reported “patch” like result with free gingival graft and a more esthetic result with Alloderm® and connective tissue graft when the three techniques were compared. Moreover post operative complain of pain was minimal in the present study. However the present clinical study does not shed any light on healing of acellular dermal matrix allograft at the histological level.

Conclusion: Within the limits of this clinical study the Acellular dermal matrix allograft Alloderm®, is a useful and predictable surgical technique for treatment of gingival recessions. A statistically significant gain in root coverage of 77.73% in class I recessions was obtained. Alloderm® used in this study was well tolerated by gingival tissue and had no adverse effects on treated and adjacent non treated sites.

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