

## Root Coverage with an Acellular Dermal Matrix Graft [Alloderm®] – A Case Report

Balaji VR<sup>1</sup>, Ramakrishnan T<sup>2</sup>, Lavanya V<sup>3</sup>

<sup>1</sup>Professor & HOD, Department of Periodontics, CSI college of Dental sciences & Research, Madurai, India.

<sup>2</sup>Professor & Vice-Principal, MeenakshiAmmal Dental college & hospital, Chennai, India.

<sup>3</sup>Private practitioner, the TN Dr.MGR Medical University, Chennai, India.

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**Abstract:** Obtaining predictable and esthetic root coverage has become an important goal of a periodontal plastic surgeon. The search for perfect root coverage technique has taken many approaches. While several surgical procedures have been proved successful and predictable the most popular are the pedicle soft tissue graft and free tissue graft. In order to minimize two surgical sites an attempt was made to evaluate the clinical efficacy of Acellular Dermal Matrix Graft in the coverage of denuded roots and also to examine the changes in the width of keratinized gingiva.

**Key Words:** Recession, Esthetics, Acellular Dermal Matrix Graft.

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### I. Introduction

Gingival recession is the exposure of root surfaces due to the apical migration of the gingival tissue margins [2]. Root coverage is indicated for eliminating a plaque trap, decreasing sensitivity, treatment of root caries and most importantly improving the esthetics. Obtaining predictable and esthetic root coverage has become an important objective and while several mucogingival surgical procedures have been proved successful and predictable, the most popular are pedicle soft tissue graft and free soft tissue graft procedures[18].

The main drawbacks of free soft tissue grafting procedures are, it involves two surgical procedures for patients [recipient and donor site], wherein there is a large denuded area created on the palate which will be painful during healing and there is a possibility of inconsistent color blending of the graft with the adjacent gingival tissues. The inconsistent color with the free gingival graft was overcome with the introduction of sub-epithelial connective tissue graft (Langer & Langer) in 1985 [13]. This graft had high survival rate as it had dual blood supply and hence was considered the gold standard in grafting procedures. But even though these autografts are predictable they are not without drawbacks. Since, they are harvested from the palate, an additional surgery is needed which will be painful during healing the amount of donor material that was necessary limited the number of teeth that could be treated with a single surgery.

These limitations led to search of alternate methods for root coverage. Klingsberg [12] used preserved sclera for coverage of denuded roots. Schoo&Coppes[16] and Bartolucci[4] tried duramater and obtained gain in the width of attached gingiva and coverage of denuded roots, at the end of their study. Yukna and coworkers [1977] [19] demonstrated the usage of allogenic freeze-dried skin graft for mucogingival problems and also demonstrated that it is a substitute for gingival autografts. Later in the early part of 1980's, David J Mishkin et al[6] reported the first case on the histologic study of Freeze Dried Skin [FDS] allograft in oral cavity.

Since these grafts contained antigens that could cause an immune or inflammatory response and also scarring while healing, Acellular dermal matrix graft [ALLODERM®] has been introduced as a substitute for autogenous grafts. This provides an unlimited supply of graft material without resorting to palatal donor site. Acellular dermal graft is obtained from human donors, by processing the dermis, which removes the cells, thereby taking away the source of disease transmission and immunogenic reaction. This leaves a structurally intact connective tissue matrix composed of type I collagen, which acts as a scaffold to allow ingrowth and replacement by host tissues. Since, the ultrastructural integrity of the Acellular dermal matrix is maintained, there is an absence of inflammatory response. These characteristics make this graft biocompatible and safe over the previously tried freeze-dried skin allograft.

The present case-report is yet another effort to evaluate the clinical effectiveness of Acellular dermal matrix in coverage of denuded roots.

### II. Case Report

A 36-year-old male patient reported to our clinics with the chief complaint of receded gingiva in relation to 23, 24 region since 6 months associated with esthetic problems[fig.1] Upon examination there was class II recession defect in relation to 23 and 24 [Miller's] [14]. In order to restore his gingival health patient was advised for root coverage procedure with Alloderm.

**Fig 1 – preoperative view**



### **II.1. Presurgical Treatment And Records**

At the baseline, the gingival recession was evaluated using the following clinical parameters: Recession depth [D] from the cemento-enamel junction to the gingival margin. Recession width [W] measured at the widest point [It is the distance between the mesial gingival margin and the distal gingival margin of the tooth][8]. Width of the keratinized gingiva. Probing pocket depth [PD]. Clinical attachment level [CAL].

All the measurements were made with a William's periodontal probe [Hu-Friedy] with markings 1,2,3,5,7,8,9 and 10. For all these measurements, the cemento-enamel junction served as the reference point. Measurements were taken to the nearest half-millimeter [0.5mm]. Recession depth and recession width were recorded during the follow up visits at the end of 8th and 16th post-surgical week.

### **II.2. Surgical Technique**

#### **II.2.1. Preparation Of The Recipient Bed**

The surgical area was prepared with adequate anesthesia using 2% Lignocaine HCl containing 1:2,00,000 epinephrine. A Coronally advanced flap procedure was performed with two vertical releasing incisions were placed adjacent to the area of recession, extending apically into the alveolar mucosa and a sulcular incision was made connecting the primary incision. [5]

A full thickness flap was raised up to the mucogingival junction and a partial thickness flap raised thereof [fig.2]. The flap was extended well beyond the mucogingival junction, so that it would not exhibit any tension when pulled coronally beyond cemento-enamel junction [CEJ]. Following flap elevation, the exposed root surfaces were gently curetted with sharp curettes. Then the measurements of the approximate length and width of the graft were obtained with the use of a periodontal probe.

**Fig 2 – after flap reflection**



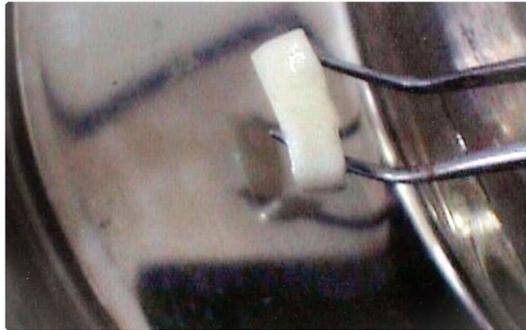
#### **II.2.2. Rehydration And Application Of Alloderm**

The foil bag was opened at the notch and the peel pouch containing Alloderm was removed. The peel pouch was opened and the Alloderm was aseptically transferred with a sterile tweezer. A sufficient dimension of the graft was cut. The Alloderm was trimmed to cover and extend at least 3-4mm on the surrounding bone.

Before use, Alloderm was aseptically transferred in the surgical room, as per the manufacturer's instructions for at least 10 minutes. The Alloderm with the attached backing was placed in the first dish in the sterile field. The dish was filled with at least 50 ml of rehydration fluid [saline]. When the backing floats away, it was removed and discarded. Then the Alloderm was aseptically transferred to the second dish, which contained at least 50ml of rehydration fluid [saline] as that of first dish.

Alloderm was completely submerged and allowed to soak for 5 minutes. Thus Alloderm was fully rehydrated and was ready for application on the recipient bed.[Fig. 3]

**Fig 3 – rehydrated Alloderm**



### II.2.3 Orientation Of The Alloderm

Alloderm has a basement membrane side and a connective tissue side. The correct orientation was determined by, Dermal or connective tissue side: Readily absorbs blood. More shiny or reflective. More slippery. Basement membrane side: Does not readily absorb blood. More dull and / or non-reflective. More rough by touch. In this report, the connective tissue side/dermal side of the Acellular dermal graft was placed towards the defect and the basement membrane side was placed away from the defect.

### II.2.4 Coronal Placement Of The Pedicle Graft

After placement of the graft, it was secured to the wound bed with 5-0 Vicryl sutures. The pedicle was then coronally positioned to cover the Acellular Dermal Matrix Graft and secured with 4-0 black silk.[Fig 4][Fig 5]

**Fig 4 – Alloderm sutured**

**Fig 5 - flap coronally placed and sutured**



A periodontal dressing was applied.[Fig 6] Post operative instructions, antibiotics and analgesics were prescribed. Patient was recalled after 10 days for suture and periodontal dressing removal. The surgical site was evaluated post operatively at 8th and 16th week. Clinical measurements were recorded and analyzed.

Fig 6 Coe-pak placed



**Fig 6 Coe-pak placed**

**Fig 7 post operative after 16 week**

### III. Discussion

Root coverage being a very sensitive or technically demanding procedure, the surgical experience of the clinician is another important factor, which can affect the final outcome of the treatment. Even though several techniques were tried and are in use, each of these procedures has their own drawbacks. Acellular dermal matrix graft is a skin allograft recently developed and marketed by Life Cell Inc, Texas. It was developed to act as a substitute for connective tissue grafts in the treatment of burn patients. It eliminates the need for donor site and offers unlimited tissue availability. It is totally non-immunogenic and safe. Clinically, it acts as much like an autologous connective tissue graft and hence it is very easy to trim, adapt and suture. The purpose of this case report was to investigate the possibility of using Acellular dermal matrix graft [Alloderm] as a substitute for autogenous connective tissue grafts in root coverage when combined with a coronally advanced flap.

In this case report, the root preparation was limited to mechanical scaling and root planing to avoid any possible influence of the acid on the healing of Acellular dermal matrix. However, a study done by Harris et al [2000][8] treated the root surfaces with Tetracycline HCl [125mg/ml] and obtained higher root coverage of 96.2% with the connective tissue and 95.8% with the Acellular dermal matrix grafts.

The processing of the Acellular dermal graft retains the basement membrane, thus creating two distinct surfaces of Acellular dermal matrix, a basement membrane side and a connective tissue side. It is recommended for gingival augmentation, the basement membrane side is placed away from the bone and the connective tissue side is placed in such a way that it rests on the bed.

Harris [1998] [9] 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 be placed towards the defects. Henderson RD et al [1999] [10] suggested that success with the Acellular dermal matrix graft is highly dependant on proper orientation of the graft. He suggested placement of connective tissue side towards the tooth.

AichelmannReidy et al [2001] [1] suggested that high predictable and effective root coverage can be obtained with Acellular dermal matrix graft when the connective tissue side is placed toward root surface and the basement membrane surface is placed toward the flap. Robin D Henderson et al [2001] [11] studied whether orientation of the Acellular dermal graft [i.e., the basement membrane side against the tooth or connective tissue side against the tooth], affected the percentage of root coverage and showed that the orientation of the material did not affect the treatment outcome.

In this case report, the connective tissue side/dermal side of the Acellular dermal graft is placed towards the defect [tooth] and the basement membrane side was placed away from the defect (similar to the studies reported).

In this report, recession depth decreased from baseline to 8th week and 16th week which is significant and correlates well with the results obtained by Harris [2002][7], Henderson et al [1999][10] and Arthur BNovaes et al [1999][3]. The recession width decreased at the end of 8th week and 16th week, which is significant and is consistent with the study done by AichelmannReidy et al [2001][1].

In this case report, there is an increase in width of keratinized gingiva from baseline to 8th week and after 16th week, which correlates well with the study done by AichelmannReidy et al [2001][1]. This significant gain in the width of keratinized tissue is worth noting. It is commonly thought that a connective tissue graft would contribute to keratinization of the overlying epithelium. However, it is not known why an increase in the amount of keratinized tissue would occur in the defects treated with Acellular dermal matrix allograft.

Moreover, the probing depth decreased from baseline to 8th week and after 16th week the probing depth and is consistent with the study done by Tal et al [2002][17].

Clinically, it was difficult to penetrate the sulcus with a probe. There was also no bleeding on probing. These clinical findings are compatible with a healthy attachment. To discover the type of attachment that is formed, it would require the removal of a successfully treated tooth. This type of information generated from human histology, was beyond the scope of this study.

Also in this report, there is a gain in mean clinical attachment level from baseline to 8th week and after 16th week and it correlated well with the results obtained in the studies done by AichelmannReidy et al [2001][1] and Harris [2002][7].

Acellular dermal matrix allograft yielded better color and tissue blended well [fig.7] into the adjacent tissues. This is because the Acellular dermal matrix allograft is mostly incorporated into the tissue and finally remodelled. The presence of Acellular dermal allograft can be identified by the presence of elastin fibers. Elastin fibers are found in the skin and in Acellular dermal matrix, but not in oral mucosa. Hence elastin fibres can act as marker for Acellular dermal matrix.

Complete root coverage [fig.6] was obtained which correlated well with the reports by Paolantonio et al [2002][15] AichelmannReidy et al [2001][1] and Harris [2002][7] who gained root coverage of 87% at the end of 18 months.

Thus, Acellular dermal matrix graft can be used as a substitute for autogenous connective tissue graft. The results obtained with the Acellular dermal graft shows that the surgical procedures with Acellular dermal graft have a definite therapeutic utility in the clinical practice.

#### IV. Conclusion

Acellular dermal graft is a safe, biologically acceptable and effective material that can be used for treatment of gingival recession. The root coverage obtained improved the esthetics and met with the expectations and demands of the patient and also the treating surgeon. There was a significant coverage obtained with Acellular dermal graft and increase in the width of keratinized gingiva. It can be used as an effective substitute for autologous grafts in the treatment of recession. Acellular dermal graft used in this report was well tolerated by gingival tissues and had no adverse effects on treated and adjacent non-treated sites. Even though complete coverage was obtained, this report has a limitation as one patient was treated and we need more sites and clinical studies in future to prove the efficacy of Acellular Dermal Matrix graft.

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