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Short Review

Gingival healing with an acellular dermal matrix

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Abstract: The acellular dermal matrices (ADMs) are an alternative to autologous soft tissue transplants. They represent a scaffold for ingrowing blood vessels and cells, leading to a fast revascularization and tissue integration. However, the opinions regarding their performance and results can be easily divided. While some claim unsatisfactory results, there is an extensive literature support that confirms the opposite. Therefore, this short review summarizes several opinions and concludes that ADMs are suitable alternatives that can support predictable results.

Keywords: acellular dermal matrices; ADM; gingiva, healing; soft tissue

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Introduction

The autologous tissue grafts are still considered as gold standard for gingival healing procedures [1]. However, they require a second surgical site which is why the collagen based acellular dermal matrices (ADMs) have been introduced as an alternative to autologous soft tissue transplants [2]. The ADMs have 3D structure with high interconnected porosity and native collagen structure, which makes an excellent scaffold for ingrowing blood vessels and cells, that supports a fast revascularization and tissue integration [3]. Here the endothelial cells activate, migrate, proliferate, and send signals for blood vessels from the surrounding tissue to grow into the matrix. Also, fibroblasts adhesion and spreading onto the matrix is important part of the entire regenerative process. That is because the simultaneous matrix degradation and the adhering fibroblasts collagen production leads to a complete ADM remodeling into newly formed host tissue within 6-9 months [4].

Unfortunately, certain research poorly interpretates the gingival healing with already well-established ADM [5], [6]. While the results clearly point to already known regenerative mechanisms, the conclusions can describe completely opposite statements [6]. For that reason, it is important to have a critical view on some already published literature.

Critical view on some critical views

Sometimes the lack of proper data leads to publication of same figures in two completely different manuscripts [5], [6]. Apparently, the authors had only three patients in total to support their claims. To be more specific, the patient 1 had obvious and successful recession coverage with satisfactory keratinized tissue gain [6] The only complaint was some slight redness at 4 months post-op and firm mass after 1 year, that could have happen for a number or reasons. The second patient was treated by tunneling technique while leaving the ADM partially exposed, which is contraindicated [6]. Here the authors claimed acceptable clinical results and noticeable increase in the attached gingiva with total root coverage of the second premolar, where the ADM was completely covered. While the histological sections have very poor quality and no cell types can be divided, the authors claim fibrosis and a considerable inflammatory infiltration, which can't be

supported by those figures. That is because no distinction is possible between the soft tissue and the ADM with such histological staining and magnification, meaning that the ADM is more likely to be well integrated and undergoing remodeling process into patient`s new soft tissue rather than being isolated by fibrous capsule. More importantly, the same figures from the third patient have been published in two completely different manuscripts without proper citation [5], [6]. This patient had thin biotype with a reduced height and thickness in keratinized gingiva, which required replacement of edentulous first left upper premolar. Not surprisingly, the authors claimed acceptable clinical results eleven weeks after surgery and the post-extraction horizontal bone defect seemed to be compensated [6]. The only issue was a slight redness after six month and was considered aesthetically unsatisfactory. Also, the authors describe histological section with poorly vascularized fibrous tissue and thick collagen fibers isolating the implanted ADM from surrounding connective tissue. However, while the presence of granulomas is correct, the implanted material can't be collagen and is more likely to be pulp/cellulose leftover from the surgery.

Evidence based

On contrary to the previously discussed research, plenty of data exists on successfully treated various soft tissue indications with the same ADM. For instance, peri-implant keratinized mucosa (PI-KM) augmentation with that ADM was performed on 27 restored implants in 14 patients [7]. After six months, it was demonstrated that ADM effectively augmented PI-KM with mean increase of 5.4 mm and >533%. Furthermore, a comparison of two different ADMs to increase keratinized tissue around dental implants (18 patients with 36 implants) when compared with free gingival graft, showed that there were no major differences between autogenous and the collagen graft materials [8]. Also 30 patients with completely edentulous mandible underwent vestibuloplasty with the same ADM being criticized above [9]. It was concluded that it's an effective alternative to autogenous grafts and can be successfully used to cover the periosteum. In addition, another study on vestibuloplasty with the same ADM for edentulous jaws in 248 patients has proved success in early prosthetic loading [10].

When it comes to gingival recessions treatment, the research with this ADM is also extensive. For example, twelve patients were treated with ADM (37 test sites) and connective tissue graft (37 control sites) by using modified coronally advanced tunnel [11]. After 1 year, the ADM group showed statistically significant improvement in all studied parameters and reduced the morbidity. Another similar study on multiple gingival recession treatment in ten patients, concluded that the use of this ADM showed statistically significant results after six months for class 2 gingival recession coverage if compared to the "gold standard" with autograft [12]. Also, eighteen patients underwent root coverage procedure with this ADM compared to subepithelial connective tissue graft treatment. The authors claimed similar results in both groups, as for reducing patient morbidity, the ADMs can be alternative for gingival recessions treatment [13]. In fact, the same ADM has been also successfully used for various situations like peri-implant soft-tissue augmentation around implants [14], [15], as well as for extraction sockets covering [16].

Conclusions

A successful alternative to autologous soft tissue transplantation are the acellular dermal matrices (ADMs). They serve as a scaffold for blood vessels and cells that are in the process of developing, which promotes rapid revascularization and tissue integration. However, there is room for disagreement regarding their performance and outcomes. Despite claims

to the contrary, there is a plenty of literature that supports the positive treatment outcomes. As a result, this brief review shows a variety of viewpoints and concludes that ADMs are appropriate choice that can support predictable results.

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