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Review Article

Fascia lata: utilization and applications in dental therapy: a comprehensive review

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ABSTRACT

Fascia lata has been identified as an alternative biomaterial in dentistry for tissue regeneration and transplantation. Its efficacy has been demonstrated in alveolar ridge reconstruction, management of gingival recessions, and guided bone regeneration. These applications are attributed to its inherent elasticity, biocompatibility, and the relative ease of donor tissue procurement, positioning it as a viable substitute for autologous connective tissue grafts. Compositional analyses reveal the presence of collagen, hyaluronic acid, fibroblasts, and telocytes-cells integral to tissue repair and regeneration. Two graft modalities exist: autografts and allografts, both subjected to lyophilization and gamma irradiation to mitigate immunogenic responses. Compared to palatal connective tissue grafts, fascia lata grafts exhibit reduced postoperative morbidity by limiting surgical intervention to a single site. Furthermore, its function as a biological membrane promotes mesenchymal cell differentiation into osteoblasts, thereby enhancing osteoinductive capacity. Notwithstanding these benefits, residual genetic material persists in allografts post-processing. Given these attributes, fascia lata represents a promising candidate for advancing periodontal regenerative therapies.

Keywords: Odontology, Fascia lata, Tissue transplantation, Regenerative medicine, Periodontal regeneration

INTRODUCTION

Bone resorption resulting from tooth loss, periodontal disease, dental fractures, trauma, and endodontic lesions leads to defects in the alveolar ridge (Figure 1), which can substantially impair prosthetic rehabilitation. Furthermore, concomitant soft tissue deformities in the surrounding areas are frequently observed. Consequently, soft tissue augmentation procedures have been utilized to enhance esthetic outcomes in restorative treatments, thereby facilitating superior optimization of fixed prosthetic devices.[1] Tissue engineering is a rapidly advancing discipline focused on the generation of tissues that accurately mimic the structure and function of native tissues compromised by injury or disease. Grounded in histological principles and biomedical research, this field facilitates the development of novel, functional tissue constructs.[2] Within dental therapeutic approaches, soft tissue grafts-particularly connective tissue grafts-have shown favorable outcomes. Nonetheless, their limited availability has prompted the adoption of acellular dermal grafts, which obviate the requirement for a secondary surgical donor site. These grafts are indicated for various clinical applications, including augmentation of keratinized gingival thickness, root recession coverage, and maintenance of gingival thickness, among other uses.[3] Notwithstanding its benefits, the application of these grafts may elicit antigenic responses or pose risks of disease transmission, thereby necessitating rigorous oversight and stringent quality control throughout their processing.[4]

Since the 1990s, soft tissue grafts have been employed as substitutes for various graft types across multiple medical disciplines. In dentistry, their application has been focused on serving as alternatives to collagen membranes for guided tissue regeneration and as replacements for palatal connective tissue grafts, particularly in the management of gingival recessions.[5]

Within this context, fascia lata has demonstrated potential as a graft material owing to its elasticity and ease of procurement. Although research on its anatomy, histology, and mechanical properties has expanded, its microscopic structure continues to be investigated, especially regarding the identification of telocytes via electron microscopy.[6]

This article seeks to evaluate the application of fascia lata grafts as an alternative to various materials in dental procedures. It will examine the graft's impact, benefits, limitations, and its role within tissue engineering. Ultimately, the study will assess fascia lata's potential as a grafting material by analyzing its biomechanical characteristics and structural composition.

MECHANICAL AND BIOLOGICAL PROPERTIES

The fascia lata is a deep muscular fascia predominantly constituted by layered collagen fibers interspersed with loose connective tissue abundant in hyaluronic acid. Its mechanical properties derive chiefly from this composition: collagen confers tensile strength, whereas hyaluronic acid ensures adequate hydration and facilitates interlayer gliding. Pathological conditions and aging have been associated with alterations in type I and type II collagen, leading to reduced tissue elasticity.[7]

Histologically, the fascia lata resembles connective tissue with structural features similar to tendons and ligaments. It consists predominantly of fibroblasts, which synthesize collagen and elastin. Moreover, a substantial concentration of mast cells, key mediators in inflammation and tissue repair, is present. Recent studies have also identified a notable population of telocytes, specialized cells implicated in tissue regeneration.[5] Telocytes are a novel cell type implicated in various critical biological functions, including forming intercellular networks with endothelial cells, muscle cells, mast cells, and fibroblasts. These interactions support tissue homeostasis, regeneration, and repair. Furthermore, telocytes mediate cellular communication by secreting signaling molecules such as interleukin-6, vascular endothelial growth factor, and nitric oxide, which modulate gene expression and cellular responses.[6]

Table 1: Seibert classification of alveolar ridge defects.

Class	Defect characteristics
Class I	Horizontal loss of alveolar ridge width (buccolingual dimension) with preserved vertical height.
Class II	Vertical loss of alveolar ridge height (apicocoronal dimension) with maintained buccolingual thickness.
Class III	Combined horizontal and vertical loss affecting both width and height of the alveolar ridge.

Structurally, the fascia lata is characterized as a dense connective tissue arranged in loosely defined parallel fiber bundles, with fibroblasts clustered in aggregates. This organization exhibits higher regularity and structural coherence compared to typical connective tissue.[8] Two primary methods have been described for obtaining fascia lata grafts: autografting, which entails harvesting the fascia lata directly from the patient's muscular region for later use in the oral cavity, and allografting, which utilizes fascia lata sourced from cadaveric donors. These allografts are processed, preserved, and stored in accredited tissue banks prior to clinical use (Figure 1).[5] Fascia lata can be obtained either as an autograft, harvested directly from the patient's thigh, or as an allograft, procured from cadaveric donors and processed in specialized tissue banks to ensure optimal biocompatibility and safety.

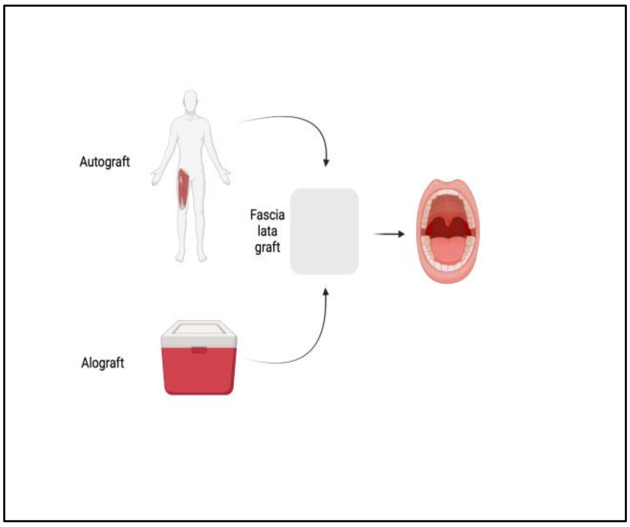

Figure 1: Surgical techniques for harvesting fascia lata grafts.

APPLICATIONS IN THE FIELD OF DENTISTRY

For patients needing soft tissue restoration, such as root coverage, the gold standard remains autologous subepithelial connective tissue grafts. Nevertheless, this approach has limitations, including the requirement of two surgical sites and limited donor tissue availability. Consequently, fascia lata allografts have been proposed as an alternative, showing decreased postoperative morbidity and improved clinical results.[9]

Fascia lata has been employed in guided bone regeneration as a biological barrier that inhibits fibroblast proliferation in bone defect areas while facilitating osteoblast proliferation. When combined with lyophilized bone powder, it effectively prevents connective tissue infiltration at the surgical site, promoting mesenchymal stem cell differentiation into osteoblasts-a process termed osteoinduction.[10]

Furthermore, fascia lata has been utilized in vestibuloplasty procedures, demonstrating complete integration with host tissue after full resorption. Its effectiveness is due to its role as a biological scaffold, facilitating interactions with keratinocytes, fibroblasts, and growth factors, thereby promoting tissue regeneration and repair.[11] The application of fascia lata in mucogingival surgery has been effectively documented, showing significant success in the correction of soft tissue defects surrounding teeth and implants. This approach enhances vascularization and graft stability, resulting in superior aesthetic outcomes and improved oral function.[5]

Advantages and limitations

A primary challenge in the use of autologous fascia lata grafts has been membrane exposure, initially considered a significant limitation. Nevertheless, the implementation of various institutional protocols has effectively addressed this problem, facilitating optimal healing outcomes.[9]

Human cadaveric fascia lata allografts undergo processes such as lyophilization and gamma irradiation to minimize immunogenicity and reduce disease transmission risk. Ardila Medina CM's study assessed genetic material presence in these allografts through electrophoresis, spectrophotometry, and PCR, detecting DNA concentrations averaging 258.3±80.1 μg/g. Nevertheless, the infectious origin of this DNA was not established. Consequently, the efficacy of complete DNA elimination in fascia lata allografts continues to be debated in scientific circles.[12]

Clinically, fascia lata grafts have shown a superior initial increase in gingival thickness compared to connective tissue grafts. However, this advantage diminishes over time due to higher resorption rates of fascia lata, whereas connective tissue grafts maintain greater long-term stability. Additionally, fascia lata grafts facilitate improved pontic management and enhanced papillary fill.

To reduce the risk of membrane exposure, pre-hydration of fascia lata prior to application is advised. In a study by Pazos A. et al. comparing autologous and allogeneic grafts for Seibert Class I defects (Table 1), collagen fibers were detected within the fascia at four months post-implantation. This finding suggests partial integration of the fascia lata graft into the patient's connective tissue, concomitant with graft resorption occurring over a relatively short timeframe.[1]

CONCLUSION

Fascia lata represents a promising alternative in regenerative dentistry due to its biocompatibility, elasticity, and ease of procurement. Clinical applications have demonstrated favorable outcomes, including reduced postoperative morbidity compared to autologous connective tissue grafts. Although residual genetic material remains a concern, fascia lata's ability to promote tissue regeneration and osteoinduction positions it as an innovative and effective option for enhancing periodontal therapies.

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