

Free gingival graft in a patient with systemic sclerosis: A case report

Abstract:

Scleroderma is a rare chronic connective tissue disorder with unknown etiology characterized by an excessive deposition of collagen in multi-organ systems. It can result in vascular anomalies, excess fibrosis, and autoimmune phenomenon. Patients with this condition can develop complex oral and periodontal manifestations requiring extreme care. Periodontal complications such as increased bone loss and gingival recessions are common in subjects with scleroderma. The oral management of a patient with gingival recessions using a free gingival graft (FGG) technique is presented in this case report.

Introduction:

Sclerosis is defined as an autoimmune chronic disease of unknown etiology characterized by increased collagen synthesis and its deposition within the connective tissue and blood vessels. Localized sclerosis involves only the skin and can be classified into plaque, bullous, linear, and deep, whereas systemic sclerosis (SSc) may affect any organ system and could be classified into three subtypes: limited cutaneous, diffuse cutaneous and overlap syndrome^{1,2,3}. Based on the expanse of the fibrosis, systemic sclerosis could be classified as limited cutaneous (lcSSc) when the face, neck, region distally to the elbows and knees are involved or as diffuse cutaneous (dcSSc) when proximal limbs, trunk and internal organs are also affected⁴.

Signs and Symptoms

A thickening and hardening of the skin are one of the major signs. It's due to a pathological accumulation of connective tissue components that leads to the loss of cutaneous elasticity

followed by sclerosis. Kidneys, lungs, heart, and gastrointestinal system are affected in the systemic form either by fibrosis or by a diminished blood supply. A damage in the peristalsis of the esophagus and colon with a reduced tonus associated to a decreased secretion are mainly responsible of the gastrointestinal tract symptoms^{5,6}. Raynaud's phenomenon (paroxysmal vasospasm), claw-like fingers, hyperpigmentation, telangiectasia, and subcutaneous calcification are common systemic manifestations that can be observed. A facial skin hardening with a classic mask-like face with a sharp nose and deep wrinkle are common. However, another form of systemic sclerosis characterized by an impairment of the organs and internal systems but absence of the skin hardening and Raynaud's phenomenon, is also observed^{4,5}.

Common oral manifestations reported are the followings:

- Limitation of mouth opening with multiple implications such as social concerns, difficulties with mastication, in maintaining oral hygiene and in dental and oral surgical procedures^{7,8,9}.
- Xerostomia occurring because of fibrosis of the salivary glands causes high caries rate and Candida infections in some patients. Removable prostheses could be also problematic due to a decreased salivary flow¹⁰. A high frequency of Sjögren's syndrome was also detected in sclerotic patients¹¹.
- Tongue rigidity with restricted mobility due to a reduced length of the frenulum and increased thickness⁵.
- Dry eyes with keratoconjunctivitis sicca or xerophthalmia¹².
- Widening of the periodontal ligament^{13,14}.
- Telangiectasia¹⁵.

- Bone resorption¹⁶.
- Temporomandibular joint symptoms².
- Apical root resorption¹⁷.
- Pulp and periodontal ligament calcifications¹⁸.
- Pathological resorption of the condylar processes¹⁹.

Healing disruption in patients with scleroderma

Vascular anomalies, excess fibrosis and autoimmune phenomenon are three primary mechanisms that contribute to scleroderma^{10,20}. Concerning vascular anomalies, the balance between vasodilator and vasoconstrictor molecules plays a major role in the stability of the vascular endothelium in a physiological situation. A perturbed vascular tone and disturbed interconnection between endothelial cells, vascular smooth cells and extracellular matrix is detected in systemic sclerosis. Increased activity of Von Willebrand factor may have a part in the evolution of the vascular lesion in scleroderma²¹. Additionally, T-cells release elevated levels of cytokines, such as interleukin, that induce fibroblast activity and bind to endothelial cells. Fibroblasts become active and secrete collagen and extracellular matrix products in an abnormal quantity whereas collagenase' activity is reduced¹⁰. Collagen IV, fibronectin, and proteoglycan are more produced by dermal fibroblasts of patients with systemic sclerosis compared to skin of healthy controls. These fibroblasts express alpha-smooth muscle actin (α -SMA) and differentiate into myofibroblasts that produce more collagen²². Even though the disease is not considered as autoimmune, immunosuppression remains the most recommended treatment to limit organs' fibrosis. The detection of specific autoantibodies can help in the diagnosis and the estimation of the prognosis of the SSc^{20,23}. In early lesions, an activation of primarily T-cell lymphocytes

with an imbalance in the T-helper cell phenotype, responsible for further tissue injury and fibrotic reaction, is observed in histologic sections²⁴. Vascular disruption has been recognized as a key element of the SS disease process with the manifestation of Raynaud's phenomenon affecting both large and small vessels throughout the body. Reduced vasodilation or an increased vasoconstriction are also consequences of the adventitial fibrosis associated with a decreased blood flow²⁵.

Endothelial progenitor cells (EPC) promote neovascularization either by direct differentiation into mature endothelial cells causing vasculogenesis, or by activating the secretion of proangiogenic factors causing angiogenesis. In SS patients, circulating EPCs are present with an impaired neovascularization and the defects are likely due to an impaired function of EPCs irrespectively of their quantity²⁶. Del Papa et al in 2006 stated that EPCs were modified before their release into the circulation and altered stem cells become hyporesponsive to proangiogenic signals²⁷.

Periodontal manifestations in patients with scleroderma

Healing impairment could explain a higher periodontitis prevalence detected in patients with SSc^{18,28,29,30,31}. Patients with SSc present with deep periodontal pockets with widening of the periodontal ligament and abnormalities in periodontal microcirculation²⁷. Scardina et al in an observation of the periodontal microcirculatory defects using capillaroscopy in patients with systemic sclerosis, found that alterations are not only in the deep but also in the peripheral circulation of the periodontal mucosa associated with reduced number but greater diameter and tortuosity of the capillaries and this plays a major role in periodontal disease in SSc patients³².

Therefore, tissue ischemia due to reduced vascularity increases susceptibility to periodontal disease leading to an increase in teeth mobility¹².

The restricted mouth opening is a common finding in SSc affecting the quality of lives of patients with scleroderma making it difficult to maintain daily oral hygiene and for the dentists to conduct the oral exam increasing the risk of periodontal disease^{12,28}.

The gingival crevicular fluid (GCF) at the gingival crevice is the first line of defense against bacterial attacks³³. Patients with SSc have higher indices of periodontal inflammation and higher TNF α level in GCF than healthy individuals which play an important role in pathogenesis³⁴.

It was stated that 14% of patients with scleroderma present a concomitant Sjögren syndrome. This is mainly due to glandular fibrosis. Xerostomia and immunosuppressive drugs make individuals with systemic sclerosis prone to oral infections, dental caries, candidiasis, and periodontal disease with tooth loss when compared to the general population³⁵.

Case report:

A 32-year-old female suffering from systemic scleroderma was referred for consultation at the Department of Periodontology in Saint Joseph University of Beirut, Lebanon. The patient has a small posture, indurated fingers on palpation with areas of telangiectasia, skin involvement with a mask-like face appearance, deep wrinkles, and a sharp nose (Figure 1). Oral examination revealed microstomia (Figure 2 & 3) due to rigid perioral skin with a limited mouth opening of 35 mm (Figure 4). Her chief complaint was severe difficulty of eating. The main purpose of her

visit was to place implants. However, radiographs revealed moderate to severe bone loss in the mandible and maxilla complicating the placement of implants. Additionally, considerable degree of labial gingival recession was found on the upper canine and all the anterior mandibular teeth. Due to the extent of the recessions with the increasing mobility, a free gingival graft (FGG) was proposed to the patient to stabilize the case. After explaining to the patient about the probability of a poor outcome due to the poor vascularity of the area and the risk of infection or further scarring, she insisted on getting the treatment performed and accepted to sign an informed consent.



Figure 1: Skin involvement with a mask-like face appearance, deep wrinkles, and a sharp nose



Figure 2: Oral examination revealing microstomia



Figure 3: Mouth opening revealing microstomia



Figure 4: Limited mouth opening of 35 mm



Figure 5: RT2 recessions on teeth #42, 41 and 31

Clinically, RT2 recessions were detected on teeth #42,41 and 31 (Figure 5) ³⁶. The main purpose of the treatment was not root coverage but to increase the keratinized tissue and to maintain remaining teeth stable. Prior to surgery, the patient was asked to rinse with chlorhexidine digluconate solution 0.12% for 1 minute. Under local anesthesia, the recipient site was prepared using horizontal incisions at the CEJ of teeth #42,41 and 31 followed by a de-epithelialization apically (Figure 6). A FGG was obtained from an edentulous palatal area #14-16 followed by three interrupted sutures (Figure 7). The FGG was inserted on the de-epithelialized recipient bed

and stabilized with one deep layer of interrupted sutures to secure the graft on the bed and one more superficial layer of criss-cross and sling sutures to prevent it from moving (Figure 8 & 9).

The patient was prescribed analgesics in case of pain and a chlorhexidine digluconate solution 0.12% mouthwash for 14 days. The patient was seen at 1, 2, 4, 6 and 12 weeks. Suture removal was completed after 6 weeks of healing to allow adequate connective tissue maturation and stability, especially in a scleroderma case, and a supragingival scaling with ultrasound was

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Figure 6: Flap preparation with horizontal incisions and a de-epithelialization apically

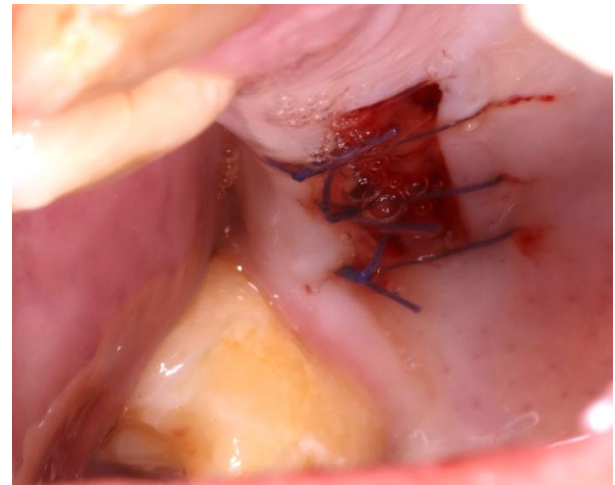


Figure 7: Palatal site after the FGG harvesting

plaque accumulation.



Figure 8: Frontal view of the sutured FGG

Clinical Outcomes:

Healing was accompanied by slight inflammation at 1,2 and 3 weeks. Sutures were not removed due to the delayed healing and collagen formation in scleroderma patients. The patient didn't complain from any pain and the donor site was healed completely at 4 weeks.



Figure 9: Lateral view of the sutured FG

After 12 weeks, an examination of the recipient site showed no root coverage but the formation of a firm band of keratinized tissue of 1mm of height with a significant decrease of teeth



Figure 10: Palatal site healing after 1 week



Figure 11: Graft site healing after 1 week

mobility.



Figure 13: Healing after 12 weeks

Conclusion:

Combination of the progressive systemic sclerosis and the RT2 recession represented some complicating factors in the treatment of this patient. Teeth that were mobile before the gingival graft operation were at risk of extraction. The main purpose of the treatment was to prolong the lifespan of the remaining dentition. The advantage of this technique in this case was to increase



Figure 12: Graft site healing after 2 weeks

the width of keratinized tissue, preventing teeth extraction and a removable prosthesis placement that could be problematic due to a decreased salivary flow. Yet, the procedure described in this case report should be applied with caution in a scleroderma patient due to the impaired healing and the weakened autoimmune system.

Consent and Ethical Approval:

As per university standard guideline, participant consent and ethical approval have been collected and preserved by the authors

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Figures:

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