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Early and late complications arising from autologous soft tissue augmentation in dental practice: systematic review

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Abstract:

Aim. To consider and analyze early and late complications that occur during autologous soft tissue augmentation in dental practice, since knowledge of complications helps the doctor to choose the right approach and materials for the treatment of any disease.

Materials and methods. The publications in the electronic databases PubMed , Google Scholar and other reliable resources, were studied during a systematic review of the literature. the author has selected articles whose content concerns the study of complications arising from autologous soft tissue augmentation in outpatient dental practice.

Results. 71 articles we reviewed during the review. After analyzing the literature for inclusion criteria, the total number of publications has become 30.

Conclusions. according to the studied literature, it can be assumed that the main complications arising from autologous soft tissue augmentation in dental practice include: bleeding, pain, swelling, increased sensitization, damage to nerve and/or vascular elements and flap necrosis.

Keywords: FGG, palate, Maxillary tuberosity, SCTG, bleeding, necrosis, pain, swelling.

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INTRODUCTION

Autotransplantation is a type of transplantation in which the recipient of the transplant is its donor [1]. Autografts are taken from the patient's own tissues (donor zone) and are placed in another zone where there is a defect in the same patient. Autografts are considered the gold standard in transplantology because, as a rule, they do not cause allergies since there is no antigenicity in these transplants [2]. As autografts during this procedure, the doctor takes the mucous membrane from the donor zone (Maxillary Tuberosity, Palate, Cheek). Oral soft tissue augmentation or grafting procedures are often necessary to achieve proper wound closure after deficits resulting from tumor excision, clefts, trauma, dental implants, and gum recessions, also to preserve the alveolar socket after tooth extraction, to restore the defect in case of gum recession, when replacing pigmented and pathological oral mucosa, root exposure related problems. for certain cases, soft tissue grafting is recommended prior to fixed type of restorations, such as crowns and implants, to protect supporting teeth and etc.

Nowadays oral soft tissue augmentation also is useful for solving gingival problems;

In the treatment of gingival recession, different surgical options have been described: free gingival grafts (FGG), connective tissue Grafts (CTG), a more recent technique, de-epithelialized free gingival graft (DFGG) and also subepithelial connective tissue graft (SCTG). This article is devoted to review and study of early and late complications arising following autologous soft tissue augmentation in dental practice, furthermore their frequency of occurrence and causes.

MATERIALS AND METHODS

The study and selection of publications was carried out in several stages. first, the author of the article chose literature dated from 2013.

The second stage of the selection of publications was a review of the brief content of the articles and their titles, after which, in the order of the final stage, the main content of the selected articles was studied.

In order to determine the risk of the possibility of a systematic error in the study of selected publications, the Cochrane Collaboration system was used.

The levels of systematic error were systematized as follows:

low risk if all criteria were met; moderate risk when only one criterion was missing; high risk if two or more criteria were missing; and unclear risk if there were too few details to decide on a specific risk assessment.

RESULTS

71 articles were reviewed, 34 of which were on the PubMed database, 19 on Google Scholar and 18 on other resources. Having made the selection according to the exclusion criteria, the total number of publications was 30. In the selected articles, complications arising from autologous soft tissue augmentation in dental practice were analysed (fig. 1).

DISCUSSION

The hard palate is the most common donor site for day-to-day soft tissue augmentation procedures. While harvesting connective tissue the clinician should be able to identify the greater palatine foramen (GPF) and greater palatine artery (GPA). Clinicians should be aware of anatomical location of

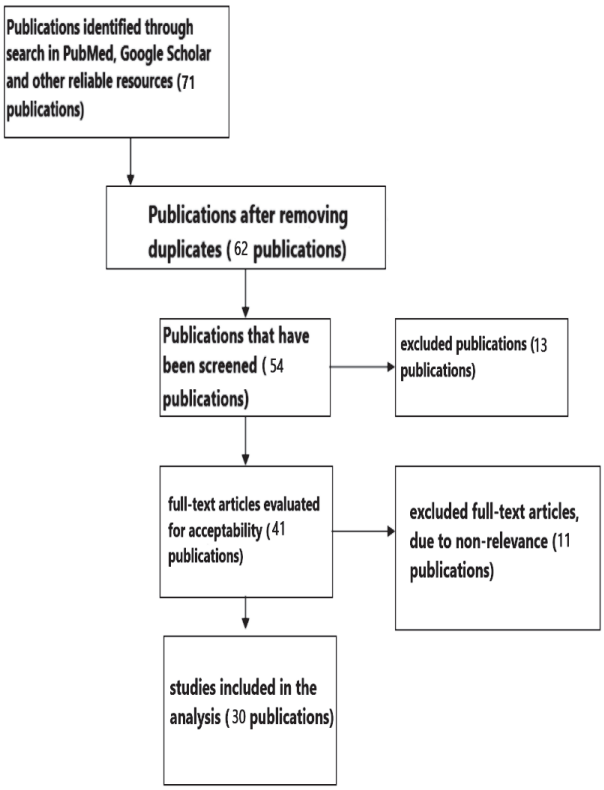

Fig. 1. **Article selection process.**

critical landmarks such as the GPF, GPN (greater palatine nerve) and GPA [5]. If the donor region is extended all the way to the region of the lateral incisor, not in the extensions of the major palatal artery and nerve but also the nasopalatine artery and nerve may be injured, with bleeding and paresthesia or anesthesia as a consequence. Studies hardly address the issue of subsequent possible sensory dysfunction, although a limited number of patients (14% – 2 patients of 14) were included for some sensory changes or loss of sensitivity in the palate following graft harvesting. The third branch of the trigeminal nerve (mandibular nerve or inferior alveolar nerve, IAN) is at constant risk of injury secondary to any mandibular, oral and maxillofacial surgical procedure. This nerve provides sensation to the lower lip and chin, as well as innervating the associated dentition. It also provides motor innervation for the muscles of mastication and sensation to the tongue. Injury to the IAN can result in partial or complete paresthesia, analgesia, anesthesia, or in rare cases dysesthesia, to the structures it innervates [3]. (this applies to any other nerve element localized in the area of the donor zone or at the recipient site.)

The greater palatine artery emerges from the greater palatine foramen and extends along the lateral palate in an anterior direction. Due to its size, injury to the greater palatine artery, particularly in its distal segment, can be expected to result in massive bleeding. It is therefore crucial to take precautions to prevent damage to the artery when subepithelial connective tissue grafts are harvested from the palate [6].

During mucous membrane grafting, donor site complications include infection, mucosal necrosis, bleeding, hematoma, non-healing of the site, lip margin scarring, hematoma formation, persistent pain, and perioral numbness due to inadvertent damage to the mental nerve. Contracture after buccal mucosal grafts leading to difficulty opening the mouth is variable and reported to occur from 0% to 32% of patients. Lower lip paresthesia may persist for many months after surgery but generally resolves unless the mental nerve has been injured. Cauterization in this area can cause nerve injury as well. Failure of mucosal grafts with necrosis may be seen when used with osteo-odonto keratoprosthesis with necrosis rates of 8% to 50% reported [19, 24].

Although studies showed that soft tissue augmentation is a procedure with low complication rates, but free gingival grafts (FGG), connective tissue Grafts (CTG), de-epithelialized free gingival graft (DFGG) and subepithelial connective tissue graft (SCTG) are not procedures exempt from the appearance of complications and they may have similar complications to each other and may also have their own specific complications.

Most publications refer to postoperative complications, and there is limited literature regarding the development of late complications (weeks or months). A classification is proposed based on its severity; Major and Minor. Major complications included re-epithelialization of the graft, epithelial bands, cul-de-sac, epithelial cysts, and bone exostoses. Minor complications included the graft´s color changes and superficial revascularization. Late major complications were only associated with the use of the DFG, and the late minor complications developed with the use of the DFGG were much higher than those associated with CTG. Reepithelialization of the DFG was seen in five cases (15.6%) in the cases with (DFG + CAF), the presence of Cul-de-sac (invagination) was seen in five cases (15.6%) in the cases with (DFG + CAF) and the presence of epithelial bands was seen in five cases (15.6%) in the caes with (DFG + CAF). Discoloration of the grafted area was observed in 15 cases (46.9%) of the cases with (DFG + CAF) and superficial graft revascularization was seen in 10 cases (31.3%) in the cases with (DFGG + CAF) [2, 7, 25].

Although SCTG is a commonly used procedure, the number and prevalence of reported postoperative complications, which have been characterized as either early (days to few weeks) or late (few months to years), are limited. Since the procedure involves two intraoral surgical sites (palatal donor site and recipient site), postoperative complications may occur on either of them. Early complications relating to the donor site include pain, bleeding and more rarely necrosis of the palatal overlying tissue . Regarding the recipient site, the most commonly reported early complications include pain and swelling. Other early complications in the recipient site include bleeding, sensitivity, ecchymosis, loose sutures, and poor graft immobilization . Although the literature contains a few reports of late SCTG complications that required histopathological assessment, early complications that require biopsy for definitive assessment have not been reported. There is an article that reports us about the first case of two late stage complications, epithelial cell discharge, and subsequent epidermal inclusion cyst (EIC) formation during the subepithelial connective tissue grafting (SCTG) and there is also a case which presents a hitherto unreported early complication of SCTG, namely the development of a gingival cyst. This report highlights epithelial cell discharge and EIC formation as a rare yet possible SCTG complications [8, 11, 17, 29, 30].

According to scientific evidence, background connective tissue graft (CTG) is considered as the gold standard for the treatment of gingival recessions (GR), but there are few studies assessing the complications that can arise in the donor site when harvesting a connective tissue graft (CTG) and how the harvesting technique can influence those complications. They find complications during connective tissue grafting by means of the TD technique as: 15% of the patients presented with infection, and necrosis 28% was observed in 35% of the cases. Besides, inflammation and bleeding

were present in 25% and 15% of the patients. Also 35% of the patients showed a severe pain. the patients who experienced a higher pain were also the patients who showed necrosis (28%) [7, 22]. there is also such a rare complication as bisphosphonate-related osteonecrosis of the hard palate after the harvesting of a subepithelial connective tissue (CT) graft [26].

For instance, in a large practice-based study, considering the use of free gingival grafts (FGGs), subepithelial connective tissue grafts (SCTGs), and acellular dermal matrix grafts (ADMGs) for Class I and II root coverage, moderate to severe pain and swelling were the most significant adverse events, but less than 6 % of the sample experienced moderate or severe bleeding, and all of them were associated with the use of autogenous grafts. The use of FG was reported as the most painful procedure, followed by SCTG and ADMG. Additionally, longer chair-time procedures were straight associated to postoperative discomfort, such as pain and swelling, as well as the rate of pain and bleeding where superior for FGG than for SCTG. On the other hand, it should be also noted that the incidence of infection (less than 1 %), bleeding (3.0 %), swelling (5.4 %), and pain (18.6 %) after the use of SCTG can be considered low to moderate. It is also important to highlight that despite the possible occurrence of some adverse events related to the treatment with SCTG (i.e., development of cyst-like areas, root resorption, or bone exostosis), these were restricted to a very limited number of cases and cannot per se undermine the safety/success of autogenous grafts. The reduced base of literature suggests that periosteal trauma/fenestration is probably the primary main-causing agent linked with exostosis development in grafted sited by FGG [9, 20, 21, 23, 28] also a case with a previously unpublished complication following subepithelial gingival connective tissue graft from the palate as pseudoaneurysm of the greater palatine vessel was explored [27].

CONCLUSIONS

Within the limits of this study, autologous soft tissue augmentation in dental practice is considered as the gold standard for the treatment of gingival problems but this is not a procedure exempt from the appearance of unsuccessful outcomes and the main complications arising from this procedure include:

- early complications: pain, swelling, bleeding, sensitivity, nerve injury;
- bleeding is the most common complication. There are immediate and delayed bleeding and they occur due to traumatic involvement in the region of the great palatine artery, which abundantly supplies the donor area with blood;
- long chair-time procedures are straight associated postoperative discomfort, such as pain and swelling;
- late complications {week(s) or months}: flap necrosis, re-epithelialization of the graft, epithelial bands, cul-de-sac, epithelial cysts, bone exostoses, graft´s color changes, superficial revascularization, infection of donor site , osteonecrosis of the hard palate, pseudoaneurysm of the greater palatine vessel;
- flap necrosis is the most common late complication but it rarely happens per se;
- late complications are rare but they too must be considered for a successful outcome.

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Yusup A. Bakaev – the acquisition.
Natalia N. Fedotova – the acquisition.
Mariana M. Borlakova – the acquisition.

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