

TECNOLOGIAS APLICADAS À PRÁTICA E AO ENSINO DA ODONTOLOGIA

EMANUELA CARLA DOS SANTOS
(ORGANIZADORA)



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APRESENTAÇÃO

Historicamente falando a odontologia já atingiu patamares inimagináveis. Relatos sobre a ciência odontológica datam desde a Antiguidade. Agora, imagine se pudéssemos contar à um praticante da odontologia da época que, no futuro, seria possível reabilitação oral completa, com implantação de parafusos, especialmente preparados para se fixarem no osso, e enxerto de tecido ósseo, caso necessário.

A tecnologia possibilita realizações na Odontologia que, cada dia mais, beneficiam pacientes e profissionais. Já não podemos mais ensinar a odontologia da década de 90 para os acadêmicos. É necessário acompanhar a evolução e o desenvolvimento, sempre.

Este e-book traz um compilado de artigos que retratam como a tecnologia vem sendo aplicada à prática e ao ensino da Odontologia atualmente. Estas duas áreas do conhecimento podem e devem colaborar mutuamente, sendo possível alcançar resultados infinitamente melhores.

E, a partir da apreciação do conteúdo que vos é apresentado, convido-os à uma reflexão: O que nos é dito hoje sobre o futuro da Odontologia? Ousamos dizer até onde a tecnologia nos levará?

Ótima leitura!

Emanuela C. dos Santos

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MUCOGUIDE FOR TUNNELING SUBEPITELIAL CONJUNCTIVE TISSUE GRAFTING: A NEW SURGICAL APPROACH

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ABSTRACT: New technologies within dentistry are taking space for the variation of classic techniques, aiming to achieve more predictable results and less traumatic techniques. Multifunctional surgical guides, such as “mucoguide”, can be used to remove connective tissue graft from the palate in the treatment of gingival recessions and “perioguide” for plastic gingival surgery. This case report aims to demonstrate the results and benefits of this new surgical approach with digital flow within dentistry. Female patient, 31 years old, leukoderma, sought the dental clinic reporting aesthetic dissatisfaction with the maxillary central incisors that presented a gingival unevenness between the elements. Moreover, the patient described sensitivity to low temperatures and to sweet foods in the maxillary right premolar. Intraoral clinical

examination of the first premolar region showed an apical dislocation of the gingival margin, with a lack of quantity and quality of keratinized gingiva in the cervical region and exposure of the root cementum. The clinical approach adopted for the patient was the leveling of the gingival zeniths of the maxillary incisors and connective tissue graft by envelope technique in the maxillary pre molar. The planned treatment was performed entirely by digital flow in order to reduce trauma and surgical time, besides generating longer predictability in the case outcome. A single surgical guide was made for both procedures (mucoguide and perioguide). At the 45-day postoperative period, a large gain in volume and in tissue quality was observed in the region of the upper right first premolar. However, there was still an exposure of the 2 mm root cementum. In order to fully cover the recession, it was decided to perform a coronal repositioning of the flap after 60 days. The patient is in follow-up without complaints.

KEYWORDS: gengivoplasty; digital workflow; periodontology; oral surgery

UTILIZAÇÃO DE MUCOGUIDE PARA ENXERTO CONJUNTIVO SUBEPITELIAL PELA TÉCNICA DO TÚNEL: UMA NOVA ABORDAGEM CIRÚRGICA

RESUMO: Novas tecnologias na área odontológica estão abrindo espaço para a variação de técnicas clássicas, visando alcançar resultados mais previsíveis e técnicas menos traumáticas. Guias cirúrgicos multifuncionais, como o “mucoguide”, podem ser usados para remover enxerto de tecido conjuntivo do palato no tratamento de recessões gengivais e o “perio guide” para cirurgia plástica gengival. Este relato de caso tem como objetivo demonstrar os resultados e benefícios dessa nova abordagem cirúrgica com fluxo digital na odontologia. Paciente do sexo feminino, 31 anos, leucoderma, procurou a clínica odontológica relatando insatisfação estética com os incisivos centrais superiores que apresentavam desnivelamento gengival entre os elementos. Além disso, a paciente descreveu sensibilidade a baixas temperaturas e alimentos doces no pré-molar superior direito. O exame clínico intraoral da região do primeiro pré-molar mostrou deslocamento apical da margem gengival, com falta de quantidade e qualidade da gengiva queratinizada na região cervical e exposição do cimento radicular. A abordagem clínica adotada para o paciente foi o nivelamento dos zênites gengivais dos incisivos superiores e enxerto de tecido conjuntivo por técnica de envelope no pré-molar superior. O tratamento planejado foi realizado inteiramente por fluxo digital, com o objetivo de reduzir o trauma e o tempo cirúrgico, além de gerar maior previsibilidade no desfecho do caso. Um único guia cirúrgico foi feito para ambos os procedimentos (mucoguide e perioguide). No pós-operatório de 45 dias, observou-se um grande ganho de volume e qualidade do tecido na região do primeiro pré-molar superior direito. No entanto, ainda havia uma exposição do cimento radicular de 2 mm. A fim de cobrir totalmente a recessão, foi decidido realizar um reposicionamento coronal do retalho após 60 dias. O paciente está em acompanhamento sem queixas.

PALAVRAS-CHAVE: gengivoplastia; fluxo digital; periodontologia; cirurgia oral

1 | INTRODUCTION

Nowadays, the search for dental aesthetics has increased in the same proportion as

new technologies within dentistry have been taking space for the variation of the classic surgical techniques, aiming to achieve better results, greater predictability, clinical time reduction and less invasive techniques (Miller *et al.*, 1996, Harris, 1996, Blue, 2001, Greenberg, 2015, Longo *et al.*, 2019).

One of the most frequent complaints in dental offices is the gummy smile. Classical gingivoplasty consists of removing a piece of the gum by means of an internal bevel incision and vertical relaxers to make a flap for the osteotomy to restore biological distances (Goldman, 1950).

With new research and resources, periodontal plastic surgery known as “flapless” was developed, performed by internal bevel and with the absence of a surgical flap for osteotomy (Ribeiro *et al.*, 2014). This procedure is considered to be less invasive because it does not require large cuts and fibromucosal detachments and sutures for the synthesis of tissues. The flapless technique is perfectly combined with the use of digital resources, such as cone beam computed tomography with the use of lip and lingual retractors for visualizing soft tissues (Januario *et al.*, 2008), virtual planning in software and the use of printed surgical guides. Surgical guides started with implantology and took their place within dentistry because they provide safety in execution, agility, and comfort for the patient throughout the treatment process (Thome *et al.*, 2009, Bencharit *et al.*, 2018, Longo *et al.*, 2019).

Hence, the mucoguide is a surgical guide that allows the precise removing of connective tissue graft from the palate in the treatment of gingival recessions, a condition observed in approximately 60% of the world population (Dominiak and Gedrang, 2014). This approach is a less traumatic alternative when compared to the classic technique (Langer and Langer, 1985), as the donor site is preserved as much as possible to reduce the chance of failure in the incisional techniques, and by predictably limiting the exact amount of tissue to be removed. Thus, the connective tissue graft is positioned sub-epithelial in the recipient bed through tunnels or envelopes and does not require large relaxing incisions (Raetzke, 1985). The mucoguide alongside the flapless technique provided successful aesthetic results with safety and predictability (Longo *et al.*, 2019).

The aim of this clinical case is to report the use of a multifunctional surgical guide for the association of periodontal plastic surgery and subepithelial connective tissue grafting in the anterior region of the maxilla.

2 | CASE REPORT

Female patient, 31 years old, leukoderma, sought the dental clinic reporting aesthetic dissatisfaction with the maxillary central incisors that presented a gingival unevenness between the elements (Figure 1). Moreover, the patient described sensitivity to low

temperatures and to sweet foods in the maxillary right premolar. Intraoral clinical examination of the first premolar region showed an apical dislocation of the gingival margin, with a lack of quantity and quality of keratinized gingiva in the cervical region and exposure of the root cementum.



Fig 1. Initial smile

The clinical approach adopted for the patient was the leveling of the gingival zeniths of the maxillary incisors and connective tissue graft by envelope technique in the maxillary pre molar. The planned treatment was performed entirely by digital flow in order to reduce trauma and surgical time, besides generating longer predictability in the case outcome. A single surgical guide was made for both procedures (mucoguide and perioguide) (Figure 2) printed on color biocompatible resin: GC-400 (Makertech Labs, São Paulo, Brazil) generated by the Anycubic 3D printer (Photon, São Paulo, Brazil).



Fig 2. Multifunction Guide

For the mucoguide confection, the patient was asked to perform additional exams, such as maxillary computed tomography, upper and lower intraoral scanning, and intra and extraoral pictures. These files were used within a 3D software (NemoTec, Madrid, Spain) for analysis and preparation of the surgical guide. From this system, the planner can align the three requested exams three-dimensionally, and based on the tomographic sections it is possible to delimit the donor area prior to surgery, using as one of the methods of choice the palate region that has the largest available connective tissue thickness (Figures 3A and 3B). The program also allows the identification of arteries and nerves to divert the incision site of these larger branches, thus avoiding the chance of anatomical accidents and bleeding processes (Figures 4A and 4B).

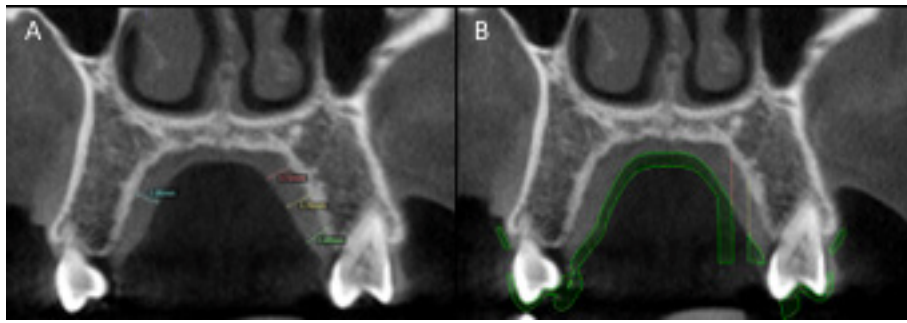


Fig 3. A: Coronal tomographic section to measure the thickness of connective tissue available in the palate. B: Coronal tomographic section with guide overlap, indicating the location and the depth of the incision window.

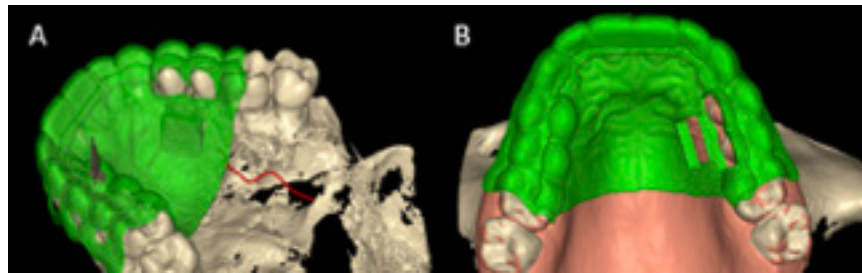


Fig 4. A: Identification of the overlying palatine artery with the surgical guide in 3D software. B: Occlusal view of the surgical guide in position with the patient's intra-oral scan.

To delimit the dimensions of the graft to be removed, the minimum distance of 3 mm between the gingival margin and the first incision site must be respected. Then the mesiodistal extension and the graft width are calculated based on the size of the recipient area. The thickness of the tissue is defined based on the amount of connective available on the side of choice, and based on this measure, a guide wall, called a “stop” is made, in which the scalpel handle must stop when it reaches the depth of safety. To do this, before making the guide, calculate the size of the scalpel blade that will be used during surgery to later add to the measurement of the depth of the incision.

For gingival plastic surgery, the patient's tomography of the anterior maxilla was also used through the software, which allows to accurately visualize, in millimeters, how much of dental structure is covered by gums and their respective biological distances (Gargiuolo, 1961). From this information, a previous design of the incision's shape was made, and it was manufactured with the “mucoguide”, a guide for gingivectomy that has the new dental delimitations of the patient already with their respective biological distances to perform osteotomy, thus preventing postoperative recurrences (Garber and Salama, 1986).

During the procedure, the guide was disinfected with 2% Chlorhexidine solution. The patient was anesthetized anteriorly by vestibular infiltration technique, with 4% Epinephrine-associated Articaine 1: 100,000 (Nova DFL, Jacarepagua, Brazil). The guide was placed in the mouth (Figure 5A) and with a 15C blade (Swann-Morton, Sheffield, United Kingdom) incisions of the gingival margin were made by the internal bevel technique on the right and

left central incisors through the buccal face (Figure 5B), with the aid of McCall 13-14 and Kirkland curettes. Soon after, without the guide in the mouth and with the aid of a millimeter probe, it was confirmed the need for a 1 mm osteotomy in each element to reach 3 mm of the biological distances, as previously confirmed in the virtual planning (Figure 5C).



Fig 5. A: Surgical guide positioned in mouth. B: incisions of the gingival margin on the right and left central incisors with the aid of the surgical guide. C: Confirmation of osteotomy measurement for reestablishment of biological distances.

Subsequently, the patient was anesthetized in the the upper right premolar region, by the infiltrative technique with Articaine associated with Epinephrine 4% 1: 100,000. Again, with a 15C blade, the receptor site was created in the region, from the upper right canine to the upper right second premolar, with an intra-sulcular incision in an internal bevel and a partial flap by the envelope technique (Figure 6). The envelope is created apically and laterally in the retraction area and must extend beyond the gingival mucus line in order to promote greater nutrition and elasticity for the flap. This technique is a variation originally described by Langer and Langer, in 1985, and has the advantage of aesthetics and a better healing response as it guarantees high nutrition due to the absence of vertical relaxing incisions (Zuhr *et al.*, 2007).



Fig 6. Partial flap by the “envelope” technique with the aid of a tunneling.

With the recipient bed prepared, the palatine region was anesthetized by blocking

the greater palatine nerve with Articaine associated to Epinephrine 4% 1: 100,000. Thus, a simple suture was made in the region with 5-0 resorbable thread (Bioline), close to the palatal artery in order to reduce the region's blood flow and to prevent hemorrhage in the trans and postoperative period. The guide was positioned in the mouth and a No. 11 scalpel blade was positioned at the first palatal access of the guide and inserted until its limit, when the scalpel handle hit the "stop" region, the incision was extended at the mesio-distal distance and after the first line was delimited, the second incision was made, creating an orientation channel (Figure 7A). The guide was removed, and two other joining incisions were made to remove the tissue with a small strip of epithelium with a 15C scalpel blade (Figures 7B and 7C). Subsequently, a compression with sterile gauze for five minutes was performed in the donor region, in order to promote blood stagnation.



Fig 7. A: First incision in the palate with the aid of the guide. B: Second parallel incision for guidance channel to remove the graft. C: Connective tissue with a small strip of epithelium

After this process, a suture was made in the apical region of the recipient bed, with a resorbable thread of 5-0 polyglycolic acid, wrapping the graft to position it internally to the envelope with a horizontal mattress suture (Figure 8 A).

For stabilization, two more simple sutures were performed, one in the mesial region and one in the distal graft, and for papillary repositioning and coronal traction of the flap, two suspensory sutures were performed, starting from the gingival margin (Figure 8B). At the 45-day postoperative period, a large gain in volume and tissue quality was observed in the region of the upper right first premolar. However, there was still an exposure of the 2 mm root cementum (Figure 8C). In order to fully cover the recession, it was decided to perform a coronal repositioning of the flap after 60 days.



Fig 8. A: Graft positioning in the bed using horizontal mattress suture. B: final aspect. C: 45-day postoperative period

The patient was anesthetized in the bottom region of the vestibule of the upper right first premolar with mepivacaine + 2% adrenaline 1: 100,000. The tooth was conditioned with a cotton ball moistened in a 24% EDTA solution for 4 minutes, with the purpose of exposing the collagen fibers of the cement and favoring the root covering [17]. An intrasulcular incision was made with a 15C scalpel blade and two relaxers in the proximal regions (Figure 9A). A partial flap was made without detaching the periosteum, so that there was elasticity of the epithelial tissue, allowing its traction to the coronal. To stabilize the flap, a suspensory suture was performed involving the tooth and three simple sutures in each relaxant (Figure 9B). At the 45-day postoperative period, a large gain in volume and tissue quality was observed in the region of the upper right first premolar (Figure 10).



Fig 9. Confection of the partial flap. B: immediate aspect of root coverage by coronal positioning. 15-Day postoperative period.



Fig 10. 45-day postoperative period

3 | DISCUSSION

Mucogingival surgery is a challenge to be achieved. This case report has demonstrated that a multifunctional surgical guide used in the periodontal plastic surgery and subepithelial connective tissue grafting resulted an accurate aesthetics and less painful surgery.

Minimally invasive gingivoplasty has been shown to be highly efficient when compared to classic gingivoplasty technique. In a study “Open-Flap Versus Flapless Esthetic Crown

Lengthening: 12-Month Clinical Outcomes of a Randomized Controlled Clinical Trial” (Ribeiro *et al.*, 2014), the two techniques were presented using split mouth and similar results were obtained between them. On the other hand, the flapless technique, brings less surgical time, less trauma, decreases the chance of bleeding, resulting in greater comfort for the patient from the beginning to the end of the procedure and also in the postoperative period. This also favors the visualization of the results after the surgery, as the tissue does not undergo major traumatic changes and does not require sutures at the end of the procedure.

For root coverage, the combination of the coronal advancement flap technique and the connective tissue graft was considered through systematic reviews, the “gold standard”, as it guarantees better results and long-term stability (Santamaria *et al.*, 2017). In turn, the radicular envelope covering technique also has its advantages, as it optimizes clinical efficacy and has the advantage of better aesthetic results, since it does not require the involvement of interdental papillae, generating a better vascular supply for the graft and less chance of scars (Aroca *et al.*, 2010).

The predictability of cases is a factor of great importance when the aesthetic result is the patient’s main expectation. The reverse planning guarantees safety throughout the treatment, from its beginning to its success, as it directs the professional to follow the step by step of all the necessary steps up to the result (Joly *et al.*, 2009). The use of surgical guides is closely related to this subject. They were first developed in the area of implantology to aid the angulation and positioning of the implants (Windhorn, 2004) and it was concluded that it prevents errors and improves the positioning of the implants during surgery three-dimensionally. The possibility of observing all the steps of the procedures that will be necessary, within the case of a patient, allows to create multifunctional and multidisciplinary guides in order to reduce the time and surgical cost, thus optimizing the results.

4 | CONCLUSION

Guided periodontal surgery for the treatment for tunneling subepitelial conjunctive tissue grafting using a mucoguide, favored postoperative results, making treatment more predictable and consistent with patient expectations.

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 **Atena**
Editora

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