# The Slice Harvesting Technique for Tuberosity Soft Tissue Grafts: A Case Report

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## Abstract

Constant efforts are made to trigger simpler, faster and less invasive surgical approaches to harvest autologous connective tissue grafts. While the palate is considered as a gold standard, its association with complications and patient discomfort have led clinicians to explore alternative sites like the tuberosity. However, current tuberosity harvesting techniques face several limitations. Through a multiple recessions clinical case intended as a proof of concept, this article describes a novel harvesting technique based on a gingivectomy that triggers the tuberosity tangentially. Clinical, aesthetic, and patient outcomes were monitored at 7 days, 14 days, 1 month, and 3 years at the grafted site as well as at the tuberosity. Multiple harvestings were conducted at the tuberosities offering connective tissue grafts suitable for micrografting. Harvested tuberosities healed completely without complication, and the patient reported no discomfort. At the grafted site, both aesthetic and functional results were maintained for up to 3 years. The Slice Harvesting Technique offers a promising alternative for tuberosity tissue harvesting, with critical advantages including high indication rate, simplicity, speed, safety, and the ability to provide user-friendly connective tissue grafts. Besides, the technique could also appear sustainable and favor the regrow of tuber for multiple rounds of harvesting. *Int J Periodontics Restorative Dent 2024. doi: 10.11607/prd.7465*

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## Introduction

Recessions at teeth and implants might be treated for aesthetic and/or functional concerns. Whatever be the grafting technique, connective tissue graft (CTG) appears as a versatile material, that is able to modify soft tissue.[1] Various clinical effects might be triggered among which biotype thickening and augmentation of keratinized tissue. While graft substitutes seem to provide less relevant outcomes when compared to autologous soft tissue grafts, constant efforts are made to trigger simpler, faster and less invasive surgical approaches to harvest autologous CTG.[2]

According to scientific literature, the palate appears as the gold standard for harvesting autologous CTG, but the risk of complication and the patient discomfort have brought clinicians to consider alternative harvesting sites, including the tuberosity. Hence, CTG originating from this location show several advantages, among which a dense reticulated collagen network inducing limited shrinkage over time and a reduced rate of per-operative and post-operative complication.[2,3] However, the grafts retrieved from the tuberosity have in common to be of a relatively small size, which is supposed to dedicate them to the treatment of reduced areas. This drawback might be bypassed by using a micrografting approach, that allows the treatment of wide areas with a reduced quantity of grafting material.[4]

CTG is generally obtained from the tuberosity by a distal wedge procedure or by derived techniques.[5,6] However, those harvesting protocols show several limitations.

The first limitation is technical. Current technics exploit the crest lengthwise, which leads to incisions that suffer from difficult access and need for a specific angulated blade. Limited buccal opening and proximity of the coronoid apophysis of the mandible might also notably impair the procedure.

Those techniques also suffer from bounded indications related to the tuber anatomy. The tuberosity might exhibit a very reduced distal extension, especially if the wisdom tooth is in place. In such a situation, the clinician might refrain from harvesting at the tuberosity, because the distal wedge and derived techniques require extended tuberosities to be applicable. This technical related renunciation is unfortunate, because in most cases, tissue is available crosswise, tangentially to the crest.

Another drawback of the distal wedge and derived techniques is related to the retrieved CTG itself, which anatomy is not well adapted to recession coverage. Indeed, the trapezoidal shaped graft that is harvested necessitates a time-consuming reshaping prior to utilization in root or implant surface coverage.

Last but not least, due to a complete retrieval of the somital region of the tuberosity, those techniques prevent ad integrum regrow of the tuber tissue over time, thus impairing any future harvesting.

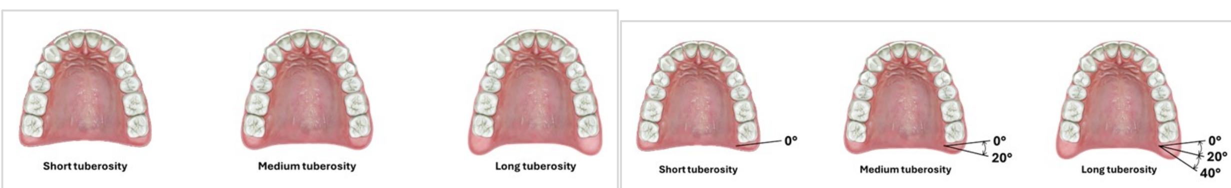
This article describes an harvesting procedure based on a gingivectomy that addresses the tuberosity tangentially to the crest. The Slice Harvesting Technique (SHT), drastically increases the indication rate of CTG harvesting at the tuberosity, but also stands out by its simplicity, its rapidity, its safety and its capacity to provide grafts whose anatomy is directly suitable for use in the treatment of recession defects at teeth and implants. Besides, the SHT could also appear more sustainable and favor the regrow of the tuber for multiple rounds of harvesting.

## Materials & Methods

This case report was prepared in compliance with the Preferred Reporting of Case Series in Surgery (CARE) guidelines.[7]

### *Technical Note*

Tuberosities might basically be classified according to their length: short, medium or long (Fig 1a). Noteworthy, whatever be the length of the tuberosity, tissue is still available crosswise, tangentially to the ridge.




A B

**Fig 1** A length-based classification of tuberosities : short, medium, long. Noteworthy, whatever be the length of the tuberosity, tissue is still available crosswise, tangentially to the ridge. B Orientation of the harvesting according to the length of the tuberosity. The reference (0°) for angle measurement is the perpendicular to the ridge. Short tuberosity : harvesting is only achievable with an angle close to 0°. Medium tuberosity : harvesting is possible between 0 and 20°. Long tuberosity: harvesting is possible between approximately 0 and 40°. But the wider is the angle, the less the harvestable surface is optimized. For long tuberosities, a 20° angle appears as a good compromise between harvesting optimization and anatomical possibilities.

## ***Protocol for a Single Graft Harvesting by the SHT***

### *Anesthesia*

Local anesthesia is administered with articaine buccally and palatally to the tuberosity area (Primacaïne™ with 1/200 000 epinephrin, ACTEON Group).

### *Harvest by gingivectomy*

The patient is requested to open the mouth widely to allow access to the surgical site. The gingivectomy relies on 3 incisions.

### *Fist incision (Fig 1b, 2a and 2b)*

Depending on the anatomical situation, the orientation of the first incision is such that it makes an angle ranging from 0° to 40° with the perpendicular to the ridge. The closest to 0° is the angle, the more the harvestable surface of the tuberosity is optimized. However, the position of the contralateral labial commissure and the limited cheek laxity might sometimes interfere with the blade handle. Hence, it might be necessary to open the angle because a wider angle facilitates the harvesting procedure. But the wider is the angle, the less the harvestable surface is optimized. For long tuberosities, a 20° angle appears as a good compromise between harvesting optimization and anatomical possibilities. But, if the tuberosity is short, a substantial harvesting can only be achieved with an angle close to 0°.

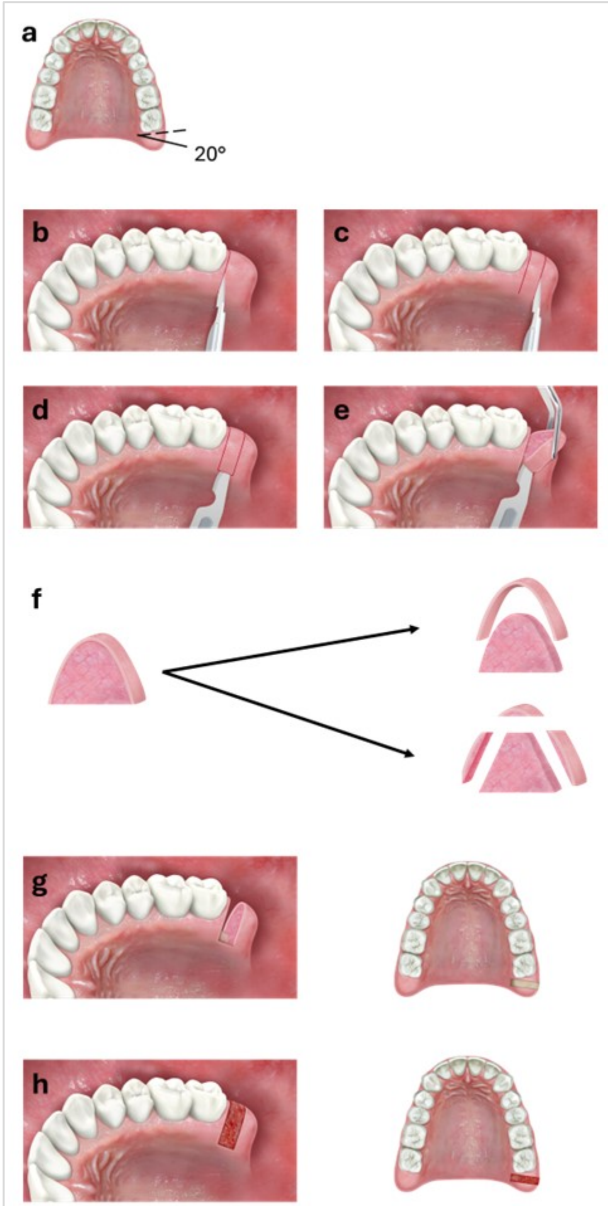



**Fig 2** The Slice Harvesting Technique. From the first incision to the deepithelialization of the graft, the procedure takes less than a minute. A The methodology description is performed with a long tuberosity and an harvesting angle of 20°. B first incision. C second incision. D third incision. E graft retrieval. F left, free graft with epithelium and right, connective tissue graft obtained by eviction of the somital epithelium layer (2 options). G harvested site after graft removal (occlusal and lateral view). H stable blood clot embedded between two connective tissue walls sets up (occlusal and lateral view).

To perform this first incision, a surgical retractor is placed buccally in the vestibule to protect the homolateral cheek. With the selected orientation, the incision is performed perpendicularly to the bone surface at about 2 mm from the distal aspect of the last molar (second molar or wisdom tooth), leaving its periodontium unaffected. This incision, conducted with a regular 15 or 15c blade (Hu-Friedy Mfg. Co. Ltd., Chicago, IL), is transfixing the crest from palatal to buccal and is stopped by the bone crest apically. Once the bone crest is reached, the blade is guided out by the same pathway.

### *Second incision Fig 2c*

The second incision is parallel to the first incision and performed distally. The distance between the first and the second incision determines the thickness of the future graft. The distance is usually 2 to 3 mm, but could be smaller or greater, in accordance with the grafting indication and the possibilities offered by the tuberosity. The second incision is transfixing the crest from palatal to buccal and is stopped by the bone crest apically. Once the bone crest is reached, the blade is rotated mesially to perform the third incision.

### *Third incision Fig 2d*

At the end of the second incision, when the blade is next to the bone crest, the blade is rotated to mesial and incises the tissue that separates incisions one and two. This third incision is performed on the verge of the bone crest, next to the perisoteum and transfixes the crest from palatal to buccal.

### *Retrieval of the graft Fig 2e*

At this stage, the graft becomes mobile and can be harvested easily with an angulated tweezer.

### *Deepithelialization of the graft Fig 2f*

Due to the harvesting methodology, the graft exhibits flat surfaces on both sides. Consequently, the graft is stable and can be incised easily for the eviction of the somital epithelium layer. Two options might be used indifferently, either three incisions crossing each other’s or one single rounded continuous incision. The whole procedure, from the first incision to the deepithelialization of the graft, takes less than a minute.

### *Preservation of the tuber CTG*

After deepithelialization, the CTG is immediately placed in a sterile saline solution to maintain its viability until use.

### *Donor site management Fig 2g and 2h*

Right after harvesting, a sterile gauze is placed on top of the tuberosity. The patient is instructed to close the mouth firmly for a minute. After this delay, the gauze is removed. Bleeding control is uneventful because tuberosity exhibits a scarce vascular network. A stable blood clot embedded between the two connective tissue walls sets up helping to prevent hemorrhagic complication during the healing phase.

The harvested site doesn’t require any suture nor protection. The tuberosity heals gradually by secondary intention.

### *Protocol for multiple grafts harvesting*

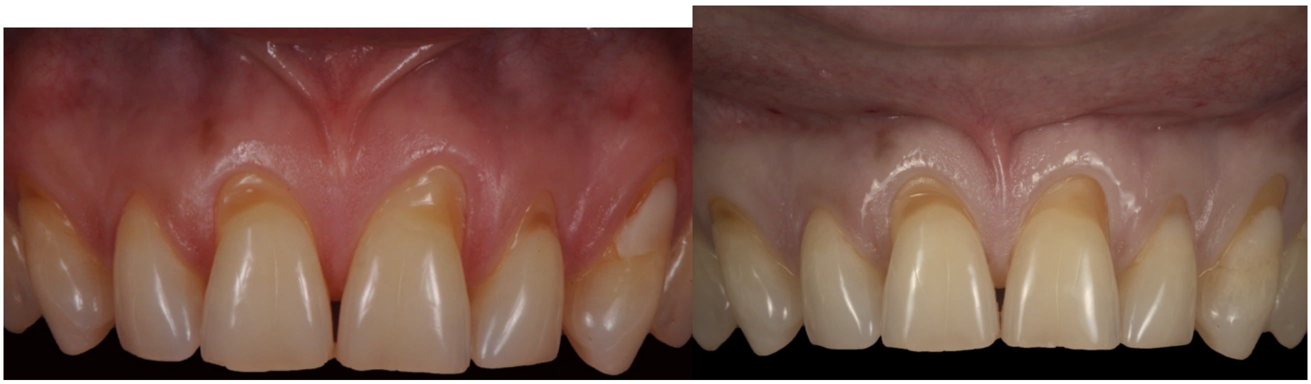
With the SHT, obtaining multiple CTGs from the tuberosity is rendered possible by repeating the previously described procedure several times in the posterior direction (Fig. 3a). The number of possible reiterations is in accordance with the anatomical possibilities offered by the tuberosity and the thickness desired for each graft.


**Fig 3** Multiple grafts harvesting with the Slice Harvesting Technique, A tuberosity after multiple graft removal (occlusal and lateral view), B stable blood clots embedded between successive connective tissue walls after multiple graft removal (occlusal and lateral view).

Ideally, post-operative tuberosity regeneration should be triggered to allow for possible future harvestings. Bearing this in mind, it seems critical to leave a genuine section between two harvested sections. By keeping a reduced distance between mesial and distal soft tissue walls for each harvested areas, secondary healing takes place in a favorable biological environment, that is likely to induce tuber complete reconstruction over time (Fig. 3b). Based on empirical experience, this pedicled standing section should be around 2 to 3 mm wide. Alike for single graft harvesting, the harvested site doesn't need any suture nor protection.

*Clinical case management (Fig. 4a to 4g)*

In the clinical case provided as a proof of concept, an healthy nonsmoker adult displaying RT1[8] gingival recessions despite of a thick gingival biotype, has to be treated for aesthetic and functional concerns, as well as for tooth sensitivity reduction.



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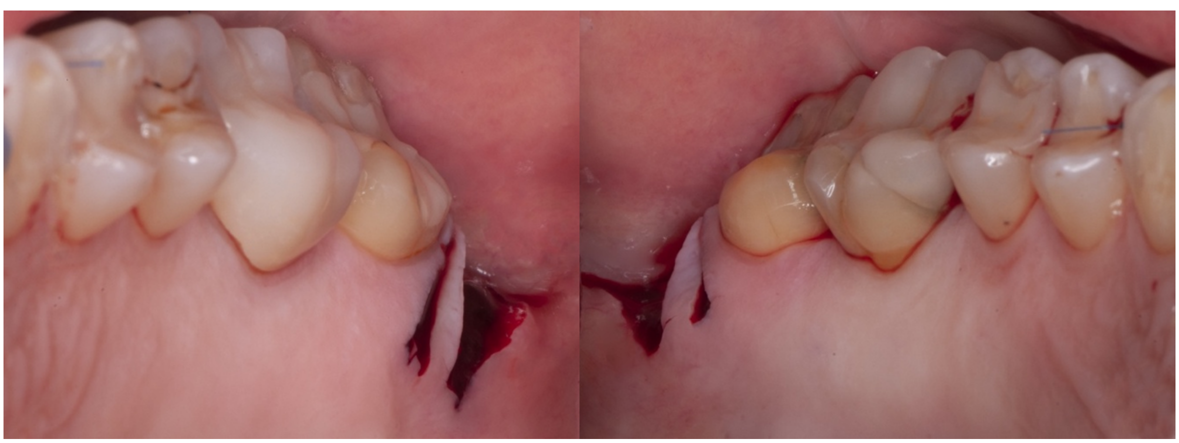

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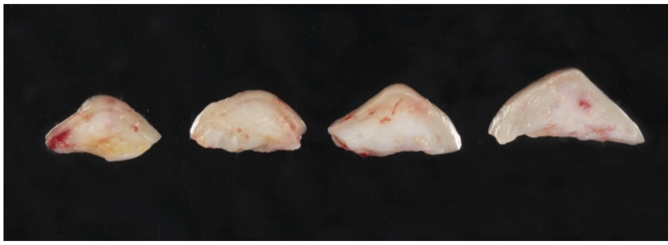

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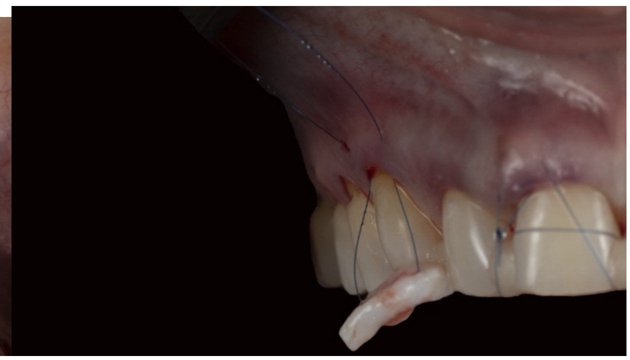

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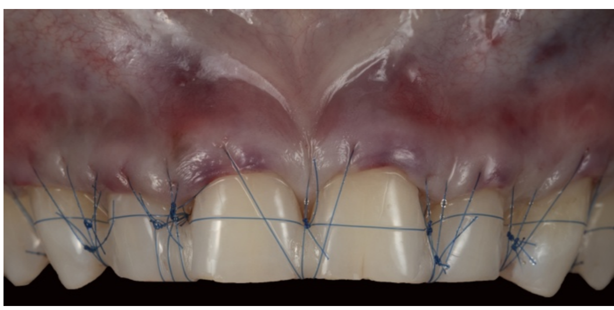

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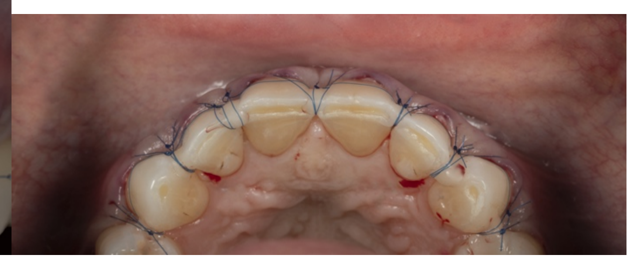

G2

H

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**Fig 4** A initial situation. Despite a thick biotype, RT1 recessions affect central incisors, lateral incisors and canines. Several roots show significant non carious lesions. The cementoenamel junction is damaged on the left lateral incisor, and the left canine displays a cervical composite covering the root and the crown. As composite does not allow for the formation of the biological width, it must be removed. Its removal will reveal an altered cementoenamel junction on the left canine. B the transition line between crown and root is crucial because its location and anatomy determine the positioning and the shape of the marginal gingiva after root coverage surgery. The picture shows the situation after the biomimetic reconstruction of the cementoenamel junction with composite on both left lateral incisor and canine (Dr. E. Sellam, Paris) C two grafts are harvested from each tuberosity using the SHT. Care has been taken to leave a section of tuberosity untouched between two harvested sections to favor complete regrow of the tuberosity. D collected free grafts. The somital epithelium layer is still in place.  E frontal and occlusal view after tunneling. After removal of the epithelium, two of the four CTGs are subdivided, resulting in a total of six micrografts. The photographs show the grafts before reshaping, so that they precisely fit into the concave areas of the roots. F micrografts obtained from the SHT naturally display a user-friendly anatomy that facilitates their insertion within the tunnel and their fitting within root concavities. G front and occlusal post-operative views. Covered micrografts and tunnelized flap are moved coronally, immobilized, and applied onto the teeth beyond the cemenato-enamel junction using the Belt & Suspenders suture concept. The precision of these suspended sutures prevents any unwilled exposure resulting from post-operative edema. This level of precision is essential to insure the revascularization of tuber micrografts, that are endowed with a reduced vascular network. H healing at 7 days. Sutures are removed. The tunnel offers a unique vascular potential, that has the ability to achieve quick revascularization of any graft, even very small fibrous structures such as tuber micrografts. I front and occlusal views at 3 years. Root coverage is complete and consequently tooth sensitivity has disappeared. The micrografts melt effectively so that the occlusal view shows a harmonious and continuous biotype.

Before addressing the surgical aspect of the treatment, the unsatisfying composite must be removed on the left canine. Its removal reveals an altered cemento-enamel junction (CEJ), just like on the left lateral incisor. The transition line between crown and root is crucial because its location and its anatomy precisely determine the positioning and the shape of the marginal gingiva after surgery.[9] Therefore, a biomimetic reconstruction of the CEJ with composite must be performed prior to surgery on the left lateral incisor and the left canine.

On a surgical point of view, a tunneling-based approach for the flap and submerged micrografts for the augmentation material are selected4.

After local anesthesia and gentle ultrasonic root cleaning, a tunneling procedure is performed using dissectors, tunneling knife and papilla elevator (TKN1, TKN2, KO12KP3R4X, PH26M, Hu-Friedy Mfg. Co. Ltd., Chicago, IL) from first left premolar to first right premolar to obtain adequate laxity for tissue displacement between the canines.

Tuber CTGs are selected for augmentation material because of their structural quality and stability over time. CTGs are harvested from both tuberosities by the SHT because of its capacity to provide user friendly CTG. Two grafts are harvested from each tuberosity. Among these four grafts, two are subdivided, resulting in a total of six tuber micrografts. The epithelium is then removed by three incisions crossing each other.

Covered micrografts and tunnelized flap are moved coronally, applied onto the teeth beyond the CEJ and secured by the Belt & Suspenders suture concept 4[10] with a 6.0 monofilament thread (Perma Sharp; Hu-Friedy Mfg. Co. Ltd., Chicago, IL). The precision of this suspended suture combination prevents any unwilled exposure of the micrografts resulting from post-operative edema. This level of accuracy is essential to ensure the revascularization of tuber micrografts, that suffer from a reduced vascular network.

As for infection control and pain management, there is no specific prescription related to the tuberosity. The harvesting being part a wider surgery though, prescription of 2 g/day penicillin (Amoxicilline, Sandoz, Levallois-Perret, France), chlorhexidine mouthrinse (Eludril, Pierre Fabre, Boulogne-Billancourt, France) and paracetamol in case of pain (Doliprane 1000 mg, Sanofi, Paris, France) are part of the prescription. Regarding oral hygiene, brushing the operated areas for the first 2 days should be avoided, then a gentle brushing may start with a post-operative toothbrush (Inava 7/100,  Pierre Fabre SA, Castres, France) for the next 12 days, before gradually returning to a normal routine.

## Results (Fig. 4h and 4i)

Clinical, esthetic and patient outcomes are observed at 7 days, 14 days, 1 month and 3 years.

Healing at 7 days is uneventful at grafted site. The sutures are removed at this stage. Healing at harvested site is also optimal. Notably, the patient doesn't report any pain nor hemorrhagic event, and declares to have ceased painkiller consumption after 2 days.

At 1 month post-operatively, the gingiva has moved back to an esthetic location positioned approximately 1 mm coronally to the CEJ and follows its curvy anatomy, whether the CEJ be native or reconstructed with composite. Probing is physiologic at every tooth operated. As the root coverage is complete, the patient doesn't complain any more of tooth sensitivity. At the harvested site, the crest exhibits a subnormal anatomy, with only limited residual traces of the harvesting trenches.

After 3 years, the front view shows that the micrografts are visually melted within the preexisting tissue: neither uncontrolled CTG proliferation nor hyperkeratinization affect the esthetic outcome of the surgery. The occlusal view shows an harmonious volume display. At the tuberosity, visual observation and probing tend to indicate the regrow of the harvested site.

## Discussion

CTGs from the tuberosity are sometimes associated with uncontrolled expansion and keratinization.[11–14] These drawbacks are not observed within the clinical case provided. Two reasons may explain this satisfactory esthetic outcome. The rational that explains the absence of excessive thickening might be linked to the relatively small CTG volume. Indeed, the CTG volume was directly correlated to the volume of the concavities on the roots, the micrografts serving as space fillers. It might be hypothesized that limited amounts of tuber CTG are less likely to induce uncontrolled volume augmentation over time. Regarding the absence of abnormal keratinization at the grafted areas, the thick biotype of the patient might play a role. It may be hypothesized that a thick biotype could act as a barrier against graft induced trans-flap keratinization.

Harvesting techniques at the tuberosity can be divided into flap-based techniques that retrieve a genuine CTG[5,6] and gingivectomy based techniques that retrieve a free gingival graft from which the epithelium has to be removed to obtain a proper CTG.[14] The SHT belongs to this later category and will be discussed hereafter through different topics.

### *Practicality*

Flap-based harvestings exploit the crest lengthwise, which leads to incisions that suffer from difficult access and need for specific angulated blade. On the contrary, the SHT appears very practical, because it is based on a simple gingivectomy procedure performed with a conventional blade, beneficiating from a straight view for the operator. Besides, coronoid apophysis and reduced buccal opening are less likely to contraindicate harvesting with the SHT because of the direct access to the operated site.

Another advantage of the SHT comes from the anatomy of the graft itself. The CTGs harvested by flap-based techniques usually exhibit a trapezoidal anatomy. Those grafts usually necessitate an inconvenient and time-consuming reshaping prior to utilization in the treatment of recessions at teeth or implants. By design, the CTGs harvested by the SHT are flat and exhibit exactly the expected thickness. Apart from the eviction of the epithelium bordering the graft, minimal manipulation is required. In this fashion, the technique introduced by Jung[14] could be compared to the SHT, because flat CTGs are also obtained, but exploiting the crest lengthwise, the technique suffers from limited anatomical indications.

### *Range of Indications*

Current techniques suffer from a reduced indication rate related to the tuber anatomy. The tuberosity might exhibit a very reduced distal extension, especially if the wisdom tooth is in place. Consequently, the clinician might refrain from harvesting at the tuberosity, whereas tissue is still available crosswise, tangentially to the crest and in the vertical dimension.[15] By exploiting the tuberosity tangentially, the SHT stands out by its capacity to increase the indication rate and exploit a considerably wider variety of tuber anatomies with the same surgical approach.

CTGs originating from the tuberosity have in common to be of a relatively small dimension, which is supposed to dedicate them to the treatment of reduced areas. However, this drawback might be bypassed in the treatment of recession at teeth and implants by using a micrografting approach, that allows the treatment of wide areas with a reduced quantity of grafting material. The concept is based on the idea that grafting the interdental spaces, mesially and distally to operated teeth, is often pointless and sometimes even unsightly in case of thick gingival biotype.[4]

### *Optimization of the Harvested Surface*

Optimizing the harvested surface implies to perform the collection parallelly to the last molar, that is with a 0° angle. This orientation should always be seeked, because the surface of unexploited tuberosity at the disto-lingual aspect of the last molar is minimal. However, the contralateral labial commissure and the cheek laxity might sometimes interfere with the requested blade handle positioning. This difficulty might be bypassed preferably by using an angulated blade holder, or by opening the harvesting angle. But the wider is the angle, the more the unexploited tuber surface increases. The selection of the harvesting angle is primarily dictated by the size of the tuberosity, and secondarily by the desired amount of grafting material. A short tuberosity can only be addressed with a 0° angle, a medium tuberosity with an angle ranging from 0° to 20° and a long tuberosity with an angle ranging from 0° to 40°.

### *Sustainability*

Most harvesting techniques have in common to completely retrieve the somital region of the tuberosity. This action prevents ad integrum regrow of the tissue over time in the area, thus leaving limited chance for a future harvesting. By harvesting a slice, or multiple interrupted slices, the SHT could appear more sustainable and favor the regrow of the tissue at the tuberosity for future harvestings. Within the limitations of that clinical case, this assumption seems strengthen. But future studies with intra-oral scanning and histomorphometric analysis should be conducted to ascertain this hypothesis.

### *Patient's Appreciation*

Patient appreciation regarding an harvesting procedure and its outcomes is tightly linked to duration, post-operative bleeding, and pain during healing.

Being based on a gingivectomy, the SHT is a very quick procedure, lasting less than a minute per graft from harvesting to deepithelialization, with limited intra-oral gestures.

Harvesting by gingivectomy implies a secondary healing process, which could theoretically cause more pain than the primary healing ongoing with a flap. However, when it comes to the tuberosity, primary or secondary intention healing doesn't appear to be crucial in patients related pain assessment.

Several reasons could be advocated. The tuberosity is less exposed to the friction caused by the tongue and the alimentation, and might exhibit a lower density in nervous fibers.[16] Another reason could be linked to the reduced section of the harvested area and the absence of wide bone exposure.

Hemorrhagic complications are scarce in the tuber area whatever be the harvesting modality. The main reason is the reduced vascular network that irrigates the tuberosity. The fact that the tuberosity is less exposed to the friction also plays a favorable role in blood clot stabilization. Regarding the SHT, the blood clot is always embedded within proximal soft tissue walls, contributing to its stabilization.

## Conclusions

The SHT might be used as a valuable alternative for harvesting graft from the tuberosity. The advantages of the technique rely on its high indication rate, its simplicity, its rapidity, its safety, and its capacity to provide user-friendly connective tissue grafts. The technique could also favor multiple rounds of harvesting.

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The author declares that he has no potential conflict of interest in relation to the present case report.

## References

1. Zuhr O, Bäumer D, Hürzeler M. The addition of soft tissue replacement grafts in plastic periodontal and implant surgery: critical elements in design and execution. J Clin Periodontol. 2014;41 Suppl 15:S123-142. doi:10.1111/jcpe.12185

2. Tavelli L, Barootchi S, Greenwell H, Wang HL. Is a soft tissue graft harvested from the maxillary tuberosity the approach of choice in an isolated site? J Periodontol. 2019;90(8):821-825. doi:10.1002/JPER.18-0615

3. Stuhr S, Nör F, Gayar K, et al. Histological assessment and gene expression analysis of intra-oral soft tissue graft donor sites. J Clin Periodontol. 2023;50(10):1360-1370. doi:10.1111/jcpe.13843

4. Ronco V. Tunneling : A Comprehensive Concept in Periodontal Plastic Surgery. Quintessence. Quintessence; 2021.

5. Zuhr O, Hürzeler M. Plastic-Esthetic Periodontal and Implant Surgery: A Microsurgical Approach. Quintessence. Quintessence; 2012.

6. Gamborena I, Blatz M. Evolution : Contemporary Protocols for Anterior Single-Tooth Implants. Quintessence. Quintessence; 2014.

7. Gagnier JJ, Kienle G, Altman DG, et al. The CARE guidelines: consensus-based clinical case reporting guideline development. BMJ Case Rep. 2013;2013:bcr2013201554. doi:10.1136/bcr-2013-201554

8. Cairo F, Nieri M, Cincinelli S, Mervelt J, Pagliaro U. The interproximal clinical attachment level to classify gingival recessions and predict root coverage outcomes: an explorative and reliability study. J Clin Periodontol. 2011;38(7):661-666. doi:10.1111/j.1600-051X.2011.01732.x

9. Zucchelli G. Mucogingival Esthetic Surgery. Quintessence. Quintessence; 2013.

10. Ronco V, Dard M. A novel suturing approach for tissue displacement within minimally invasive periodontal plastic surgery. Clin Case Rep. 2016;4(8):831-837. doi:10.1002/ccr3.582

11. Ouhayoun JP, Sawaf MH, Gofflaux JC, Etienne D, Forest N. Re-epithelialization of a palatal connective tissue graft transplanted in a non-keratinized alveolar mucosa: a histological and biochemical study in humans. J Periodontal Res. 1988;23(2):127-133. doi:10.1111/j.1600-0765.1988.tb01345.x

12. Dellavia C, Ricci G, Pettinari L, Allievi C, Grizzi F, Gagliano N. Human palatal and tuberosity mucosa as donor sites for ridge augmentation. Int J Periodontics Restorative Dent. 2014;34(2):179-186. doi:10.11607/prd.1929

13. Karring T, Lang NP, Löe H. The role of gingival connective tissue in determining epithelial differentiation. J Periodontal Res. 1975;10(1):1-11. doi:10.1111/j.1600-0765.1975.tb00001.x

14. Jung UW, Um YJ, Choi SH. Histologic observation of soft tissue acquired from maxillary tuberosity area for root coverage. J Periodontol. 2008;79(5):934-940. doi:10.1902/jop.2008.070445

15. Studer SP, Allen EP, Rees TC, Kouba A. The thickness of masticatory mucosa in the human hard palate and tuberosity as potential donor sites for ridge augmentation procedures. J Periodontol. 1997;68(2):145-151. doi:10.1902/jop.1997.68.2.145

16. Amin PN, Bissada NF, Ricchetti PA, Silva APB, Demko CA. Tuberosity versus palatal donor sites for soft tissue grafting: A split-mouth clinical study. Quintessence Int. 2018;49(7):589-598. doi:10.3290/j.qi.a40510