Efficient optimization of peri-implant soft tissue through radiofrequency surgery

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Fig. 1: ARROW*tip*™ monopolar microdissection electrode **(REF 36 03 20)**

Introduction: Dental implants for the prosthetic rehabilitation upon tooth loss have become a standard solution. Healthy peri-implant soft tissue is an inevitable requirement for predictable and satisfying long-term results. However, experience has shown that a lack of bone tissue or soft tissue is the rule rather than the exception, impairing the achievement of optimal results. Consequently, the reconstruction of peri-implant soft tissue is still a critical challenge in implantology. Especially after bony reconstruction of the alveolar process with appropriate plastic closure a shift of the attached gingiva from vestibular to oral can be observed.

After successful implantation the mucogingival junction has to be moved buccally during denudation at the latest. This will help to reconstruct a sufficiently wide edge of fixed gingiva and an appropriate vestibule laterally of the implants. The former is necessary to avoid peri-implant infections, and the latter to enable easy access to implants in order to facilitate adequate care for the patient. To achieve solid soft tissue conditions for the long term the vestibular depth of the keratinized gingiva immediately attached to the implant should be 2 to 3 mm.

Fig. 2: Premature vestibuloplasty using radiofrequency during implantation

Fig. 3: Adequate reconstruction of the vestibule at the point of denudation with a sufficient amount of attached gingiva

Often this is not the case, and a free palatal mucosal graft is involved. With this technique, however, both technical effort and morbidity are very high, and the acceptance on the side of the patient is rather low. This often leads to the avoidance of this important soft tissue procedure. Alternatively, especially in the lateral tooth area, one can often gain an edge of 1 to 2 mm of attached gingiva by performing a lateral flap displacement procedure. This, however, does not create a new vestibule and hence no complete reconstruction of the regular anatomy of the alveolar process. This demonstrates the need for an efficient surgical technique that meets the patients' needs on the one hand, and that can be performed efficiently from a technical standpoint on the other hand.

Material and Methods: In our practice for oral and maxillofacial surgery, we have been using radiofrequency surgery for soft tissue procedures for more than eight years. To also use radiofrequency for mucogingival surgery seemed natural to us. Using an ARROWtip™ monopolar microdissection electrode and 4 MHz radiofrequency energy at 18 to 25 watts, we perform a vestibuloplasty at the time of implantation (region 24 and 26) immediately following the wound closure. This is necessary when a preceding augmentation of the hard tissue and the associated plastic closure leads to a shift of the unfixed gingiva in palatal direction. The incision is made directly at the border between attached and loose marginal gingiva. This is followed by a dissection strictly epiperiostally to mobilize the gingiva apically with a mucosal flap. The cranial remainder of attached gingiva is crucial to ensure that keratinized mucosal cells can grow on the secondarily healing wound. We expect keratinized gingiva and unfixed mucosa to meet roughly in the middle of the epiperiostal wound

Fig. 4: Nonirritated and sufficiently attached gingiva with vestibule 5 years after denudation and prosthetic treatment

Fig. 5: CURIS® 4 MHz radiofrequency generator

which we generated in atraumatic fashion with radiofrequency. If keratinized gingiva is missing at the margin of the wound, the radiofrequency method itself cannot generate any. In that case a free palatal mucosal graft would be necessary. It is important to leave as little muscle and connective tissue on the periosteum as possible without exposing the bone. Further, one should pay attention to anatomic structures such as the mental nerve during preparation. Thanks to the very atraumatic method this is usually not difficult.

Another important aspect is that the preparation of the flap should be done generously in order to prevent recurrence. This is why we always involve the entire lateral tooth area of a quadrant or the anterior teeth respectively from canine to canine in the preparation. Apically the distance should always be twice as much as the desired result, since a recurrence rate of 30 to 50 % can be expected. Finally, the mobilized gingiva margin is sutured apically to the periosteum with fine monofilament (e. g. Resolon 6.0). Special care is advisable, since a premature recurrence can be expected if the mucosal flap is not directly sutured on to the periosteum but to the remaining soft tissue. Due to the atraumatic radiofrequency technology, postoperatively there are only few impairments and surprisingly little postoperative hemorrhage despite the relatively large wound. Usually, the patient can continue his or her normal activity on the same day. A local wound dressing, antibiosis, or disinfectant mouth washes are usually not necessary and should be avoided to not affect secondary wound healing and the corresponding epithelialization of the wound.

Conclusion: Peri-implant soft tissue surgery with radiofrequency is still little known in implantology. This is surprising because it enables the surgeon to work very efficiently. Larger soft tissue surgeries which would otherwise be accompanied by hemorrhage and a high morbidity for the patient can be performed in a fraction of the usual time. In addition, the surgeon can benefit from a better

view intraoperatively due to less bleeding with this technique which also serves as a way to minimize risks with regards to damaging sensible structures. Postoperatively, the complication rate is very low which ensures a high acceptance on the patient's side. Thus, optimization of peri-implant soft tissue can be safely achieved using radiofrequency surgery even in cases where from a medical standpoint it is not absolutely necessary. This will help to further improve the long-term prognosis of soft tissue conditions.

In contrast to high-frequency monopolar current, due to the high current density of radiofrequency energy, which is also being adjusted to the impedance of the tissue, there is no burning of tissue. Cutting by use of radiofrequency is similar to the vaporization of cells when using a CO^2 laser. Compared to the laser, however, the handling of radiofrequency surgery especially in the field of oral surgery is simpler and less expensive.

In conclusion, radiofrequency surgery is a distinctly innovative tool which opens up new perspectives for surgeons in implantology. It impresses with very efficient handling, a low morbidity and hence a high patient acceptance. In our opinion, these factors call for its frequent use especially where a facultative optimization of soft tissue conditions will benefit the overall implantological outcome.

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Product Information

Qty.	REF	Description
2	**36 03 20**	**ARROW*tip*™** monopolar microdissection electrode Ø 0.3 mm, straight, total length: 57 mm

[REF 87 00 10] CURIS® 4 MHz radiofrequency generator
basic set with single-use patient plates

Qty.	REF	Description
1	**36 01 00-01**	**CURIS®** 4 MHz radiofrequency generator (incl. mains cord, user manual and test protocol)
1	**36 01 10**	Foot switch two pedals for CURIS® (cut & coag), cable length: 4 m
1	**37 01 54L**	Bipolar cable for CURIS®, length: 3 m
1	**36 07 04**	Monopolar handpiece (pencil) cut & coag, shaft 2.4 mm, cable: 3 m
1	**36 02 38**	Cable for single-use patient plates, length: 3 m
1 (x50)	**12 80H**	Patient plates, single-use, 5 x 10 pcs. (not shown)

Unit settings / Other accessories*

CURIS®
4 MHz radiofrequency generator

ARROW*tip*™: Monopolar CUT 2
Power adjustment: 18 to 25 watts

Valid for the **CURIS®** with the orange label.

CURIS®
4 MHz radiofrequency generator

ARROW*tip*™: Monopolar CUT 2
Power adjustment: 30 to 50 watts

* Please consider that this information is not meant to serve as a detailed treatment guide. Always adjust according to patient and application.

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Lengths for orientation purposes; may vary slightly.

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