

Radiofrequency resection of the uncinate process in endonasal sinus surgery

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Functional endonasal sinus surgery is almost always preceded by the removal of the uncinate process. Complete resection frees the surgeon's field of vision of the natural ostium of the maxillary sinus and offers an unobstructed frontal view of the ethmoid bulla.



Fig. 1: Micro-dissection ARROWtip™ electrode (Sutter) REF 36 03 42

The hook-shaped uncinate process is a mucosal duplication supported by fine bone extensions (spiculae). It has a rostral and caudal connection to the lateral nasal wall via the mucosa and the small bone extensions. It may merge into the lateral nasal wall or protrude medially, in which case identification and resection is easier. It may also be immersed laterally and not be fully accessible by straight instruments. In cranial direction the attachment of the uncinate process limits, depending on its shape as a recessus terminalis (blind pocket), the path along the orbit or to differing extent the view parallel to the middle turbinate.

Predominantly two approaches have been established to achieve controlled resection of the uncinate process. A back-biting punch is inserted behind the free end of the extension to remove a piece to the front. In this way, good orientation across its width should be possible when the cavity in the ethmoid bone is wide, the ethmoid bulla is not pneumatized and the uncinate is in a more or less medial position. The task remains to achieve a clean opening of the cranial extension and its end part in dorsal direction. Punches for cutting will generally have the problem that they do not remove tissue up to the instrument's tip. In the other, anterior approach the uncinate process is cut into, in tangential direction to the lateral nasal wall. With a slightly angled or bent blade, or even a sharp Freer raspator the cut may be continued in cranial or caudal direction. There are limitations here as

well: Resection in dorsal direction is usually obstructed by the shoulder of the inferior concha. The blades will rarely ever lead to a clean cut, and small bleedings will complicate orientation. Small bleedings are extremely vexing if the surgeon wants to use the required precision to cut along the extension of the uncinate process without incurring the danger of cutting into the orbit. Unintended incomplete resection is considered the cause of recurrence of symptoms in many cases.

This problem can be solved efficiently by inducing high-frequency alternate current into the tissue by means of a slim monopolar probe, which is angled at 45° and uninsulated at the very end of the tip. Radiofrequency technology (4 MHz) promises to achieve sufficient coagulation at a low power setting and with minimal thermal damage to the surrounding tissue.

Introduction: Acute and chronic inflammation, less frequently tumors

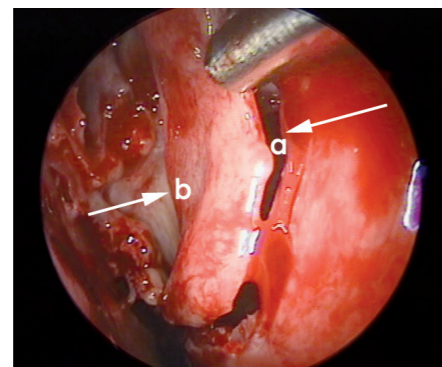


Fig. 2: The uncinate process incised and lifted anteriorly. Arrow (a) indicates the incised anterior edge, arrow (b) indicates posterior margin.

or conditions resulting from trauma to the midface, are indications for endonasal surgery of the paranasal system. There is a general consensus today to perform mainly standardized tissue resections based on functional and anatomical aspects. For the large number of interventions due to inflammatory diseases of the mucosa the goal is to restore or improve the drainage system of the sinuses. This can be exemplified by severing the surfaces of the mucosa of the uncinate process and the lateral nasal wall. For the surgeon a narrow mucosal groove will usually indicate the uncinate process, or he will palpate the moveable part to locate it. When cutting into the adhesion zone at the very front it is desirable to penetrate the uncinate process with both its mucosal layers completely.

Cutting into the uncinate process will result in inconvenient bleeding and hamper the field of vision. Conventional blades are hardly capable of dissecting mucosa and bone extensions sharply, and will often cause ruptures and tears in the tissue. Under such conditions it can be difficult to distinguish the different planes and continue to dissect in cranial and dorsal direction in such a way that injuries of

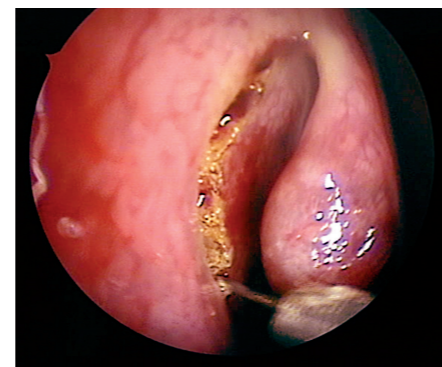


Fig. 3: Incision starting at the cranial attachment of right uncinate process utilizing angled monopolar RF probe.

the corresponding mucosal areas can be excluded. This is one reason for synechiae, which imperil the surgical result.

Bleedings, even if small, will hinder the workflow and can use up considerable time. The narrow site may render the use of bipolar coagulation forceps difficult. The anterior cutting edge behind the processus frontalis of the maxilla in particular defies this type of electrocoagulation.

Case study: History of an exemplary patient shows chronic, polypoid pansinusitis stage three according to the criteria of Lund and Mackay [1]. The indication for the surgical approach was determined by radiological (multiplanar CT) and clinical criteria. Initially administered conservative treatment proved to be insufficient. It consisted mainly of systemic and topical steroids after infection had been eradicated by antibiotics. Eventually endonasal surgery was indicated and was performed under general anaesthesia.

Swelling of the mucosa of the middle nasal meatus was reduced by the insertion of cotton strips soaked in epinephrine 1:1000.

It was easy to identify the exact edge of the uncinate process in rostral direction by lifting the posterior margin from the back with the help of the ARROWtip™ needle electrode. Using endoscopic visualization (30° angled telescope) a cut was made in the mucosa of the lateral nasal wall at the extension to the uncinate process. To manage the bony underlay of the mucosa, we use the ARROWtip™ at 30 watts for this step. The mucosa is severed on the bony understructure. Then the bone is dissected. Subsequently the second

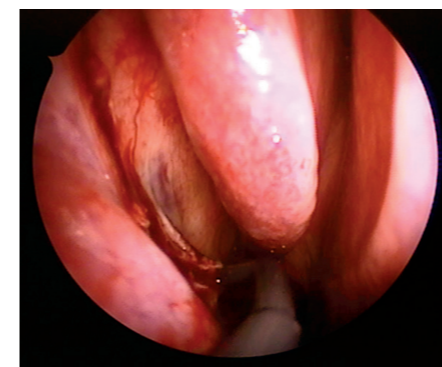


Fig. 4: The posterior part of the uncinate process can be incised by means of the angled tip. No deterioration of the inferior turbinate.

mucosal layer is perforated under visual control. This procedure helps to ensure that the orbit is not injured. Now it is possible to move under the uncinate process and dissect in cranial, caudal and dorsal direction.

With the ARROWtip™ electrode (REF 36 03 42) and 4 MHz alternate current (CURIS® Radiofrequency generator, Sutter Medizintechnik, „Cut 1“, 30 watts) it has been possible in all cases to dissect the uncinate process under exact endoscopic control with almost no bleeding and without any visible carbonisation. The postoperative healing process shows minimal crusting [2].

Method: We will perform endonasal, functional sinus surgeries under general anaesthesia in most cases. To swell down the mucosa to the best possible degree, cotton strips soaked in epinephrine are inserted. Mucosal bleedings of the lateral nasal wall are difficult to access for bipolar coagulation when there is a strong inclination to work in tangential direction. The use of monopolar electrosurgery offers the crucial advantage of keeping bleedings as low as possible right from the onset. We have found that a monopolar coagulation probe [3,4] with a sharp, short, angled tip works very well. As the active electrode has a small surface, it is possible to obtain high performance density inside the tissue. Combined with the special characteristics of radiofrequency current, excellent cutting and coagulation effects are achieved while the risk for the surrounding structures remains minimal [5,6,7]. Nasal packing is required in less than 10 % of cases operated on in this way.

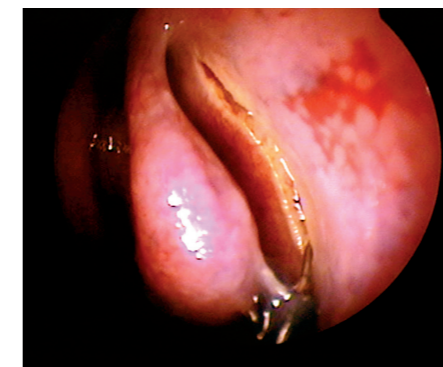


Fig. 5: Nearly bloodless incision at the anterior edge of the uncinate process.



Fig. 6: CURIS® RF unit (Sutter, Germany)

Conclusion: Endoscopic endonasal sinus surgery demands subtle hemostasis and the precise cutting performance of the instruments employed. The disadvantages of "cold steel" can be levelled out favourably by the application of radiofrequency current through an angled probe.



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Literature:

1. Rhinology. 1993; 31 (4):183-4. Staging in rhinosinusitis. Lund VJ, Mackay IS.
2. Intl J Dermatol 1995; 34 (1): 42-47. Comparative Study of Wound Healing in Porcine Skin With CO2 Laser and Other Surgical Modalities: Preliminary Findings. Molgay, Yvonne M, et al.
3. Otolaryngol Head and Neck Surg. 2010; 124 (3) 149-151. Endoscopic resection of supraglottic (T1-T2-T3) and glottic (T2-T3) carcinomas using microdissection. Basterra Jorge, et al.
4. Otolaryngol Head Neck Surg. 2008; 138 (3):294-9. Comparative study of four radiofrequency generators for the treatment of snoring. Blumen MB, et al.
5. J Prosthetic Dentistry 1978; 40 (3): 304-8. Histologic evaluation of electrosurgery with varying frequency and waveform. Maness, WL, et al.
6. J Clinical Periodontol 1978; 14: 557-563. Electrosurgery - a biological approach. Krejci, Robert F, et al.
7. New York State Dental J 1974; 40 (6): 349-353. A Preliminary Study of the Histological Effects of Three Different Types of Electrosurgical Currents. Friedman, J, et al.