Radiofrequency Turbinate Ablation

Mucosal preservation is critical to success in treatment of nasal obstruction secondary to turbinate hypertrophy. Since hypertrophy is most often secondary to submucosal and non-osseous factors including hypervascularity and submucosal soft tissue excess, Bipolar Radiofrequency Turbinate Ablation (RFTA) represents a highly effective, rapid, and well-tolerated technique that can be done both in the office/ clinic under local anaesthetic as well as in the operating room (OR) in conjunction with other nasal, sinus, or turbinate procedures.

Hypertrophy of the inferior turbinates is an important cause of nasal obstruction. It is caused by multiple factors including both soft tissue and bony factors, including hypervascular engorgement, inflammation, and compensatory turbinate hypertrophy on the side less blocked by cartilaginous or bony deformities. Medical treatment for obstruction, while critical and first-line in nature, often fails when anatomical turbinate obstruction exists. Thus, turbinate reduction is critical to management of the obstructed nose.[1]

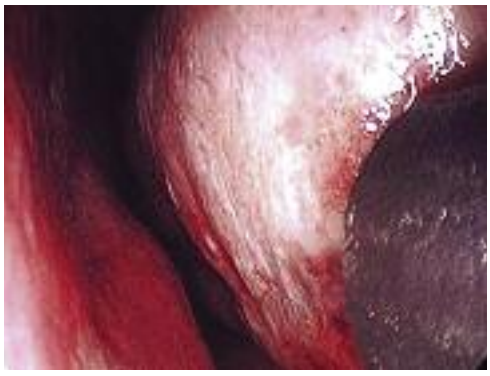
Traditionally, turbinate excision comprised the mainstay of treatment. However, our increasing understanding of the role of turbinates in nasal obstruction, along with the morbidity of excisional techniques, most notable in the prevalence of 'empty nose syndrome', led to more conservative approaches to the turbinates. Unlike epithelium-ablating techniques, RFTA has been shown to preserve mucociliary clearance.[2,3]

We have found Radiofrequency Turbinate Ablation (RFTA) to be an extremely valuable instrument in management of the obstructive turbinate, both as an isolated procedure, and in conjunction with septoplasty, sinus surgery, and as an adjunct to limited excisional turbinate procedures. Additionally, RFTA can be done easily in the office / clinic setting, with re-usable instrumentation, thus providing a patient-friendly, cost effective alternative to OR surgery in selected cases. We recommend RFTA as an essential tool in the rhinologic armamentarium.[4,5,6]

Preoperative assessment

A thorough nasal and sinus examination delineates the causes of nasal obstruction. Contributions of the turbinates, septum, nasal valve, dorsum, and inflammatory and infectious causes should be weighed before proceeding. The soft tissue contribution to

1a: Preoperative view of hypertrophic left turbinate. Note how the hypertrophic turbinate obstructs the airway, and contacts the septum.



1b: RF device inserted into hypertophic turbinate with full penetration of the bipolar electrodes.

1c: Turbinate at completion of ablation pass with the RF device. Note the contraction and blanching of the turbinate, which indicates the endpoint of treatment.

1d: Postoperative view. Completed turbinate ablation with substantial reduction of turbinate bulk, clear airway, and unobstructed view of the middle turbinate.

Mr KW S Ah-See

'How I Do It' is co-ordinated by

Mr KW Ah-See, MD, FRCS, FRCS(ORL),
Consultant Otolaryngologist -Head and Neck Surgeon, Aberdeen Royal Infirmary, Foresterhill, Aberdeen, AB25 2ZN, UK.
Tel: +44 (0)122 455 3571,
Email: kim.ah-see@nhs.net

Contributor to
'How I Do It'

David Greene, MD, FACS, FARS,
Chief of Otolaryngology, Physicians Regional Health System;
Adjunct Faculty, Cleveland Clinic Head and Neck Institute.

Correspondence
Physician's Regional Medical Center, 6101 Pine Ridge Road, Naples, FL 34109, USA.
Email: DavidGreeneMD@comcast.net
Tel: 239-348-4081.

turbinate hypertrophy, versus that of the bone, can be assessed by decongestion with oxymetazoline.

Treatment of underlying medical causes of obstruction, such as nasal steroids, allergy treatment, and treatment of sinusitis, should be performed. Failure of medical therapy is the indication for surgical treatment. In the ENT clinic, most often our patients have already undergone maximal medical therapy, and are ready for surgical intervention.

Selection for RFTA can be made based on four criteria:

1. Isolated turbinate hypertrophy principally caused by soft tissue hypertrophy
2. Need for other nasal surgery to which RFTA will be a mucosa-sparing adjunct
3. High-risk status of the patient for the OR which makes minimally invasive procedures in the office / clinic preferable
4. Patient preference for a minimally-invasive procedure. In the latter case, we fully counsel the patient on the goals and limitations of minimally invasive RFTA, as well as the fact that they may need septoplasty or more in the OR if RFTA alone does not relieve their symptoms

Surgical technique

In the office / clinic setting, the patient is anaesthetised and decongested topically with 4% lidocaine and oxymetazoline. The turbinate is injected with a modest amount of 1% lidocaine with 1:100,000 epinephrine, to anaesthetise the turbinate, but not give the patient excessive side-effects of epinephrine uptake. Five to ten minutes later, a second injection is given to 're-inflate' the turbinate, expanding the submucosal tissues to be ablated. This manoeuvre helps isolate the undesirable submucosal tissues from the epithelium and the bone, and produces little or no additional tachycardia in the patient since vasoconstriction has already been achieved.

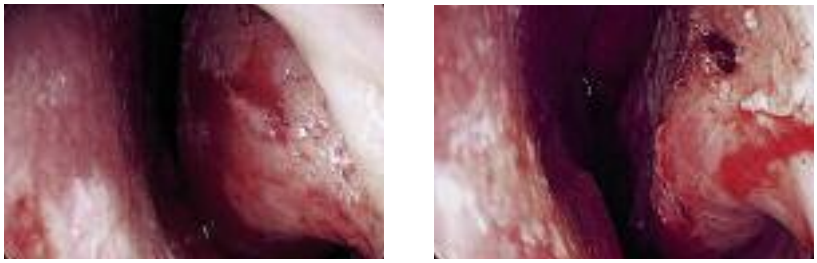


Figure 2: Radiofrequency Turbinate Ablation (RFTA) procedure: before and after.

The bipolar bayonette radiofrequency probe (Ellman International, Oceanside, NY, USA) is then introduced submucosally into the turbinate at the head of the turbinate and the inferomedial edge. The bipolar turbinate probe consisted of two parallel needles with 24.5mm exposed electrodes.

We utilise the 4.0MHz radiofrequency generator to provide high frequency, low temperature energy for an average of 10 seconds on setting 15, after which the probe is slid out of the turbinate (Surgitron 4.0 Dual Frequency radiofrequency generator, Ellman International, Oceanside, NY, USA). This setting utilises 19 watts, which creates 152 joules with an eight second application measured at a 500 ohm load which most closely simulates the human tissue. This device, combined with the above settings and prudent technique, coagulates the undesired tissue without burning or injuring surrounding structures.

The ablation is performed under direct vision, allowing the surgeon to observe the hypertrophic turbinate tissues blanch and contract, which signals the endpoint of treatment. Unlike traditional electrocautery, the tissue is not allowed to char. As the blanching and tissue-contraction occurs, the probe can be retracted outward. A second or third ablation can be performed, depending on the anatomy and visualised reduction.

For patients with more complex obstructive anatomy, RFTA is used as a mucosa-sparing turbinate reduction technique, in conjunction with turbinate out-fracture, or resection limited to the portion of the turbinate obstructing the valve area. In our series, RFTA has thus facilitated greatly reduced mucosal resection, and thus reduced complications to minimal levels.

Postoperative period

For patients treated with RFTA as an isolated procedure, there is no recovery period. Our patients occasionally require acetaminophen 'paracetamol' for analgesia, but often need nothing, and can resume normal activities

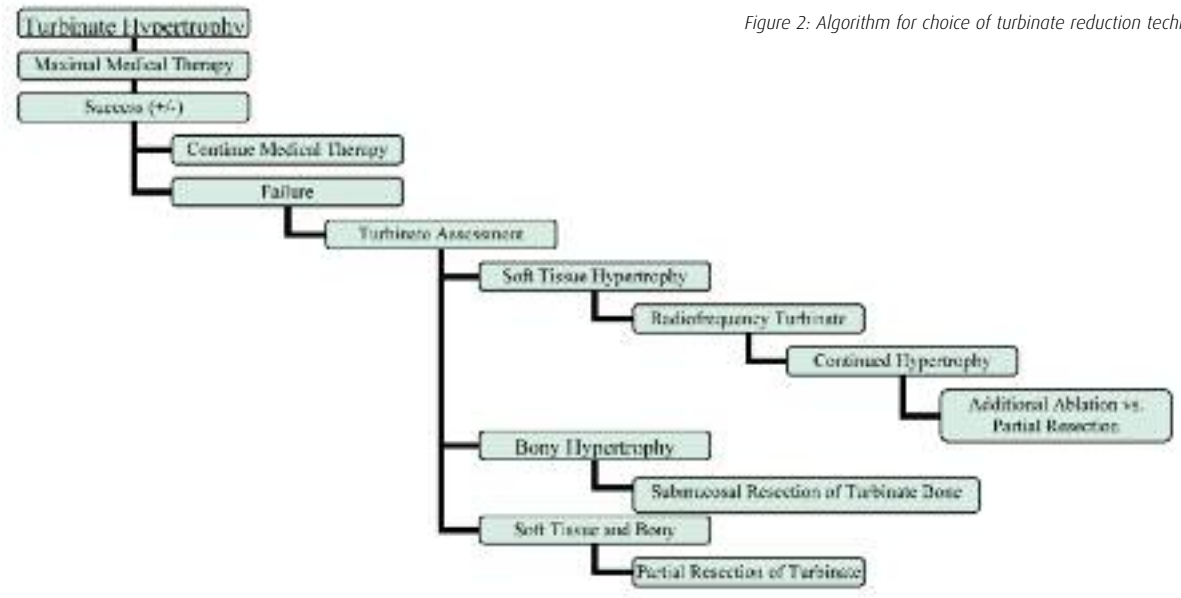


Figure 2: Algorithm for choice of turbinate reduction techniques.

as long as they avoid straining. Nasal emollients and saline are recommended as needed. The patients were seen one month later. In 5% of our series, a small crust was noted and removed. At this time, patients with soft-tissue hypertrophy of the turbinates should feel substantially improved. Those in whom complete relief has not been achieved can be scheduled for other nasal surgery in the OR such as septoplasty. For patients who have undergone RFTA in conjunction with other nasal and sinus procedures, standard FESS / septoplasty / rhinoplasty care is given, but is much lessened by the reduced morbidity of RFTA versus resection.

Our experience

The author has performed 438 RFTA procedures using this technique, with follow-up from one month to five years, in patients ranging from 18-85. The procedure was well tolerated by all of the patients. A substantial proportion of patients were managed for nasal obstruction causing CPAP failures in OSAS. Two hundred and twenty of the cases were performed in the office / clinic, with only four episodes of bleeding requiring conservative treatment. Notably, all four of these patients had been on anticoagulant therapy, and were treated in the office / clinic to avoid the risk of anaesthesia. No cases of atrophic rhinitis, crusting, synechiae, dryness, persistent crusting, olfactory disturbance, synechiae, necrosis, or any other complication were noted in RFTA-treated turbinate tissue in either the isolated or combination RFTA groups. Substantial decrease in the bulk of the turbinate was observed in all cases. The only patients who ultimately required OR surgery (septoplasty, FESS, or rhinoplasty), were those who were identified preoperatively as having bony and cartilaginous deformity, and had elected RFTA as a minimally invasive procedure, or as a way to avoid OR risks. More than half of patients whom the author recommended for OR surgery were satisfied with the improvement from RFTA, despite indications for more invasive surgery.

Conclusion

Radiofrequency Turbinate Ablation (RFTA) is a safe and highly effective technique for symptomatic nasal obstruction refractory to medical therapy, and attributable to hypertrophy of turbinate soft tissue. Bipolar RFTA preserves the turbinate mucosa, thus minimising the risk of complications and physiological disturbances from turbinate reduction. When used in conjunction with excisional techniques to reduce obstructive turbinate bone, it facilitates mucosal preservation for the remainder of the turbinate, thus improving patient tolerance and outcomes. Thus, RFTA should be considered an effective and cost effective option in the treatment of nasal obstruction. ■

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Competing interest:
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