Treatment of turbinate hypertrophy with high frequency surgery

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Abstract:

Aim: For over a century, surgical management of lower turbinate hypertrophy, has given rise to much discussion. Aim of the present investigation was to establish, by means of the analysis of a large patient population, the efficacy and reproducibility of high frequency surgery, in the treatment of' this condition.

Material and Methods: A total of 1689 non-allergic patients with nasal obstruction, presenting hypertrophy of the lower turbinates were submitted, under local anaesthesia, to turbinates decongestion using, a high frequency, instrumental unit with a bipolar terminal electrode. Efficacy of the procedure was evaluated on the basis of objective examination, results of questionnaires, active anterior rhinomanometry and mucociliar transport time.

Results: Results revealed a reduction of hypertrophy, an improvement in symptoms. A reduction in nasal resistances and an improvement of mucociliar transport time the large patient population. Low post-operative complication rate and the good patient compliance, due also to the fact that no haemostatic procedure is necessary.

Conclusion: Would suggest that this method is particularly valid. Effective and sate for the treatment of hypertrophy of the lower turbinates.

Key words: Turbinate hypertrophy – Surgical treatment – High frequency.

Introduction:

Nasal obstruction is one of the most frequent symptoms encountered in the ENT consulting service and hypertrophy of the lower turbinates is the most common and, indeed, often the only triggering factor [1-4], when medical therapy is ineffective. A surgical approach may offer a feasible improvement in nasal function and, therefore, in the symptoms reported by patients, thus becoming necessary when aetiology of nasal obstruction is of an organic nature [1, 3, 5, 6].

Various surgical techniques are currently used to restore nasal function by mechanical reduction of the lower turbinate and, possibly, preserve the mucosa. The surgical techniques most frequently employed in hypertrophy of the turbinates [4, 7] are: Turbinectomy: this procedure is performed by inducing a medially and upper directed fracture of the lower turbinate. This is then resected in correspondence to the bone

insertion[7,1]. Decortication: once medialised. The mucosal part of the lower turbinate[8] is removed using a pair of scissors, especially fashioned for this purpose. Sub-mucosal decongestion to reduce the volume of the turbinate, an incision is made on the head of turbinate itself and a tunnel is created at submucosal tissue level; using micro forceps or debrider. The corpora cavernosa are then removed [7].

Sub-mucosal decongestions of the turbinate with lateral outfracture: This procedure is similar to submucosal decongestion except that, in this case, a fracture is made in the bony portion of the lower turbinate which is then displaced laterally [7]. Laser Argon Plasma: Coagulation of the lower turbinate is carried out using an Argon Plasma Coagulation (APC) probe which, placed on the mucosal surface, generates an argon plasma [9 10]. Laser CO_2: Coagulation of the lower turbinate is achieved with direct application of 300 impulses/second (10-15 watt) on the mucosa [7, 11, 12]. Radiofrequency: A bipolar tool that acts by transmitting, to an ionised liquid film, the ability to break the molecular bonds. This effect is exerted only in close proximity to the instrument tip, with localised transmission of the current between two closely placed electrodes and with local temperatures ranging from 40° C to 70° C depending upon the power used [5].

Cryocoagulation: With this technique, a probe is placed on the surface of the turbinate for approximately two minutes. Nitrogen Protoxide is used, reaching temperatures – 80° C [7]. Aim of these techniques is to restore correct nasal-sinus ventilation, effective mucociliary clearance, better local immune response and better absorption of the drugs administered via the endonasal route [1, 3, 6, 8, 13]. Aim of the investigation was to establish, taking into consideration various (subjective and objective) parameters, the efficacy and feasibility of high frequency bipolar decongestion in the treatment of nasal obstruction due to hypertrophied lower turbinates.

Materials and methods:

With the technology used in electrotherapy, it is possible to apply locally a high frequency alternate current which, at tissue level, is transformed into thermic energy. Between 1989 and 2008, 1689 non-allergic patients, age range 4-82 years, presenting nasal obstruction, due to hypertrophy of lower turbinates, not responding to drug therapy, were submitted to high frequency bipolar decongestion of the turbinates. As far as concerns the technical aspects, the same instrument was used in all cases ("Timed T 100", "Korpo", Genova, Italy): this equipment provides stable power and emission, with the possibility of correctly programming and timing the surgical action with a precision of 0.01 second. These cases, not including treatment of nasal septum deviation, were submitted to high frequency, by surgeons with the same expertise, using local contact anaesthesia associated with a vasoconstrictor (chlorure benoxinate + epinephrine) and without nasal packaging. The bipolar electrode was passed along the tail, the body and head of the lower hypertrophied turbinate. Post-operative pharmacological treatment was exclusively topical, using an antibiotic ointment twice a day for 7 days, together with nasal cavity lavages using isotonic saline solutions for a few weeks.

The following examinations were carried out, in all patients, before and then 1 and 12 months after surgery: Active anterior rhinomanometry, using a RMF-02 Medtronic no.129602 Rhinomanometer, scrupulously adhering to the guidelines drawn up by the International Standing Committee for Rhinomanometry Standardization. Evaluation scale of subjective symptoms: patients were asked, at each follow-up control, to indicate the subjective entity of nasal respiratory obstruction using a numeric reference scale between 0 and 4 (0 = asymptomatic; 1 = mild; 2 = moderate; 3 = severe; 4 = very severe). Mucociliar transport timing test.

Results:

An analysis of the data emerging from active anterior rhinomanometry showed: mean values of total nasal resistance of 2.56 Pasc/cc (MAD = 0.55) prior to surgery, 1.20 Pasc/cc (MAD = 0.21) one month after surgical treatment and 0.23 Pasc/cc (MAD = 0.30) at 12-month follow-up: statistical analysis using Wilcoxon test showed a statistically significant decrease ($p<0.05$) in total resistances. The mean reference value in the subjective symptoms evaluation scale decreased from an initial 2.61 (prior to surgery) to 1.88 (one month after surgical treatment), the final value (after 1 year) being 0.89: statistical analysis of data (Wilcoxon test) revealed a statistically significant decrease ($p<0.05$).

Mucociliar transport time, initially 20.3 minutes, dropped to 17.5 minutes (one month after surgery) reaching a final value of 15.5 minutes after one year: Wilcoxon test failed to reveal (taking into account all follow-up data) statistically significant differences. One month after surgery, 152 patients (9%) presented synechias, 84 (5%) disorders in nasal sensitivity, while 12 months later those patients who had presented synechias (later submitted to surgery) had dropped to 84 (5%) and disorders of nasal sensitivity to 50(3%). Only in 42 patients (2.5%) was it necessary, postoperatively, to adopt anterior nasal packaging due to severe bleeding. At 12-month follow-up, repeat surgery, due to further hypertrophy of the lower turbinate, was necessary in 5% of patients.

Discussion:

The term HF is used here to define a high frequency programmed bipolar decongestion: aim of this surgical procedure is to inhibit the congestion of corpora cavernosa spaces of lower turbinates, responsible for obstruction, without modifying mucosal function of the overall structure of the nasal cavity [1-14]. The possibility to obtain a perfectly stable power not modified with time and precise control of the duration of emission (in hundredth of second) with the possibility of modulating the effect allows the use of high powers, for short time periods, without any risk of damage to the tissues. With the passage of the tip over the surface of the turbinate, it is possible to send high frequency short, intense impulses, which causes minimum damage to tissues and rapid spread along the nervous fibres, which have a greater conduction velocity; a type of "devitalisation" of these fibres is thus effected: in actual fact, blockade of the trigeminal sensorial receptors (afferent branch) and consequently, inhibition of parasympathetic system (efferent branch); this action not only leads to a decrease in the congestive hypertrophy of the turbinate but also results in a reduction of rhinorrhea, with a further improvement in symptoms [10, 14, 17]. In

very severe cases of hypertrophy, it is possible to prolong the electrode action on the turbinate, effecting sclerosis': the action of passing the bipolar electrode on the lower turbinate results in an area of coagulative necrosis which, after 30 days, is replaced by a sclerotic connective-like tissue: this, in turn, results in a stable decrease in the hypertrophic turbinate, without, however, modifying the normal physiology of the mucosa, as demonstrated by the results of the mucociliar transport timing test [7, 14, 15]. Data emerging from active anterior rhinomanometry, in keeping with reports in the literature, reveal the greater decrease in total endonasal resistances following high frequency treatment compared with that following other procedures, thus accounting for significant regression of the feeling of "nasal obstruction" in the patients treated [4, 7, 8]. The possible modifications induced on endonasal mucociliary clearance do not appear to be equally significant: the minor changes in the mucociliar transport time, which are comparable to those following other surgical procedures, reveal only a slight physiological improvement after high frequency decongestion [4, 7], albeit demonstrating that this has not been negatively affected. Recovery of nasal function is obtained by means for mechanical reduction of the lower turbinate restoring correct nasal-sinus ventilation resulting in an improvement not only in the local immune response but also in absorption of drugs administered endonasally [1, 3, 6, 8.] Data related to post-operative complications and to the mucociliar transport time demonstrate the good tolerability and efficacy of this method, particularly if compared, at one-month post-operative follow-up, with those related to other surgical procedures [6, 9-13, 15-17, 19].

Conclusions:

The high frequency is a reliable surgical procedure permitting a reduction of the turbinate volume without requiring nasal packaging. This form of treatment seems to be particularly effective in patients with non-allergic chronic hypertrophic rhinitis: in these patients, it was possible to reduce the turbinate mass restoring nasal flow and improving symptoms, while, furthermore, in agreement with reports in the literature, obtaining great satisfaction on the part of the patients [8, 18].

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