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MAIN ARTICLE

Traitement de l'hypertrophie des cornets inférieurs par radiofréquence chez les enfants atteints de mucoviscidose

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Inferior turbinate hypertrophy radiofrequency management for children with cystic fibrosis

Résumé

Objectif *: évaluer l'intérêt et l'efficacité du traitement de l'hypertrophie du cornet inferieur chez les enfants atteints de mucoviscidose par la technique de la radiofréquence.* ***Matériels et méthodes*** *: étude portant sur les patients atteints de mucoviscidose présentant une hypertrophie des cornets inferieurs, traité au Centre Hospitalier de Lisieux dans les services de Pédiatrie et d'ORL-chirurgie cervico-faciale. 41 patients ont été inclus dans l'étude et suivi sur 2 ans. Nous avons analysé les suites opératoires, ainsi que l'efficacité du traitement grâce à un examen clinico-radiologique.* ***Résultats*** *: les symptômes cliniques sont améliorés dés le troisième mois postopératoire dans 100 % des cas. On note une perte d'efficacité de la radiofréquence sur les cornets après 1 an post-opératoire et qui s'aggrave avec le temps. Cependant les résultats restent satisfaisants à 1 an et 2 ans post-opératoire.* ***Conclusion*** *: la radiofréquence est, pour nous, le traitement de choix de l'hypertrophie des cornets inferieurs chez l'enfant atteint de mucoviscidose. Il associe une technique simple et peu risquée à un traitement conservateur efficace. Cependant le bénéfice de la radiofréquence s'estompe avec le temps même si les résultats restent satisfaisant à 2 ans post-opératoire. Il est utile d'envisager une nouvelle séance au-delà de ce délai.*

Mots-clés : Mucoviscidose, hypertrophie, cornet inférieur, radiofréquence.

Summary

Objective*: To evaluate, using radiofrequency techniques, the relevance and effectiveness of treatment of inferior turbinate hypertrophy in children with cystic fibrosis.* ***Materials and methods****: A study of patients with cystic fibrosis with hypertrophy of inferior turbinate who were being treated at Lisieux Hospital In-Patient Paediatric and ENT- Head and Neck Surgery Department. 41 patients were included in the study and followed over 2 years. We analyzed the postoperative phase and the effectiveness of treatment, through clinical and radiological examination.* ***Results****: A clinical improvement of symptoms is observable from the third month after surgery in 100% of cases. However, we noted a loss in the effectiveness of radiofrequency on the turbinate tissue one year following operation, which worsens with time. However, the postoperative results remain satisfactory at 1 year and 2 years.* ***Conclusion****: Radiofrequency is, in our opinion, the treatment of choice for inferior turbinate hypertrophy in children with cystic fibrosis. It combines a simple and low-risk effect with effective preservative treatment. However, the benefits of radiofrequency fade with time. Nonetheless, this technique yields postoperative results that remain satisfactory beyond 2 years. It is often useful to consider a new session after this date.*

Key-words: Cystic fibrosis, hypertrophy, inferior turbinate, radiofrequency.

INTRODUCTION

Cystic fibrosis is an autosomal recessive disease frequently affecting 1/2500 births. It is caused by a mutation in the CFTR gene located on the long arm of chromosome 7.

This gene enables the synthesis of a transmembrane ion channel allowing the movement of chloride and sodium across the membrane of epithelial cells. An anomaly of these ion transfers is responsible for the thickening of secretions in the bronchi, pancreatic ducts, intestine, bile duct, the vas deferens in men and upper airways.

There are numerous clinical manifestations of this disease. They are primarily respiratory and especially pulmonary [1] with a progression to respiratory failure and terminal bronchial overinfection. Gastrointestinal symptoms are common with exocrine pancreatic impairment in the foreground, then endocrine pancreatic impairment, hepatobiliary impairment and ileal impairment. Genital symptoms are also described as manifesting bilateral atresia of the vas deferens in men and a thickening of cervical mucus in women.

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Apart from damage to the lungs, the cystic fibrosis patient also shows impairments of the upper airways:

- Partly, in the region of the trachea, accompanied by an increased incidence of tracheal defects with abnormalities of the cartilaginous rings [2];

- Elsewhere, and more frequently, showing ENT symptoms [3];

This effect is manifested by chronic nasal sinus infection leading to onset of various disorders in ENT cavities. Patients primarily develop chronic rhinitis, which may involve a purulent rhinorrhea, nasal polyposis and sometimes hypertrophy of the inferior turbinate. These disorders of the nasal mucosa are naturally associated with chronic sinusitis, with or without a sinus polyposis and increased incidence of serous medial otitis due to tubal dysfunction.

The purpose of this study is to assess, by radiofrequency techniques, the relevance and effectiveness of treatment of inferior turbinates hypertrophy in children with cystic fibrosis.

MATERIALS AND METHODS

Materials

Population

We conducted a prospective study of patients with cystic fibrosis with hypertrophy of the inferior turbinate treated at the In-Patient Paediatric and ENT- Head and Neck Surgery Department of Lisieux Hospital.

Only patients with hypertrophy of the turbinates who did not respond to the medical treatment and who were treated by radiofrequency have been included in this study. Patients who underwent other treatments of the turbinates were excluded.

We therefore specified a group of 41 patients aged 7 to 15 years (average 11.5 years), composed of 25 boys (60.97%) and 16 girls (39.03%).

Among the 41 patients, 15 hd already been given ENT treatment: 2 tonsillectomies alone, 1 tonsillectomy with adenoidectomy, 3 tonsillectomies with adenoidectomy and bilateral paracentesis, 9 tonsillectomies with adenoidectomy and insertion of a trans-tympanic ventilation tube. None of these patients underwent surgery on their turbinates, sinuses or nasal fossae.

These 41 patients were operated on between 01/09/04 and 31/12/2007. The results stretch over 24 to 40 months (average 27 months).

Operative technique

In this section we describe the technique of surgical treatment of inferior turbinates hypertrophy with radiofrequency, as practised in our department.

The equipment required includes: A radio frequency transmitter (in our department we use Coblator™), radiofrequency probe (Reflex Ultra 45™), an optical instrument of 0° 4 mm diameter with its own camera and cold light, a 20 cc syringe, an injectable sterile saline, a subcutaneous needle, a Palmer-type nostril retractor, a Politzer clip, a suction nozzle and hose, 2 algostérile™ dressings.

The patient is laid supine, under general anesthesia, with the arms resting along the body. Ventilation is by orotracheal intubation.

The 2 turbinates are treated in the same operative period, one nostril, then the other. Here are the operative times (fig. 1):

- Installation of the nostril retractor.

- Infiltration of the inferior turbinate with saline solution as the radiofrequency spreads only within tissues rich in water.

- Introduction of the probe into the inferior turbinate. Beware, before introduction, the tip of the probe should be dipped in saline.

- Application of radiofrequency for 12 seconds, intensity 4. The operation is carried out on 3 points of the inferior turbinate: anterior, middle and posterior.

- Dressing with a strand of algostérile™ withdrawn immediately following postoperative awakening.

- No prescription of antibiotics or anti-inflammatories is needed in the post-operative phase.

Methods

Measurement and analysis

The postoperative phase was studied through a systematic survey of medical and/or surgical complications that emerge.

Effectiveness of treatment was assessed using clinical, functional and radiological data recorded pre operatively, then postoperatively at 3 months, 6 months, 1 year and 2 years (Table I).

TABLE I: Postoperative survey strategy for patients.

	Pre-operatively	3 months	6 months	1 year	1,5 year	2 years
Questionnaire	X	X	X	X	X	X
Endoscopic examination	X	X	X	X	X	X
Rhinomanometry	X	X	X	X	X	X
CT scan	X		X			X

A clinical examination was carried out before surgery, then 3 months, 6 months, then every 6 months.

This review consists primarily of a clinical questionnaire. This questionnaire studies the absence or presence of 5 functional signs: Headache or facial pain, anterior or posterior rhinorrhea, snoring, dysosmia, mouth breathing.

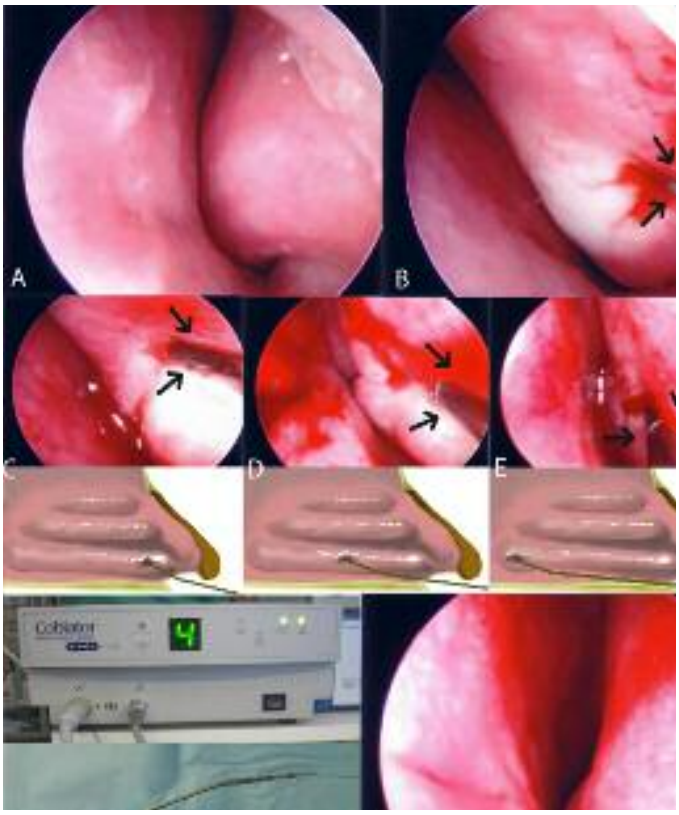

Fig. 1: Surgical technique, from left to right and top to bottom: A) Preoperativaly inferior turbinate, B) Infiltration of the inferior turbinate with saline solution, C) Introduction of the probe into the inferior turbinate into the anterior point, D) Introduction of the probe into the inferior turbinate into the middle point, E) Introduction of the probe into the inferior turbinate into the posterior point, F) Radiofrequency transmitter and probe, G) Postoperativaly inferior turbinate.

Then an endoscopic examination using a 0° scope is performed, with or without a bacteriological sampling. Finally, a rhinomanometry objectifies nasal obstruction.

A sinonasal CT scan was performed before surgery then 6 months, 2 years, and every 2 years after surgery.

Therapeutic management of patients: Depending on the preoperative assessment, individual treatment plans were established for each patient.

The 41 patients studied all show bilateral hypertrophy of both lower turbinates.

They were treated with radiofrequency bilaterally on the lower turbinates (100%).

Among these 41 patients, those who showed bilateral polyps were subjected to an endoscopic nasal polypectomy.

Among the patients treated for polyposis, those who suffered rhinosinusitis had also a middle meatal antrostomy in addition to their endonasal polypectomy.

RESULTS

Patient profiles

The 41 patients studied were examined pre-operatively according to the protocol described above.

The survey shows that of the 41 patients:

- 18 present with facial pain or headache (44%), of which 11 have daily symptoms and 7 non-daily;

- 22 exhibit anterior and posterior rhinorrhea (54%), 12 of which are purulent and 10 non-purulent;

- 4 confirm dysosmias (10%), but this sign is difficult to assess in children;

- 41 patients complain of snoring (100%);

- 41 demonstrate breathing through their mouths (100%), 28 total (not strictly nasal) and 13 partial (alternate).

The nasal endoscopy and CT scans helped to highlight:

- Hypertrophy of both inferior turbinates in 41 patients (100%), that is;

- Hypertrophy of both inferior turbinates alone in 19 patients (46%);

- Hypertrophy of both inferior turbinates with bilateral sino-nasal polyps in 8 patients (19.5%);

- Hypertrophy of both inferior turbinates with bilateral polyps and rhinosinusitis in 14 patients (34%).

Patients who had bilateral polyps (22 patients) (54%), had an endoscopic polypectomy. Amid them 18 required in the same sitting a middle meatal antrostomy (44%).

Finally rhinomanometry preoperatively found pressures from 1 to 1.40 Pascal with a mean of 1.10 Pascal, the norm being between 0.60 and 0.70 Pascal.

The postoperative phase

The postoperative phase was simple and in most cases without specific complications. However, 4 cases of complications occurred (9.7%). 3 in the immediate post-operative period: 1 case of mucosal bleeding occurred on day 1, developing benignly following dressing and infiltration with xylocaine naphazoline. 1 case of arterial bleeding from the right anterior ethmoidal artery following right meatal antrostomy, occurring at hour 5 and requiring further surgery by bipolar coagulation combined with a dressing; 1 case of lower left palpebral emphysema following left meatal antrostomy, regressing spontaneously within 7 days after treatment with antibiotics (Flagyl™) and anti-histamine (Polaramine™) with a prohibition of nose-blowing/ wiping. 1 case showed a late complication: unilateral right synechia following radiofrequency treatment + polypectomy, which occurred at 3 months following surgery. It regressed benignly after

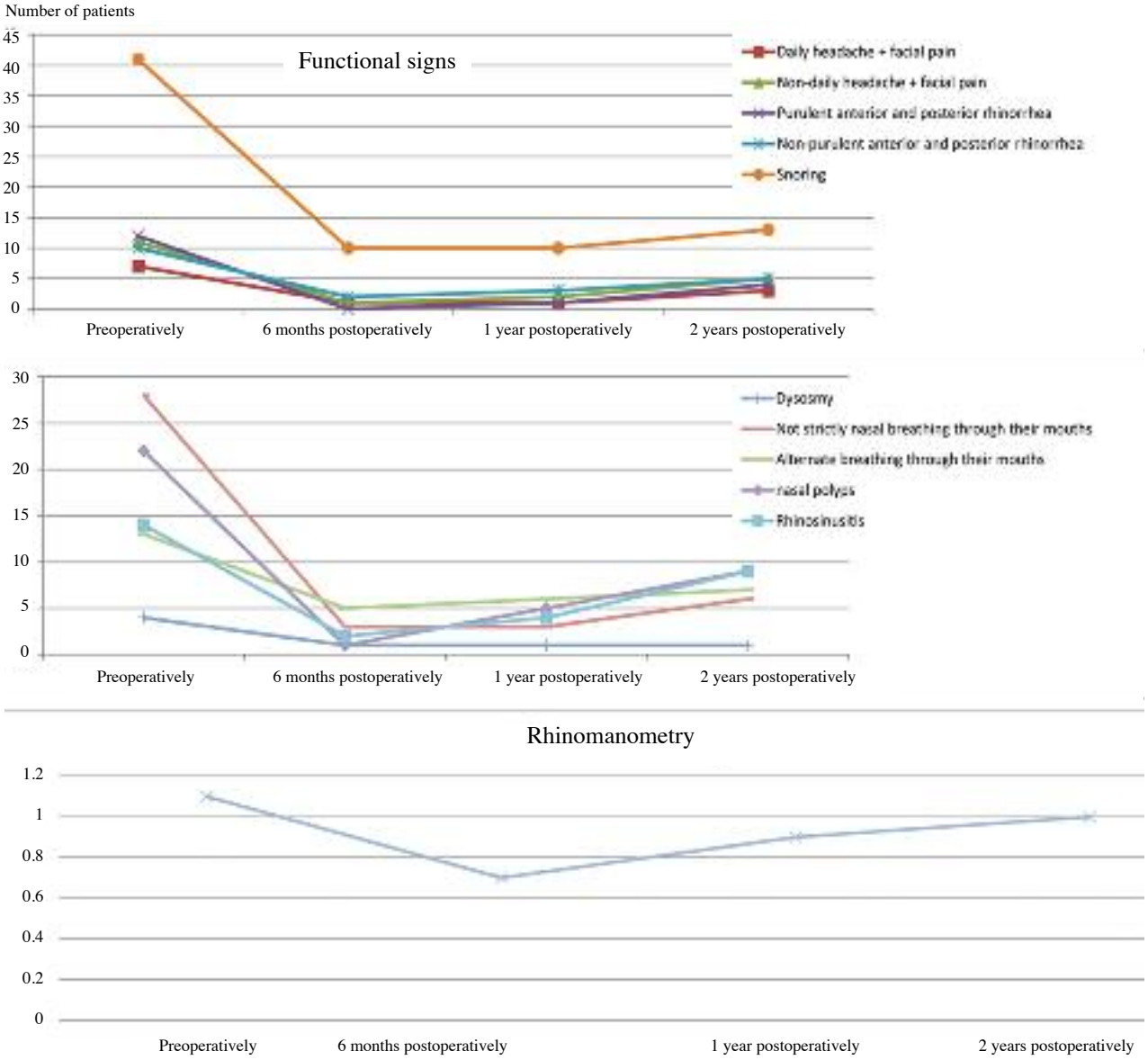

Fig. 2: Summary of functional results for treatment of inferior turbinate hypertrophy with radiofrequency as a graph.

cutting the synechiae under local anesthesia, then insertion of a Silastic™ blade and dressing.

Functional results

The 41 patients were followed for at least 2 years according to the protocol specified above. The results are recorded in the attached table (table II) and transferred to the accompanying graph (fig. 2).

There was a significant decrease in the different functional signs in the questionnaire as well as a significant improvement in clinical, radiological and rhinomanometric signs in the 3 months following surgery. These clinical improvements are parallel to a retraction of the turbinates that tend to reduce in volume.

However, there is a recrudescence of the functional and clinical signs and a decrease in the number of shrunken turbinates within the first postoperative year, with a worsening of these outcomes at 2 years after surgery.

DISCUSSION

The turbinates perform very important functions in breathing. They serve especially to humidify and warm the air and remove dust from it. They also have a role in the immune defense of the upper airways by increasing the surface contact of the nasal mucosa with the air.

The management of lower turbinate hypertrophy is controversial [4]. The methods are numerous and each has its advantages and disadvantages [5]. The first goal of these treatments is to achieve good nasal permeability, while obtaining results which are maintained over time and with minimal side effects.

TABLE II: Summary of functional results for treatment of inferior turbinate hypertrophy with radiofrequency.

	Preoperatively	6 months postoperatively	1 year postoperatively	2 years postoperatively
Number of patients	41	41	41	41
Daily headache + facial pain	7	1	1	3
Non-daily headache + facial pain	11	1	2	5
Purulent anterior and posterior rhinorrhea	12	0	1	4
Non-purulent anterior and posterior rhinorrhea	10	2	3	5
Snoring	41	10	10	13
Dysosmy	4	1	1	1
Not strictly nasal breathing through their mouths	28	3	3	6
Alternate breathing through their mouths	13	5	6	7
Sinonasal polyps	22	1	5	9
Rhinosinusitis	14	2	4	9
Rhinomanometry	1 à 1,40 Pa Moy. 1,10	0,60 à 1,00 Pa Moy. 0,70	0,60 à 1,40 Pa Moy. 0,90	0,60 à 1,40 Pa Moy. 1,00
Retracted inferior turbinates	0	41	35	28

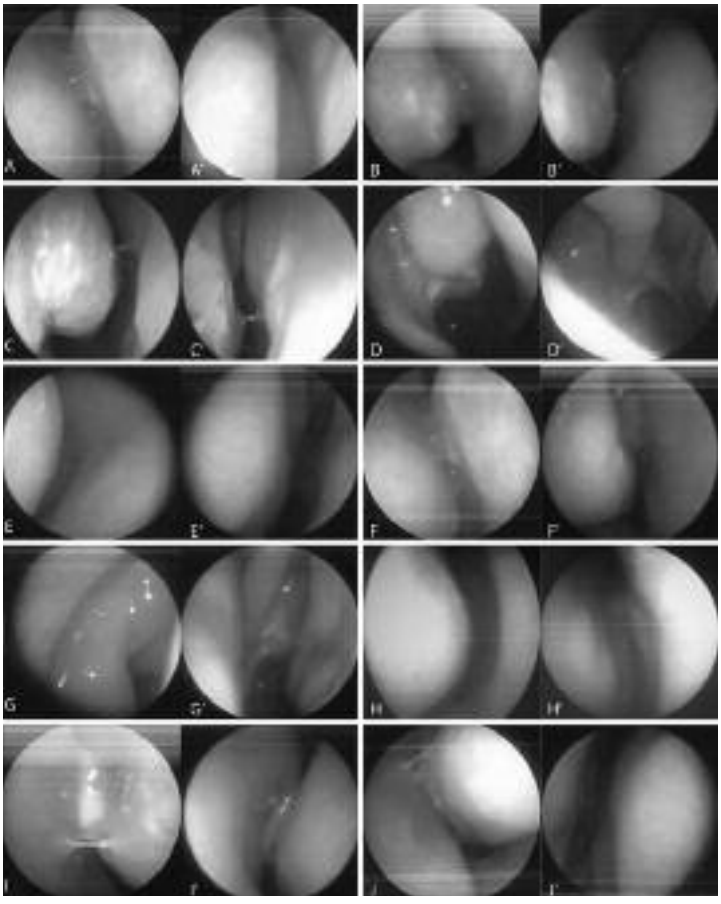

Fig. 3: Endoscopic examination for 14 patients at the preoperative phase and at the postoperative phase after 6 months.
A to J: Endoscopic examination at the preoperative phase.
A' to J': Endoscopic examination at the postoperative phase.

Many methods exist, ranging from the injection of steroids or sclerosing agent to electrocoagulation, through cryosurgery, laser treatment or surgical resection [6, 7].

In the case of children with cystic fibrosis, we opted for treatment with radiofrequency [8].

This method has the advantage of being minimally invasive, fast and simple, which is important in such delicate domains as cystic fibrosis. Another non-negligible advantage is that radiofrequency treatment is a preservative treatment, allowing the retracted turbinate to continue its function, including that of vital immune defense of the airways in children with cystic fibrosis.

As we have seen in the results of our study, radiofrequency treatment is very effective in the management of inferior turbinate hypertrophy in children with cystic fibrosis [9].

This is due to the action of radio frequencies that cause shrinkage of the turbinates. This has several benefits: It frees the nasal airways thereby reducing snoring, nasal obstruction, and dysosmia; it disengages the medial meatus, thus improving the ventilation of the maxillary sinuses by decreasing rhinosinusitis, rhinorrheas and headaches; it frees access to the sinus for medication, particularly when inhaled or injected by aerosol.

The effectiveness of treatment is very rapid with a retraction of the turbinate visible immediately after surgery (fig. 3).

Moreover, our experience has demonstrated the beneficial effect of radiofrequency over the entire nasal mucosa by reducing chronic inflammation, a finding that we can not yet explain yet, but this might be due to the action of the radiofrequency on or around the cells [10].

Our study showed the presence of a significant percentage of complications (9.7%). But complications have all been benign and their treatment early performed and effective. We also found that in 3 out of 4 cases, complications can be attributed to an additional surgical technique associated with radiofrequency (medial meatal antrostomy in 2 cases and polypectomy in one case). In the literature, however, we find a very low proportion of complications in the treatment of upper airways by radio frequency [11, 12].

Interestingly, the study of our results over time shows effectiveness of radiofrequency treatment during the first year. After 1 year, there is a recrudescence in the number of patients with functional and clinical signs of

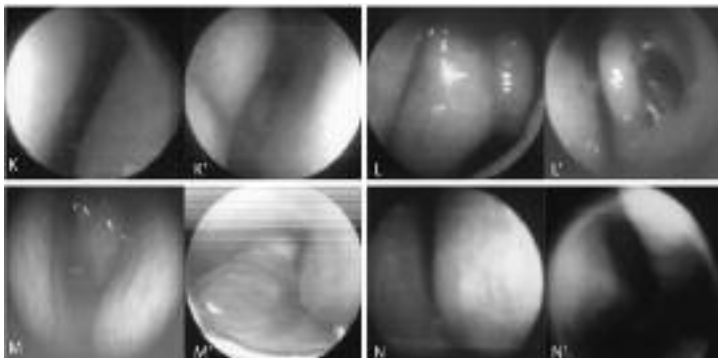

Fig. 3: Endoscopic examination for 14 patients at the preoperative phase and at the postoperative phase after 6 months.
K to N: Endoscopic examination at the preoperative phase.
K' to N': Endoscopic examination at the postoperative phase.

turbinate hypertrophy, with less observed shrinkage of the turbinates treated. This loss of effectiveness of treatment worsens with time. This leads us to conclude that wearing-off of the effects of radio frequency takes place over time. However, the results are still satisfactory at 2 years following surgery.

CONCLUSION

Due to its very favorable risk/benefit ratio, radiofrequency is our treatment of choice for inferior turbinate hypertrophy in children with cystic fibrosis.

It combines ease of implementation and low occurrence of side effects in a minimal invasive treatment which has an effectiveness that is more than interesting.

However the effects of radiofrequency do not seem inexhaustible and fade with time. The results are, nevertheless, still satisfactory beyond 2 years following surgery.

It would be interesting to determine how often it is necessary to perform a revision session of radiofrequency on these patients to achieve optimum long-term results. In our experience within 2 to 3 years seems quite reasonable.

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