

# Assessment of Radiofrequency in Otorhinolaryngology at the Military Hospital of Ouakam (MHO)

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## Abstract

**Introduction:** Coblation<sup>®</sup> is a low temperature-controlled tissue ablation technique widely used in human surgery. Its development in otorhinolaryngology has allowed a spectacular advance in the management of diseases of the nasal and oral cavities. The objective of our work was to study the indications for radiofrequency in ENT, to describe the technical aspects and to evaluate the results of his practice at the HMO. **Patients and Methods:** This is a retrospective study carried out in the ENT and Head and Neck Surgery department of the Ouakam Military Hospital (MHO) over a period of 3 years (from January 2015 to the end of December 2017), involving 37 patients who received radiofrequency treatment in the ENT sphere. **Results:** The study was carried out on 37 patients. The sex ratio of 0.19. The mean age of the patients was 33.3 years. The indications were dominated by chronic caseous cryptic tonsillitis with or without halitosis with 24 cases (64.9%) followed by recurrent tonsillitis in 5 cases (13.5%) then we have obstructive hypertrophy of the palatal tonsils with syndrome sleep apnea (OSAS) in 4 cases (10.8%) followed by nasal obstruction (hypertrophy of the inferior turbinates) and hypertrophy of the soft palate and uvula in 2 cases (5.4%). The complication rate was 8.1% and dominated by transient dysgeusia in 1 case or 2.7%, uvula edema in 1 case or 2.7% and bleeding in 1 case or 2.7%. The postoperative follow-up was done one week, 1 month, 3 months, 6 months and 12 months after radiofrequency. Volumetric reduction begins to set in from 1 month (62.5%) and becomes maximum in 3 months (74.3%). **Conclusion:** Coblation<sup>®</sup> is a controlled tissue ablation technique at low temperature, patented by ArthroCare<sup>®</sup> Corporation in 1997. Very widespread in human surgery. Its development in otorhinolaryngology was later, but allowed a spectacular advance in the management of diseases of the nasal and oral cavities.

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## Keywords

Radiofrequency Evaluation, Coblation Indications, Techniques, Complication

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### 1. Introduction

Radiofrequency or Coblation<sup>®</sup> is a controlled low-temperature tissue ablation technique patented by the ArthroCare<sup>®</sup> Corporation in 1997 [1]. It consists of applying a high-frequency electric power to biological tissue for a thermal effect purpose.

In the late 1920s, Harvard physicist William Bovie and neurosurgeon Harvey Cushing developed an electrosurgical instrument that later became a benchmark for incising, coagulating, drying or destroying tissue. Thus was born the electric scalpel, commonly called “Bovie” from the name of its inventor. Radiofrequency currents induce the stirring of ions forming the tissues, which produces heat by a phenomenon of friction. The tissue surgical effect depends largely on the amount of heat released and how it is distributed throughout the tissue. This phenomenon induces thermal necrosis of the tissues, linked to the coagulation of intracellular proteins. Cell death is completed within 72 hours. The intensity of thermal necrosis depends on the degree of temperature rise and the duration of action.

Very widespread in human surgery, with more than ten million patients treated, in particular for joint and spinal disorders, its development in otorhinolaryngology was later, but allowed a spectacular advance in the management of diseases of the nasal and oral cavities.

Coblation is an alternative to tonsillectomy and is performed as a treatment for several ENT diseases, including veil, turbinates and uvula.

The Military Hospital of Ouakam (MHO) ENT department has acquired the radiofrequency equipment since 2015. It is the first ENT and head and neck surgery department in Senegal to have used radiofrequency for the management of the pathologies mentioned above.

We aimed to study the indications of radiofrequency in ENT, to describe the technical aspects and to evaluate the results of its practice at the Military Hospital of Ouakam.

### 2. Patients and Methods

We conducted a retrospective study in the ENT and Cervicofacial Surgery Department of the Military Hospital of Ouakam (MHO) over a period of 3 years (from January 2015 to the end of December 2017), involving 47 patients who received radiofrequency treatment on the ENT sphere. The medical records of all patients were collected and analysed. The follow-up of the patients' evolution for this study purposes was enabled by telephone calls; all patients who could be reached were called.

All the medical records of patients who had undergone radiofrequency treatment in the ENT sphere with follow-up and postoperative monitoring from January 2015 to the end of December 2017 were included.

At the end of the analysis, 10 patients were excluded because of unusable medical records.

Thus the study was conducted on 37 medical records and we were interested in the following parameters: age, sex, marital status, geographical origin, socio-professional status, medical history, clinical examination data, therapeutic indications, number of sessions performed per patient, radiofrequency results as well as evolution and complications. Evolution was based on:

- Functional symptomatology (pain, ronchopathy, halitosis)
- Physical examination: Volumetric reduction.

Collected data were analyzed using the software Microsoft Excel 2016.

### 3. Results

The mean age of the patients was 33.3 years with extremes of 16 and 67 years. Nineteen patients, corresponding to 37.8%, were between 26 and 35 years of age, which is the largest age group in terms of number (**Table 1**).

There were 31 women (83.8%) and 6 men (16.2%), with a sex ratio of 0.19. In this study there were 25 married patients (67.6%) and 12 single patients (32.4%).

The pupil-student group (11 cases) and the housekeeper group (11 cases) are the two most representative socio-occupational categories (**Table 2**).

The indications were dominated by chronic cryptic caseous tonsillitis with or without halitosis accounting for 24 cases (**Table 3**).

There were 5 patients (13.5%) who underwent a second session.

The rest, 32 patients (86.5%), received a single session.

The complications rate was 8.1%. They involved (**Figure 1**):

- Transient dysgeusia in 1 case (2.7%).
- An oedema of the uvula on the first postoperative day in one case, standing for 2.7%.
- Late bleeding (1 month post RF) in 1 case representing 2.7%.

In our study, postoperative follow-up was done at 1 week, 1 month, 3 months, 6 months and 12 months post radiofrequency.

**Table 1.** Patients distribution according to their age group.

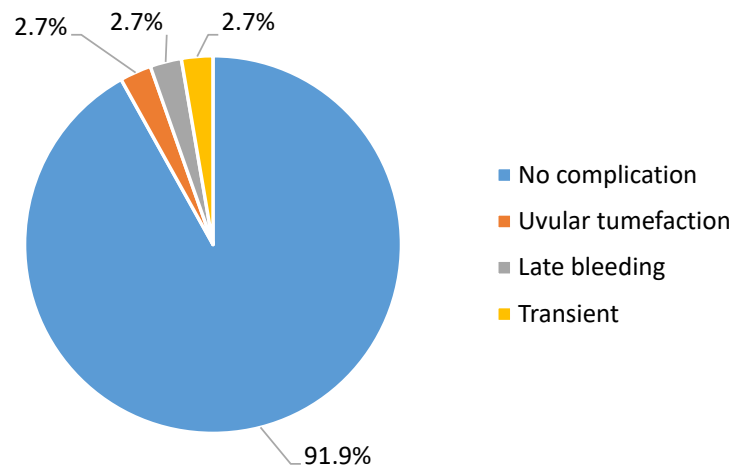
Age group	Number of patients	Percentage (%)
16 - 25 years old	11	29.7
26 - 35 years old	19	37.8
36 - 45 years old	6	16.2
46 - 55 years old	4	10.8
56 - 67 years old	2	5.4
Total	37	100

**Table 2.** Patients distribution according to the socio-occupational status.

Socio-occupational status	Number of patients (N)	Percentage (%)
Pupil-student	11	29.7
Housekeeper	11	29.7
Koranic teacher	1	2.7
Retired	1	2.7
Trader	5	13.5
Public servant	6	16.2
Economic operator	2	5.4
Total	37	100

**Table 3.** Patients distribution according to the indications.

Indications	Number of patients (N)	Percentage (%)
Chronic cryptic caseous tonsillitis with or without halitosis	24	64.9
Repetitive tonsillitis	5	13.5
Obstructive tonsillar hypertrophy with obstructive sleep apnea syndrome (OSAS)	4	10.8
Nasal obstruction (hypertrophy of the lower turbinates)	2	5.4
Enlargement of the soft palate with a long uvula	2	5.4
Total	37	100



**Figure 1.** Patients distribution according to the postoperative course (N = 37).

- One week after radiofrequency, the assessed sign was postoperative comfort. Only 2 patients still complained of slight pain.
- In 1 month post radiofrequency there was 62.5% improvement
- At 3 months post-radiofrequency, the improvement was 74.3% and volume reduction was 74.3%.

- At 6 months post-radiofrequency, the improvement was 67.6%, and in the volumetric reduction was 67.6%.
- At 12 months post-radiofrequency, the improvement was 64.9% and the volume reduction was 64.9%.

An overall improvement rate of 98.9% was obtained for all indications combined.

The evolution was labelled by an improvement of the symptomatology in 20% of cases for recurrent tonsillitis, in 75% for obstructive hypertrophies of the palatine tonsils as well as cryptic palatine tonsils with or without caseum. Regarding the hypertrophies of inferior turbinates, soft palate and uvula, a reduction was obtained in 100% of cases.

Of the 5 patients who underwent a second session, we noted an improvement in 4 cases (10.8%). This rate added to the 75% of the first session leads to a cumulative improvement of 85.8% for both sessions.

#### 4. Discussion

Radiofrequency (RF) has some broad spectrum of indications in ENT: halitosis in chronic cryptic caseous tonsillitis, obstructive palatal tonsillar hypertrophy, ronchopathy, nasal obstruction, OSA, tongue base hypertrophy, epistaxis...

Current surgical modalities for the medical treatment of halitosis with tonsillitis include conventional tonsillectomy and laser-assisted surgery [2] [3] [4]. The valid surgical approach to treat the caseum of the tonsils has been laser-assisted cryptolysis, which is based on the removal of cryptic parts, while preserving part of the pharyngeal tonsils [3] [5]. The application of radiofrequency (RF) to tonsillar tissue has been developed as an option for the treatment of patients with tonsillar hypertrophy [6] [7].

In our study we had 24 cases of cryptic caseous tonsillitis with or without halitosis, standing for 64.9% of total indications. Eighteen cases out of these 24, corresponding to 75% had reported an improvement after the first session. This number was increased to 21 cases of improvement or 87.5% after the second session. This result is fairly close to that found in the literature [8]. This shows the importance of a second or even a third session whenever necessary.

Tonsillectomy is indicated for recurrent tonsillitis (to avoid systemic complications), in cases of antibiotic resistance and in cases of peritonsillar phlegmon. In our study, there were 5 cases of recurrent tonsillitis, accounting for 13.5% of the total indications. Only one of the 5 cases had improved, corresponding to 20% of favourable results. This poor result is explained by the fact that tonsillectomy always leaves a residual stump. This stump is a contributive factor of recurrence and is therefore a poor indication.

In our study there were 4 cases of obstructive palatal tonsil hypertrophy, standing for 10.8% of total indications. All four cases improved after the first RF session, accounting for a rate of 100%. This rate is similar to literature data where several studies show that partial tonsillectomy by radiofrequency or tonsil reduc-

tion by radiofrequency are effective on snoring and sleep apnoea regardless of the technical approach [9] [10] [11].

Inferior turbinate reduction is one of the most commonly performed nasal-sinusal surgical procedures, and the most common indication for turbinate reduction is nasal obstruction due to inferior turbinate hypertrophy. In addition to relieving nasal obstruction, inferior turbinate reduction may also play a role in the treatment of OSAS in adults and children [12]. This surgical reduction (total or partial turbinectomy) can be performed conventionally or by radiofrequency. In our study we had 2 cases of inferior turbinate hypertrophy that had undergone radiofrequency reduction, representing 5.4% of total indications. Both cases had improved, representing 100% favourable results. Although the number of patients is very small, this result corroborates with the literature [13] [14]. However, other results in the literature are slightly less convincing in terms of improvement than ours [15] [16] [17].

For hypertrophies of the soft palate and uvula, two techniques are available to the surgeon: palatoplasty or uvulo-palatoplasty or volumetric canal reduction of the soft palate muscle tissue. The choice of treatment depends on the severity of the sleep-disordered breathing and the location of the sound production (snoring) or obstruction. In our study we had 2 cases (5.4%) of snoring whose anatomical substratum was a hypertrophy of the soft palate. Both cases had benefited from radiofrequency treatment with a 100% improvement. This result is close to that reported in the literature [18] [19] [20].

The basic principle of tongue reduction by radiofrequency approach is to create a submucosal coagulum that will transform into contracted scar tissue, resulting in an overall reduction in tissue volume.

In our study, postoperative follow-up was done at 1 week, 1 month, 3 months, 6 months and 12 months post radiofrequency.

- One week after radiofrequency, the assessed sign was postoperative comfort. Only 2 patients still complained of slight pain. This result confirms the early disappearance of pain observed during radiofrequency surgery. It was premature at this stage to evaluate the volumetric reduction.
- In 1 month post radiofrequency there was 62.5% improvement. This result can be explained by the volumetric reduction that started, thus leading to an improvement in symptomatology.
- At 3 months post-radiofrequency, the peaks of improvement (74.3%) and volume reduction (74.3%) were reached. We can therefore say that 3 months is the time necessary to obtain an optimal volumetric reduction.
- At 6 months post-radiofrequency, the decrease in the rate of improvement (67.6%), and in the rate of volumetric reduction (67.6%), as well as the increase in complaints and the absence of volumetric reduction, which rose to 35.1%, can be explained by the phenomena of symptomatic flare-up or recurrence.
- At 12 months post-radiofrequency, the downward trend in improvement

continued, from 25 cases to 24 cases (64.9%). Conversely, complaints are on an upward slope, dropping from 32.4% to 35.1%. The volume reduction is down 64.9% while the absence of volume reduction is up (35.1%). All this is the clinical expression of the regrowth phenomenon.

This study shows that the second session, when necessary, should be performed between 3 and 6 months. Volumetric reduction is optimal at 3 months, but may not be complete. In this case, a second session must be done as a complement on the one hand, and on the other hand, to avoid the phenomena of symptomatic flare-up observed.

These recurrences can be explained by a compliance problem that we faced in this study. Indeed, out of 15 requests for a second radiofrequency (RF) session, only 4 patients achieved. The other 11 did not report any follow up despite repeated reminders. As far as we are concerned, this constitutes a break in or stop of the treatment. These breaks in treatment seem to have economic reasons.

Indeed, in our series, low-income people constituted the majority (65%): 11 pupils, 11 students, 1 retired person and 1 Koranic teacher.

## 5. Conclusion

Our study suggests that the use of radiofrequency constitutes a valid alternative in the management of certain surgical conditions in otorhinolaryngology, particularly in the treatment of chronic cryptic tonsillitis and hypertrophy of the inferior turbinates. However, this study has some limitations: the size of our sample is too small and several patients could not undergo a second radiofrequency session due to financial problems.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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