

Molecular Resonance Generator (MRG) Assisted Tonsillectomy-An Innovative Technique

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ABSTRACT

Introduction

Dissection and Snare method of tonsillectomy was first introduced nearly a century ago. Since then several methods of performing tonsillectomy have evolved like electrocautery, harmonic scalpel, Laser, coblation and Magnetic Resonance Generator (MRG). All these methods have been used with the aim of overcoming the shortcomings with the previous methods like intra and post operative bleeding, reducing the duration of surgery and post operative pain. MRG works on the principle of quantum resonance and it has helped in minimizing the intraoperative and post operative bleeding as well as post operative pain. In this study MRG was used for tonsillectomy with favourable outcome.

Materials and Methods

12 patients who underwent tonsillectomy by MRG were included in the study. Various parameters like duration of surgery, intra and post operative bleeding and post operative pain were recorded and compared with other studies.

Results

In all the 12 patients favourable outcome was recorded. None of the cases had post operative bleeding and there was minimal intraoperative bleeding. Post operative pain showed a decreasing trend with very minimal post operative pain on day 3.

Conclusion

Our study highlights the advantages of MRG in tonsillectomy which nearly overcomes the drawbacks and complications encountered with other methods employed for tonsillectomy.

Keywords

Tonsillectomy; Complications; Magnetic Resonance Generator

Over the last two decades there has been several innovations and developments in the surgical methods employed for tonsillectomy, one of the most commonly done surgeries in otorhinolaryngology.

Ever since the introduction of first method of doing tonsillectomy-the Guillotine method, there has been a stupendous stride in newer methods constantly evolving. Conventional method of dissection and snare has been the longest in use for over a century, first described in 1909. Other methods like electro cautery, harmonic scalpel, laser, coblation and Molecular resonance generator (MRG) have since evolved and each of these,

have been used with an attempt to make the surgery least morbid with closer to minimal or no complications at all.^{1,2,3} Several authors have extensively published their experiences with these various methods elaborating the advantages of one over the other in the last few years.

Needless to say, the question then arises as to why

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despite there being several time tested methods still there is relentless research into developing newer and newer technologies for performing the surgery. We believe what can partly summarise the justification for this, is the infallible human endeavor to find that one robust technique, which can supersede almost all the shortcomings of the preceding methods, with maximum emphasis on almost nil intraoperative bleeding and mild to nil post operative pain.

Molecular resonance generator (Fig. 1) operates on the principle of quantum science and initially introduced in neurosurgery has steadily found its application in otorhinolaryngology especially in tonsillectomy.^{4,5}

Quantum molecular resonance (QMR) in MRG is generated by means of alternate current, high-frequency electron waves, characterized by a precisely and well-defined major wave at 4 MHz, followed by subsequent well-defined 8, 12, and 16 MHz waves with decreasing amplitudes. Electron energy quanta (EEQs) are thus obtained and calibrated for human tissue. As these EEQs are delivered, cell molecular bonds are posed to resonance- the QMR- and subsequent bond breakage occurs with minimal rise in temperature.^{4,6}



Fig. 1. Molecular resonance generator

Materials and Methods

It is a prospective, single blind, randomized study. 12 patients were included in the study done at a tertiary care centre. simple randomization method was used, where in patients considered fit for tonsillectomy were assigned numbers from one onwards and the odd ones were

selected for MRG assisted tonsillectomy. This helps in avoiding selection bias.

Single blind study enabled that patients did not know which method was used so as to ensure the patients response post operatively is not biased based on method of surgery especially for parameters like post operative pain.

The Aims Objective is to study the efficacy of MRG assisted tonsillectomy by considering the following parameters :-

- a) Intraoperative and postoperative bleeding
- b) Post operative pain
- c) Duration of surgery

Twelve patients, both males and females between 6 yrs to 30 years of age, who underwent tonsillectomy by MRG, were selected and included in the study, and following patients were excluded from study.

1. Patients who underwent adenoidectomy with tonsillectomy in the same sitting.
2. Patients in whom MRG was combined with other methods like conventional or coblation during the same surgery.

Signed informed consent was taken from the parents of pediatric age group patients and in adult patients, consent was sought from the patient themselves. All the surgeries were performed by experienced senior surgeon. Visual analogue scale was used for assessing the post operative pain. Pain assessment was done immediately after surgery, after twenty four hours of surgery and after three days postoperatively. Score 0 indicating no pain and 10 indicating agonizing pain. This method was used effectively, as all the patients could understand instructions well including the youngest patient in our series who was of 6years.

Intraoperative bleeding was recorded by calculating number of soaked cotton swabs and suction collection at the end of surgery.

Duration of surgery is recorded by measuring the time from start of procedure till the end of the procedure.

Results

Total 12 tonsillectomies performed by MRG were included in the study. Indications were either chronic tonsillitis or obstructive tonsillar hypertrophy.

Majority were males (M:F ratio 2:1). Maximum were in 10 and 11 age group (50%) followed by children in 1 to 10 yr age group (44.4%). (Table I)

Table I: Age distribution of patients

AGE GROUP (IN YEARS)	NUMBER OF PATIENTS
1 - 10	5 (2 Patients of 8 yrs each, 2 patients of 7 yrs each and 1 patient of 6 yrs)
10 - 20	6 (4 patients of 10yrs each and 2 patients of 11 yrs each)
20 - 30	1 (26yrs)

Intraoperative and post operative bleeding - The average blood loss in MRG was 6.5ml intraoperatively and in none of the cases post operative bleeding was reported.

The average post operative pain score was 2.66,1.58 and 1.42 in immediate post operative period, day 1 post operative and day 3 post operative respectively, thus suggesting a decreasing trend over 3 days, when the need for analgesic was almost nil. Even the immediate post operative pain score was minimal. (Fig. 2)

Minimal instruments used in MRG assisted tonsillectomy- Only 2 instruments –Boyle Davis mouth gag with tongue blade and tonsil holding forceps were used in performing the surgery while the MRG probe tip was enough for incision, dissection, cutting and coagulation whereas the conventional method requires an array of instruments.

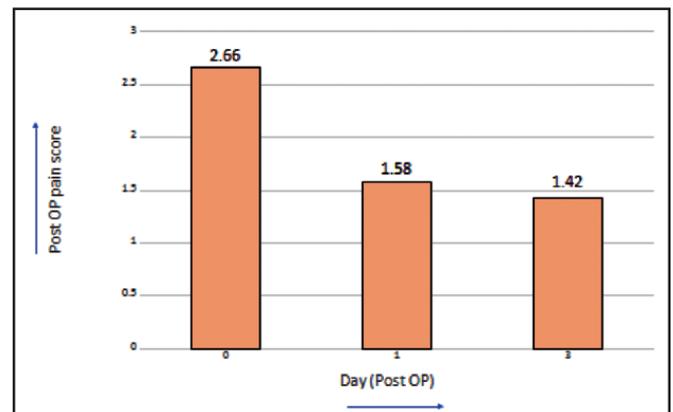


Fig. 2. Post operative pain score

Discussion

Tonsillectomy as a surgical procedure has seen introduction of many newer methods over the last few decades. In the current era where the digital platform provides over and excess information to the patients about the medical conditions, treatment options and the latest developments enabling them to seek better options with least complications, it is imperative for the otolaryngologist to be able to understand the pros and cons of all the current methodologies of performing tonsillectomy. This helps the patient as well as enables the ENT surgeon to choose the most suitable and judicious option amongst the spectrum of choices.

Traditionally the dissection & snare method for tonsillectomy has remained popular over the years. Cohen and Ernst first described the dissection and ligation method of tonsillectomy in the year 1909.⁷ Over the years use of electrocautery gained popularity as it helped to overcome complications like bleeding to a large extent and also reduced the operative time.^{8,9} But higher thermal tissue trauma with electrocautery with the cautery tips reaching temperature as high as 400 to 600 degree centigrade with monopolar and 150 to 200 degree centigrade with bipolar resulted in increased severity of post operative pain.^{8,10} Ever since there has been a relentless pursuit to develop methods which could overcome this drawback as well.

Hence the application of newer methods like Coblation and MRG paved the way for better outcomes. Coblation

method operates at low temperatures (60 to 70 degree centigrade) and therefore causes lesser tissue thermal injury and less post-op pain.⁷ Molecular resonance generator, causes even lesser temperature rise (<45 degrees).⁹ The principle of MRG is to break the molecular cell bonds without causing cell death or tissue vaporization.^{11, 12, 8}

MRG though popular & widely used in neurosurgery, its application in otolaryngology has remained limited and therefore not much literature elaborating its effectiveness.

The main reason we believe could be, due to lack of its cost effectiveness and hence not being available widely.

What prompted us to present our experience with MRG assisted tonsillectomy in a tertiary centre is the promising outcome in nearly hundred percent of the patients.

The intraoperative bleeding in our series was minimal (6.5 ml), which is comparable to the study by Riccardo D'Eredita et al. The mechanism of coagulation unlike in cautery is -it breaks the molecular bond, triggers proteic fibrinogenic denaturation and this activates a physiologic coagulation cascade without the formation of necrotic plug.^{4,5}

In our study none of the patients reported post operative bleeding, whereas in the study by Riccardo D'Eredita using MRG, one patient had post operative bleeding after twenty four hours of surgery.

Post operative pain - In our series there has been a declining pattern of pain severity from immediate post op period till day 3. In immediate post op period pain was moderate in severity which reduced to mild by day 3. This is a striking feature of MRG which gives it a remarkable edge over other methods. In studies by Temple RH et al & Timms MS et al, in which coblation assisted tonsillectomy was done and in a study by Wexler D B in which electrocautery was used, an increasing pain severity by day 4 was reported. The reason for increasing pain severity in these methods is believed to be due to detachment of eschar from the tonsillar fossa, exposing muscle fibers & nerve endings previously sealed. MRG however owing to minimal thermal injury & therefore

reduced eschar formation and detachment does not cause increase in severity of pain. Our findings are comparable to the study by Riccardo D'Eredita et al.⁹

The average time taken in our study for MRG assisted tonsillectomy is 18mins, whereas in the study by D'Eredita et al, the average time duration was 9.5min with MRG, which is almost half the time taken for coblation assisted surgery in their series.

In our study increased time taken is possibly due to exposure to this new technology for the first time at our institute.

Besides tonsillectomy MRG has extended application in otolaryngology like in adenoidectomy, thyroid & ear surgeries.

Though the cost of MRG is still a limiting factor but considering the favorable outcome with this technique, which remains incomparable with other techniques, MRG certainly has an edge to gain momentum with time.

However if more and more literature is made available by different authors with their experience with MRG it will certainly help much more to boost its application potential.

Conclusion

In conclusion our study highlights the advantages of MRG in tonsillectomy which owing to its unique mechanism has enabled the possibility of nearly overcoming the drawbacks and complications of other surgical methods used in tonsillectomy.

Besides closer to nil complications and very minimal post operative pain and bleeding, this method considerably lessens the duration of surgery & also the need for instruments is minimal.

In this era of ever growing demand for painless & bloodless surgery, MRG has the potential to have a strong foothold in its application in tonsillectomy.

As with introduction of any new technology more experience is gained by operating large number of cases, which definitely helps to bring out better surgical outcomes, MRG too we believe is no exception to the above.

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