Available online freely at www.isisn.org

Bioscience Research

Print ISSN: 1811-9506 Online ISSN: 2218-3973

Journal by Innovative Scientific Information & Services Network

RESEARCH ARTICLE BIOSCIENCE RESEARCH, 2020 17(4): 4179-4186. **OPEN ACCESS**

Cytological Evaluation of Radiofrequency Ablation versus Diathermy after Turbinate Mucosa Reduction

Samir Sorour Sorour[1], Naser Naguib Mohamed[1], Mai Mohamed Abdelwahab[2], Mahmoud Mohammed Al-Mokhtar Al-Toumi, Ashraf Elhussiny Oda Basha[1], Mohammad EL-sayed Abd Elbary[1] and Mohamed Elsayed Elshora[1]

[1]Otorhinolaryngology Department, Faculty of Medicine, Zagazig University, **Egypt**
2 Pathology Department, Faculty of Medicine, Zagazig University, **Egypt**

***Correspondence: M.altoumi83@gmail.com** **Received 30-04-2020, Revised: 23-05-2020, Accepted: 11-06-2020 e-Published: 23-12-2020**

Chronic nasal obstruction is often caused by enlargement of the inferior nasal turbinate. There are many surgical methods that are commonly used to treat nasal obstruction due to turbinate hypertrophy as electrocautery cryosurgery, partial turbinectomy, laser turbinoplasty, microdebrider and radiofrequency thermal ablation (RFTA). This study aimed to examine the microstructural appearance of the ciliated mucosal epithelium tissues by nasal cytology through light microscope obtained by nasal cytology from Radiofrequency volume tissue reduction (RFTA) and bipolar electrocautery (BEC) treated patients with nasal obstruction due to hypertrophied turbinates. A prospective study included 36 patients with hypertrophic inferior turbinate nasal obstruction, who have persistent symptoms not responding to medical treatment. Patients were divided into 2 groups: group (A) were managed with radiofrequency ablation of inferior turbinate hypertrophy and bipolar turbinate reduction in group (B). Routine nasal examination was done with the aids of anterior rhinoscopy and nasal endoscopy. The follow up of patients were 3 months after surgery. Saccharin test and pathological examination of nasal mucosa were done postoperatively. There were improvement in nasal obstruction and no crustation observed in nasal mucosa among patients in both group post operatively. The Discharge and crustation were significantly associated with Diathermy Group. Cytological microscopic examination of ciliated epithelial cell there were in diathermy group the majority of sample show abnormality in cilia and epithelial cells 77% of patient had abnormal ciliated epithelial cell and 22% their sample show no abnormality. In radiofrequency group, 88% of patients had no abnormality in ciliated epithelial cell and only 27% have abnormal ciliated epithelial cells. At present, we definitely prefer Radiofrequency volumetric tissue reduction as a first line treatment modality in patients with chronic nasal obstruction due to inferior turbinate hypertrophy unresponsive to medical treatment. Radiofrequency showed minimal injury to nasal muscosal tissues with good ciliary structure and healthy goblet cells, along with an intact and functioning epithelium.

Keywords: Turbinate mucosa, Radiofrequency ablation, Nasal mucosa and Bipolar electrocautery.

INTRODUCTION

The nose represents a major portal of air exchange between the internal and external environment with conditioning inspired air toward a 37 °C and 100% relative humidity. The nose provides olfaction and local defense for filtering inhaled particulate matter and gases (Sahin-Yilmaz and Naclerio,2011). The inferior turbinate provides humidification of air entering the nose and functions as a barrier to environmental allergens. It contributes to inspiratory resistance,

which is necessary for normal breathing cycle consists of alternating engorgement of the inferior turbinates leading to varying laterality to a patient's nasal obstruction. Alteration in this physiological role of the inferior turbinate can result in what is referred to as the "empty nose syndrome" where reduction in resistance leads to paradoxical obstructive symptoms (Daniel et al. 2018). The anterior tip of the inferior turbinate is found in the nasal valve region so nasal valve is dynamic as swelling of the erectile venous sinusoids of the inferior turbinate can lead to increase in airway resistance (Dinç et al. 2020).Two methods that uses heat controlled turbinate reduction by radiofrequency and laser preserving nasal ciliary mucosa and hence clearance superior to electrocautery method (Rosato et al. 2016). The biophysics of radiofrequency are unique and delivered in a unipolar or bipolar fashion from an electrode that generate low heat energy sufficient to denature tissue protein. A radiofrequency needle may be placed submucosally and only the tissue adjacent to the unprotected protein will undergo ablation. This fact eliminates surface destruction (Pang et al., 2013). Every surgical procedure targeting turbinates may cause some effects on the nasal cycle (NC). Submucosal diathermy has been reported to cause a reduction in NC amplitude which may be explained by the cauterization of the venous sinuses in the nasal submucosa likewise Tatar reported that submucosal radiofrequency thermal ablation preserves the periodicity of the NC even though it decreases its amplitude (Tatar and Altas, 2014).Nasal cytology represents a useful, cheap and easy to apply diagnostic method to better detail the phenotypic characteristics for nasal mucosa tissue. In fact, it allows to detect and quantify the cell populations within the nasal mucosa at a given instant, to better discriminate the different pathological conditions (Toppila-Salmi et al. 2015). This has important pathophysiologic and clinical consequences, in fact, the decrease in the ciliated component and the proportional increase in goblet cells increases the production of mucus production and its consequent endonasal stagnation (Heffler et al. 2018). Therefore, this study aimed to examine the microstructural appearance of the ciliated mucosal epithelium tissues by nasal cytology through light microscope obtained by nasal cytology from Radiofrequency volume tissue reduction (RFTA) and bipolar electrocautery (BEC) treated patients with nasal obstruction due to hypertrophied turbinates.

PATIENT AND METHODS

A prospective study performed on Thirty six patients recruited from the ENT outpatient clinic in the Zagazig university hospital, during the period from November 2019 to August 2020. Written Informed consent was taken from the patient to participate in the study. Approval for performing the study was obtained from Otorhinolaryngology Department, Zagazig University Hospitals after taking Institutional Review Board (IRB) approval.

Inclusion and exclusion criteria:

Patients were complaining of nasal obstruction due to inferior turbinate hypertrophy with mean age was ranging from 18 to 60 years. All patients have persistent symptoms not temporarily relieved by medical therapy (topical corticosteroids, antihistamines, decongestants, and topical anticholinergic agents) with a CT scan. Patients with study coagulation disorder, uncontrolled hypertension, sinonasal tumors, pregnancy, allergic fungal rhinosinusitis, nasal polyposis and arked nasal adhesions were excluded from this study.
Full detailed history was taken. Analysis of the chief symptom of the patient was obtained. The main symptom was nasal obstruction. Routine physical ear-nose-throat examination, focusing on detailed nasal examination as anterior rhinoscopy, nasal endoscopy, nasal decongestion and CT scanning.

Surgical procedures:

All procedures were done under general hypotensive anesthesia with patients in supine position and slight elevation of patient head. Nasal cavity prepared with nasal packs soaked with mixture of saline epinephrine solution concentration 1:100,000. All surgical steps were done using 0-degree angled endoscope in addition to sets of endoscopic sinus surgery. Patient in group (A) were managed with radiofrequency ablation of inferior turbinate hypertrophy. After preparation of nasal cavity a special electrode was connected to a radiofrequency device (ENTERMED enter wave electrosurgical unite). The electrodes were inserted submucosally under endoscopic guidance. The energy given through the procedure was 300 J at less than 75°C and energy was delivered to three different sites of each turbinate in the anterior, middle, and posterior portions In relatively small turbinates, two applications were accomplished in the anterior and posterior parts. In addition, energy delivery

was stopped once whitening was noted over the applied area of mucosa during the procedure; the power was kept constant while the duration was decreased. Patient in group (B) underwent bipolar turbinate reduction After preparation of nasal cavity Bipolar cautery forceps was connected to a standard surgical coagulation diathermy source under endoscopic guidance with visualization of whole turbinate, the forceps was introduced into the nasal cavity touching both the superior and inferior surface of the turbinate. parallel to the floor of the nose and the diathermy circuit 20w was closed while the forceps was gradually withdrawn applying linear burn to the mucosa. Usually 2-3 runs were needed for reduction of turbinate size. Bipolar cautery was controlled with foot switch. attention was given to inspecting ciliated cell integrity, noting the percentage of patients with altered cells and calculating the ratio between goblet and ciliated cells.

Post-operative follow-up:

The follow up of patients were 3 months after surgery and patient came to OPD every 1st week of 3 month after operation. Saccharin test: All patients were examined by saccharin test after 3 months. 5mg of particulate saccharin is placed on the inferior turbinate about 1.5 cm posterior to the nostril and saccharin transport time (STT) was measured from the placement of the particle until the subject reports the taste is. Nasal cytology: All patient will be taken nasal cytology biopsy from nasal mucosa after 3 months using a pencil shaped nasal curette with a small distal cup over the mucosal surface of the medial aspect of the inferior turbinate. The stained sample is read at optical microscopy, at 1000× magnification with oil immersion. The microscopic evaluation of percentage of epithelial cells was given to inspecting ciliated cell integrity, noting the percentage of patients with altered cells and calculating the ratio between goblet and ciliated cells.

Statistical analysis

Data were then imported into Statistical Package for the Social Sciences (SPSS version 20.0) (Statistical Package for the Social Sciences) software for analysis. According to the type of data qualitative represent as number and percentage, quantitative continues group represent by mean ± SD, the following tests were used to test differences for significance;. Difference and association of qualitative variable by Chi square test (X2) Differences between quantitative independent groups by t test, paired by paired t. P value was set at <0.05 for significant results and <0.001 for high significant result.

RESULTS

This study was included 36 patients to evaluate inferior turbinate size and mucosal state after reduction by radiofrequency ablation versus diathermy. 36 patients had been enrolled in two groups, 18 of them by radiofrequency ablation group and 18 in diathermy group. Table (1) showed an improvement in nasal obstruction for both groups postoperatively, in diathermy group 6 patients (33%) had grade I mild nasal obstruction, 10 patients (55%) had grade II and two patients had grad III nasal obstruction. In radio frequency group, 8 patients (44%) had grade I nasal obstruction, 9 patient (9%) had grade II nasal obstruction and only one patient (5%) had grade III. There was no significant difference between both groups although there was improvement in objective evaluation. Nasal discharge postoperatively in diathermy group was clear discharge and it was resolved 3 weeks post operatively. Three patients (16.6%) has no discharge and 6 patient (33.3%) has mild discharge, 9 patient (50%) has moderate discharge and only one patient (5.6%) had heavy discharge. In radiofrequency group regard nasal discharge also clear fluid and resolved first few days in first week post operatively the majority of patient had no to mild,14 (88.9%) patient had no discharge and 3 patient (16%) of them had mild discharge and one (11%) patient has moderate discharge and heavy discharge were observed. Crustation post-operatively in diathermy group we observed crustation in all cases and it was resolved 4 week post operatively 7 patients (16.6%) had isolated crustation and 11 patient (61%) had moderate crustation. In radiofrequency group, there were no crustation observed in nasal mucosa among patients. The Discharge and crustation were significantly associated with Diathermy Group as shown in (Table 1). The post-operative STT in diathermy group 14 patient (77%) was within normal limit, 4 patients (22%) had prolonged STT. In radiofrequency group regard post-operative STT all patient had normal STT. No significant difference between two group after 3 months as shown in (Table 2). Cytological microscopic examination of ciliated epithelial cell there were in diathermy group the majority of sample show abnormality in cilia or epithelial cells or both 14 patients (77%) had abnormal ciliated epithelial cells and 4 (22%) patients their sample show no abnormality. In Nasal

cytology 5 patients had moderate mucinous cells and only one patient had large mucinous cells in their cytological sample. There was no significate difference between two groups as shown in (Table 3). As regarding nasal cytological microscopic examination from a cases of radio-frequency group (A) showed mild to moderate number of ciliated cells with low abnormal ciliated cells, mucinous cells, inflammatory cells and many basophiles in addition to normal basal epithelial cells and striated cells (Figure 2). Nasal cytology from acases of electrocautry group (B) showed abnormal ciliated cell, numerous P.N.L.s, oesinophils and striated cells. Also, there were a large number of mucinous cells, abnormal ciliated cells, groups of crushed mucinous cells and lymphocytes with a mucin threads (Figure 3).

Table (1): Nasal obstruction, discharge and crustation distribution between groups at 3 month postoperatively:

			Group		X2	P
			Diathermy Group	Radiofrequency Group		
Nasal turbinate obstruction	Grade I	N	6	8		
		%	33.3%	44.4%		
	Grade II	N	10	9	0.67	0.71
		%	55.5%	50%		
	Grade III	N	2	1		
		%	11%	5.6%		
Crustation	No	N	0	18		
		%	55.6%	100.0%		
	Isolated	N	7	0	30.22	0.00**
		%	38.8%	0.0%		
	Moderate	N	11	0		
		%	61.1%	0.0%		
Discharge	No	N	3	14		
		%	16.6%	88.9%		
	Mild	N	6	3		
		%	33.3%	16.6%		
	Moderate	N	9	1		
	Heavy	N	1	0	15.51	0.001*
		%	5.6%	0.0%		
Total		N	18	18		
		%	100.0%	100.0%		

Table (2): Saccharin transport time distribution between studied groups:

			Diathermy Group	**Radiofrequency Group**	**t/ X2**	**P**
Saccharin transport time post			**15.44±7.85**	**11.83±4.39**	**1.252**	**0.219**
Saccharin transport time post	**<20min**	**N**	**14**	**18**		
		%	**77%**	**100%**		
	>20	**N**	**4**	**0**	**1.59**	**0.206**
		%	**22.2%**	**0%**		
Total		**N**	**18**	**18**		
		%	**100.0%**	**100.0%**		

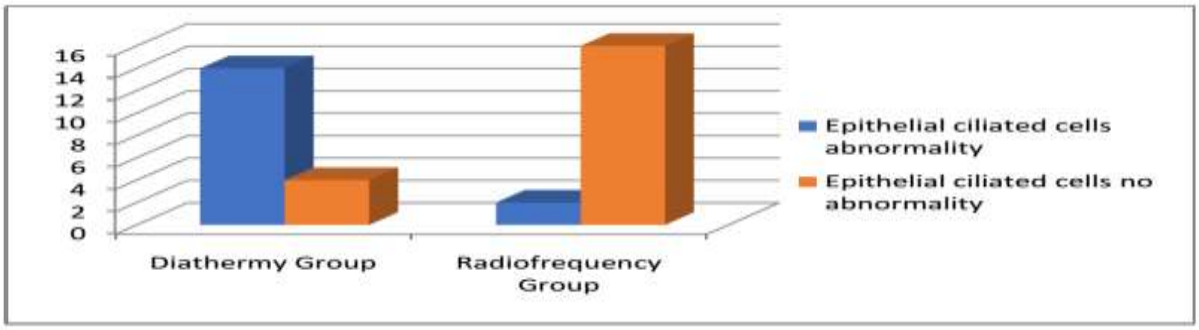

Figure (1): Epithelial ciliated cells abnormality distribution between studied groups 3-month postoperatively.

Table (3): Mucinous cells distribution between studied groups at 3-month postoperatively:

			Group		t/ X2	P
			Diathermy Group	Radiofrequency Group		
Mucinous cells	Mean ± SD		57.38±19.5	49.38±16.2	1.718	0.078
	Non	N	5	12		
		%	27.8%	66.7%		
	Moderate	N	9	5		
		%	50.0%	27.7%	5.82	0.054
	Large	N	4	1		
		%	22.2%	5.6%		
Total		N	18	18		
		%	100.0%	100.0%		

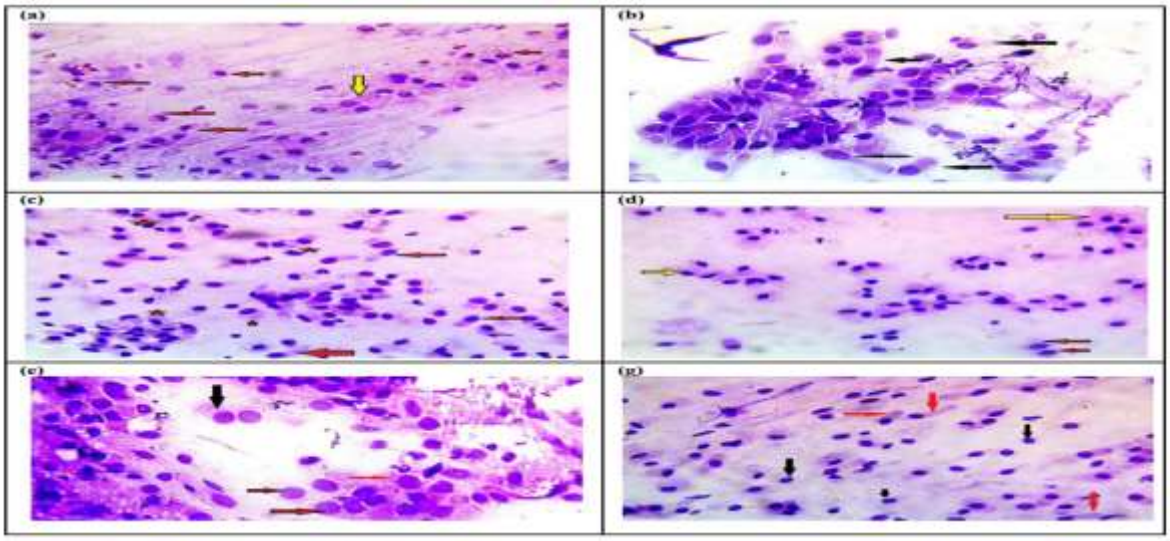

Figure (2): Nasal cytology from a cases of radio-frequency group showing: (a) Ciliated cells (yellow arrow) and inflammatory cells (red arrows) in a mucinous background.(b): Ciliated cells (arrows) in addition to normal basal cells and striated cells. (c): ciliated cells (arrows) and mucinous cells (Asterix).(d):Basal epithelial cell (red arrow) and striated cells (yellow arrows) with paucity of ciliated cells.(e):Abnormal ciliated cell (black arrow) with many basophiles (red arrows). (g): Ciliated cells (red arrows and basal cells (black arrows) (H&E x400).

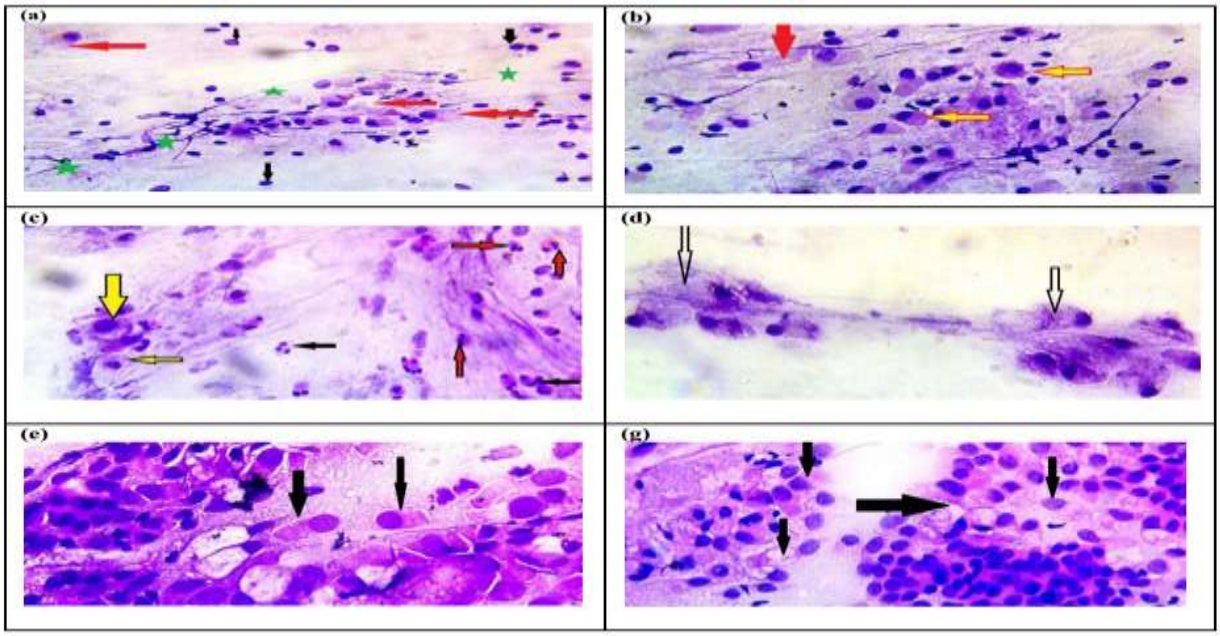

Figure (3): Nasal cytology from a cases of electrocautry group showing: (a) Mucinous cells (red arrow) and lymphocytes (black arrows) with a mucin threads (astrix). (b): Abnormal ciliated cell (red arrow), and numerous striated cells (yellow arrow). (c): Oesinophils (red arrow), P.N.L.s (black arrow) and mucinous cells (yellow arrow). (d): Groups of crushed mucinous cells (arrows). (e): Abnormal ciliated cells (black arrows). (g): Large number of mucinous cells (black arrows) (H&E x400).

DISCUSSION

The present study was conducted to compare bipolar electrocautery and radiofrequency in the treatment of hypertrophic inferior turbinate with regards to objective method to assess nasal ciliary mucosa preservation. As well, compare the microscopic and macroscopic effects of radiofrequency and electrocautery therapies for inferior turbinate reduction for patient with inferior turbinate hypertrophy. Our study showed that nasal discharge and crustation were significantly associated with diathermy electrocautary group. There were no crustation observed in nasal mucosa among patient in radiofrequency group. This result was inagreement with Fradis et al. (2000) who reported crusting in 8% cases of diathermy. Also, Porter et al.,(2006) who revealed that no cases of crusting within group of radiofrequency tissue reduction. Also, Salzano et al. (2009) who stated in their result, the postoperative complications of crusting were reported to be higher in diathermy group. The superiorty of radiofrequency in absence of postoperative crustation due to several advantages have been identified by including decreased thermal insult to tissues (cautery techniques use temperatures at 800°C, whereas radiofrequency temperatures are 60 –90°C) (Pang et al. 2013). Similarly, Kilavuz et al.,(2014) who evaluated radiofrequency and bipolar electrocautery (BEC) in the management of inferior turbinate hypertrophy. They reported that there was significant nasal obstruction improvement after surgery, but no significant difference between both groups regarding nasal obstruction postoperatively, which also consist with the study. Dhulipalla (2015) had a study comparing the effectiveness of electrocautery, cryotherapy and radiofrequency. They found that no statistical difference in the amount of improvement in nasal obstruction was noted between the treatment groups at the end of 12 months because of relatively small sample size. But clinically radiofrequency showed better endoscopic objective improvement in nasal obstruction when compared to cryotherapy and electrocautery which is consistent with our results. Moreover, our results concur Shah et al. (2015) who compared bipolar electrocautery and radiofrequency coblation in the treatment of

inferior turbinate hypertrophy. They concluded that Radiofrequency coblation seems to offer an equivalent alternative to bipolar electrocautery for the treatment of inferior turbinate hypertrophy with less discomfort during the procedure and early post-operative period. Kumar et al. (2017) who revealed the effectiveness of bipolar radiofrequency turbinate volume reduction and bipolar radiofrequency-assisted turbinectomy in patients presenting with nasal obstruction caused by inferior turbinate hypertrophy. They concluded that when surgery is indicated, bipolar radiofrequency turbinate volume reduction is the preferred treatment for nasal obstruction secondary to inferior turbinate hypertrophy. Regarding saccharin transport time (STT): The post-operative STT in diathermy group in 77% of patients were within normal limit and 22% of patients had prolonged STT. In radiofrequency group, all patients had normal STT. No significant difference between two groups after 3 months and nasal mucociliary function was preserved. This results were agree with Salzano et al. (2009) who showed that electrocautery group in postoperative STT 17.54 (2.28) minutes SD, in comparison to our result in electrocautery group 15.44±7.85 SD, with little improvement in time in our study which may result from advantage of extra month. Also in group of radiofrequency mean 16.10 (2.34) minutes after 2 months. In comparison to our study of radiofrequency was 11.83±4.39 minutes that may also come from same reason of advantage of extra month. Similary, Uluyol et al.,(2016) who goes with our results and showed in their study that compared radiofrequency with bipolar electrocautery (BEC) was RVA STT 9 minutes ± 1 minute and foe BEC group mean 9.7 minutes ± 1 minutes post-operative two months later. They confirmed there is no significant difference between BEC &RVA regard STT after 2 months post-operative. Nasal cytology provides a useful diagnostic tool to assist in evaluating nasal mucosa alterations after inferior turbinate surgery and progress toward restoration of nasal mucosa function over time. Nasal cytology is being increasingly used to differentiate between different types of rhinopathies, to manage rhinitis, and to monitor the efficiency of medical and surgical treatments (Cassano et al. 2010). In the present study, cytological microscopic examination of ciliated epithelial cells there were in diathermy group showed abnormal ciliated epithelial cells in 77% of patients had abnormal ciliated epithelial cell and 22% showed no abnormality. In radiofrequency group 88% of patients had no abnormality in ciliated epithelial cell and only two patients has abnormal ciliated epithelial cell. Epithelial ciliated cells abnormality was significantly associated with diathermy Group. This result was harmony with Harju et al. (2019) who evaluated y the effects of radiofrequency ablation, diode laser, and microdebrider-assisted inferior turbinoplasty techniques on ciliated epithelium and mucociliary function. They concluded that radiofrequency ablation is more mucosal preserving techniques, which was found to increase the amount of squamous metaplasia at the 3-month follow-up. The number of cilia seemed to even increase after radiofrequency ablation.

CONCLUSION

Bipolar diathermy and Radiofrequency volumetric tissue reduction are equally effective in improving both the subjective and objective nasal obstruction post-operative. But Radiofrequency volumetric tissue reduction has an edge over bipolar diathermy, keeping in view earlier postoperative healing and lesser incidence of complications like bleeding, crusting and synechiae

CONFLICT OF INTEREST

The authors declared that present study was performed in absence of any conflict of interest.

AUTHOR CONTRIBUTIONS

All author contributed in all parts of the paper.

REFERENCES

Cassano, M., Granieri, C., Del Giudice, A. M., Mora, F., Fiocca-Matthews, E. & Cassano, P. 2010. Restoration of nasal cytology after endoscopic turbinoplasty versus laser-assisted turbinoplasty. American journal of rhinology & allergy, 24, 310-314.

Daniel, C., Utainrat, W. & Setabutr, D. 2018. Surgical management of inferior turbinate hypertrophy. Operative Techniques in Otolaryngology-Head and Neck Surgery, 29, 83-88.

Dinç, M. E., MULUK, N. B. & VONAKIS, B. M. 2020. Physiology of the Nose and Paranasal Sinuses. All Around the Nose. 6, 768-773.

Fradis M, Golz A, Danino J, Gershinki M, Goldsher M, Gaitini L et al. Inferior turbinectomy versus submucosal diathermy for inferior turbinate hypertrophy. Ann Otol Rhinol Laryngol. 2000;109(11):1040-1045.

Harju T, Honkanen M, Vippola M, Kivekäs I, Rautiainen M. The effect of inferior turbinate surgery on ciliated epithelium: A randomized, blinded study. Laryngoscope. 2019;129(1):18-24.

Heffler, E., Landi, M., Caruso, C., Fichera, S., Gani, F., Guida, G., Liuzzo, T., M., Malvezzi, L., Passalacqua, G. and Gelardi, M. 2018. Nasal cytology: Methodology with application to clinical practice and research. Clin Exp Allergy, 48, 1092-1106.

Kilavuz, A. E., Songu, M., Ozkul, Y., Ozturkcan, S. & Katilmis, H. 2014. Radiofrequency Versus Electrocautery for Inferior Turbinate Hypertrophy. The Journal of Craniofacial Surgery, 25, 1998-2001.

Kumar S, Anand TS, Pal I. Radiofrequency turbinate volume reduction vs. radiofrequency-assisted turbinectomy for nasal obstruction caused by inferior turbinate hypertrophy. Ear Nose Throat J. 2017;96(2):E23-E26.

Pang, K. P., Rotenberg, B. W. & Woodson, B. T. 2013. Advanced surgical techniques in snoring and obstructive sleep apnea, Plural Publishing, 23, 770-776.

Porter MW, Hales NW, Nease CJ, Krempl GA. Long term results of inferior turbinate hypertrophy with radiofrequency treatment: a new standard of care. Laryngoscope. 2006;116:554-557.

Rosato, C., Pagliuca, G., Martellucci, S., De Vincentiis, M., Greco, A., Fusconi, M. and Gallo, A. 2016. Effect of Radiofrequency Thermal Ablation Treatment on Nasal Ciliary Motility: A Study with Phase-Contrast Microscopy. Otolaryngol Head Neck Surg, 154, 754-8.

Sahin-Yilmaz, A. & Naclerio, R. M. 2011. Anatomy and physiology of the upper airway. Proceedings of the American Thoracic Society, 8, 31-39.

Salzano, F.-A., Mora, R., Dellepiane, M., Zannis, I., Salzano, G., Moran, E. & Salami, A. 2009. Radiofrequency, high-frequency, and electrocautery treatments vs partial inferior turbinotomy: microscopic and macroscopic effects on nasal mucosa. Archives of Otolaryngology–Head & Neck Surgery, 135, 752-758.

Shah An, Brewster D, Mitzen K, Mullin D. Radiofrequency Coblation Versus Intramural Bipolar Cautery for the Treatment of Inferior Turbinate Hypertrophy. Ann Otol Rhinol Laryngol. 2015;124(9):691-697.

Tatar, A. & Altas, E. 2014. Effects of Radiofrequency Thermal Ablation on the Nasal Cycle Measured Using Rhinomanometry. Annals of Otology, Rhinology & Laryngology, 123, 771-777.

Toppila-Salmi, S., Van Drunen, C. M., Fokkens, W. J., Golebski, K., Mattila, P., Joenvaara, S., Renkonen, J. and Renkonen, R. 2015. Molecular mechanisms of nasal epithelium in rhinitis and rhinosinusitis. Current allergy and asthma reports, 15, 495.

Uluyol, S., Karakaya, N. E., Gur, M. H., Kilicaslan, S., Kantarcioglu, E. O., Yagiz, O. & Arslan, I. B. 2016. Radiofrequency thermal ablation versus bipolar electrocautery for the treatment of inferior turbinate hypertrophy: Comparison of efficacy and postoperative morbidity. International archives of otorhinolaryngology, 20, 2-5.