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Effeciny of CO₂ laser in treatment of nasal obstration due to inferfer turninate hypertrohy in Kirkuk province

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Abstract--Introduction: Nasal obstruction secondary to Inferior turbinate hypertrophy (ITH) may be a slight irritation to some people but to others it is considerable distress and affects the value of life to a great extent. The aim of study is to assessment of outcome of CO₂ laser application to anterior end of inferior turbinate in treatment of nasal obstruction, and assessment of effect of CO₂ laser on mucosa of inferior turbinate. Method: Cross sectional comparative study of 46 patients with nasal obstruction due to inferior turbinate hypertrophy. After select of patient according to inclusion and exclusion criteria, complete explanation of the procedure and its sequel with informed, procedure done in Kirkuk general hospital with lemmer CO₂ laser with local anesthesia apply to nasal cavity, by using proper size laser probe laser apply to anterior 1/3 of inferior turbinate for 30-90 seconds, nasal pack apple for 2 -3 hours then removed, with re-packing if there is bleeding, daily follow up of patient for 1st week then 1 month and 6-month post operatively done. Results: Cross sectional comparative study of 46 patients, mean age (37 ± 14) years old, 14 (30%) of them are females and 32 (70%). There is significant difference between (2nd, 5th, 1 week, 1 month) post operation period according to mucosal changes, there is significant difference between (pre op, 5th day, 1 week, 1 month, 6th month) post operation period according to mucosal changes, there is significant difference between (2nd, 6th month) post operation period according to need decongestion, there is significant difference between (1st, 2nd, 3rd

day, 4th day and 5th day) post operation period according to pain, there is significant difference between (1st, 2nd) post operation period according to repacking. Conclusion: Nasal obstruction improves, no need for re-use of decongestant in those patient who use it after follow of 6 months, no need for re- packing in most of cases, most patient complain for mild to moderated pain in first 2days with relief fast in 5th day, change in mucous membrane of inferior turbinate return normal in 1 week.

Keywords---CO2 laser, nasal obstruction, inferior turbinate, hypertrophy

Introduction

Nasal obstruction secondary to Inferior turbinate hypertrophy (ITH) may be a slight irritation to some people but to others it is considerable distress and affects the value of life to a great extent. ITH usually observed in allergic rhinitis, vasomotor rhinitis, and chronic hypertrophic rhinitis ⁽¹⁾. Therefore, a patient with ITH may also have sneezing, rhinorrhea and headache in addition to nasal obstruction. Allergic or vasomotor rhinitis leads to deposition of collagen in the submucosal tissue of the turbinate's and remodeling of the turbinate bone and cause chronic inflammation of the nasal mucosa leads to the development of ITH ⁽²⁾. Topical decongestants, antihistamines and steroids form the mainstay of treatment for ITH as medical treatment while surgical reduction of inferior turbinate to relieve the symptoms is usually done for the cases refractory to medical treatment ^(3,4). Numerous surgical reduction of inferior turbinate like total or partial turbinectomy, turbinoplasty, chemical cautery, diathermy, radiofrequency volumetric tissue reduction (RFVTR), laser turbinate reduction (LTR) and cryotherapy ^(3,4). Most of these techniques provide good results for a variable period and they are associated with various adverse effects like post-operative bleeding, crusting, pain and synechiae formation. Optimal surgical technique for inferior turbinate reduction should strike a balance among effective turbinate volume reduction, preservation of nasal function and avoidance of complications. LTR is an effective and simple method for treatment of ITH. The advantages of laser surgery are lack of bleeding, high precision and good healing of the wound. Different types of lasers are used in the medical field like CO₂ laser ⁽⁵⁾. The aim of study is to assessment of outcome of CO₂ laser application to anterior end of inferior turbinate in treatment of nasal obstruction, and assessment of effect of CO₂ laser on mucosa of inferior turbinate.

Method

Cross sectional comparative study of 46 patients with nasal obstruction due to inferior turbinate hypertrophy. The study has been carried out from July 2020 until February 2022 in Kirkuk General Hospital

Inclusion criteria

- Chronic nasal obstruction due to inferior turbinate hypertrophy.

- No response to medical treatment.

Exclusion criteria

- Moderate to severe septal deviation.
- Nasal construction by other pathology.

Parameters which assessed

Severity of nasal obstruction using (Analogue visual scale) of 10 degrees ^(6,7). Assessment done in: -pre-operation, 5th post-operative day, 1-week post-operative day, 1 month post-operative; 6 months post-operative).

- Assessment Need for decongestant use pre-operative and 6 months post-operative (0 not use & 1 used).
- Assessment need for intranasal packing post operatively in day of operative and 2nd day.
- Assessment of pain in first 5 POD, by type of analgesia need to relief pain

1	NO pain
2	mild pain relief by simple analgesia (paracetamol)
3	moderated pain relief by NSAID
4	sever pain need strong analgesia (opioid)

- Assessment change happened to inferior turbinate mucosa with clinical examination in

2nd, 5th, 1 week; 1-month post operatively, by

assessment of change in inferior turbinate mucous membrane	
1	normal mucosal surface
2	crust over mucosa not reaching septum
3	crusting reaching septum
4	crust reaching septum with swelling of inferior Turbinate and clotted blood over it

- After select of patient according to inclusion and exclusion criteria, complete explanation of the procedure and its sequel with informed
- Procedure done in Kirkuk general hospital with lemmer CO2 laser with local anesthesia apply to nasal cavity.
- By using proper size laser probe laser apply to anterior 1/3 of inferior turbinate for 30-90 seconds.
- Nasal pack apple for 2 -3 hours then removed, with re-packing if there is bleeding.
- Daily follow up of patient for 1st week then 1 month and 6-month post operatively done.

Statistical analysis done by SPSS 22, frequency and percentage used for categorical data, mean, median and SD for continuous data. T test (before and

after) used for evaluation differences between mean and median of continues variables. P-value less or equal to 0.05 is consider significant.

Results

Cross sectional comparative study of 46 patients, mean age (37 ± 14) years old, 14 (30%) of them are females and 32 (70%). As table 1, there is significant difference between (2nd, 5th, 1 week, 1 month) post operation period according to mucosal changes. In 5th day after operation there is less mucosal changes also in 1 week and in one month's post operation.

Table 1
differences between (2nd, 5th, 1 week, 1 month) post operation period according to mucosal changes

		Mean	Std. Deviation	P-value
Pair 1	2nd POD	3.59	0.49	0.0001
	5th POD	2.87	0.71	
Pair 2	2nd POD	3.59	0.49	0.0001
	1 week POD	1.34	0.47	
Pair 3	2nd POD	3.59	0.49	0.0001
	1 month POD	1.00	0.00001	

P-value ≤ 0.05 (significant).

As table 2, there is significant difference between (pre op, 5th day, 1 week, 1 month, 6th month) post operation period according to nasal obstruction. In 5th day after operation there is less nasal obstruction also in 1 week and in one month's post operation.

Table 2
differences between (pre op, 5th day, 1 week, 1 month, 6th month) post operation period according to nasal obstruction

		Mean	Std. Deviation	P-value
Pair 1	pre op	8.47	0.75	0.042
	5th D post op	8.15	0.75	
Pair 2	pre op	8.47	0.75	0.0001
	1 w post op	5.37	0.82	
Pair 3	pre op	8.47	0.75	0.0001
	1 m post op	1.93	0.80	
Pair 4	pre op	8.47	0.75	0.0001
	6 m post op	2.50	1.81	
Pair 5	5th D post op	8.15	0.75	0.0001
	6 m post op	2.50	1.81	

P-value ≤ 0.05 (significant).

As table 3, there is significant difference between (2nd, 6th month) post operation period according to need decongestion. At 6th after operation there is no need to decongestion.

Table 3
differences between (2nd, 6th month) post operation period according to need
decongestion

		Mean	Std. Deviation	P-value
Pair 1	2nd POD	0.6	0.49	0.0001
	6 months POD	0	0	

P-value ≤ 0.05 (significant).

As table 4, there is significant difference between (1st, 2nd, 3rd day, 4th day and 5th day) post operation period according to pain. In 2nd day after operation there is less pain also in 3rd day and, 4th day and 5th day post operation

Table 4
differences between (1st, 2nd, 3rd day, 4th day and 5th day) post operation period
according to pain

		Mean	Std. Deviation	P-value
Pair 1	1st POD	2.46	0.65	0.003
	2nd POD	2.12	0.67	
Pair 2	1st POD	2.46	0.65	0.0001
	3rd POD	1.87	0.64	
Pair 3	1st POD	2.46	0.65	0.0001
	4th POD	1.61	0.49	
Pair 4	1st POD	2.46	0.65	0.0001
	5th POD	1.17	0.37	

P-value ≤ 0.05 (significant).

As table 5, there is significant difference between (1st, 2nd) post operation period according to repacking. 2nd day not need repacking.

Table 5
differences between (1st, 2nd) post operation period according to repacking

		Mean	Std. Deviation	P-value
Pair 1	1 st day POD	0.28	0.2	0.0001
	2 nd day POD	0	0	

P-value ≤ 0.05 (significant).

Discussion

Numerous types of lasers have been used in reduction of nasal turbinate. By far, most experience has been gained using argon lasers. There are also reports on the successful application of the CO₂ laser. Little bleeding and tissue traumatization are considered to be advantages of the laser surgical procedures ^(8,9). An assessment of the published results must necessarily be limited because of the small number of cases, the short follow-up periods in some instances and the use of different modes of treatment, which preclude comparison. Accurate diagnosis adhering to strict criteria is an essential prerequisite if the laser surgical

procedure to treat hypertrophied turbinate's is to be effective and successful. Obstruction of nasal respiration must mainly be due to pronounced mucosal swelling ⁽¹⁰⁾. The localization of turbinate hyperplasia will determine which kind of laser to use. The CO₂ laser is especially effective if nasal obstruction is caused by a hyperplastic head of the turbinate, which is true in most of the cases ⁽¹¹⁾. However, if the entire mucosa is hyperplastic then the Nd:YAG laser should be used alone or together with the CO₂ laser ⁽¹²⁾.

A great variety of CO₂ laser surgical techniques is uses the CO₂ laser to respect the hypertrophied mucosa of the turbinate in a line (15-18 W) ⁽¹³⁾. Depending on the extent of the shrinkage of the turbinate one to three additional laser light applications are administered to the same spot with exactly the same parameters. This results in penetration depths of up to 4 mm. Very high temperatures develop at the laser application site. This leads to the formation of a scar in the submucosal tissue with subsequent shrinkage of the turbinate. The thermal damage to the adjacent tissues is low ⁽¹⁴⁾. Sometimes excessive fibrin exudation can be observed, requiring postoperative wound care for many weeks ⁽¹⁵⁾. Extensive epithelial scars clearly disturb the function of the turbinate mucosa, entailing a tendency towards recurrent crust formation, dryness of the nasal mucosa or atrophic rhinitis ⁽¹⁶⁾. Moderate scar formation, on the other hand, is desirable especially in cases of allergic rhinitis, in order to effectively interrupt allergic reactions in the superficial layer of the submucosa, which is the probable site of the allergic reaction. The positive effect of CO₂ laser treatment on allergic rhinitis shows clinically in an improved nasal breathing, in a decrease of watery nasal discharge and in less sneezing ⁽¹⁷⁾.

Furthermore, in over 60% of the patients suffering from perennial house dust-mite allergy the dose of anti-allergic drugs could be reduced. Long-term results are the decisive criterion in assessing the suitability of a surgical technique, especially in comparison to other, already established methods. In order to evaluate this, a group of patients treated with laser surgery was followed up for 2 years. Their results were compared with those obtained in a retrospective study of cases in which only electrocoagulation had been used. The CO₂ laser surgical technique proved to be by far superior to electrocoagulation. The most significant difference between the laser technique and turbinate cauterization, next to the lower rate of complications, is the better long-term result achieved by the laser, which is possibly due to more pronounced scar formation of the turbinate mucosa. Consent to another round of laser surgery is also conspicuously higher than to electrocoagulation. The favorable acceptance of laser surgery may be attributed to its effectiveness on the one hand, and to the fact that the procedure is fast, involves little pain and can be done in an outpatient setting, on the other hand ^(18,19,20). In current study there is significant difference between (1st, 2nd) post operation period according to repacking. 2nd day not need repacking this is similar to other study have the same results ⁽²¹⁾.

Conclusion

Nasal obstruction improves, no need for re-use of decongestant in those patient who use it after follow of 6 months, no need for re- packing in most of cases, most

patient complain for mild to moderated pain in first 2days with relief fast in 5th day, change in mucous membrane of inferior turbinate return normal in 1 week.

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