



The Efficacy of (810 Nm) Diode Laser in Treatment of Idiopathic Epistaxis

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Abstract: There are many causes for epistaxis but it is mainly idiopathic in type. In Management of epistaxis there are different modality either medical or cautery(chemical or galvanic) recently laser is used in management of epistaxis. The type of laser used in current study was 810 nm diode laser. The aim of the study is to evaluate its efficiency in control of active and non active idiopathic epistaxis; The design of the study is interventional therapeutic trial. The study was performed from December 2011 to December 2012 in Al Yarmouk teaching hospital at otorhinolaryngology department. In current study the diode laser is used in different power with same exposure time in all application; The power density is measured and choose the best one to stop both active and non active bleeding. The modality is compared with galvanic electrical cautery used in treatment of epistaxis. the comparison depends on the side effect and the complication of each modality.

Introduction

Epistaxis is the commonest otolaryngologic emergency. It has been estimated that almost 60% of the adult population experiences epistaxis at some point during their life time. For most patients, the epistaxis resolves spontaneously. however for a minority of patients estimated around 6%- the bleeding continues and medical attention must be sought (Williams and Wilkins, (1995)),because of the numerous possible causes of epistaxis, it's important to approach the problem in an orderly fashion, considering both local and general diseases (Pasha et al., (2001)).

A part of the first aid to stop bleeding, other procedure can be used as direct (cautery, topical antiseptic cream or ointment) or indirect (anterior packing) and surgical (posterior packing, arterial ligation embolisation), (Shaheen et al., (1987)).

Patients and Methods Study Design

Interventional therapeutic trial is designed to evaluate the efficiency of diode laser (810 nm) on idiopathic epistaxis.

Procedure

Topical xylocaine spray 2% was applied to nasal mucosa and then xylocaine gel is applied and left for a time from 5-10 minutes for two groups. then using noncontact method in a distance about 2-3 mm from the tip end of the optic fiber and nasal mucosa ; The laser beam is then applied to the mucosa in a power of 8W for 9 patients and in power of 9W for 10 patients and in power of 10W for 14 patients in non active bleeding group, while in active epistaxis power of 12W used to 5 patients and power of 14W to 7 patients. The procedure was performed in the theater and the exposure time is not exceeded 10 seconds to achieve the proper

coagulation by directed the fiber beam to the bleeding site which inform of central clot surrounded by whitish blanching of the surrounding mucosa in cases of active bleeding, while in non active bleeding the photocoagulation is achieved as a whitish patches on the mucosa. The whole procedure was taken a time less than 15 minutes.

Some patients had recurrence of bleeding after laser treatment in power of 8, 9 and 12 watts, and these patients are managed by second session of laser therapy using next power parameter. For the control group (galvanic electrical group) the procedure was done by cauterization around the bleeding vessel in circle until the bleeding stopped, using degree 6 or 7 after application of local anesthesia.

Dose Parameter of Laser Therapy

The exposure time of laser therapy which used was not more than 10 seconds of CW mode. Different parameters are used regarding power to stop bleeding, and an equation is used to calculate the power density as:

$$\text{Power density (watt/cm}^2\text{)} = \frac{\text{power(W)}}{\text{exposure area(cm}^2\text{)}}$$

Results

Laser Group Patients Age

The current study included 45 patients and their distribution according to age and sex as showed in the Table (1). The most affected age group in both active and non active bleeding were those in a range of 10-19 years old.

Table (1): patients distribution according the age and sex.

Age group (years)	Non active		active		total
	male	female	male	female	
10-19	9	8	1	4	22
20-29	5	2	2	2	11
30-39	3	3	1	1	8
>40	2	1	1	0	4
total	19	14	5	7	45

Total recurrence rate: by using of laser photo coagulation for control of epistaxis there is recurrence of bleeding in 2 patients of active

bleeding group(17%) and 8 patients of non active group (24%) , as shown in the table(2):

Table (2) : recurrence rate in active and non active nose bleeding .

	Controlled	%	Recurrence	%	Total pt no.
Active	10	83	2	17	12
Non active	25	76	8	24	33
total	35		10		45

Recurrence Rate In Relation With Power Used of Laser In Active Bleeding:

In patients with active bleeding two powers were used to reach the best power to achieve coagulation to stop bleeding. In 5 patients, The

power of 12W was used; a high recurrence rate (2\5) . In power of 14 W. which was used in 7 patients; there was no recurrence of bleeding as shown in the Table (3):

Table (3) : Recurrence rate of active bleeding in relation to power of LASER.

Laser power	Pt no.(12)	recurrence	Recurrence %	Efficacy %
Power 12	5	*2	40	60
Power 14	7	0	0	100

*All pt. with recurrent bleeding were controlled by 2nd session of laser with a higher power.

Recurrence Rate In Relation With Power Used Of LASER In Non Active Bleeding :

In patients with non active bleeding three powers were used to reach the best power to achieve coagulation to stop bleeding starting

with the power of 8W in 9 patients ,The power of 9W in 10 patients and the power of 10W in 14 patients .The recurrence rate for each power is describe in Table(4):

Table (4): Recurrence rate of non active bleeding in relation to power of Laser.

Laser power W	Pt no. (33)	Recurrence	Recurrence %	Efficacy %
Power 8	9	5*	55	45
Power 9	10	3*	30	70
Power 10	14	0	0	100

*All pt. with recurrent bleeding were controlled by 2nd session of laser with a higher power .

Intra Operative Pain During LASER In Active and Non Active Bleeding :

In active bleeding intraoperative was 25% while in non active was 15%.

Distribution of patients managed by galvanic electrical cautery according their age and gender:

The galvanometry cautery was more used in males and in age group 10-19 years .

Table (5) : Age and gender distribution of patients managed by galvanic cautery

Age(years)	male	female	total
10-19	3	2	5
20-29	1	2	3
30-39	2	1	3
>40	0	1	1
total	6	6	12

Comparison between laser and galvanic electrical cauterisation in management of active bleeding:

In 12 patients with active nose bleed who were managed with laser; there was a high control rate and a low complication. On other hand, 12 patients managed with cautery; there was a relatively low control rate and higher complication.

Table (6) : Comparison between laser and electrical cauterisation in management of active bleeding

	Laser (12pt)	%	Cautery (12pt)	%
Controlled bleeding	10	83	7	58
Recurrence	2	17	5	42
Pain	3	25	6	50
Abrasion of mucosa	0	0	2	17
Trauma to other sites	1	8	3	25
annoyance	1	8	9	75

Discussion

Management of epistaxis by laser was mainly used for patients with hereditary haemorrhagic telangiectasia(HHT) suffering from repeated epistaxis, Fiorella, used diode laser 810 nm in treatment of epistaxis showed an effectiveness to stop bleeding and reduce it recurrence up to (25%) (Fiorella, et al., (2010)). Jorgensen and Jens Hojberg Wansher, found a similar result by reducing the recurrence to (21%) on using diode laser (910 nm), (Gita Jorgensen, et al., (2011)). Also by using another types of laser in management of epistaxis in HHT, Elizabeth Mahoney, MD; used Nd/YAG laser in stop the bleeding and reduce its recurrence (Elizabeth, et al., (2005)).

While the use of laser in treatment of idiopathic epistaxis is used either by contact and

non contact mode, by diode laser as one of other type used to stop bleeding in which mechanism of diode laser has high affinity to react with hemoglobin and water which cause photocoagulation (Karl-Bernd H. P.) with less complication as damage to surrounding structure with less recurrence.

In current study the most affected age group was (10-19 years) which represent (49%) of the total patients numbers and these results were similar to those reported by Chi F. Land Kerr A.G who found 41% to the same age group (Chi F. (1997)) and Rasso G, and Werner. which they represent 43% to same age group (Rasso G, (2000)). Males were slightly affected more than females (53% and 47% respectively).

Zhang, J. & Qiu, R. reported a similar result (49 males and 33 females) and study of Chi F. Land Kerr A.G also stated a similar result (42 males and 28 females), (Zhang, J. Qiu, R. a (2012). In the current study the controlled rate of active bleeding was (83%) and that of non active bleeding was (76%). similar results were observed by Zhang, J. & Qiu, R when managed epistaxis by diode laser had a controlled rate (85%) and by Chi F. Land Kerr A.G (78%), and by Rasso G, and Werner (80%).

We noted in our study that the most effective power of laser used in treatment of active bleeding was (14 watt), in which there was no recurrence of epistaxis during follow up period which was three months. On other hand, the most effective power of laser used in treatment of non active bleeding was (10 watt) with no recurrence of epistaxis. So is patients with active bleeding need power more than non active and this due to the need of more power density that deliver to the tissue to achieve photocoagulation and stop bleeding.

The intra operative pain during the procedure in active bleeding was higher than non active bleeding (25% and 15%) respectively. This may be explained by the power needed in active bleeding was higher than needed in non active bleeding. the patient with active bleeding usually in a stressful condition and irritable during the procedure which caused the laser beam go to other site and caused trauma to this sites.

Galvanocautery under local anesthesia is not recommended in children and even adult find the experience unpleasant, the sight of heated filament, the sensation of heat within the nose, and the smell charred flesh are off-putting to all (O.H. Shaheen, (1997)).

In comparison of the diode laser in active bleeding with electrical cauterization, the recurrence rate of bleeding was high in electrical (42%) while in laser was (17%). the pain in electrical cautery was (50%) which higher than in laser (25%), the electrical cautery associated with (17%) mucosal abrasion of nasal septum were that not notice in laser group patient, also the cautery had more percentage of trauma to other site than laser (25% and 8%) respectively.

The diode laser had lower complication than electrical cautery because the laser is more precise, less invasive, and mechanism of action of laser is selectively hemoglobin absorption so caused thrombosis of blood vessels.

Conclusion

Diode laser 810nm in non contact mode is benefit in treatment of idiopathic active and non active epistaxis. The power density of diode laser of non contact method in non active bleeding and power density in active bleeding are (3500 W/cm² and 5000 W/cm²) respectively which is better to achieve photocoagulation and stop bleeding. Diode laser is more effective than galvanic electrical cautery in management of active epistaxis with less complication and recurrence rate

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فعالية ليزر الدايدود ٨١٠ نانوميتر في علاج الرعاف المجهول السبب دراسة مقارنة

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الخلاصة: أسباب الرعاف (النزيف من الانف) كثيرة منها أسباب موضعية ومنها عضوية. والأكثر شيوعاً وأبسطها هو مجهول السبب والذي يكون فيها موضع النزيف بالمنطقة الأمامية للحاجز الأنفي وهو نزف شرياني. ويكون علاجه أما بالإجراءات الأولية من خلال الحشوة الأمامية لتجويف الانف وغيرها أو جراحياً بالكوي الكهربائي والكميائي واستحدثت طرق أخرى ومنها الليزر بأنواع معينة استعملت لإيقاف الرعاف ومنها الدايدود ليزر. الهدف من استعمال الليزر لبيان فعاليته مقارنة بالطرق الأخرى. والقياسات التي استعملت بالبحث هي القوة بالوات مختلفة الدرجة مع ثبات الوقت بكل استعمال ومنها استخرجت كثافة القوة المتلى التي يمكن استعمالها في إيقاف الرعاف بنوعيه الفعال والغير فعال.