

Retinal complications after Nd:YAG Laser iridotomy

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الخلاصة

اجريت هذه الدراسة في مستشفى ابن الهيثم للعيون في بغداد حيث تمت مراجعة سجلات 177 عين ل 177 مريض يعانون من داء الزرقاء الحاد نتيجة انسداد زاوية الحجرة الامامية بعد استعمال الحد الاعلى للعلاج بالادوية المخفضة لضغط العين وقد وجد ان ثلاثة عيون فقط 1.69% اصيبت بوذمة كيسائية في الشائبة الصفراء وعين واحدة 0.56% اصيبت بثقب الشائبة الصفراء وعين واحدة 0.56% باعتلال الشبكية المركزي المصلي . ان النتائج المسخلصة من هذه الدراسة تبين ان مضاعفات الشبكية على الرغم من ندرتها يجب ان تاخذ بعين الاعتبار بمتابعة المريض بعد استعمال الياك ليزر وخصوصا في النساء المتقدمات في العمر.

Abstract

To identify the retinal complication after Nd:YAG laser iridotomy in patients with angle- closure glaucoma (ACG)

Retrospective cross sectional study reviewed the medical records of 177 eyes of 177 patients with ACG with initial intraocular pressure (IOP) above 40 mmHg. All of the patients received maximum tolerable medical therapy (MTMT), followed by laser iridotomy done in 156 eyes and not done in 21 eyes (because of variable causes). In order to follow – up the occurrence of retinal complications all patients underwent detailed retinal examinations.

Retinal complications occur rarely after Nd: YAG laser iridotomy in patients with angle – closure glaucoma (ACG).

Cystoid macular oedema (CMO) occurred in 3(1.92%) of 156 eyes

Central serous chorioretinopathy (CSR) occurred in 1(0.64%) of 156 eyes.

Macular hole in 1(0.64%) of 156 eyes.

Retinal detachment , Uveal Effusion ,Subhyaloid haemorrhage and Retinal burn not seen in the study .

Our data suggest that we can expect retinal complications after laser iridotomy in eyes with AACG (even uncommon), and the incidence increase in females and with advancing age.

Keywords: Nd:Yag laser , Laser iridotomy , Angle closure glaucoma

Introduction

Within a normal eye, the iris is in partial contact with the lens of the eye behind it. Individuals with narrow angles are at greater risk of angle closure by pupillary block because their anterior chamber is shallow; thus, the iris is closer to the lens and more likely to adhere completely to the lens, creating a pupillary block. Pupillary block can be started by prolonged exposure to dim light . It can also be brought on by neurotransmitter release during emotional stress or by medications taken for other medical conditions.(1)

The term ‘angle-closure’ refers to occlusion of the trabecular meshwork (TM) by the peripheral iris (iridotrabecular contact – ITC), obstructing aqueous outflow. Angle-closure can be primary, when it occurs in an anatomically predisposed eye, or secondary to another ocular condition. Primary angle-closure glaucoma may be responsible for up to half of all cases of glaucoma globally (2)

Risk factors

1.age average 60 years.

2. Gender. Females are more commonly affected than males.

3. Family history. First degree relatives are at increased risk.

4. Refraction. Eyes with 'pure' pupillary block are typically hypermetropic, although this is not as clear-cut with non-pupillary block.

5. Axial length

-Short eyes tend to have shallow anterior chambers.

-Eyes with nanophthalmos have a very short eye with a proportionally large lens and are at particular risk (2)

Laser iridotomy is a procedure that is performed primarily for the treatment of acute angle-closure glaucoma (AACG) caused by relative pupillary block.(3)

Recently, Nd: YAG laser when available or, in some unusually thick irides,

combined argon and Nd:YAG laser iridotomy, has superseded the argon laser alone. (4)

Laser iridotomy offers the same efficacy as surgical iridectomy with fewer complications and can be easily and quickly performed in outpatient departments (3)

The purpose of a laser iridotomy is to allow an equalization of pressure between the anterior and posterior chambers of the eye by making a hole in the superior peripheral iris. Once the laser iridotomy is completed, the aqueous flows freely from the posterior to the anterior chambers of the eye, where it is drained via the trabecular meshwork. The result of this is a decrease in IOP.(4)

Materials and Methods

In this retrospective study the subjects were selected from patients who visited glaucoma department in Ibn AL-Hytham Eye Hospital during the period from April 2008 to June 2011 and presented with AACG with initial IOP above 40 mmHg at the time of visiting the hospital. Based on medical records, a retrospective review was carried out using 177 eyes of 177 patients. Secondary angle-closure glaucoma such as neovascular glaucoma, lens-induced glaucoma and uveitic glaucoma were specifically excluded.

AACG was diagnosed when the eye showed an IOP more than 40 mmHg and closed angle by gonioscopy with accompanying acute symptoms including ocular pain, redness and blurred vision . At the time of first visit, all patients immediately received β -blocker drops and 2% pilocarpine in the eyes, along with oral administration of a carbonic anhydrase inhibitor. Intravenous hyperosmotic agent (20% Mannitol) was given if the patient did not have a significant systemic disease, such as acute intra-cranial hematoma or severe congestive heart failure. Laser iridotomy was performed in (156) patients

immediately after the resolution of corneal edema and reasonably quiet anterior chamber, and preferably a normalized IOP, while not done in (21) patients because of variable causes that prevent doing laser (corneal edema and heaziness that not resolved, nquiet anterior chamber, high IOP that not reach preferable level to do laser) .

Laser iridotomy was performed with Nd:YAG laser (YC-1800; NIDEK,) by a single operator on all patients, in order to minimize interobserver error. 0.5% proparacaine drops were instilled into the eye prior to surgery , and then an Abraham iridotomy lens was inserted into the eye to apply laser to the superotemporal or superonasal area of the iris. The Nd:YAG laser irradiation was applied 3-9 times at 3-7 mJ. The size of the application area was of sufficient size and patent. After surgery all given 0.5% timoptol drops bid was dropped into the eye and then 0.1% fluorometholone was administered four times a day for a week. As unaffected eyes have an approximately 50% acute angle-closure attack probability within five years, prophylactic laser iridotomy

was performed for the other eye during the follow-up observation period.

Fundoscopical examination was done for all patient in subsequent follow-up visits at one week, one month, three month, six month, one year and two years after the initial Nd:YAG iridotomy procedures and the complications was documented by B-scan ultrasonography and optical coherence topography(OCT) (B-scan and

OCT done when there is retinal complications and not done routinely for all patients). For the purpose of analysis, the time of occurrence of retinal complications discovered on follow-up visits were recorded.

We analyzed the data to detect whether there were predictive factors for development of retinal complications such as age, sex of the patient.

Results

The medical records of 177 eyes of 177 patients with AACG managed during the period from April 2008 to June 2011 were reviewed. The mean follow-up period was 12 months (range 1-24 months). Of the 177 eyes with AACG 156 eyes (88.1%) laser iridotomy was done to them, while (21) eyes(11.9%) did not receive laser because of variable causes. In those who received laser males were 63 patients while there were (93) eyes of female patients, In those who did not receive laser males were

(14) eyes while there were (7) eyes of female patients {total female was 100 eyes (56.5%) while males were 77eyes(43.5%)} . Mean age of all patients is (60) years (range 45-75 years).

All the data were computed on FoxPro database and statistical analyses were done using SPSS PC windows version 17 (Chicago, IL).

The statistical significance P values <0.05 were considered significant.

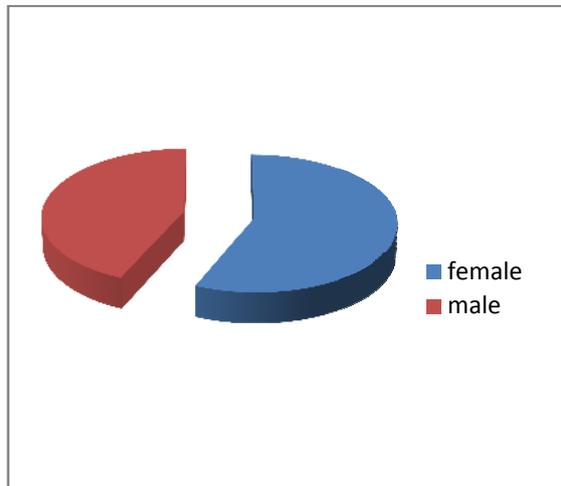


Figure no.1 shows Male to female ratio for occurrence of retinal complications (Female56.5%)(male43.5%)

In those patients who underwent laser iridotomy after maximal tolerable medical therapy, all eyes achieved a patent iridotomy of sufficient size.

Table no.1 : Retinal complications during the study

Retinal complications	Total No.	Age (years) Mean(SD)	Male	Female
Retinal Burn	null	/	/	/
CMO	3(1.92%)	67	0	3
CSR	1(0.64%)	65	0	1
Uveal Effusion	null	/	/	/
Macular Hole	1(0.64%)	69	0	1
Retinal detach.	null	/	/	/
Subhyaloid haemorrhage	null	/	/	/
Total	5(3.2%)	67	0	5

Table no.1 shows From those (156) eyes we have (5) eyes(3.2%) that show retinal complications while (151) eyes(96.8%) pass without retinal complications during the follow-up period (which extend to 24 months after Nd:YAG laser iridotomy)

All complicated cases were females (one at age group 56-65 years and four at age group 66-75 years)

In those patients who didnot do laser iridotomy they did not have retinal complications .

(3 of 156) (1.92%) eyes develop CMO within six months after Nd:YAG laser iridotomy,

(1 of 156) (.64%) eyes develop Macular Hole within sex months after Nd:YAG laser iridotomy,

(1 of 156) (.64%) eyes develop CSR within one year after Nd:YAG laser iridotomy

None of the eyes develop retinal burn , **Uveal Effusion** , retinal detachment and Subhyaloid haemorrhage after Nd:YAG laser iridotomy .

The time intervals for the development of retinal complications after Nd:YAG iridotomy are shown in the Following Figure.

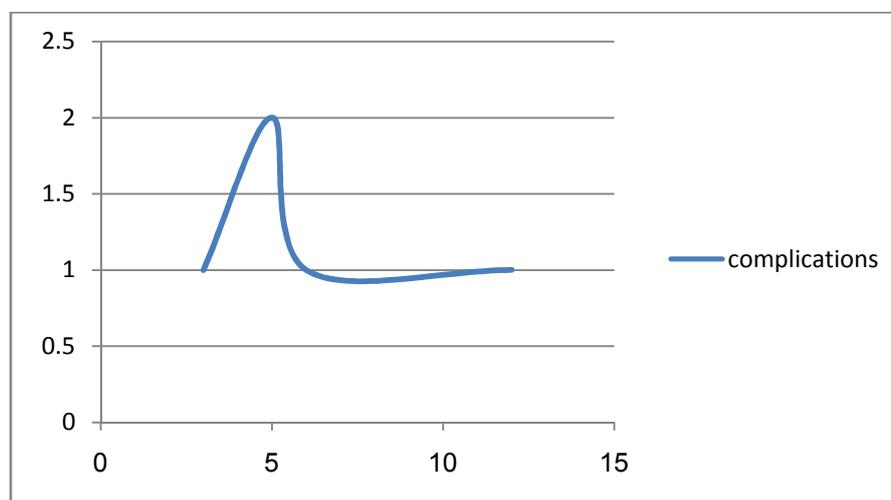


Figure no.2 shows the time intervals (in months) for the development of retinal complications after Nd:YAG iridotomy (x-months,y-number of cases)

We evaluated possible predictive factors for the development of a subsequent retinal complications after Nd:YAG laser iridotomy like age and gender of the patient. Patients who were female, older than 60 years, were found

to have a greater chance of developing an increase the incidence of retinal complications after laser iridotomy.

We sort data according to gender ,age group, and calculate frequency of retinal complications in each group and do chi-

square to see if the test is significant or not We consider P values <0.05 were considered significant.

In this study we find that there is correlation between gender of the patient

(female) and complications (p=.047) significant .While there is no significant correlation between age group of the patient and complications (p=.124) not significant

Table no.2 showing number and percentage of complicated and noncomplicated cases occurs in specific age group (a)45-55 years old (b) 56-65 years old, (c) 66-75 years old

		VAR00003		Total
		comp	no comp	
VAR00002 a	Count	0	52	52
	% within VAR00003	.0%	30.2%	29.4%
b	Count	1	57	58
	% within VAR00003	20.0%	33.1%	32.8%
c	Count	4	63	67
	% within VAR00003	80.0%	36.6%	37.9%
Total	Count	5	172	177
	% within VAR00003	100.0%	100.0%	100.0%

Table no.5 shows chi-square test of complications occurs in males and females

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.932 ^a	1	.047		
Continuity Correction ^b	2.350	1	.125		
Likelihood Ratio	5.821	1	.016		
Fisher's Exact Test				.070	.055
Linear-by-Linear Association	3.940	1	.047		
N of Valid Cases	177				

Table no.3 shows Chi-square test of complications that occurs in specific age group

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.182 ^a	2	.124
Likelihood Ratio	5.118	2	.077
Linear-by-Linear Association	3.935	1	.047
N of Valid Cases	177		

Table no.6 showing number and percentage of complicated and noncomplicated cases occurs in laser

		VAR00003		Total
		comp	no comp	
VAR00004 done	Count	5	151	156
	% within VAR00003	100.0%	87.8%	88.1%
not done	Count	0	21	21
	% within VAR00003	.0%	12.2%	11.9%
Total	Count	5	172	177
	% within VAR00003	100.0%	100.0%	100.0%

Table no.4 showing number and percentage of complicated and noncomplicated cases occurs in males

		VAR00003		Total
		comp	no comp	
VAR00001 female	Count	5	95	100
	% within VAR00003	100.0%	55.2%	56.5%
male	Count	0	77	77
	% within VAR00003	.0%	44.8%	43.5%
Total	Count	5	172	177
	% within VAR00003	100.0%	100.0%	100.0%

Discussion

Laser iridotomy is the treatment of choice for primary angle closure secondary to pupillary block. (18)

Once an iridotomy has been performed, the pupillary block is relieved and the pressure gradient between the posterior and anterior chambers is normalized, which in most cases allows the iris to fall away from the trabecular meshwork. As a result the anterior chamber deepens and the angle opens. (5)

As any procedure it may cause complications which are related either to anterior or posterior segment (which are rare) (6)

However, because laser iridotomy is a relatively low risk procedure compared with other surgical procedures. it should be performed prior to a more invasive or risky operative procedures. (7)

In this retrospective study we searching for occurrence of retinal complications after Nd:YAG laser iridotomy used in the management of closed angle glaucoma .

CMO nearly have the same incidence(1.92%) in our study and Ching-Hsi CH Hsiao et al in their study 1.5% . (8)

CSR we find one case (.64%) in our study but we did not find a registered case in other studies.

Recommendations

Use the optimal conditions, appropriate settings and accurate technique to decrease the possibility of complications.

Abraham iridotomy lens should be used which benefit focusing laser beam and decrease energy needed for iridotomy and also let the eye open and still free of movement .

Retinal burn was null in our study, While there are some cases that are registered in Louis W. Schwartz & George L. Spaeth study (9)

There was no case of retinal detachment in our study, while there is one reported case of retinal detachment according to S Behrendt, L Giess, G Duncker study (10)

One case of macular hole (0.64%) were found similar to Justin E. Anderson study (11)

Subhyaloid haemorrhage and Uveal Effusion were not reported in our study but had been reported as individual case reports by Nicolas G Hamush and Alexander R Schakal , and Rajesh S. Kumar study respectively (12. 13)

As shown in this study the incidence of retinal complications increased with advancing age of the patients and occur more frequently in female than male.

So despite these rare retinal complications ,the Nd:YAG iridotomy nearly safe and effective procedure especially if these generally outweighed by the risks of primary disease if left without performing laser iridotomy and with the use of optimal conditions during doing Nd:YAG laser iridotomy (14)

Doing thorough retinal examinations for all patients undergone laser iridotomy in subsequent follow-up visits to early investigate and manage retinal complications if occurred especially females with advancing age and those with compromised retina such as proliferative diabetic retinopathy.

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