International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 05 Issue 05 May 2022
DOI: 10.47191/ijcsrr/V5-i5-49, Impact Factor: 5.995
IJCSRR @ 2022
www.ijcsrr.org

Post Traumatic Optic Nerve Decompression in Patients with No Light Perception

Hina Rauf[1], Iqtaza Arif[2], Laiba Maryam[3]
[1]WMO at BHU 414 Gojra
[2]WMO at Holy Family Hospital, Rawalpindi
[3]Mayo Hospital Lahore

ABSTRACT
Objective: To determine if optic nerve decompression has any efficacy in patients with traumatic optic nerve (TON) damage specifically those patients whose optic nerves have been severely damaged and as a result, they suffer no light perception (NLP).
Material & Methods: A retrospective study for group of 54 patients was observed for a period of between 3 to 12 months from 2020 to January 2021.
Results: 35 patients still had no light perception at end of the study. By the time others were discharged some had gained a level or two of visual acuity but no cases of perfect vision restored were reported.
Conclusion: The methods were relatively useful in reducing discomfort in patients such as significant reduction in swelling but they were not in any way completely responsible for the total recovery of the patients.

KEY WORDS: Optic Nerve Decompression, Optic Nerve, Traumatic Optic Neuropathy, Vision Loss.

1. INTRODUCTION

First described by Hippocrates Traumatic Optic Neuropathy (TON) is defined as the loss of vision with no evidence of injury to the optic nerve [1]. Accordingly, TON is rare but very devastating. Optic neuropathy can be on the anterior or posterior of the optic nerve and each classically divided into direct or indirect injuries [2]. Direct TON can result from penetrating injury or broken bone fragment that may lead to optic nerve avulsion, stretch injury, shearing, contusion, lacerations, and disruption. Compressive optic neuropathy can result from orbital haemorrhages [3].

Indirect TON is the most common type of optic nerve injury and accounts for 0.5-5% of closed head injuries [4]. It is believed to result from transmission of shock from an orbital impact to the intracranalicular portion of optic nerve [4]. Due to lack of understanding of the pathophysiology involved and uncertainty of clinical results, treatment of TON remains generally controversial. Methods such as optic decompression and use of steroids have been brought forward to try alleviating the cases of TON. Our study focuses mainly on optic nerve decompression.

Optical decompression has been used for the treatment of optic canal fractures [5]. Un-roofing the optical canal could relieve pressure in the optic intracranalicular portion of the optic nerve halting further damage. However, some arguments brought forward voiced concern that further injuries could be meted on the optic nerve resulting in further loss of vision [6]. In this paper a retrospective study of patients with no light perception, admitted in our hospital was done during their admission time, to determine the efficacy of optic nerve decompression.

2. METHODS

2.1 General Information

A group of 54 patients, 53 males and a female, who has suffered optic nerve trauma were put under observation. 23 of them had injured their left eye, 30 their right and 1 patient had injured both eyes. 27 had sustained injuries from car accidents, 23 from falls, 4 from motorcycle accidents. The timing from injury to treatment was more than 3-21 days. 12 cases took 3-7 days, 8 took 15-21 days and some 5 cases took more than 21 days.

Examination of the patients was as follows:

International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 05 Issue 05 May 2022
DOI: 10.47191/ijcsrr/V5-i5-49, Impact Factor: 5.995
IJCSRR @ 2022
www.ijcsrr.org

2.2 Visual Acuity

Ideally should be determined using a hand held near card, newspapers, magazines or Snell's chart. One should bear in mind that delayed visual loss develops due to secondary optic nerve injury hence visual acuity should be conducted again after 24 hours [7]. A comprehensive history of the patient should be obtained to ensure that the loss of sight is as a result of the injury and not an underlying optic problem. The only drawback of this test is that it can only be done on patients who were conscious and had no swellings over their eyes. The patient's comfort also had to be ensured so that discomfort from other injuries did not bias the feedback they gave the doctor.

2.3 Rapid Afferent Papillary Defect (RAPD)

RAPD is elicited through the swinging flashlight test. The light stimulates the pupil of the eye to constrict as a normal response to stimuli to regulate the amount of light that enters the eye. This relative afferent pupillary defect is the basis for the light test. This is the most important clinical sign in an unresponsive patient [8]. An eye with optic injury exhibits less pupillormotor stimulation reaching the brain than an uninjured eye [9]. This is one of the tests that are used to test response in patients [10].

2.4 Imaging

This is one of the most appropriate tests for patients who are unconscious. A CT scan with clinical exploration is the most important method in acute emergency settings. Fractures through optic canal can be best depicted with thin-section CT scanning [11]. Patients that undergo head CT scans and the optic canal thin layer scanning and reconstruction are usually getting tested for optic canal fracture, ethmoid and sphenoid sinus haemorrhage, fracture of the lateral wall of orbit and head and face fractures [12]. While CT scan is superior to magnetic resonance imaging (MRI) in delineating fracture of bone, MRI is superior to CT scanning for soft tissue.

2.5 Prognosis

Most of the patients had consciousness disturbed when their prognosis were made and this was sufficient information to conclude that their prognosis was poor as it could not be established if the trauma had occurred on impact or gradually. Only 4 patients were conscious when they were examined and were the only cases of good prognosis.

3. SURGICAL METHODS

3.1 Endoscopy

The fact that the optical canals protrude into the sphenoid sinus wall is the basis for endoscopy. The procedure is performed under anaesthesia. The bulge caused by internal carotid artery and optic nerve is identified in the lateral wall of sphenoid sinus after ethmoidectomy and sphenoidotomy. The optic canals medial wall is thinned out with a micro-drill and removed with a microcurrete. No incisions are made on the annulus of Zinn [13, 14].

3.2 Extra-Nasal Trans-Ethmoidal

It is the most popular approach and avoids lifting of the frontal lobe of the brain. There is a possibility of damage to the carotid artery during surgery since the carotid artery is in close proximity with the sphenoid sinus [15].

3.3 Trans Nasal Trans-Sphenoidal

Adrenaline in a concentration of 1:100000 with xylocaine were used to decongest the nasal cavity. The middle turbinate was medialized and bulla opened, ground lamella was then entered, posterior ethmoidal and sphenoid sinuses were entered sequentially. The sinus ostium was widened in the inferior medial direction and lateral wall bone was removed in the region of the optic canal in the length of the canal. The nerve is decompressed and a medical pack kept in the nasal cavity [17].

4. TREATMENT METHOD

Patients were treated with drugs, craniotomy optical canal decompression and endoscopic nerve decompression.

International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 05 Issue 05 May 2022
DOI: 10.47191/ijcsrr/V5-i5-49, Impact Factor: 5.995
IJCSRR @ 2022
www.ijcsrr.org

4.1 Statistics: SPSS17.0 software $\chi 2$ test, $P < 0.05$ statistically significant.

case	age (yr)	Cause of injury	DOC	Time of lost vision day)	Result of CT scan	Injured to operation time (day)	Preoperative vision	Time of vision recovery (day)	Vision at discharge	Time and postopera-tive vision during follow up
1	23	CA	yes	7	FBF,SH	6	NLP	15	NLP	0.04 (12)
2	28	TF	yes	20	FOC,SH ,OF	30	NLP	8	Light perception	Finger movement （10）
3	31	TF	yes	30	CLB, FOC,SH	51	NLP	—	NLP	NLP （10）
4	30	TF	yes	3	FOC,OF, SH	10	NLP	—	NLP	NLP （7）
5	29	TF	yes	10	ASBF,SH	18	NLP	7	Finger movement	Finger movement (6)
6	20	TF	yes	1	CLB, SH	14	NLP	—	NLP	NLP (7)
7	33	TF	yes	3	FBF,FOC ,SH	3	NLP	13	NLP	light (6)
8	17	CA	yes	9	CLB,SH	24	NLP	—	NLP	Lost of follow up
9	30	TF	Yes	1	OF	8	NLP	—	NLP	NLP（4）
10	33	CA	Yes	1	FOC	4	NLP	—	NLP	NLP（3）
11	19	TF	Yes	14	CLB,SH, OF	21	NLP	—	NLP	NLP（3）
12	34	CA	Yes	2	SH, FBF	7	NLP	3	Finger movement	0.6 （6）
13	26	TF	Yes	3	FOC,SH	13	NLP	—	NLP	NLP（4）
14	46	CA	Yes	2	FOC, TBF	6	NLP	—	NLP	NLP(6)
15	38	TF	Yes	14	SH,OF	23	NLP	—	NLP	NLP(7)
16	23	CA	Yes	4	FOC, TBF	6	NLP	—	NLP	NLP(9)
17	24	TF	Yes	1	FOC,SH	7	NLP	11	light	light (12)
18	29	CA	Yes	2	SH	6	NLP	—	NLP	NLP(8)
19	31	TF	Yes	1	FOC,SH	8	NLP	—	NLP	NLP(4)
20	26	CA	Yes	1	FBF	3	NLP	—	NLP	NLP(8)
21	29	CA	Yes	1	FOC,OF	7	NLP	10	NLP	light(9)
22	30	CA	Yes	5	SH	8	NLP	—	NLP	NLP(3)
23	36	CA	Yes	3	FBF, OF	5	NLP	8	NLP	light(6
24	24	TF	Yes	2	FOC,SH	15	NLP	—	NLP	NLP(6)

International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 05 Issue 05 May 2022
DOI: 10.47191/ijcsrr/V5-i5-49, Impact Factor: 5.995
IJCSRR @ 2022
www.ijcsrr.org

25	28	CA	Yes	4	SH, FBF	22	NLP	—	NLP	NLP(5)
26	28	CA	Yes	3	SH	5	NLP	7	light	light(7)
27	31	TF	Yes	5	OF, TBF	8	NLP	—	NLP	NLP(6)
28	34	TF	Yes	2	FOC,SH	20	NLP	—	NLP	NLP(7)
29	33	CA	Yes	4	FOC,SH	18	NLP	—	NLP	NLP(3)
30	20	CA	Yes	2	SH	10	NLP	—	NLP	NLP(4)
31	13	CA	Yes	1	FOC,OF	2	NLP	—	NLP	NLP(3)
32	43	MA	Yes	2	FOC,OF	3	NLP	2	Finger Movement	Finger Movement (7)
33	20	CA	Yes	2	FOC,OF	3	NLP	2	Visual Acuity(0.04)	0.04(3)
34	28	CA	Yes	1	FOC,SH	2	NLP	3	Index	Index(5)
35	47	TF	Yes	7	OF,TBF	8	NLP	3	LP	LP(8)
36	51	CA	Yes	3	OF,SH	4	NLP	—	NLP	NLP(6)
37	20	CA	Yes	3	FOC,OF, TBF	5	LP	3	VISUAL ACUITY 0.2	0.2(4)
38	18	CA	Yes	4	OF	5	NLP	2	INDEX	INDEX (10)
39	22	CA	Yes	2	OF	3	NLP	5	FINGER MOVEMENT	FINGER MOVMENT (3)
40	17	MA	Yes	2	FOC,OF	3	NLP	—	NLP	NLP(9)
41	32	TF	Yes	5	OF,TBF	6	NLP	6	INDEX	INDEX (5)
42	21	MA	Yes	3	FOC,OF	4	LP	—	NLP	NLP(8)
43	39	TF	Yes	2	FOC,SH	3	NLP	1	LP	LP(6)
44	42	CA	Yes	1	FOC,OF	2	LP	4	VISUAL ACUITY 0.08	0.08(9)
45	16	CA	Yes	5	OF	6	LP	3	VISUAL ACUITY 0.6	0.6(7)
46	29	TF	Yes	3	FOC,OF	4	NLP	7	INDEX	INDEX (3)
47	35	MA	Yes	8	FOC,OF, TBF	10	NLP	—	NLP	NLP(10)
48	41	TF	Yes	1	FOC,OF	2	NLP	3	VISUAL ACUITY 0.04	0.04(4)
49	19	CA	Yes	3	FOC,OF, SH	4	NLP	—	NLP	NLP(6)

International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 05 Issue 05 May 2022
DOI: 10.47191/ijcsrr/V5-i5-49, Impact Factor: 5.995
IJCSRR @ 2022
www.ijcsrr.org

50	28	TF	Yes	1	FOC,OF	2	NLP	3	INDEX	INDEX (11)
51	31	CA	Yes	1	FOC,OF, TBF	3	NLP	5	NLP	NLP(6)
52	32	TF	Yes	4	FOC	5	NLP	—	NLP	NLP(4)
53	18	CA	Yes	5	FOC	2	NLP	—	NLP	NLP(3)
54	23	TF	Yes	8	FOC	4	NLP	—	NLP	NLP(5)

CLB=contusion and laceration of brain,; FOC=fracture of optic canal,;
SH=Sinuses hematoma, ; OF=orbital fractures, ; NLP=no light perception, DOC-Disturbance of Consciousness CA- car accident. TF- to fall FBF- frontal bone fracture TBF-Temporal bone fracture ASBF- Anterior skull base fracture

5. RESULTS

In the group of 54 patients who were followed up for a period between 3 to 12 months. At the end of the follow up, 7 patients had recovered visual acuity to different degrees. The other cases showed ineffectiveness and one patient was lost to the follow up. The earliest time that a period recovered visual acuity was one day and the latest recovery was fifteen days after the operation. Improvement of visual acuity was 1 level in 1 patient, two levels in 1 patient, 3 levels in 1 patient and 4 levels in 2 patients. Recovery occurred between 1 and 2 weeks after recovery but ceased by the end of 2 months and remained as was. 5 could count number of fingers shown to them, 4 could perceive finger movement 50 cm away and 7 could see the eye chart.

6. DISCUSSION

Generally any blindness sustained immediately after an injury exhibits a poor prognosis but gradual loss of vision exhibits a better prognosis. Immediate treatment of injuries is believed to be of paramount importance if desired results are expected [18]. However, there has been no observed correlation between immediate treatment and recovery in patients [19]. In the event that surgical decompression occurred immediately after the accident then it meant that the optic nerve was severely damaged or that majority or all the nerves were fractured, and surgical decompression would be of insignificant effect [20, 21]. In a report by Ohlsson and Svensson early decompression of the injured optic nerve reduces axonal degeneration and showed significant improvement in adult rats [23]. However, there was little evidence to support that these cases improved as a direct result of the surgery [8]. A study by the International Optic Nerve Trauma the largest multicentre study of TON to date analysed 133 people with indirect TON who were treated within 7 days of trauma. No clear evidence was found to support benefits of optic nerve decompression surgery [22].

Endoscopic decompression at other times is an alternative method that alleviates pressure in the canal. It is considered to have advantages such low morbidity, retention of a sense of smell, a shorter recovery time as compared to surgical procedure, no surgical scar and does not interfere with children's growth [18, 8]. However, there is no evidence to support that there is significant improvement in patients after the procedure.

CONCLUSION

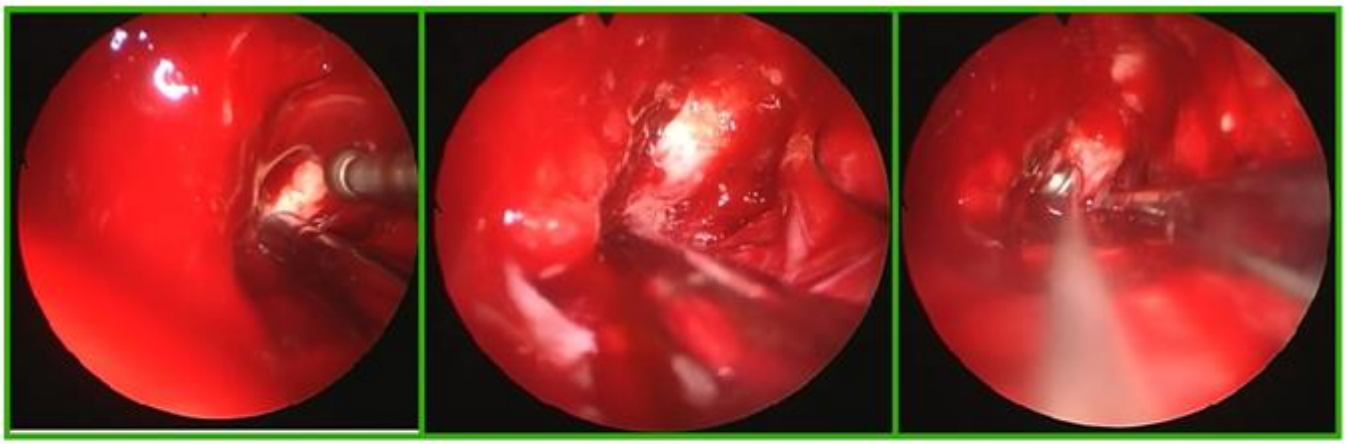
The decompression of the optic canal by surgery or endoscopy served to alleviate some of the symptoms of the optic nerve injury. Swelling of the nerve reduced and in cases eliminated. A level or two of improved visual acuity was reported. However, there is no proof that they in any way help in the restoration of the vision in patients. This can be supported by cases of spontaneous visual recovery in patients who have never received any treatment. In the end, we felt that it would be better to save the patients from huge expenses and time that would be used up in numerous surgeries that may not yield any positive feedback instead of giving them false hope of recovery. Our services may even better served by helping patients start getting accustomed to their new state of blindness and help them through the transition.

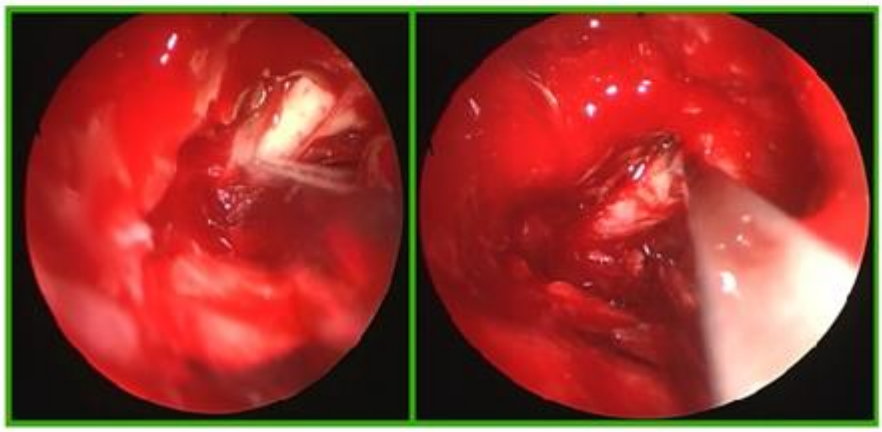
International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 05 Issue 05 May 2022
DOI: 10.47191/ijcsrr/V5-i5-49, Impact Factor: 5.995
IJCSRR @ 2022
www.ijcsrr.org

REFERENCES

1. Chandwick, J & Mann WN The Medical works of Hippocrates. Oxford: England, Backwell 1950
2. Levin L Traumatic Optic Neuropathy; Roy and Fraufelder's Current Ocular Therapy 6th edition Eds: Roy FH. Fraunfelders FS. Philadelphia 2007; 5(2):73-78
3. Nishi T, Ueda T et al. Traumatic optic neuropathy caused by blunt injury to the inferior orbital rim. J Neurophthalmom, 2006; 26:44-46
4. Van S GP, Biousse V, Lynn MJ et al Neuroophthalmic manifestation of the head trauma. J Neuroophthamol, 2000; 21:112-117
5. Sofferman B. The recovery potential of the optic nerve, Laryngoscope, 1995; 105:1-38
6. Guyer RG, Miller RN MD, Long MD, PHD, et al.Visual function following optical Decompression via Craniotum, Balitimore 1985; 7:112-116
7. Levin LA, Beck RW, Joseph MP The treatment of traumatic optic neuropathy: the international Optic Nerve Trauma Study. Ophthalmology, 1999; 106:1268-1277
8. Steinsapir KD, Goldberg RA Traumatic optic neuropathy; a critical update. Comp Ophthalmol Update, 2005; 6:11-612
9. Steinsapir KD, Goldberg RA Traumatic optic neuropathy Surv Ophthalmol, 1994; 38:487-518
10. Lessel L Traumatic optic neuropathy and visual system injury In Shingleton BJ, Hersh PS, Kenyon KR, Editors Eye trauma. St Louis: Mosby Year Book; 2010 June; 23:371-379
11. Tsai HH, Jengb SF, Linb TS, et al. Predictive value of computed tomography in visual outcome in indirect traumatic optic neuropathy complicated with periorbital facil bone structure. Clin. Neurol. Neurosurg. 2005 april;107(3):200-206
12. Lee AG. Imaging for neuroophthalmic manifestations of the head trauma. J Neuroophthalmol, 2004;138:852-862
13. Kountakis SE, Maillard AAJ, Urso R, et al. Endoscopic approach to traumatic visual loss. Otolaryngol. Head Neck Surg. 1997 June, 116(6): 652-655
14. Rajiniganth MG, Gupta AK, Gupta A, et al. Traumatic optic neuropathy: visual outcome following combined therapy protocol. Arch Otolaryngol Head Neck Surg. 2003 Nov, 129(11):1203-1206
15. Wohlrab TM, Maas S, de Carpentier JP. Surgical decompression in traumatic optic neuropathy. Acta Ophthalmol Scand 2002 Jun, 80(3):287-293
16. Gupta AK, Gupta AK, Gupta A, et al. Traumatic optic neuropathy in pediatric population: early intervention or delayed intervention? Int J Pediatri Otorhinolaryngol. 2007 april, 71(4):559-562
17. Lipkin AF, Woodson GE, Miller RH .Visual loss due to Orbital Fracture. Arch Otolaryngol Head Surg, 1983 Jun, 91(3):276-279
18. Spoor TC, Hartel WC, Lensik DB, et al. Treatment of Traumatic Optic Nerve Neuropathy with Corticosteroid Am J Ophthamol, 1990; 110:665-9.
19. Luxenberg W, Stammerger H, Jebels JA et al. Endoscopic optic nerve decompression: the Graz experience. Laryngoscope, 1998; 108:873-882
20. Lubben B, Stoll W, Grenzebauch U. Optic nerve decompression in the comatose and conscious patients after trauma. Laryngoscope, 2001; 111:320-328
21. Wu N, Yin ZQ, Wang Y. Traumatic neuropathy therapy: an update of clinical and Experimental studies 2008; 36 :883-889
22. Thakar A, Mahaptra AK, Tendons, DA Delayed Optic Decompression for Indirect Optic Nerve Injury, The Laryngoscope, 2003; 113:112-119
23. Ohlsson M. Mattsson P. Svensson M. A temporal study of axonal degenerational glial scar formation following a standardized crush injury of the optic nerve in adult rat Restore Neural Neuroscopy, 2004; 22:1-10

International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 05 Issue 05 May 2022
DOI: 10.47191/ijcsrr/V5-i5-49, Impact Factor: 5.995
IJCSRR @ 2022
www.ijcsrr.org





Cite this Article: Hina Rauf, Iqtaza Arif, Laiba Maryam (2022). Post Traumatic Optic Nerve Decompression in Patients with No Light Perception. International Journal of Current Science Research and Review, 5(5), 1786-1792