Original article

Surgical outcome of pars plana vitrectomy: a retrospective study in a peripheral tertiary eye care centre of Nepal

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Abstract

Back ground: Trans-pars plana vitrectomy (TPPV) is an effective surgical procedure to retain the useful vision in vitreoretinal diseases.

Objective: To evaluate the surgical outcome of pars plana vitreoretinal surgery.

Study design: Retrospective non-comparative interventional case series.

Materials and methods: A hospital-based retrospective interventional study of series of cases was carried out in retina clinic of Lumbini Eye Institute, Nepal, over a period of one-and-a-half years. Records of 64 patients who underwent vitreo-retina surgeries were reviewed. Demography, duration of symptoms, risk factors and indications, preoperative and post-operative visual acuity, intra-operative and post-operative complications were analyzed.

Outcome measurement: The parameters studied were post-operative visual acuity and complications.

Results: Of 64 patients, 61 % presented 2 months after the onset of symptoms. Preoperatively, 65.5 % had visual acuity of hand motions to 3/60 followed by perception of light only in 26.6 %.The main indication for TPPV was vitreous haemorrhage (VH), in 53 %. The visual acuity improved to better than 6/60 in patients with VH (68 %), whereas, overall, in 72 % of the subjects, it improved by 2 lines postoperatively. The commonest intra-operative complications were iatrogenic retinal break (5, 7.8%) at the sclerostomy site.

Conclusion: The main indication for TPPV is vitreous haemorrhage. Useful vision can be restored by pars plana vitrectomy in the majority of the patients. Retinal break is the commonest complication of TPPV.

Keywords: Trans-pars plana vitrectomy, vitreous haemorrhage, visual outcome, retinal break.

Introduction

Vitreous opacities requiring vitrectomy may result from vitreous degeneration, vitreous haemorrhage (VH), infection and inflammation of the vitreous. Sometimes clear vitreous is removed in cases of macular hole, dropped lens, intraocular foreign body (IOFB) and complicated retinal detachment. It is important to evaluate the surgical outcome of TPPV for a surgical audit.

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Materials and methods

A retrospective interventional study of a series of cases was conducted in the Retina Unit of the Lumbini Eye Institute, Nepal - a peripheral tertiary-level eye care

centre over a period of one-–and-–a-–half years. A detailed review of the case records was done including nationality, age, gender, chief complaint and it's duration, preoperative and post-–operative visual acuity (VA) measurement, indications for surgery, type of surgery, intra-operative findings and complications, if any. The patients included were those who underwent TPPV surgery and had completed one month of follow-–up. Those patients with previous vitreo-retinal surgery and diabetic VH were not included. An informed consent was obtained from all the subjects before intervention. The parameters studied to evaluate the outcome of the TPPV were visual acuity and complications of this procedure.

The standard three port 20-guageTPPV was performed under local anaesthesia by a single vitreo-retinal surgeon (SS). In all cases, a 4 mm infusion cannula was placed, except in endophthalmitis and complicated RD, where a 6 mm cannula was used.

Surgical procedure
The surgical procedure used for different indications for the TPPV was as follows.

Endophthalmitis
In cases with endophthalmitis, a three-port core TPPV (vitrectomy of central axial vitreous) was conducted till the visibility of the red glow. After closing the scleral ports, intra-vitreal vancomycin (0.1 ml of 1mg) and ceftazidime (0.1ml of 2.25mg) were given in all cases.

IOFB removal
The foreign body was identified and cleared from its surrounding vitreous and encapsulated fibrous tissues. Three rows of barrage laser were applied around the foreign body before the foreign body removal from the sclerotomy site with the help of a foreign-–body forceps.

Sub-hyaloid hemorrhage
In case of sub-hyaloid hemorrhage, the same procedure was performed as for the IOFBs. Posterior vitreous detachment (PVD) was induced and the blood clot was removed by flute–needle aspiration followed by the closure of the sclerotomies.

Complicated RD
In case of complicated RD, all vitreous was removed including that from the periphery with a high-–speed vitreous cutter. Vitrectomy was accompanied with membrane peeling using perfluorocarbone liquid simultaneously, followed by fluid air exchange and barrage endo-laser to the retinal breaks. Finally, before closing the sclerotomies, air silicon oil exchange was performed. Inferior peripheral iridectomy was done in aphakic eyes.

IOL removal, nucleus removal and vitreous haemorrhage
In all such cases, more vitreous was removed than in IOFB removal, but the peripheral vitreous was left unlike in complicated RDs. Endo-diathermy was used whenever indicated. The IOL and the nucleus were made free from the vitreous before their removal.

In all the cases, the sclerotomies and retina were examined with indirect ophthalmoscope to rule out iatrogenic/–pre-existing retinal breaks and treated as required. The sclerotomies and the conjunctiva with Tenon's capsule were closed separately with vicryl 6/0 suture.

Results
There were 64 eyes of 64 patients, consisting of 52 males and 12 females (Table 1). The age ranged from 16 to 76 years with a mean of 41.75±7.5 years.

Table 1
Age and gender of the patients

Age group(years)	Gender		Total	%
	male	female		
11-20	8	1	9	14.06
21-30	15	1	16	25
31-40	4	1	5	7.81
41-50	11	2	13	20.31
51-60	2	3	5	7.81
61-70	10	3	13	20.31
71-80	2	1	3	4.70
Total	52	12	64	100

The preoperative visual status in the majority of the patients (n=42) was (Table 2) HM to 3/60. The duration of presentation of the symptoms ranged from one day to 2 months (Table 6), among which 34 eyes had vitreous haemorrhage. The vitreous hemorrhage was the main cause of visual impairment in 26 subjects.

The main indications for the surgery (Table 4) were VH and endophthalmitis followed by complicated RDS.

Table 2
Pre-operative and postoperative visual acuity (VA)

Visual acuity	preoperative		postoperative	
	frequency(n)	%	frequency (n)	%
PL	17	26,57	5	7.82
HM< 3/60	42	65.62	16	25
3/60 - <6/60	2	3,12	7	10.94
6/60 - <6/24	1	1.57	18	28.12
6/24- 6/6	2	3.12	18	28.12
Grand total	64	100	64	100

PL=perception of light, HM= hand motion

The surgery performed was TPPV, with endo-laser application in more than half of the cases (Table 5).

The visual acuity did not improve post-operatively in 4 eyes with pre-operative vision of PL (Tables 2 and 7). Of 64 eyes, complications occurred in 8. In 5 eyes, iatrogenic retinal break was observed. Three eyes with the breaks were managed intra-operatively (2 eyes with diode laser and one with cryopexy combined with intra-vitreal air), whereas one eye required post-operatively cryopexy, radial sponge, sub-retinal fluid drainage and intra-vitreal air injection. One eye with an old retinal detachment was left without intervention due to poor prognosis.

Table 3
Associated conditions

Disease/ conditions	Frequency	%
Vasculitis	16	25
Trauma	15	23.44
HTN-BRVO	10	15.62
Post cataract surgery	8	12.5
Aphakia/pseudo phakia	7	10.94
Others	8	12.50
Total	64	100

HTN-BRVO- hypertension with branch retinal vein occlusion

In 2 eyes, the lens was touched with the vitrectomy probe during surgery, of which one required immediate lensectomy due to poor posterior segment visibility. In one silicone- oil (SO) filled eye, glaucoma was detected in the immediate post-operative period and required partial removal of the SO.

Table 4
Indications of trans pars plana vitrectomy

Indications	Frequency	%
Vitreous haemorrhage	34	53.13
Endophthalmitis	8	12.50
Complicated RD	6	9.37
IOFB	4	6.26
SHH	4	6.26
Dropped nucleus in vitreous	3	4,68
Dropped IOL in vitreous	3	4.68
Others	2	3.12
Grand total	64	100

RD=retinal detachment, IOFB=intraocular foreign body, SHH= subhyaloid hemorrhage, IOL= intraocular lens

Table 5
Type of surgical procedure

Surgical procedures	Frequency	%
TPPV+ EL	36	56.25
Core PPV+I/V AB	8	12.50
PPV+SOI	7	10.93
PPV+IOFB removal	4	6.25
PPV+IOL removal	3	4.69
PPV+lens removal	3	4.69
PPV only	3	4.69
Grand total	64	100

TPPV=trans pars plana vitrectomy, EL-endo-laser, I/V AB=intra-vitreal antibiotics, SOI=silicon oil injection, IOFB=intraocular foreign body and IOL=intraocular lens

Discussion

As reported by various authors, surgical outcomes of TPPV depend on various factors like preoperative VA, indications for surgery and intra-operative

Table 6
Duration of the of symptoms of the disease at presentation

Duration	Frequency	%
<1week	7	10.93
1 week to < 2 weeks	2	3.12
2 weeks to <4weeks	5	7.81
1 month to <2 months	11	17.20
2 months or more	39	60.94
Grand total	64	100

Table 7
Postoperative visual recovery in patients with preoperative PL (n=17)

Visual acuity	Frequency	%
PL	4	23.52
HM< 3/60	6	35.30
3/60 - <6/60	2	11.77
6/60 - <6/24	3	17.64
6/24- 6/6	2	11.77
Grand total	17	100

complications. A retrospective study by Gupta et al (2008) found retinal breaks as intra-operative complications in 2.9 % and among the post-operative complications, RD was found in 1.4 %. In another retrospective study by Gupta et al (2007), out of 92 cases, they observed retinal breaks in 2.2 % intra-operatively and retinal tear and RD in 1.1 % each postoperatively. In our study, out of 64 eyes, complications occurred in 8 eyes. In 5 eyes, iatrogenic retinal break was observed. In 2 eyes, the lens was touched with the vitrectomy probe.

One of the major parameters to assess the surgical outcomes of TPPV is postoperative visual acuity. A retrospective, multi-centre study of 92 cases done by Gupta et al (2008) reported that overall visual acuity improved significantly in the majority of their patients in each surgical indication. The TPPV was performed for various indications including epiretinal membrane, non-resolving VH, idiopathic macular hole and rhegmatogenous RD. In another study by Gupta et al (2007) in which 70 cases had undergone 25–gauge TPPV for epiretinal membrane, non-clearing VH and idiopathic macular hole, VA improvement of 20/368 preoperatively to 20/105 twelve weeks after surgery was achieved.

Likewise, Verbraeken and Egmond (1999) did a retrospective analysis of 126 cases of TPPV for non-diabetic and non-traumatic VH showing the best corrected post-operative visual acuity (BCVA) of 20/40 to 20/200 in all of the cases with Terson's syndrome and PVD. The postoperative visual acuity is less favourable in retinal tear (80 %), vascular disorder (27 %) and RD (25 %) according to the same study. Zhao et al (2000) evaluated the safety and efficacy of TPPV to treat massive haemorrhage caused by retinal arterial macroaneurysm in 8 cases who had preoperative VA of counting finger to 0.09. After 3 to 36 months (average 19 months) of follow-up, the post operative vision was improved to better than 0.1 in six eyes.

Another retrospective study by Kumagai et al (2007), showed that of 120 eyes of 120 patients who undergone PPV with or without internal limiting membrane peeling for macular edema with foveal hemorrhage due to BRVO with a minimum 12 months follow-up, the mean VA significantly increased from 0.24 (median 0.3) before surgery to 0.57 (median 0.7) one year after surgery ($p<0.0001$). The internal limiting membrane removal did not seem to have significant beneficial effects on visual outcomes in this series.

As shown in Table 4, VH was the major indication (n=34) among the indications of TPPV followed by endophthalmitis, complicated RD, IOFB and others in our study.

The causes for VH were vasculitis including Eale's disease (n=16), HTN with BRVO (n=10), trauma (n=5) and others like PVD and choroidal neovascularization (CNV). The postoperative visual acuity improved significantly in the patients with VH.

In our study, the preoperative VA in eyes with VH was PL (7 eyes), HM to <3/60 (25 eyes) and 3/60 to <6/60 (2 eyes). After the surgery, VA improved by 2 lines in 83 % of the eyes.

Among the patients with endophthalmitis, post-operative visual acuity improvement was found in more than 50 %. The post-operative visual improvement depends on the pre-operative visual status in such cases.

Huang HM et al (2004) analyzed 36 eyes of 36 patients who had undergone vitrectomy and lensectomy for lens

sub-luxation or dislocation due to trauma (blunt and penetrating) or intraocular surgery. The final best-corrected visual acuity was 20/40 or better in 45 % of the eyes in traumatic cases and in 31 % of eyes in iatrogenic cases. Visual acuity improved after TPPV/ TPPL in 90 % of the eyes in traumatic cases and in 81 % of the iatrogenic cases. They observed that posterior segment complications including RD and glaucoma were the major causes of poor postoperative visual outcomes.

Poudyal et al (2005), in a similar study reported that 39 % of the patients experienced improved VA postoperatively with 33 % obtaining >6/60 vision. In our study, of all the cases who underwent vitrectomy 22 cases (68.75 %) achieved VA of >6/60 postoperatively.

Wani VB et al (2003) retrospectively evaluated 40 consecutive cases of TPPV for removal of IOFB for visual results and prognostic factors and found that 19 patients (47.5 %) achieved a visual acuity of 20/40 or better. Postoperative RD occurred in 13 patients (32.5 %). Poor visual outcome was found to be significantly associated with poor initial visual acuity and postoperative RD, whereas good visual outcome was significantly associated with the absence of lens injury and absence of post-operative RD.

A Similar study by Sziiarto Z et al (2008) concluded that visual prognosis was significantly worse in cases with a lower trauma score, initial visual acuity less than 0.1 Snellen E, large foreign body, upset of bacterial endophthalmitis, and with proliferative vitreoretinopahy.

In our series, only 4 eyes with penetrating injury and retained IOFB underwent TPPV with IOFB removal, which is less in number as compared to the other studies.

Steimetz et al (2004) conducted retrospective charts review of 59 eyes of 58 patients in which posteriorly dislocated PCIOL was removed from the vitreous cavity through the enlarged sclerotomy after PPV. 54 eyes (92 %) had improved visual acuity after surgery, in which 66 % of eyes achieved at least 20/40 vision. Intra-operative complications were limited supra-choroidal hemorrhage in 2 eyes and post-operative complications were RD in 5 eyes, CME in 13 eyes, and VH in 3 eyes.

In our study, 6 eyes of 6 patients underwent TPPV for lens and dropped IOL removal. Two cases with preoperative VA of PL improved to 6/24 postoperatively. There were no intra-operative or post-operative complications. The visual acuities were similar to Steimetz 's findings, although our sample size was smaller.

Conclusion

Among the indications for vitreous surgery, VH ((53 %) is the commonest. Visual acuity improves significantly after vitrectomy for vitreous haemorrhage. Iatrogenic retinal tear is a common complication of vitreous surgery, which can be managed successfully if recognised intra-operatively.

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