Management and outcome of iatrogenic globe perforation during peribulbar block at tertiary eye centre

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Abstract

Aim: Needle perforations can present with various clinical manifestations, management depends on the clinical presentation. Our aim is to know the outcome in all cases of needle penetration with different clinical presentation.

Study Design: We have done retrospective study of block related globe perforation cases who presented to the vitreo retina Department at Sarojini Devi Eye Hospital. We collected the data of these patients from the medical records who presented during January 2017 to December 2017.

Materials and Methods: All patients who presented to our department underwent detailed ocular examination. Apart from history BCVA, slit lamp examination, fundus examination and b scan in patients with hazy media due to vitreous haemorrhage done.

Results: Total 11 patients presented to our department, patients with retinal breaks barrage laser done, did not require any further procedure. These patients had good outcome due to peripheral retinal break.

1. Patients with retinal breaks and vitreous haemorrhage without retinal detachment also had good outcome; 2. Patients with retinal detachment and delayed presentation had poor anatomical and visual outcome; 3. Patients with pale retina and patients where retinal detachment (RD) associated with choroidal detachment (CD) had poor visual outcome.

Conclusion: Iatrogenic ocular perforation is an ocular emergency, need to be treated immediately to prevent blindness.

Keywords: CD, Globe perforation, Retinal break, PVR, RD, VH.

Introduction

Block related globe perforations should be treated as emergency. Risk factors for the globe penetration are myopia with high axial length more than 26mm, deep set eyes, repeated injections, uncooperative patient and in eyes with previous buckling procedures.¹

Damage is due to needle penetration and drug. Now incidence is reduced, because most of the cataract surgeries are done in topical anaesthesia. Patients presented with different clinical manifestations were managed at our institute.

Aim

Our aim is to study the outcome of iatrogenic block related globe perforations with different clinical presentations at our Institute.

Study Design: we have done a retrospective study by collecting all the data from medical records of patients who presented to our vitreo retina department during the period January 2017 to December 2017 at Sarojini Devi Eye Hospital, Hyderabad, and Telangana.

Materials and Methods

All eleven patients underwent detailed examination apart from history. 6 patients presented to our department, underwent cataract surgery at our institute, one patient had tractional retinal detachment due to old vascular occlusion underwent vitrectomy in our department, 4 patients presented from outside the institute, these patients underwent cataract surgery in camps conducted by private organisations. Common complaint in these patients was no improvement of vision after surgery. Few cases had complaint immediately in post operative period, some presented 7 to 10 days after surgery.

BCVA, slit lamp examination, indirect ophthalmoscopy, and b scan in patients with hazy media and documentation done in all cases.

Demographic Data: 6 cases were male patients and 5 cases were female patients.



Fig. 1: Pie chart showing gender distribution

Mean age of presentation was 37 years.

Patients (3) presented with no improvement in vision immediately next day after surgery, patients (8) had good vision for the first few days after surgery.

Patients with mild vitreous haemorrhage (VH) and retinal break underwent only barrage laser at the penetration site.

Patients with dense vitreous haemorrhage underwent parsplanavitrectomy and barrage laser at the perforation site.

Patients with dense VH and retinal detachment (RD) on B scan underwent pars plana vitrectomy (PPV) with silicone oil tamponade.

Results

3 patients with retinal break and mild VH had good anatomical and visual outcome.

3 patients with dense VH also had good outcome after PPV.

One patient presented 2 weeks after cataract surgery with organised VH, RD and choroidal detachment (CD) underwent PPV and silicone oil tamponade had good anatomical outcome immediately after surgery, 3 weeks after PPV patient presented with star fold in the infero temporal quadrant and elevated retina inferiorly. Patient underwent second procedure to flatten the retina.

One young adult operated for traumatic cataract also had only retinal break without RD, barrage laser done, outcome was good.

One female patient presented after 2 weeks of cataract surgery had VH, pale retina, advised admission, patient refused and came after one week with RD, this patient had GRT and folded retina. Prognosis was very poor in this patient, after clearing VH; GRT noted with folded edges, retina could not be flattened with PFCL (heavy liquids). Patient was explained regarding prognosis.

Two patients presented with hypotony and retinal breaks, IOP was normal after one week, breaks were lasered.



Fig. 2



Fig. 3

Discussion

The technique of peribulbar aneasthesia described by Davis and Mendal was an attempt to reduce the complications associated with retro bulbar aneasthesia. This two injection technique included an injection at the lateral third of the lower orbital rim and second at the medial third of the upper orbital rim. While their series reported ocular perforations in 0.006% of cases, there has subsequently been an increase in the reported incidence of ocular perforations as a result of peribulbar block.

The incidence described in the literature varies from 0 in 2000 peribulbar blocks, to 1 in 12 000 of a series of peribulbar and retrobulbar blocks, 3 in 4000 retrobulbar blocks, and 1 in 16 224 peribulbar blocks.

In our centre the incidence is 0.27% (11/4000).

According to Duker et al, 45% of globe perforations occurred in patients who had an axial length of ≥ 26 mm. They calculated that myopic patients have a 30 fold increased risk of perforation during intraconal injections. Posterior staphyloma (posterior outpouching of the globe) can be associated with myopia. In a review of 50,000 patients who had needle block, 7 patients had globe perforation and they all had posterior staphyloma.⁸

Incidence of iatrogenic globe perforation is very low in our institute, 3 cases in our study were myopes with high axial length, 4 cases which were referred from outside were blocked by some technicians in the private organisations.

All the cases who presented to our department had intact posterior capsule with IOL in bag. One case

which was posted for vitrectomy to treat tractional retinal detachment and VH was also pseudophakic. In this patient needle penetration site was within arcades near infero temporal arcade.

Peribulbar block has definitely risk of needle penetration in cases with high myopia, uncooperative patients. Peribulbar injection is safe compare to retro bulbar injections but still risk of needle penetrating injury is always there hence proper technique is required to prevent the block related complications.

Before surgery after peribulbar block the tone of globe will help to know the possibility of iatrogenic globe perforation.¹

In our study all patients were operated under peribulbar anaesthesia. Drugs used were 2% lignocaine and Bupivacaine (0.5%) mixed with hyaluronidase. Repeated blocks may also cause needle perforation.² Drug concentration and proper technique can obtain quick and safe block. Drug related complications which were mentioned in other studies like toxicity of drugs and central retinal artery occlusion due to raised IOP because of druginjected in vitreous cavity not noted in our study. Only one case had pale retina, in this case media was haze due to VH, may be commotio retinae.

Central retinal artery occlusion due to severe tamponade from retro bulbar or peribulbar haemorrhage cans also occur.³

In our institute for all cases 23G needle is used for peribulbar block.

Infero temporal block is considered as safe technique but in our study most of the perforations are due to infero temporal peribulbar injections. High Myopia is common risk factor for globe perforation in most of the studies, in our study only 3 cases had axial length more than 26mm.

A perforating wound was found most commonly in the inferotemporal quadrant. This finding is consistent with the angle of approach of a retrobulbar injection. The perforation sites found posteriorly in the vicinity of the disc and macula were presumably exit wounds of needles &at had entered the globe anteriorly.⁴

Table	1:	Risk	factors	in	our	study	
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High Myopia	3 cases
Previous buckling	2 cases

Highly myopic eye with an axial length exceeding 26 mm is a contraindication for regional ophthalmologic anesthesia.

 Table 2: Clinical presentation of patients

Mild VH with retinal break	3 cases
Dense VH with retinal breaks	3 cases
VH +Retinal break+RD	2 cases
VH+ Retinal break+RD+CD	2 cases
VH+Retinalbreak+RD + Pale retina	1 case

In some cases retinal breaks were noted on table at the time of surgery.

Table 3: Location of breaks

Superior breaks	3 cases
Inferior breaks	3 cases
Infero temporal with in equator	2 cases
Superior and inferior breaks	3 cases

All the breaks were anterior to equator or at equator.

Perforation signs noted by Berlin et al. in series of 25 cases included VH in 100%, sub retinal haemorrhage in 76%, and RD in 56%. Modarres et al. reported VH in all seven myopic cases, with RD in four of them. Gillow et al. reported six cases with VH in all and RD in five cases. Wearne et al. reported twenty cases where nine had RD. Localisation of the retinal break in most series were posterior to the equator. The IT location was the most common.

In our study breaks were seen superiorly as well as inferiorly, one case had break nasally and inferiorly.

Table 4: Presentation

Immediate (next day after surgery)	3 cases
Delayed presentation (1week)	5 cases
After 2 weeks	3 cases

Risk of proliferative vitreo retinopathy (PVR) is high in globe perforation; outcome in cases with PVR is not favourable. Early presentation will prevent the risk of PVR. Double needle perforations cases developed PVR changes faster compared to single needle penetration cases.

Patients presented with PVR: 3 cases

Interpretation of ultrasound studies of acutely traumatised eyes can be unreliable, particularly in the presence of choroidal haemorrhage or intraocular lenses, there is a considerable risk of proliferative vitreoretinopathy (PVR) in these cases. PVR may develop rapidly and adversely affect the prognosis.⁴ PVR can develop within 2 weeks after needle injury.

Patients underwent treatment based on clinical presentation; all patients were followed for a period of 12 weeks after management. Silicone oil removed in 2 cases.

Mild VH + Retinal	3 cases	6/12
breaks		
Dense VH+Retinal	3 cases	6/18 -6/24
breaks		
VH plus RD	2 cases	CF 4mts
VH+RD+CD	2 cases	CF ¹ / ₂ to 1mt
VH+RD+ pale retina	1case	PL negative

In our study the reason for poor visual outcome was retinal detachment and PVR. In cases of RD though anatomical outcome was good, functional outcome was not favourable. Delayed presentation was one of the most risk factor for poor outcome. Some studies showed the incidence of endophthalmitis after needle injury, in our study no endophthalmitis case was noted.

Several studies, supported that the peribulbar tech nique is effective and safer than retrobulbar in jection, as the needles do not enter the retrobulbar space. This is anatomically close to the posterior surface of the globe and optic foramen which contains the optic nerve with its dural sheath and central retinal artery and vein. Certainly the most recent multicentre report of over 16 000 peribulbar blocks showed a very low complication rate. Similarly it is often stated that blunt needles are safer than sharp needles. However, most of the complications, and particularly severe haemorrhage and globe perforation, noted with both methods and with both types of needle tip.⁵

The advantages of sharp needle include less pain for the patient, greater ease in controlling bleeding from an inadvertently punctured vessel and less damage to the globe if globe perforation occurs. The advantages of the blunt needle include increased chance of recognizing resistance if the globe is encountered and therefore less chance of perforating the globe but there is a greater chance of permanent damage to the globe, if perforation does occur with a blunt needle.⁸

In our study most of the injections given by junior residents, one by consultant and two by anaesthetist. In our study all perforations were noted in peribulbar injections, where as in previous studies perforations were noted in sub conjunctival and posterior sub tenon injections.

Precautions to avoid iatrogenic globe perforations.

- 1. To have good anatomical knowledge
- 2. To check any globe anomalies before injecting
- 3. Avoid vascular areas like supero nasal area, use avascular area as injection site
- 4. Check axial length of eyeball before injecting
- 5. Proper history regarding previous surgeries
- 6. Length of needle should be less than 31mm, better to use 24 to 27mm
- 7. Safe technique is infero temporal route, eyeball in primary gaze position, at least down and in or out but not up and in to save optic nerve injury.
- 8. Palpation around the globe will give an indication of the size of the globe in relation to the orbit.

Mein" has described a subtenon's anaesthesia technique for vitreoretinal surgery. Anaesthetic is infiltrated beneath conjunctiva and Tenon's capsule at the limbus. The conjunctiva is then opened and the subtenon's space around the globe opened. The retrobulbar space can then be irrigated with anaesthetic solution via a blunt cannula. The final option in high-risk cases remains general anaesthesia.⁶

Role of B scan in ophthalmic anaesthesia has been described in literature to reduce this complications, Ultra Sound guided needle placement in peribulbar and retro bulbar spaces when prolonged aneathesia is required and also for relief of post operative pain, but there is no sufficient evidence regarding this technique during ophthalmic block.⁷

Conclusion

Though the incidence is less, penetration or perforation caused by these sharp needles will lead to serious and permanent damage. Most of the times globe perforation or penetration remains undetected so indirect ophthalmoscopy immediately after block helps to ensure the patency of retinal vessels and sclera integrity. Early diagnosis and proper management is very important. Good results can be achieved in cases which present early. Early vitrectomy is recommended in cases with dense vitreous haemorrhage and retinal detachment to improve over all visual prognosis and subsequent PVR.

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