



## Original Research Article

## Bungee cord related ocular trauma: An avoidable cause of ocular morbidity

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## ABSTRACT

**Purpose:** To study the mechanism and clinical features of ocular injury and its outcome associated with bungee cord related eye trauma.

**Materials and Methods:** A retrospective review of medical records was performed at our tertiary care centre to identify patients presented with bungee cord related eye injury between March 2016 to February 2017. Data collected from medical records were age, sex, mechanism of injury, clinical features, therapeutic intervention, presenting visual acuity, final visual acuity and length of follow up.

**Result:** Total of thirteen patients with bungee cord related trauma were identified. Ten (77%) patients presented with closed globe injury and 3(23%) presented with open globe injury. All patients were male with mean age group of 30.15±7.38 years. Presenting visual acuity ranges from 6/12 to NPL. Only seven (54%) of patients were having final visual acuity of better than or equal to 6/18 in injured eye. Three patients (23.1%) with open globe injury had final visual acuity of counting fingers or worse. Main mechanism of injury being combination of blunt and high speed projectile injury due to slippage of metal or plastic hook while the cord is stretched.

**Conclusions:** Trauma with bungee cord is usually affecting working age group male with injury resulting in loss of workable vision to loss of eye hence there is need of appropriate intervention like use of printed warning on package and modification of hook design to decrease the incidence of bungee cord related trauma.

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## 1. Introduction

Bungee cords are elastic cord of variable length and weight with an open metallic J or S shaped hook attached at each end and are gaining popularity because of their flexibility and ease of use (Figure 1). Now a days it is commonly used for occupational purpose and for leisure activity. Bungee cords injury mostly occur when the metal or plastic hook slips from its point of attachment when the cord is stretched or when metal hook straightens by the force of loads while the cord is stretched and leads to both blunt and penetrating ocular trauma.

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There were few published reports of bungee cord injury and in all these studies most patients were male and significant number of them required surgical management. The main aim of this study was to identify the mechanism and clinical features and outcome associated with bungee cord related eye trauma and to support previous author regarding modification of hook design

## 2. Materials and Methods

A retrospective review of medical records of patients presenting with bungee cord eye injury between March 2016 to March 2017 was conducted in a tertiary care centre of eastern India. Data collected were age, sex, mechanism of

injury, clinical features, therapeutic intervention, presenting visual acuity, final visual acuity and length of follow up.

### 3. Results

During 12-month period of review thirteen cases of ocular injury due to bungee cord were identified. The mean age of patients was  $30.15 \pm 7.38$  years (range 16-40 years).

All of the patients were men and all of the injury occurred during work while loading/unloading goods from vehicle. Main mechanism of injury being hook released from secured object in ten cases (76.9%), cord breaking from hook in two cases (15.4%) and hook straightening in one case (7.7%). None of the patients were wearing protective eye glasses.

Presenting visual acuity ranged from 6/12 to no perception of light [Table 1]. Three patients (23%) had open globe injury whereas remaining ten patients (77%) had closed globe injury.

Wide array of anterior and posterior segment injury was noted depicted in Table 1. Most common Anterior segment manifestation was hyphaema and post traumatic uveitis (53.8%). Vitreous haemorrhage was most common posterior segment finding (53.8%). Periorbital oedema/ecchymosis was present in 30.8% of patients.

Every patient needed medical treatment and six (46.15%) patients required hospital admission for surgical intervention for corneoscleral perforation repair (two cases), enucleation for badly lacerated injury (one case), trabeculectomy (one case), vitrectomy (one case) and lensectomy (one case).

Final visual acuity ranged from 6/6 to no perception of light [Table 1]. Seven patients (54%) with final visual acuity better than or equal to 6/18 had closed globe injury and five (38.5%) of them had injury limited to anterior segment. Four (30.8%) patients had final acuity of less than 6/60 mainly due to traumatic maculopathy in closed globe injury (one case) and corneo sclera laceration (three cases). Three patients (23.1%) with open globe injury had final visual acuity of counting fingers or worse. Right and left eye was affected in ratio of 5:8. Length of follow up ranged from 3-9 months with an average of 6 months.

### 4. Discussion

There are few studies reporting bungeecord associated ocular trauma summarised below.

Cruysberg et al(1995) reported 22 cases of bungee cord injury and 95% of injured subjects were male. Hyphema and retinal detachment were most common anterior and posterior segment injury. Two cases had open globe injury and 14 cases required surgical intervention.<sup>1</sup>

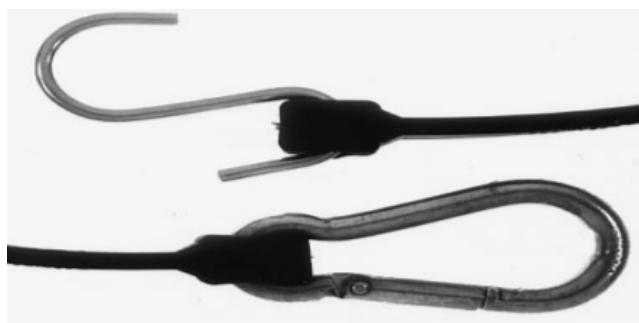
Gray et al (1988) reported six cases of bungee cord injury, all were male with hyphema being most common injury. Open globe injury was present in one case. Surgical

**Table 1:** linical features of bungee cord injury

Clinical feature	Number of cases	
	Presenting	Final
<b>Visual acuity</b>		
6/6 to 6/18	1/13	7/13
<6/18-6/60	3/13	2/13
<6/60-1/60	3/13	1/13
Counting fingers	1/13	1/13
Hand movement	1/13	
Light perception	3/13	1/13
No light perception	1/13	1/13
<b>Injury</b>		
<b>Anterior segment</b>		
1. Hyphema	7/13(53.8%)	
2. Iritis	7/13(53.8%)	
3. Iris sphincter tear	5/13(38.5%)	
4. Iridodialysis	1/13(7.7%)	
5. Angle recession	4/13(30.8%)	
6. Traumatic glaucoma	4/13(30.8%)	
7. Cataract	1/13(7.7%)	
8. Subluxated lens	1/13(7.7%)	
9. Corneo scleral laceration	3/13(23.0%)	
<b>Posterior segment</b>		
1. Vitreous haemorrhage	7/13(53.8%)	
2. Commotio retinae	1/13(7.7%)	
3. Sub retinal aemorrhage	3/13(23.0%)	
4. Choroidal rupture	3/13(23.0%)	
5. Traumatic maculopathy	1/13(7.7%)	
6. Retinal detachment	1/13(7.7%)	
<b>Periocular</b>		
1. Periorbital oedema ecchymosis	4/13(30.8%)	
2. Lid laceration	1/13(7.7%)	



**Fig. 1:** Bungee cord - Elastic or rubber cord with metallic hooks at each ends



**Fig. 2:** Modified hook with spring loaded gate clip replacing S shaped hook

intervention needed in four cases.<sup>2</sup>

Nichols et al has reported 5 patients with ocular trauma due to elastic cords with attached metal hooks. All were male with mean age of 38 years. Four of the injuries occurred while securing object on roof of automobile. Two had open globe injuries, and three had final visual acuities of 20/200 or less.<sup>3</sup>

Chorich et al (1998) reported 4 cases of bungee cord injury with 75% of subjects were male and most common anterior manifestation was angle recession glaucoma and posterior segment manifestation was retinal tear / detachment requiring surgical intervention.<sup>4</sup>

Cooney and Pieramici (1997) had reported 17 cases of bungee cord injury with mean age of 38 years. The most common injury being hyphema and vitreous haemorrhage. Three (18%) had open globe injury and four cases required surgical intervention with final acuity of counting finger and worse in one case. None of the patients were wearing protective glasses in their study.<sup>5</sup>

Litoff and Catalano<sup>2</sup> (1991) have reported 11 patients of bungee cord injury while securing articles to the roof of an automobile, mean age was 26 years and 82% were male. They had found a wide array of anterior and posterior segment injuries with the most commonly being hyphema in anterior segment and retinal tear and dialysis in posterior segment. Open globe injury was present in only two cases. Surgical intervention was required in 6 cases (55%) 9 out of 11 patients had visual outcome 20/30 or better and light perception for the remaining 2 (18%) patients.<sup>6</sup>

Nam et al (2019) reported 100 cases of bungee cord injury with 79% male, hyphema (79%) and vitreous haemorrhage (40%) being most common anterior and posterior segment finding 97% had not used protective eye glasses. Open globe injury was present in 33%, surgical intervention was required in 51%. Final visual outcome of counting finger or less was seen in 30%.<sup>7</sup>

Aldave et al(2001) reported 67 cases of bungee cord injury with mean age of 35.6 years and 89.5% male. Most common anterior and posterior segment manifestation being hyphema (63%) and commotio retinae (55%). Seven

(10%) subjects suffered from open globe injury and surgical intervention was needed in 31%. Poor visual outcome of counting finger or less seen 15% cases.<sup>8</sup>

Similar to previous authors, our study demonstrated that bungee cord could cause both closed and open globe injury former being more common and latter being more severe.<sup>1-8</sup> Visual acuity of counting fingers or worse was seen in 46.1% of patients at presentation and 23.1% of patients at follow up. Significant number of cases need surgical intervention and this vary in different study depending on experience and skill of surgeon.<sup>1-8</sup> Blunt trauma accounted for better visual outcome particularly when injury is limited to anterior segment as seen in our study. Posterior segment involvement and penetrating injuries caused severe reduction of visual acuity. Many of studies including our reported that all injured patients were male of working age.<sup>1,4</sup> Bungee cord trauma may cause irreversible vision loss and even loss of eye indicating the danger of injury and psychological, social and economic impact on injured person and their families. None of patients used protective glasses in our study and one study reported severe injury in patients with protective glasses.<sup>8</sup> Hyphema was the most common anterior segment finding similar to previous studies.<sup>1,2,4-8</sup> Our study also found post traumatic uveitis to be equally prevalent. Ours study along with two other found vitreous hemorrhage being most common posterior segment finding.<sup>6,8</sup>

Bungee cord is inexpensive, easily accessible and combined with its flexibility and ease of use is becoming a common work place and leisure activity article. But is also a cause of severe ocular trauma mainly because of hook design which is S or J shaped metallic structure with open ends. Previous authors have stressed on modification of hook design and replacing S shaped design with spring loaded gate clip [Figure 2].<sup>1</sup> Most injury in our series (76.9%) were due to hook getting released from object when it was secured and this modification could prevent hook from releasing, unless gate was depressed therefore, most of trauma could be prevented. However it is unlikely that bungee cord users will use protective glasses and even in the presence of protective glasses severe injury could occur, therefore it is the responsibility of the manufacturers for making their product safer.<sup>8</sup> We also recommend use of printed warning on package indicating the potential of severe injury.

## 5. Conclusion

Our study highlights varied spectrum of ocular injury caused by bungee cord, many are serious and resulted in low visual outcome to loss of eye and the main culprit is the design of hook. So, we support previous author for modification in the design of these cords, as well as an appropriate printed warnings to users as a preventive strategy for severe ocular trauma.

## 6. Conflict of Interest

The authors declare that there are no conflicts of interest in this paper.

## 7. Source of Funding

None.

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