

## Ocular traumatology in children. A retrospective study

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**SUMMARY:** Ocular traumatology in children. A retrospective study.

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**Objective.** *This study assesses the descriptive epidemiology of children with eye injuries presenting to the Emergency Department of a non exclusive Paediatric University Hospital - First Division of Ophthalmology of "Sapienza" University of Rome - over a period of 12 years.*

**Study Design.** *A retrospective long term study of 12 years.*

**Participants.** *All paediatric patients (up to 14 years of age) presenting with ocular injuries and hospitalized.*

**Methods.** *It was analyzed the incidence of the ocular trauma among males and females. The situation in which the trauma occurred, type of trauma (contusive or perforating), the presence of endo-bulbar foreign bodies, visual acuity outcome.*

**Results.** *There were 203 patients who presented to the Emergency Department in the period examined. Contusive traumas were 130 (90 males, 40 females). The perforating trauma were 73 (63 males, 10 females). The presence of an endo-bulbar foreign body was registered in 10 patients. A detailed analysis of the causes of the trauma is therefore provided. We evidence that males were almost exclusively involved in sport traumas (60 males versus 2 females), and in second instance accidental trauma is almost equally divided between two genders.*

**Conclusions.** *Our retrospective study presents the paediatric cases of a non exclusive Paediatric University Hospital where 3% of ocular traumas requiring hospitalization were in children. Therefore our data could be useful in order to bring about the necessary preventive measures to minimize paediatric eye injuries.*

**RIASSUNTO:** Traumatologia oculare nei bambini. Studio retrospettivo.

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**Obiettivo.** *Gli Autori prendono in considerazione i casi di trauma oculare verificatisi in pazienti con età inferiore a 14 anni e ricoverati nell'arco di 12 anni presso la I Divisione di Oftalmologia dell'Università degli Studi "Sapienza" di Roma.*

**Disegno dello studio.** *Studio retrospettivo della durata di 12 anni.*

**Partecipanti.** *Tutti pazienti pediatrici (fino a 14 anni di età) che presentavano traumi oculari e ricoverati.*

**Metodi.** *È stata analizzata l'incidenza dei traumi oculari tra i maschi e le femmine, la situazione in cui si è verificato il trauma, il tipo di trauma, la presenza o no di corpo estraneo e l'acuità visiva alla dimissione.*

**Risultati.** *Nel periodo esaminato si sono presentati al Dipartimento di Emergenza 203 pazienti. I casi di trauma contusivo sono stati 130 (90 maschi, 40 femmine). I casi di trauma perforativo sono stati 73 (63 maschi, 10 femmine). È stata registrata la presenza di un corpo estraneo endobulbare in 10 pazienti ed è stata fornita un'analisi dettagliata delle cause del trauma. I maschi erano quasi esclusivamente coinvolti in traumi sportivi (60 maschi versus 2 femmine), e in seconda istanza i traumi accidentali erano quasi equamente divisi tra i due generi.*

**Conclusioni.** *La maggior parte dei traumi oculari si verificava a casa e più del 3% dei bambini, che arrivava al Dipartimento di Emergenza con trauma oculare, presentava danni con minaccia di compromissione visiva che richiedevano trattamento chirurgico. La crescente consapevolezza della natura seria dei traumi oculari aiuterà a sviluppare un piano globale di formazione dei genitori e dei bambini per minimizzare i traumi oculari pediatrici prevenibili.*

**KEY WORDS:** Eye injuries - Pediatrics - Prevention - Therapy.  
Traumi oculari - Pediatria - Prevenzione - Terapia.

### Introduction

Ocular traumas have always been one of the most frequent causes of unilateral loss of eyesight, both at working and paediatric age, and after-effect psycho-physical deficiency (1-5).

The prognosis of the injuries is based on various ele-

ments, the most important of them are the site, the therapeutic timeliness, both medical and surgical, the patient's personal response and the difficulty of a clinical monitoring, very often conditioned by the young age (6-8) in comparison with adults traumas.

This retrospective study has the aim of primary prevention in traumatology in children's ophthalmology. Our specific objective was the analysis of the causes and circumstances of the ocular traumas in order to give the social-health workers the reference parameters necessary to carry out the necessary preventive measures (9-17). Moreover some considerations related to therapeutic behaviour and time monitoring are given in order to achieve a more effective prevention of complications in this field.

## Patients and materials

In our retrospective study we have analysed all the cases of hospitalization in the First Division of Ophthalmology of the "Sapienza" University of Rome in 12 years, referred to ocular traumatic pathology in patients under 14. It is important to notice that all the subjects with ocular trauma that did not need hospitalization or that have refused to be hospitalized have not been included in this study.

The following data have been taken out from each medical record: age; sex; situation in which the trauma occurred; eye involved; type of trauma (contusive or perforating); presence of foreign endobulbar bodies; visual acuity; consequences.

Other elements taken into consideration in this study have been the incidence rate of hospitalization due to trauma, the numbers of days in hospital and the male/female relationship in the various aspects of ocular traumatology.

While hospitalized all the patients have undergone an accurate exam of the fundus oculi with indirect binocular ophthalmoscope with scleral indentation.

As it has already been pointed out by our School, we have noticed frequent small haemorrhages or post-traumatic retinal lesions, that, if ignored, could lead to retinal break and detachment even sometime after the lesion occurred.

For a correct execution of this exam it has been necessary to apply a short narcosis to smaller children or non collaborative ones.

When retinal lesions have been noticed, the exam of the fundus oculi under narcosis has been done also in the periodical checks without hospitalizing the patient.

About the statistical analysis the categorical data were presented as absolute frequencies and percentage values. The confidence interval of each group was calculated. Fisher's exact test is applied to assess the difference between groups.

## Results

Out of 6900 hospitalized patients for various pathologies in the First "Division of Ophthalmology", 858 (12.43%) had been hospitalized with ocular traumas, among them 203 (23.65%) were under 14 years (Fig. 1); the age bracket more involved was the one from 8 to 12 years (54.1%) with an average age of 8.7; 42 boys and 9 girls were pre-school children (24.1%). Among the

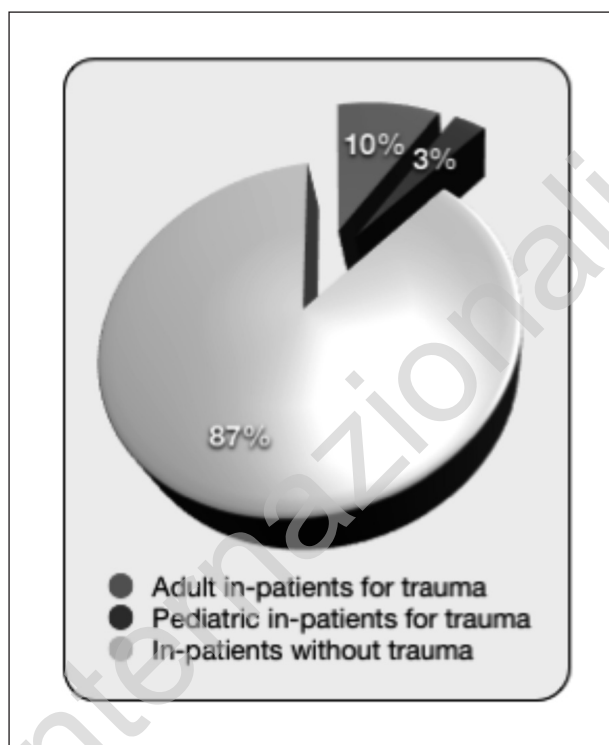


Fig. 1 - Distribution of hospitalization for trauma in 12 years.

subjects suffering from ocular trauma 50 (25%) were female and 153 (75%) were male (Fig. 2).

### - Type of trauma and localization

90 males and 40 females had contusive traumas. Among the contusive cases 107 (82.30%) were affected in the anterior segment (78 males and 29 females).

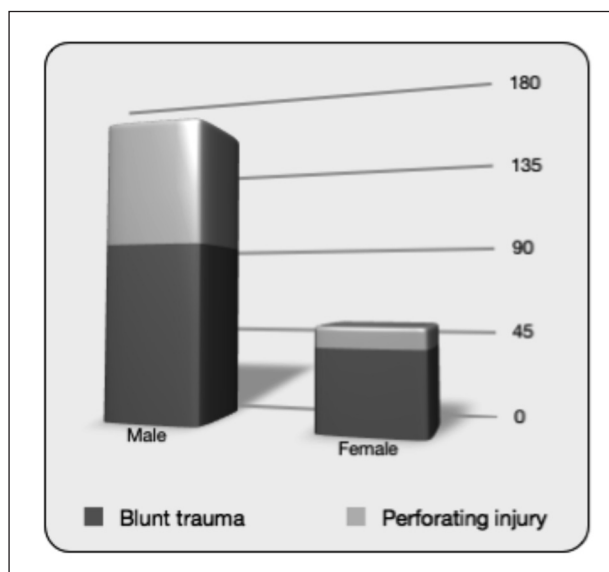


Fig. 2 - Incidence/Type of trauma in paediatric patients.

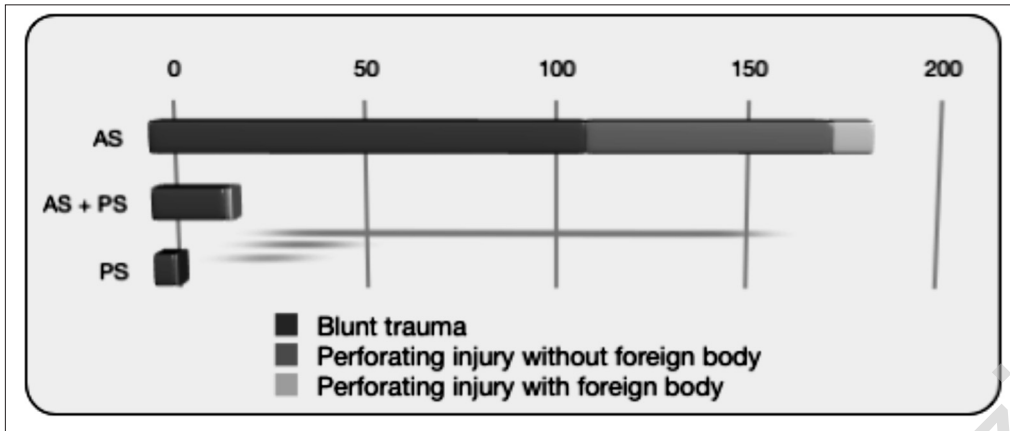


Fig. 3 - Localization in anterior segment or posterior segment or both. AS: Anterior Segment; PS: Posterior Segment.

The anterior and posterior segments were affected in 18 cases (13.84%), 10 males and 8 females, while the posterior segment was interested only in 5 cases (3.84%), 4 males and 1 female. In 63 males and 10 females the trauma was perforating.

Among the ocular perforating traumas in 70 cases only the anterior segment was affected. The presence of an endo-bulbar foreign body was registered in 10 patients while in the other 60 ones the perforating injury affected only the anterior segment without the presence of a foreign body (Fig. 3).

In 20 cases both the anterior and posterior segments were affected: one case presented a foreign body and the other one didn't have anything. There was only one case in which only the posterior segment was affected. This patient had a perforating injury but no foreign body.

- Trauma aetiology

Regarding to trauma aetiology 60 males (29.55%) and 2 females received the injury while doing sports activities; 8 males (3.9%) and 4 females (1.97%) because of car accidents; 5 males (2.46%) and 2 females (0.9%) because of aggression; 80 males (39.40%) and 42 females

(20.68%) accidentally (Fig. 4, Table 1).

In this last group 45 males (22.16%) and 17 females (8.37%) received the injury while playing with other children of their same age; 15 males (7.38%) and 10 females (4.92%) while playing by themselves.

The contusive traumas in relation to their causes were distributed as follows: 61 cases (30%) during sports activities; 3 cases because of car accidents, 4 cases (2%) because of aggression, 62 cases (30.5%) accidental (Table 2).

The perforating traumas were distributed as follows: 1 case (0.5%) during sports activities, 9 cases (4.5%) because of car accidents, 4 cases (1.5%) because of aggressions, 60 cases (30%) accidental (Table 3).

In relation to the place where the trauma happened, 50 males (24.63%) and 20 females (9.87%) were injured at home, while 103 males (50.73%) and 30 females (14.77%) outside home.

The eye injured was the right one in 62% of cases, while the left eye was injured in 38% of cases.

Among the patients with contusive bulbar trauma 53 (40.76%) presented traumatic hyphema; in all these ca-

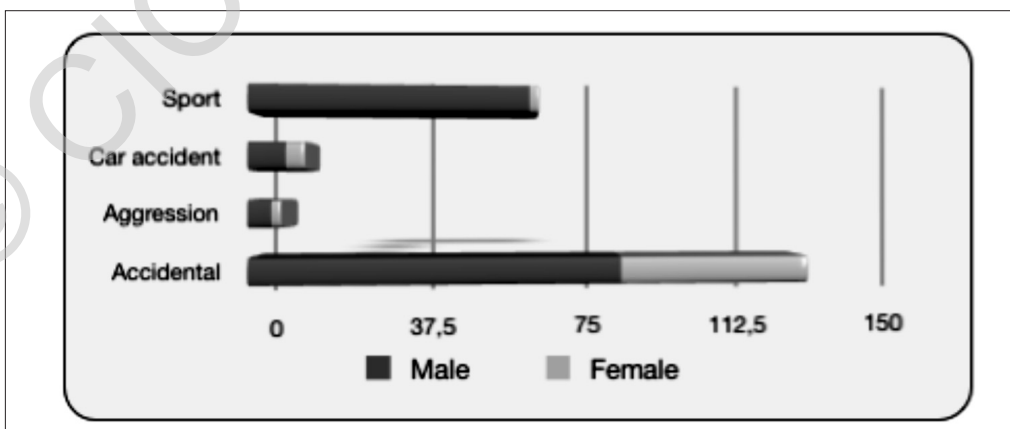


Fig. 4 - Causes of trauma.

TABLE 1 - DISTRIBUTION BY TYPE AND CAUSE OF TRAUMA IN THE 12 YEARS OF PATIENTS' HOSPITALIZATION.

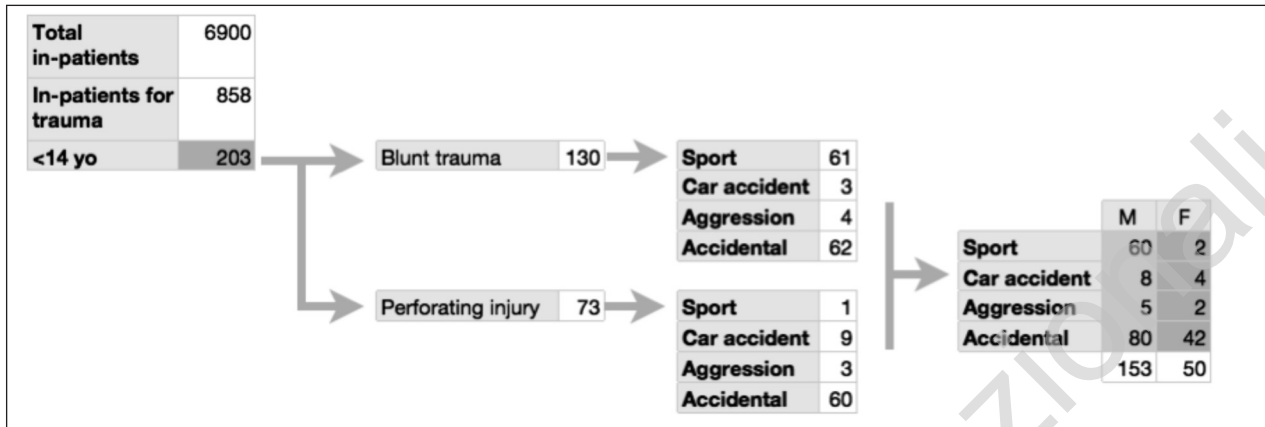


TABLE 2 - INCIDENCE OF TRAUMA CAUSES. P<0.001.

Aetiology	Male	95% confidence interval			Female	95% confidence interval			tot	95% confidence interval		
Sport	60	39,2%	31,5%	47,0%	2	4,0%	0,5%	13,7%	62	30,5%	0,5%	13,7%
Car accident	8	5,2%	1,7%	8,8%	4	8,0%	2,2%	19,2%	12	5,9%	2,2%	19,2%
Aggression	5	3,3%	0,5%	6,1%	2	4,0%	0,5%	13,7%	7	3,4%	0,5%	13,7%
Accidental	80	52,3%	44,4%	60,2%	42	84,0%	70,9%	92,8%	122	60,1%	70,9%	92,8%
<b>Total</b>	<b>153</b>				<b>50</b>				<b>203</b>			

TABLE 3 - INCIDENCE OF TRAUMA CAUSES ACCORDING TO TRAUMA TYPE.

Aetiology	Blunt trauma	95% confidence interval		Perforating injury	95% confidence interval	
Sport	61	46,92%	55,5%	38,3%	1	1,37%
Car accident	3	2,31%	4,9%	0,00%	9	12,33%
Aggression	4	3,08%	6,0%	0,11%	3	4,11%
Accidental	62	47,69%	56,3%	39,1%	60	82,19%
<b>Total</b>	<b>130</b>			<b>73</b>		
<b>P&lt; 0.0001</b>						

ses and also in others where a relevant haemorrhagic or oedematous stage a therapy with osmotic agents, was given, orally or intravenously, beside the usual therapy.

This therapy with osmotic agents has been used mainly in order to prevent the hypertensive crisis of the intraocular pressure (IOP) which usually happens in the first 24-48 hours and may happen in about 25-30% of the cases.

Starting from these considerations and by observing in the cases treated a wider blood resorption in both the anterior and vitreous chambers we started to use manitole in almost all bulbar contusions. While using this treatment we also noticed a positive effect on the retinal post-traumatic oedemas.

For all these patients we also used corticosteroids to

make good use of their anti-exudative and anti-organizational effect, if there were not contraindications.

We have also added antihemorrhagics and antibiotics with intramuscular injections.

In none of the cases we treated there was a secondary hypoema, a complication reported by other authors with a 4-6% frequency.

We have not noticed any relevant permanent change in the IOP.

All the subjects to whom it has not been possible to measure the intraocular pressure with the Goldman applanation tonometer have undergone electronic tonometry while awake, or were anaesthetically sedated during the check of the ocular tone, if they were not collaborative.

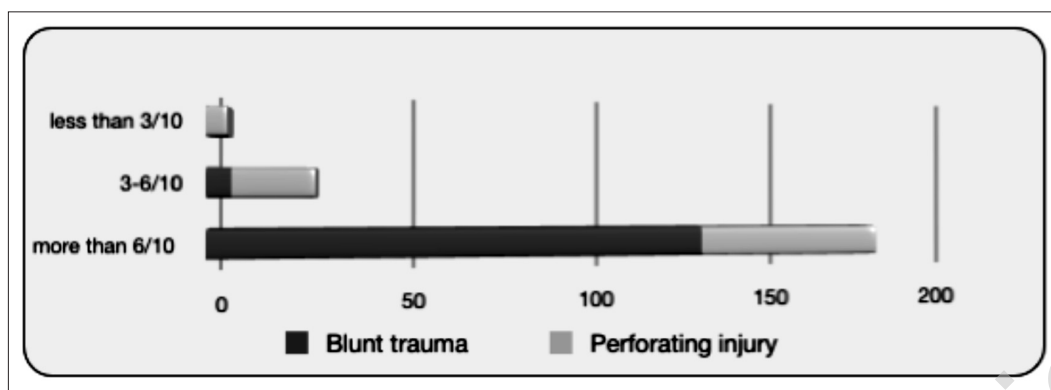


Fig. 5 - Functional recovery of traumatized eye.

The analysis of the visual recovery when the patients left the hospital was done by specifying the type of trauma. After a contusive trauma 6 patients presented a visual acuity between 3 and 6/10, 124 patients had better sight. After a perforating trauma the visual acuity was inferior to 3/10 in 5 patients (of these 3 had foreign body = FB), between 3 and 6/10 in 20 patients (5 with FB) and superior in 48 patients (2 with FB). One patient lost the ocular bulb because of the trauma (Fig. 5).

## Conclusions

Our retrospective study presents the case histories of a non exclusive Paediatric University Hospital where 3% of ocular traumas requiring hospitalization are children. Therefore our data could be useful in order to bring about the necessary preventive measures to minimize preventable paediatric eye injuries.

Paediatric eye injuries are common in the emergency room (2).

Although very few eye injuries cause a total vision loss, eye injuries are the most common reason of non congenital unilateral blindness in children (1).

It is of great importance that the general public becomes aware that simple prevention of eye injuries is possible.

It is three times more likely that boys with an eye injury need to go to the emergency room, in comparison with girls. This result is consistent with other paediatric eye injury studies, which conclude that, often, gender-specific risky behaviour is the reason for this trend (10).

It is really important to consider introducing preventive legislative regulations, well defined and directed to health education and infancy safety. Obviously for a correct application of this type of rules the competent committees need to have an analysis of the causes and of the circumstances that have provoked these injuries.

Our survey has highlighted a prevailing male component in comparison with the female one, certainly due to the different behaviour in the games preferred by the two sexes.

As the majority of injuries is caused by improper use of toys, it is important to underline the role that parents and pedagogists exert in a type of education aiming at safeguarding the psychophysical integrity of children.

To all this we must add the respect of safety rules in the making of toys, with special regard to the materials used in the specialized factories.

The results deriving from our study on the school age patients call our attention on sports traumatism. Also in this sector there is a prevailing male incidence.

With reference to traumas caused by car accidents it is important to notice that it has notably decreased in the last decade, thanks to the compulsory use of safety belts and of special baby's chairs.

With reference to therapeutic behaviour we think it is important to underline that, as in children's ocular traumatology, together with a surgical and classic pharmacological therapy, in our experience a therapy with osmotic diuretics is important and valid, both for checking the frequent ocular hypertension, and specific therapy of haemorrhages and oedematous ocular states.

Another consideration in treating children's ocular traumas is connected to the legal problems related to a correct objective examination, especially of the fundus oculi and of the retinal periphery while the patients are hospitalized and during the successive checks, which often imply a check under sedation. This type of therapeutic approach has obtained better results in the almost totality of the cases treated.

### Conflict of interest declaration

All the Authors do not have conflicts of interest (specific financial interests and relationships and affiliations) relevant to the subject of their manuscript.



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