ORIGINAL ARTICLE

Corneal Foreign Bodies in Children

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SUMMARY

Corneal Foreign Bodies in Children

The purpose of the study was to answered three questions. Which part of all patients with diagnosis of corneal foreign body (CFB) diagnosed in period from 2006 to 2010 were children? Is there any dependence on sex like in adults? Is there any typical mechanism of injury in children?

Methods: Retrospective study analyzed data of 2381 patients with diagnosis of CFB, 2225 men and 156 women. There were in the group 0–17 years 154 patients, 82 boys and 72 girls, in group 18–64 years 2103 men and 80 women and in group patients older than the age of 65 years 40 men and 4 women. Mechanism of injury was analyzed in the group of children.

Results: CFB is a common condition in working-age adult men due to occupational exposure, eg grinding, drilling or cutting. CFB is very rare in adult women. Similar dominance of men was in the group of patients older then the age of 65 years. The results demonstrate, that both sex in group of children occurred equally. The majority of the mechanism of injury in children wasn't recognized (115 children). The biggest recognised group was use of swing in case-history of 17 children with corneal metallic foreign body, 15 of them were children younger than the age of 7 years. Seven children suffered injury by part of plants such as thorns or bark from branch of tree. Three boys had in case-history common mechanism of grinding. Remaining mechanisms of injury were less frequent.

Conclusion: From 2006 to 2010, 154 (6.5 %) pediatric eye injuries of CFB were treated in Department of Ophthalmology for Children and Adults. Both sex in group of children occurred equally. Although majority of mechanism of injury remained unrecognised, use of swing is among children younger then the age of 7 years important unknown mechanism of injury. Is possible to prevent it, eg rust prevention of metallic suspensions of swing, protective eyeweare, cap.

Key words: solitary vitelliform macular dystrophy, variability of phenotypic expression, diagnostic

Čes. a slov. Oftal., 68, 2012, No. 4, p. 142–145

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INTRODUCTION

Corneal Foreign Bodies (CFB) are amongst the most frequent eye injuries. We usually encounter them in adult men engaged in manual work, who within the framework of their professional activity or hobby in leisure time are involved in grinding, drilling, chopping, cutting or automobile repair (lying on their back beneath the undercarriage of the vehicle), either entirely without protective aids or using aids which do not provide sufficient protection. These mechanisms of incipient CFB are most often metallic, usually iron, and sometimes partially corroded upon impact on the surface of the eye. The occurrence of metallic CFB outside of employment is rare, the risk is increased by leaning out of a window of a fast-moving means of transport such as a train or car, by corroded scaffolding on a building in a street or particles of smoke from a steam locomotive.

If metallic CFB remains on the surface of the eye it forms a "pigment lining" within a few hours, in which after the destruction of the layer of the epithelium rust begins to penetrate into the surface lamellas of the cornea beneath the CFB and in its immediately surrounding area. After a few days the area surrounding the CFB is usually secondarily infected, an infiltrate of the cornea forms in the area surrounding the pigment lining of the foreign body, and there is induced iritis with characteristic pain and light-sensitivity of the injured eye. In many cases it is not until this pain is felt that the injured person attends a medical examination. A number of injured persons are led to wait for a certain period before seeking medical attention also by their personal experience that metallic foreign bodies are sometimes expelled from the eye naturally and the small defect of the corneal epithelium heals spontaneously.

Treatment is performed by the standard method in outpatient care under local instillation anaesthesia (oxybuprocaine), the foreign body is removed from the surface of the eye with a sterile cotton wool bud with the use of a slit lamp, if no pigment lining is present so far or by an ocular lancet or cutter including

the pigment lining. There follows local antibiotic treatment, in which the antibiotics used are without addition of a steroid in the form of eye drops or oitment. In the case of uveal irritation only mydriatics are used initially in adjuvant treatment, whilst local steroids are sometimes used after healing of the surface of the cornea.

Multiple metallic CFBs are rare. In the past the first author (JŠ) has encountered only two patients who had more than two metallic CFBs on both corneas simultaneously. One of these was a seven year old girl in 1998, who had 4 individual metallic CFBs on one cornea and 5 on the other. She did not have amamnestic contact with the usual sources of metallic CFBs for adults, and was able to state the mechanism of injury unequivocally and precisely: she injured herself on a swing. This patient inspired both the following observations and also the origin of this work.

METHOD

On the basis of the previous presented case-history observation, the first author placed the active inquiry into the use of the swing a number of days before the discovery of the child's complaints amongst the inquiries of parents of younger children with metallic CFBs. Because it was shown that the case-history observation was not isolated, in 2006 the author familiarised her colleagues with these observation within the framework of a clinical seminar.

Records of patients treated with diagnosis code CFB (T150) were retrospectively sought out in the years 2006 – 2010. The records of all child patients were further analysed from the perspective of the character of the CFB, anamnesis and the method of treatment. The occurrence of CFBs in children was compared with the occurrence of CFBs in adults.

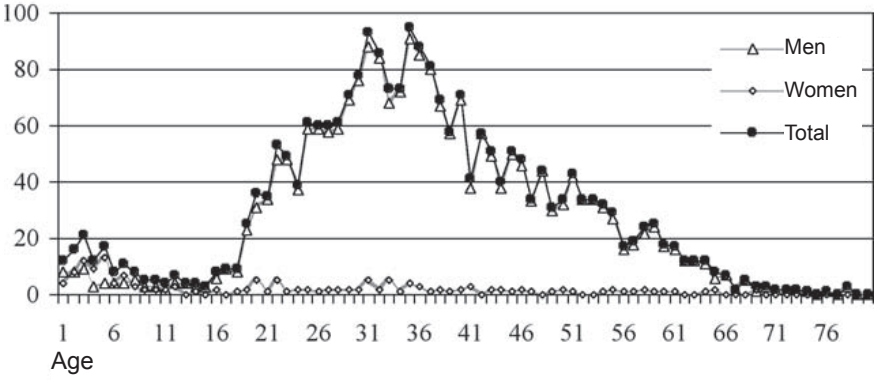
RESULTS

In the years 2006 – 2010 a total of 2381 patients were treated with diagnosis of CFB at the Department of Ophthalmology for Children and Adults at the 2nd Medical Faculty of Charles University and University Hospital Motol. The group of patients was divided according to age and sex. Of the total number of patients there were 2225 men and 156 women. In the group aged 0-17 years there was a total of 154 patients, 82 boys and 72 girls. In the group aged 18-64 years there were 2013 men and 80 women. In the group aged over 65 years there were 40 men and 4 women. The most numerous group was adults aged 18-64 years (91.7%), of whom men represented 88.3%, with maximum occurrence between the ages of 25 and 40 years. The number of children considerably exceeds the occurrence of senior citizens in our sample (1.8%).

The occurrence of CFBs in women ranked amongst random findings. The occurrence of CFBs in senior citizens to a considerable degree maintained the character of occurrence in the productive population, thus with a predominance of men (graph 1).

The occurrence of CFBs in children differed from the adults in our patients both in the area of occurrence according to sex and also to a certain extent according to the method of treatment. In the group of girls and boys the occurrence of CFBs was similar, and up to the age of 7 girls in fact outnumbered boys (graph 2). The mechanism of injury remained without clarification in 115 child patients. Seventeen patients, of whom 15 were aged under 7 years, had playing on a swing in the anamnesis. A further sizeable group was injury of the eye by vegetable material (4 patients with pieces of tree bark in the cornea, 3 patients with thorn in the cornea). The traditional

Occurrence of CFB according to age and sex

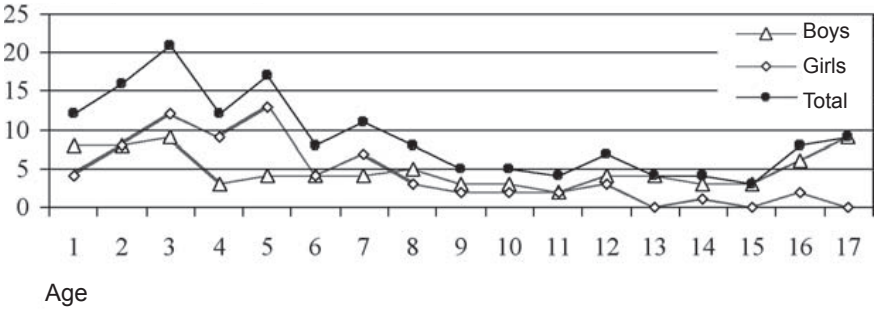


Graph 1

Age	Men	Women	Total
0-17 years	82	72	154
18-64 years	2103	80	2183
65 years and over	40	4	44
Total	2225	156	2381

Table 1 Corneal foreign bodies according to mechanism of injury

Occurrence of corneal foreign bodies in children



Graph 2

	Boys	Girls	Total
Not clarified	60	55	115
Playing on swing	8	9	17
Bark/branch in forest	2	2	4
Thorn	0	3	3
Grinding / standing by grinding	2	1	3
Superglue	2	0	2
Chip from lawnmower	1	1	2
Other mechanisms (1x)	7	1	8
Total	82	72	154

Table 1 Corneal foreign bodies according to mechanism of injury

activity of grinding was found in 3 boys. Other mechanisms of injury were less numerous, as presented in table 1.

Treatment, with the exception of extraction of CFBs, did not differ between children and adults. In the group of children predominantly up to 3 years outpatient extraction of the CFB under instillation anaesthesia was considered an excessive risk in 9 children, and as a result was performed with hospitalisation and under general anaesthesia under a surgical microscope.

Other mechanisms: sawing of paving stones, work in forgery, popped ball, spark from camp fire, pulling rivet out of wall, braking of sledge with feet – chip flew up, exploded petard, visit to mining museum.

DISCUSSION

Children formed 6.5% of our patients. We believe that the number of children in relation to adults in our group was slightly increased by the fact that our workplace focuses on the treatment of children, and children with eye complaints are referred to us from other workplaces.

The total frequency of occurrence of CFBs was virtually equal between the sexes, 53% boys to 47% girls. Up to the age of 7 years however there was a predominance of girls. Between the ages of 8 and 12 the frequency was equal between the sexes and from the age of 15 upwards there was a higher occurrence in boys. In the majority of injured children (74.6%) it was not possible to detect the mechanism of injury. The most frequently determined mechanism of injury was use of a swing – 11%.

Playing on a swing as a mechanism repeatedly generating metallic CFBs in children was first described in 2009 by Kehat and Bonsall (1) on the basis of two observations of repeatedly occurring metallic CFBs in two autistic boys aged 8 and 10 years, for whom playing on a swing was part of their treatment.

Swings are popular fixtures on children's playgrounds. They usually comprise a seating surface fixed on two suspension chains or poles.

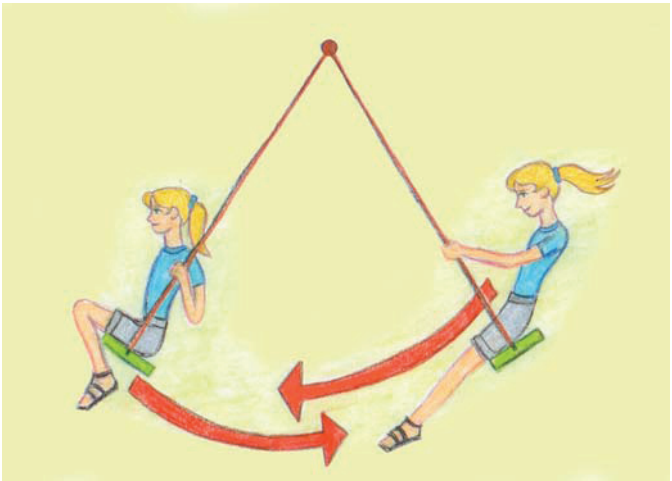


Fig. 1

The behaviour of the child on the swing differs to a certain degree according to whether the child has learnt to swing independently or is being pushed by an adult. In order to use a swing and keep it in motion it is necessary to use the centre of gravity of the body, which in practice means that upon 50% of passages of the body beneath the suspending apparatus the face is inclined downwards (backward movement) and in the remaining 50% (forward movement) the child usually logically looks forward, and it is thus possible to prevent a collision with another child who could approach too near the swing (fig. 1). Usually only those children who are unable to swing themselves independently (fig. 2) look in all directions (and therefore also upwards in the direction of the suspension apparatus).

Fig. 2

In our sample the occurrence of playing on a swing was equal amongst the sexes (8x boys, 9x girls, table 1). If there is a difference in the popularity of fixtures on children's playgrounds according to the sexes, therefore for example if up to the age of 7 girls use swings more frequently than boys (2), they could be more endangered by this mechanism. However, this finding was not the aim of our work.

CONCLUSION

We believe that use of a swing is a relatively unknown mechanism generating metallic CFBs. If we actively ask parents about this, it may be detected far more frequently than it is at present. Prevention

is possible both by means of selecting protective aids for children (public children's playground) and through notification of the need for regular maintenance (children's playgrounds in schools), or through considered choice of suspension apparatus for the swing in the case of home installation.

THANKS

The authors thank Professor Blanka Brůnová for the information provided in 2006 that she had not encountered the mechanism of generation of metallic CFBs in children by means of playing on a swing in the past. Supported by the project (Ministry of Health) of conceptual development of the research organisation 00064203 (University Hospital MOTOL) and CZ .2.16/3.1.00/24022

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