Orbital laceration caused by a blast of water: report of 2 cases

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SUMMARY Two cases of orbital injuries caused by the jet of water from an irrigation sprinkler are described; they were of a type not previously reported. The jet of water, possessing high kinetic energy, stretched the orbital tissues and resulted in a rupture which followed the anatomical seams. Thus there was no bleeding, but oedema was present. The eyeball was also injured.

A blast of water has previously been reported to cause loss of the globe and luxation of the globe into the maxillary sinus. We report 2 cases of typical orbital laceration caused by a jet of water from a powerful agricultural sprinkler irrigator. This type of injury has not been previously described.

Case reports

CASE 1 A 52-year-old farmer was admitted to the Department of Ophthalmology, Turku University Central Hospital, on 31 May 1978 for injuries arising when a stream of water from a powerful irrigator had hit his left eye. The upper and lower lids of the eye were oedematous. The palpebral portion of the orbital muscle was torn off from the anterior limb of the medial canthal tendon. The margin of the upper lid was lacerated medially, and the upper canaliculus was ruptured. The upper eyelid was ruptured in its full thickness along the entire medial border of the superior tarsus, to its upper end. The margin of the lower eyelid was intact. The skin of the lower lid was lacerated about 4 mm from the margin; the shape and length of the laceration followed the curvature of the lower lid. The bulbar conjunctiva had a 360° rupture about 3 mm from the limbus. This laceration was deepest in the upper nasal quarter. None of the orbital lacerations were bleeding, and haematomas were minimal. In the inner bulb the only finding was a certain amount of blood in the vitreous. The lacerations were sutured, but no repair of the upper canaliculus was attempted. The eye was treated topically with atropine, chloramphenicol, and dexamethasone. The blood in the vitreous disappeared within 10 days. After 6 months the size of the left palpebral fissure was identical to that of the right, and no functional differences were found.

CASE 2 A 24-year-old agricultural student was admitted to the Department of Ophthalmology, Turku University Central Hospital, on 14 July 1982, for injuries incurred when his left eye was hit by a powerful jet of water from an irrigator. The upper and lower lid of the eye were oedematous. The upper lid had no support from the medial canthal tendon. In addition to the medial rupture the upper lid was split in two by a rupture following the medial border of the tarsus and extending to its upper end (Fig. 1). Thus the upper canaliculus was also ruptured. The bulbar conjunctiva of the left eye were ruptured circularly about 3 mm from the limbus. The conjunctival laceration

Fig. 1 Case 2. The rupture of the medial canthal tendon and the upper lid along the medial border of the superior tarsus.
was deepest in the upper nasal quarter, where a 2 cm rupture in the orbital septum with orbital fat prolapse was found. The lacerations were not bleeding and haematomas in the lids were minimal. The red reflex showed blood in the vitreous.

The prolapsed orbital fat was replaced and the lacerations were sutured. No repair of the upper canaliculus was attempted. On 15 July the central visual acuity of the eye was 0.5. Slit-lamp examination showed a recession of the anterior chamber and 2 penetrating ruptures in the iris. The eye was treated with topical atropine, chloramphenicol, and dexamethasone.

The patient left hospital on 27 July 1982 with slightly raised intraocular pressure but with no vitreous blood. Two months after the accident antiglaucoma treatment with timolol was begun. After 6 months the size of the left palpebral fissure was identical to that of the right, and no functional differences were found. The timolol medication was continued.

Discussion

The orbital lacerations reported were caused by a mass of water ejected by an agricultural irrigation sprinkler, which struck the orbital region. Such irrigators emit short and thin but sharp jets of water, at an initial velocity of about 120 km/h (information obtained from the manufacturer). This stream of water pushed the orbital tissues backwards with great force. Under these circumstances the normal elasticity of the tissues was not sufficient, and ruptures occurred along the anatomical seams. There was no bleeding. The orbicular muscle was torn off from the medial canthal tendon. The rupture of the full thickness of the upper eyelid separated the preseptal and pretarsal portions of the orbicular muscle. The bulbar conjunctiva ruptured at the anterior end after limbal fixation. The orbital septum ruptured at its junction to the levator aponeurosis. The concussion to the eyeball was followed by typical consequences. The blood in the vitreous originated from the ciliary body. In the case of our second patient the ciliary body was lacerated and a secondary glaucoma developed. The lack of haematomas in the lids suggests that the blood vessels were compressed by the blow, while the tissue oedema of the lids originated from the powerful concussion caused by the water.

Eye injuries in agricultural workers are common. In Finland such injuries have often been due to chemical agents. Irrigator sprinklers are coming into increasingly common use everywhere in the world. The stream of water ejected by such devices can cause serious injuries to the eyes and soft tissues, and it is of great importance that users be warned of the dangers involved.

References