

Injury to the cornea due to fish bile

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CHRISTOFFERSEN T, GRØNVOLD OLSEN E. Injury to the cornea due to fish bile. *Scand J Work Environ Health* 1993;19:358-9. A retrospective study of 207 patients with chemical eye injuries in northern Norway revealed that fish bile was the causal agent in 14%. Fish bile caused superficial corneal erosions in 28 of 29 cases. All but one of the patients were professional fishermen or fish industry workers. In one case delayed medical care led to serious corneal opacity. Provided that there was immediate and abundant rinsing of the affected eye and good medical care, the prognosis of fish bile injuries was fairly good. The mechanisms for corneal damage due to fish bile are not clear.

Key terms: occupational eye injuries.

In a coastal region of Norway physicians are regularly consulted by fishermen and workers in the fish industry because of fish bile spurt into their eyes. Few reports exist on eye injuries caused by bile (1, 2). To our knowledge, serious damage to the cornea caused by fish bile has not yet been reported. This study was done to estimate the size of the problem and to evaluate the severity of these injuries.

Subjects and methods

The files of all 207 patients (259 eyes) treated for chemical eye trauma during 1980-1989 at the Department of Ophthalmology, University Hospital of Tromsø, were examined retrospectively. The following information was recorded: gender, age, profession, type of chemical agent causing the trauma, immediate action taken by the patient to minimize the injury, the state of the eye on arrival at the hospital, hospital treatment, and duration of hospitalization. The final outcome concerning corneal opacity and visual acuity was assessed.

Results

In 29 patients (28 males and 36 eyes) the traumas were caused by fish bile. Of these patients 28 were exposed to fish bile during occupational work, one was a leisure-time fisherman. Fish bile caused 56% of all occupational eye traumas due to chemicals among fishermen and workers in the fish industry. Twenty-three patients rinsed their eyes with water immediately after the accident. All of the patients attended medical care because of discomfort or pain

in the injured eye. All of them showed some degree of chemosis and blepharospasm. In 28 patients (32 eyes) the affected cornea showed fluorescein staining. On arrival at the hospital all of the eyes were treated by continuous irrigation by at least 4 l of sterile 0.9% saline solution through an irrigation lens system, followed by chloramphenicol ointment and an occluding eye pad. The median duration of hospitalization was 3 (range 0-60) d.

A summary of the findings is shown in table 1. One patient suffered severe corneal opacity. The remaining 28 patients (35 eyes) avoided sequela.

The patient who suffered severe corneal opacity was a male fisherman who was 44 years of age at the time of the accident. He had had no previous eye disorder. Fish bile spurted into his right eye as he rinsed a codfish. He attempted to rinse the eye with water. Due to increasing pain he consulted a physician 11 h after the accident. The eye was treated with chloramphenicol ointment. The symptoms persisted, and he was admitted to the Department of Ophthalmology 3 d later. The right eye was markedly congested. Large parts of the corneal surface showed fluorescein staining. There was slight edema of the cornea. The visual acuity of the affected eye was 0.7. The eye was irrigated with 6 l of 0.9% saline solution and treated with chloramphenicol ointment and topical atropine. A bandage lens was applied 4 d after his admittance. The cornea was completely covered by epithelium after 14 d in the hospital. There was stromal edema and opacity causing a decrease in visual acuity so that he could count fingers no farther away than 2 m. Chloramphenicol and atropine was continued and supplemented with topical prednisolone. The stromal edema and opacity persisted. Five weeks after the injury his visual acuity had deteriorated to the point that he could count fingers no farther away than 30 cm. The patient subsequently underwent two penetrating keratoplasties. Twenty-three months postoperatively his visual acuity in the affected eye was 0.95.

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Table 1. Patients treated for chemical eye trauma during 1980—1989 in the Department of Ophthalmology, University Hospital Tromsø, Norway, by chemical agent.

Chemical agent	Patients (N)	Mean age (years)	Immediate washing		Patients with sequela (N)	Time in hospital for patients without sequela (d)	
			Number	Percent		Mean	Median
Fish bile	29	38	23	79	1	2.9	3
Others	178	33	144	81	1	2.1	1

Discussion

All serious corneal injuries in the two northern counties in Norway are referred to the University Hospital of Tromsø. During the period 1980—1989 all referred patients with chemical traumas to the eye were hospitalized. The primary treatment of such patients was kept unchanged in the period studied. A significantly different occurrence of sequela between fish bile injuries and other chemical injuries would therefore reflect different severity. No such difference was found. Another indicator of severity is duration of hospitalization. The fish bile patients stayed longer in the hospital than the rest of the patients, even if the patient with sequela is excluded (table 1). However, this difference was not statistically significant.

To our knowledge one case of corneal opacity in a human eye exposed to fish bile has earlier been reported (1). However, this corneal opacity was probably caused by the weak solution of lead acetate used for rinsing.

In the case presented in our Results section, proper irrigation of the eye was delayed. In addition to epithelial erosion stromal edema was observed. The epithelial wound grew slowly. No signs of corneal infection were found. The eye was treated only with topical medication commonly used in eyes with similar traumas. No other reason than the fish bile has been found for the corneal opacity. Fish bile produces erosions in the corneal epithelium. The prognosis is fairly good. Except for one patient, the cornea healed without any permanent change. However, this was the case also for all but one of the patients with corneal trauma caused by other chemical agents in the same period. The fact that approximately 80% of the patients rinsed their eyes immediately after the injury may have contributed to the good prognosis.

The fish bile tested had a neutral pH. Bile contains bile salts which are highly effective detergents (3, 4). Thus bile salts may attack the hydrophobic surface

layer of the cornea. The bile salt sodium taurodeoxycholate enhances the permeability of hydrophilic compounds through rabbit corneas *in vitro* (5). Bile produces temporary damage to the corneal epithelium (1, 6). It facilitates mechanical removal of corneal epithelium and causes a temporary superficial acellular band in the corneal stroma (7).

In conclusion, fish bile traumas accounted for 14% of all chemical corneal traumas and one of the two serious complications in our material. It seems to be an important cause of occupational eye traumas of persons rinsing fish. It causes superficial corneal erosion. Provided that the affected eye receives immediate and abundant washing and good medical care, the prognosis is mostly good. However, the present study shows that fish bile injuries can cause serious sequela.

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