ORIGINAL ARTICLE

Ophthalmological findings in elite amateur Turkish boxers

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Objective: To evaluate the nature and incidence of pathological ocular conditions in boxing.

Methods: A group of 20 active, elite, amateur, asymptomatic Turkish boxers were examined and compared with a control group composed of 20 age matched sportsmen who were not boxers. The boxers had been actively boxing for 5–20 years (mean 9.65), were aged 16–34 (mean 22.25), and weighed 51–91 kg (mean 73.07). They had been involved in 67–500 fights (mean 143.8), with 5–40 losses (mean 17.75). All were championship title holders at the national, European, Olympic, or World level.

Results: An atrophic retinal hole was found in one boxer, which was treated with laser prophylaxis. In this series, the incidence of traumatic eye injuries was much lower than in the literature. Possible reasons are their young age, their division being mainly lightweight or middleweight, few fight losses, being elite boxers, their fighting distance being near or distant, protective methods, and racial factors.

Conclusion: Boxing does not appear to be as hazardous to the eyes as previously reported, but prospective, longitudinal studies need to be carried out, including boxers of all divisions, ages, boxing experience, and level, and using various methods of fighting and protection. It should be made mandatory for all boxers to have a complete ophthalmological examination at the beginning of their careers and periodically thereafter.

Boxing is a sport with a long tradition, with roots going back thousands of years to the Olympics of the ancient Greeks. It is the only amateur or professional sport in which winning is linked to intentionally inflicting physical damage to the opponent. In recent years, we have become aware of its long term damage to health, especially chronic neurological, cerebral, and ophthalmological damage, documented by electroencephalographic recordings, computed tomograms, and neurological examination.^{1–2}

Ocular injuries from boxing have been noted in the sports medicine and ophthalmic literature, but they are scarce with varying conclusions. Duggart³, in 1955, suggested that, ruptures of Descemet's membrane, hyphaema, glaucoma, iridodialysis, cataracts, retinal detachments, vitreous haemorrhage, maculopathies, and choroidal ruptures were potential ocular complications of boxing, but reported no data. Other reports followed this. The results varied widely between studies because neither the boxers chosen nor the examination methods were standardised. Although many studies have been reported, a well designed, prospective, cross sectional, or longitudinal study is needed describing the nature and severity of ocular damage from boxing and its visual consequences.^{4–6}

In this study, we aimed to investigate ophthalmological findings in active, asymptomatic, elite, amateur boxers who hold national or international titles.

MATERIALS AND METHODS

A group of 20 active, elite, amateur, asymptomatic Turkish boxers were examined and compared with a control group composed of 20 age matched sportsmen who were not boxers. A thorough ophthalmological examination was performed including visual acuity, anterior segment examination, intraocular pressure, and retinal examination with a dilated pupil. At the time of examination, all boxers were active, having fought at least once in the preceding two weeks and trained by sparring five days a week. The number and length

of rounds in a fight and the type of protective headgear and gloves were determined.

An extensive boxing and self medical history was obtained for each subject including age, weight division, years of boxing, mean number of fights, dominant arm, approximate number of sparring rounds and losses, and head and eye injuries in and out of the ring. They were also asked about previous ocular disease, eye diseases in the family, general health, and medication including anabolic steroids.

All boxers were visually asymptomatic when examined. They had been actively boxing for 5–20 years (mean 9.65 years), were aged 16–34 (mean 22.25), and weighed 51–91 kg (mean 73.07). They had been involved in 67–500 fights (mean 143.8), with 5–40 losses (mean 17.75). Their weight divisions were as follows: 51, 54, or 57 kg (five boxers); 60 kg (two); 63.5 or 71 kg (three); 75 kg (two); 81 kg (three); 91 or 91+ kg (five). All boxers were championship title holders at the national, European, Olympic, or World level.

Four boxers led with their right hands. Five boxers were near, 10 were distant, and five were middle distance fighters. Fights were composed of four rounds lasting two minutes each. The approximate number of trauma involving the eyes was about 45.4 to each eye. They all used headgear in their bouts and sparring rounds to protect their head and eyes. Two boxers complained of serious eye trauma in a fight. Others were not aware of any ocular or periocular trauma.

RESULTS

Of the 20 boxers examined, only one had any visual complaints; he had refractive disorders and his vision was 20/20 with myopic astigmatism correction. There was a pigmented scar in the traumatised eye of one boxer. All the boxers in this series had 20/20 vision, no angle recession, no glaucoma, and no retinal detachment. There was an atrophic retinal hole in one eye of one boxer, which was treated with argon laser (figs 1 and 2). Three boxers who did not report any eye trauma had non-specific pigmentation in one of their eyes.

Table 1 Age, weight division, boxing experience, number of bouts, number of losses, fighting distance, approximate number of trauma around an eye in one bout, level (former)

Number	Age (years)	Division (kg)	Boxing experience (years)	No of bouts	No of losses	Fighting distance	No of eye trauma in a bout (approx)	Level
1	23	57	11	114	22	Near	17	Gold medal (Turkey)
2	20	51	8	98	5	Near	13	Gold medal (Turkey)
3	19	60	9	91	6	Distant	20	Gold medal (Turkey)
4	16	57	5	67	7	Distant	10	Gold medal (Turkey)
5	18	60	9	114	15	Near	15	Gold medal (Turkey), World Championship, bronze medal
6	23	71	11	138	27	Middle	22	Junior World Championship, silver medal
7	21	54	11	133	10	Middle	22	Gold medal (Europe)
8	20	63.5	7	88	8	Distant	15	Gold medal (Turkey)
9	18	71	7	120	30	Distant	12	European and World championship, bronze medal
10	18	75	7	76	9	Distant	16	Gold medal (Turkey)
11	31	81	20	500	40	Distant	8	Gold medal (World championship), Olympic games silver medal
12	32	91	15	185	25	Near	15	Gold medal (Turkey)
13	19	81	5	68	8	Distant	12	Ankara region gold medal
14	17	57	5	63	6	Distant	10	Ankara region gold medal
15	18	81	6	73	18	Middle	25	Ankara region gold medal
16	20	75	7	75	16	Distant	13	Gold medal (Turkey)
17	18	57	6	63	21	Distant	12	Ankara region gold medal
18	32	71	18	450	25	Middle	23	Ankara region gold medal, Turkish championship bronze medal
19	28	91	10	110	23	Near	12	Gold medal (Turkey)
20	34	57	15	250	34	Middle	20	Gold medal (Turkey)
Mean	22.25	73.07	9.65	143.8	17.75		15.6

Figure 1 Atrophic retinal hole. **Figure 2** Retinal hole after laser treatment.

In the control group of 20 cases, two had simple myopia less than 1 dioptres, and in two cases peripheral snail tract degeneration was found.

DISCUSSION

In a boxing bout, the predisposition of the eye to trauma is determined by the distance of the fight, the power and placement of the fist, and protective equipment. The effect of trauma on the eye is related to the force, placement, velocity, number, and protective measures. Three mechanisms have been described to explain ocular changes associated with blunt trauma: coup injury, contrecoup injury, and equatorial expansion.⁷ Coup injury is the result of a direct blow producing local injury, and lesions of the lids and cornea, scleral, ciliary body, and peripheral retinal injuries are the result. Contrecoup injuries are found away from the area of impact but along a direct line of force traversing the globe. Subcapsular cataracts and traumatic maculopathy are results of this kind of trauma. The third mechanism is equatorial expansion which reduces the anterior-posterior equator of the globe, resulting

in distension of the equatorial sclera. The underlying retina and pars plana are separated from the vitreous base, resulting in vitreous detachment and tearing of the retina and pars plana.⁸ The incidence of retinal detachment caused by trauma varies between racial groups. The area that is the most susceptible to trauma is the inferior temporal area. Boxers use head-gear in their bouts and sparring rounds. These air filled protectors have been found to protect the head in 70–80% cases of trauma, but cannot provide complete protection of the eye and head. Therefore trauma to the eyes, nose, maxilla, eyebrows, and mandibula are often encountered.

Wedrich *et al*⁹ reported a 16% incidence of angle recession in 25 asymptomatic boxers with a mean age of 23.5. The incidence of glaucoma related to angle recession is reported to be 7–9% and can even be manifest after 10 years.¹⁰ In this same series, lenticular opacities were seen in 16% of cases, and the incidence of posterior segment pathological conditions was 72%. Traumatic retinal pigmentation was found in 60% of cases and retinal tears in 24%. In our series, the rate of pathological eye conditions is quite low compared with other

reports. Retinal pigmentation was the most common pathological condition seen (four (20%) of the cases); only one of these boxers reported a serious eye trauma in a fight. An atrophic retinal hole was encountered in one case, which was not due to vitreoretinal traction.

Giovinazzo *et al*¹¹ reported the ophthalmological findings on 74 boxers with a mean age of 25. Angle abnormalities were encountered in 19% and cataract also in 19% of cases. Vision threatening injuries were found in 58% of patients. Macular pigment epithelial alterations and retinal tears were also encountered in up to 25% of cases. They concluded that the retinal tears were directly related to the total number of bouts and number of fights lost. The risk of retinal tears increased after six fights and two losses, and nearly all boxers who had had more than 100 fights had retinal tears. The rate of retinal detachment was much lower than the number of tears, and the authors explained this by the fact that their series mainly comprised young black boxers (60%).

Vadala *et al*¹² reported some asymptomatic traumatic changes in 75 experienced and novice boxers, and retinal detachment was seen in four cases, three as the result of trauma.

In another study, ocular injuries occurred in 5% of boxers, and resulted in a longer hospital stay and disability than all other boxing injuries.¹³

The medical advisory board of the New York State and California Athletic Commission recommends that no boxer with a retinal detachment should be permitted to obtain a licence to box. The Medical Council of Australia has recommended that retinal detachments are a contraindication to a boxing career.¹⁴

In our series, although boxers had a significantly greater risk of eye trauma than non-boxers, except for one atrophic retinal hole, no vision threatening pathologies such as cataract, angle recession, glaucoma, traumatic retinal tears, or retinal detachment existed. There are several explanations. Firstly, our boxers were mostly in the lightweight or middleweight division. Heavyweight boxers hit harder causing more trauma. The fighting distance of our boxers was mostly near or distant. It is known that more eye trauma is encountered in middle distance fighters. In this series, all of our boxers were title holders and therefore had lost relatively few fights (about 16 of 140 bouts).

It is recommended that, before being given a licence to box, amateur and professional boxers should have a complete ophthalmological examination. This examination should be repeated after six bouts, two losses, if eye trauma occurs, and routinely once a year. No fights should be allowed within 30 days of a retinal tear and 60 days of a retinal detachment repair. The minimal requirements for boxing should be a visual acuity of 20/40 or better in each eye and a full central visual field not less than 30° in each eye.¹¹

Take home message

Boxing is potentially dangerous for the eyes. Appropriate protection and periodic check ups are important preventive measures.

Conclusions

In this series of elite Turkish boxers no serious ophthalmic pathology was encountered. Prospective, longitudinal studies including more boxers of all weight divisions and ages is needed. It can be concluded from this study that boxing is not as hazardous to the eye as previously reported if suitable protective measures such as the use of suitable headgear and gloves are applied. A careful routine ophthalmic examination will reduce the incidence of trauma related vision threatening injuries.

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