least enables the epileptic child's problems to be considered on their own merits and the appropriate treatment to be successful. For example, a boy aged 6 had typical petit mal, at first treated by another hospital, where it was noted that, whereas all drugs seemed ineffectual at home, the child had attacks while an in-patient only when visited by the mother. She was an anxious woman whose husband was a chronic inadequate psychopath permanently in a mental hospital. With regular out-patient attendance of the child's mother the petit-mal attacks almost stopped on a small dose of amphetamine. The mother no longer worried about him, but problems previously denied as existing in the other children now filled her mind.

It should be stressed how important it is for the psychiatric social worker to have some working physiological knowledge as well as her psychological training. Parents are keen to understand this apparently mysterious disease, and simple explanations along the lines of abnormally excitable areas in the brain, and so on, are of great value in taking away much of the mystery that these children present to their parents.

It is still early days to speak of the effects of temporal lobectomy in the few selected cases in which it has been found possible to do the operation. The results are undoubtedly dramatic, and two or three of the most difficult cases have returned to normal as a result (one was reported by Falconer and Pond, 1953). The pitfalls in trying to deal psychotherapeutically with temporal-lobe cases have already been mentioned. It is important, however, to temper the wind to the shorn lamb after temporal lobectomy. Peaceful behaviour and freedom from fits on the ward may worsen after the child is back in his disordered home.

A boy aged 13 was the illegitimate son of a clever but unstable woman whose own mother, a doctor's wife, had had to assume responsibility for the child's welfare. He was early noted to have nystagmus and spent the first three years of his life in a home for blind babies till it was noted his sight was nearly normal. By then occasional major seizures had developed and he spent his schooldays being moved from boarding schools to colonies because of the attacks and his worsening behaviour disorder. When admitted for investigation he came with the reputation of being a liar, bad-tempered, and sexually perverse. In the ward he was a pathetic ugly duckling rejected by the other children. Tests showed him to be of near average intelligence but educationally retarded. The epileptic attacks were infrequent on regular anticonvulsants, but E.E.G. studies showed a frequently firing left inferior temporal focus. Following temporal lobectomy his behaviour improved so much that his grandmother was prepared to try him at her home. He attended the ordinary local school, and within a year was asked to join a school party going to Switzerland.

The outcome for these 50 cases so far as schooling is concerned shows that nearly one-half went back to ordinary schools, 13 were defective or attended E.S.N. schools, while only five went to epileptic colonies. Two have gone beyond school-leaving age.

These last figures clearly indicate that epileptic colonies play only a limited though valuable part in the care of epileptic behaviour-problem children. Their most important work in this respect lies in preventing the onset of severe disorders by providing a sensible and stable life for children from disturbed homes. At the present time the aim of treatment is to keep children so far as is possible at home and at ordinary schools, as Henderson (1953) has stressed. It may be regarded as a satisfactory therapeutic outcome if this can be done, even when the child is still having occasional attacks. The implication of this trend is therefore that the education of schools and parents in the handling of epileptics is of prime importance. It would be appropriate at this point to refer to the British Epilepsy Association, which is endeavouring to help the welfare of epileptics in these and many other ways. A special clinic such as this has a place in that it helps in sorting out the obscure cases and in handling the most difficult ones.

Summary

The problems of the diagnosis and management of epileptic behaviour-problem children are discussed on the basis of 50 selected cases. Full neurological and psychiatric investigations are needed for the proper application of combined medical treatment and child-guidance technique. The handling of the parental reaction and the educational placement are at least as important as the drug control of the seizures.

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THE MEDICAL ASPECTS OF AMATEUR BOXING*

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Boxing has a wide appeal both as a sport and as a spectacle, and it is estimated that there are at least 100,000 active amateur boxers in Britain. It offers the youth a healthy form of physical training, and as a result of abiding by the laws of boxing he learns discipline and self-control. In some cases it may be a suitable outlet for psychopathic traits, and it is playing a part in combating juvenile delinquency. It is obvious that the medical management of amateur boxing is of much importance, and we propose to consider this aspect as observed by one of us (J.L.B.) over a period of twenty-five years. Special reference is made to head injury and its sequelae, and to methods of preventing the latter. The use of the electroencephalogram (E.E.G.) in particular is dealt with.

Medical Management of Amateur Boxing

In order to make the sport as safe as possible the London Amateur Boxing Association has introduced a scheme of medical welfare which has been approved by the Amateur Boxing Association.

Most clubs have a medical officer, and each boy on joining is given a thorough medical examination. As well as the more obvious disorders, impaired vision or hearing and locomotor defects preclude a boy from boxing. If acceptable, he receives a booklet which he must produce at each contest, and in which is recorded any injury and the period for which he is debarred from boxing. Clubs sponsoring a tournament must supply an approved first-aid kit, and a medical officer is present at each contest.

*Modified from papers read at a meeting of the British Association of Sport and Medicine on March 19, 1954.

Certain rules have been introduced and suggestions made so that the boxers may be safeguarded to the full. Contestants are divided into juniors, who are aged 17 or under, and seniors above this age. The length of each round and the number of rounds boxed depends upon the age of the boxers. They are matched in accordance with age as well as with weight, so that boys meet opponents of their own experience. The referee, as well as being able to disqualify for the usual offences, has the power to stop a bout if a boy receives a bad cut, if he is obviously outclassed, or if he appears dazed on rising. The gloves weigh 8 oz. (230 g.) at least and are well padded; the laces and eyelets must be covered to prevent lacerations. Bandaging of the hands and the wearing of a resilient mouthpiece are encouraged. The London Amateur Boxing Association has recently approved the sorbo-rubber floor. It is hoped that these measures will help to make amateur boxing a safe sport.

Common Amateur Boxing Injuries

In the last seven years there have been six deaths due to boxing among amateurs, but on the whole the majority of the injuries observed have not been serious.

Nose-bleeding is the commonest, and plugging with adrenaline-soaked cotton-wool may be needed for the severe cases. The use of styptics or nasal stimulants is not allowed.

Cuts of the supraorbital ridges and zygomatic areas are also frequent, and are treated with a sterile plaster dressing, and thread sutures where necessary. If the wound is on the scalp, collodion is applied instead of plaster. When sutures have been used the boy is not allowed to box for four weeks, and if the scar becomes adherent, for two months. The more severe wounds are dealt with at hospital. This method of dealing with facial cuts is entirely satisfactory, although Continental officials claim equal success without the use of sutures. The early aspiration or evacuation of a *haematoma of the auricle* will avoid the disfiguring "cauliflower ear."

Sprains of the metacarpo-phalangeal joint of the thumb are very common, and are best treated with strapping, early movements, and later by short-wave diathermy.

The common fractures are, in order of frequency, the heads of the first and second metacarpals, Bennett's fracture, fractured nasal bones, and fractured mandible; the latter two are fairly rare in amateur boxing. Although intra-articular Bennett's fracture is known as "the boxer's fracture," it is not the commonest. In all cases splints are applied and the patient is sent to hospital; it is a rule that all boys going to hospital should be accompanied. In fractures of the nasal bones, the fragments are either thrust directly backwards or displaced to one side. The ensuing oedema may make replacement difficult, and the boy is therefore taken to hospital as quickly as possible. He is suspended for three months, and if nasal obstruction persists he is referred for surgery. A boxer sustaining a fractured jaw would be permanently suspended. Compared with rugby football (O'Connell, 1954), fractures appear to be relatively uncommon.

Ocular injuries are as rare as the periorbital ecchymoses are common. In 25 years' experience one of us (J. L. B.) has never seen a case of retinal detachment.

Head Injuries

Injury to the cranium and its contents is a direct product of boxing and not an accident as in all other sports. As the sequelae may, on rare occasions, be serious, more detailed consideration of this subject is necessary.

The six fatalities were all due to intracranial haemorrhage; unfortunately, a high mortality rate must necessarily be accepted in the acute extradural and subdural haematoma (Lewin, 1949). Other immediate complications, such as amnesia without unconsciousness ("out on the feet") and repeated knock-outs, are more common, but fractures of the skull and focal brain damage are extremely rare. The delayed sequelae, post-traumatic epilepsy, and the "punch-

drunk" state, have never been encountered. That the latter may occasionally afflict the amateur boxer is, however, evidenced by Raevuori-Nallinmaa (1951), but medical control was perhaps inadequate in the cases cited. Finally, a post-concussional state may appear occasionally in the boxer who has received several knock-outs.

Most boxers after a knock-out have regained consciousness by the time ten has been counted. The seconds are instructed to carry the boxer to his corner if necessary, and not to hurry him back to the dressing-room. If the occasion arises, he is carried from the ring on a stretcher. In any case where recovery is incomplete or there is evidence of more serious damage, the boxer is sent to hospital. A youth who has been knocked out and recovers consciousness rapidly is suspended for two months, but if the injury is more severe, as judged by the post-traumatic amnesia, he is barred from boxing permanently. Boxers who are more easily knocked out ("knockout prone") are also permanently suspended.

Measures to Avoid the Sequelae of Head Injuries

One of the most important tasks in the medical control of boxing, both amateur and professional, is an attempt to avoid as many as possible of the complications of the head blows inevitably sustained by the boxer. The available methods of doing so, other than the general prophylactic measures already described, are unfortunately few. Clinical examination is crude and of little value in fit young men. Radiology has been considered, and Chenoweth (1951) surveyed the skull x-ray films of a group of college boxers. Because of thinning of the frontal bones, one aspirant was prevented from boxing. There is a suggestion that boxers who are knocked out more readily than others have thinner skulls, and it is known that in two of the six fatal cases mentioned already the skull vault was exceptionally thin. Further study of this interesting aspect of the head injury, and in particular as it concerns boxing, is needed. Until additional information is available, however, it does not seem justifiable to make decisions regarding a person's future in boxing on the basis of a skull x-ray examination.

Psychometric testing may detect the earliest evidence of mental deterioration, so that the initial stages of the "punch-drunk" state may perhaps be appreciated and the condition either forestalled or modified by abstinence from boxing. However, other evidence would, in most cases, be readily available. Because of the strict regulations employed, and the referee's powers, it is most unlikely that this pitiful sequel will ever be seen in amateur boxing.

The Electroencephalogram

The E.E.G. has been suggested as also having a possible part to play in the detection and prevention of cerebral complications, and an investigation into its application to amateur boxing was thought to be necessary. This test will obviously never predict a traumatic intracranial haemorrhage, although at times it is useful in diagnosis. Its use in other conditions following a boxing injury of the head is likely to be similarly limited.

Dow *et al.* (1944) were able to show that E.E.G. changes follow a blunt blow to the head. These appear immediately, and usually disappear within a few minutes. However, the more severe the injury the more severe and persistent is the electrical abnormality. This has been substantiated by Jasper *et al.* (1945), who also noted the not infrequent lack of correlation between the clinical and the E.E.G. findings. Further, they found that comparable trauma in a young person produced more severe changes than in the older subject. This observation is of importance to our present considerations because of the age group being dealt with, and deserves further elucidation.

Reports of the application of the E.E.G. to boxing are few. Titeca (1952) found abnormal records in two deteriorating boxers, and, although these abnormalities disappeared after two months' resting, subsequent events in these cases are not described. In Colorado, State laws make electro-

encephalographic examination compulsory for all professional boxers, and Busse and Silverman (1952) found abnormalities in 36.5% of 24. Although there was "some indication" that the severer disturbances were found in boxers who had been knocked out, a control group of non-traumatized males of similar ages was not investigated. One boxer with a persistent and progressive dysrhythmia was suspended from boxing, the decision being made on the grounds of the electrical changes only.

We have studied 48 amateur boxers electroencephalographically; 24 had received one or more recent knock-outs and the remainder, who acted as controls, had suffered none during the current season. Their ages varied from 17 to 29 years, and they were all examined within two weeks of the last injury. The investigation was somewhat hindered by the prejudices of the boxers or of their parents and officials, and, as the youths are all fully employed, it was often difficult to obtain a recording within the necessary time limits. Four of the group that had suffered knock-outs had abnormal E.E.G.s; all were under 20 years old. The abnormality observed was a diffuse slowing, and no focal dysrhythmia was recorded. In all cases it had disappeared within two months of the injury. One boy who had been knocked out four times took the longest period to return to normal, but, in common with Busse and Silverman (1952), other associations between the boxer's known history and the electrical changes could not be made.

Advantages From Use of E.E.G.—Although multiple records have rarely been obtained from subjects receiving repeated head injuries, it is possible that the E.E.G. can detect incipient chronic brain damage before clinical features become evident. The findings of Temmes and Huhmar (1952) tend to support this, although their evidence is not entirely convincing. A dysrhythmia, at first transient, may eventually become permanent in the presence of repeated trauma, and perhaps, as suggested by Busse and Silverman, this is the time to prevent a boxer from sustaining further cerebral damage. Only strict correlation with clinical findings and an adequate follow-up will decide this important point. It is remotely possible that a boy may have a hereditary epileptic tendency with an abnormal E.E.G. and that a head injury might precipitate convulsions. Phillips (1954), however, has shown that epilepsy follows a closed head injury in only 6% of cases and that pre-morbid tendencies play little or no part. A baseline E.E.G. on all boxing aspirants is therefore unwarranted. The use of the E.E.G. in the diagnosis of the post-concussional state, chronic subdural haematoma, focal brain damage, and post-traumatic epilepsy resulting from boxing injuries is well established and need not be discussed here.

Objections to Use of E.E.G.—We are dealing with a predominantly adolescent group, and it is well known that the normal maturation defects may cause confusion in the interpretation of the E.E.G. tracings. As has been pointed out (*Lancet*, 1953), this possibility cannot be entirely excluded from the findings of Busse and Silverman. Further, the more severe changes found by Jasper *et al.* (1945) in younger individuals, and the fact that all our subjects with abnormal records were less than 20 years old, are perhaps related to this. A baseline E.E.G. at the onset of a boxer's career might be expected to overcome some of these difficulties, but the gradual change associated with ageing would counter any advantage. The E.E.G. disturbances found in psychopathic personalities may also cause confusion (Hill and Watterson, 1942). Only routine E.E.G.s on all such persons beginning boxing would eliminate this difficulty. It is interesting in this respect to note that in Busse and Silverman's group those with temporal lobe foci were more aggressive. Finally, if clinical and electrical correlation is frequently lacking, it will be very difficult to draw conclusions in the individual case. It would therefore appear that the disadvantages outweigh the advantages.

Although information at the moment is inadequate, and although further evidence may show that the E.E.G. has a part to play in making boxing a safe sport, it seems

unlikely that it will contribute greatly to amateur boxing. In professional boxing, where cerebral damage is more frequent and more severe, its role has yet to be decided. However, there is also the fact that boxing presents the only opportunity in man of observing repeated head injuries in an almost experimental setting, and further study of the E.E.G. changes will obviously be of considerable interest and value.

Conclusions

Amateur boxing is a useful and justifiable sport.

The medical amenities provided by the London Amateur Boxing Association afford adequate treatment of all the injuries encountered and the prevention of most.

The undesirable sequelae of boxing head injuries are rare among amateurs, mainly because of the rigid medical supervision. Their detection, however, is not altogether satisfactory at the moment.

Radiology offers a possible means, but present knowledge is limited.

The value of the E.E.G. in boxing is uncertain. Among amateurs its use is probably limited, but further information is required.

Summary

The medical supervision of amateur boxing (London Amateur Boxing Association) is described and the common injuries encountered are discussed. The head injury and its sequelae are considered in more detail and methods to eliminate the rare but undesirable complications detailed. The E.E.G. is a possible preventive measure, and its application is illustrated by an investigation of 48 amateur boxers. Although information is incomplete, it seems to be of doubtful value in amateur boxing if rigid medical control is practised.

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