

Sudden Death of a Young Wrestler During Competition

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INTRODUCTION

Sudden death of healthy athletes during and because of their sport activities, are relatively very rare but cause anxiety among athletes, technical and administrative personnel, sport fans and, above all, consternation and grief to the family, while being given lavish coverage by the press.

Negative effects of such sport injuries do not seem to last long, but compel Sports Science in general and Sports Medicine in particular, which is concerned with the athlete's well-being, to study such incidents thoroughly so that they may be prevented.

Mechanical forces are mainly responsible for sudden death in healthy children and adolescents during sport activities.

Although accidental death can occur in any sport, at any age, sports involving body contact and collisions present the greatest potential for fatal injury, because of their high inherent risk for sport-related sudden death.

Head and neck injuries seem to account for the majority of deaths (80%) among athletes in collision or contact sports, as in American football (Blyth et al., 1969), rugby football (Bruce et al., 1982), soccer (Zakopoulos, 1973), basketball (Bruce et al., 1982), boxing (Ryan, 1987), etc., as well as in non-contact sports.

Regarding wrestling, a contact and collision sport, there appears to be no other case of fatal injury other than the one which occurred recently in

Greece in the course of a wrestling match, and which is the subject of this study.

DESCRIPTION OF THE CASE STUDY

On 22 November 1986, in the course of wrestling contests for boys - adolescents, a fifteen-year-old healthy wrestler of the 68 kg class was mortally injured in the second round when the victim was already losing to his opponent by 11 points to 3.

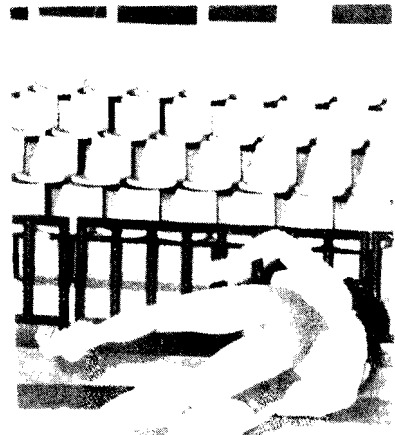
The lack of a video recording or even photographic material of the match made it necessary to reconstruct and photographically record, after the fact, the phases of the discontinued match, with the assistance of two volunteer student wrestlers of the 68 kg class, and according to the description of reliable witnesses: the referees, umpires, the physician of the competition, coaches, and the opponent wrestler.

The characteristic phases of the bout until it was stopped at 1 min 13 sec of the second round are shown in the following photographs.

In the first round, a throw by the chest was repeated three times in identical manner: the injured athlete (in a blue athletic suit) is always on the defensive (Phot. No. 1-4).



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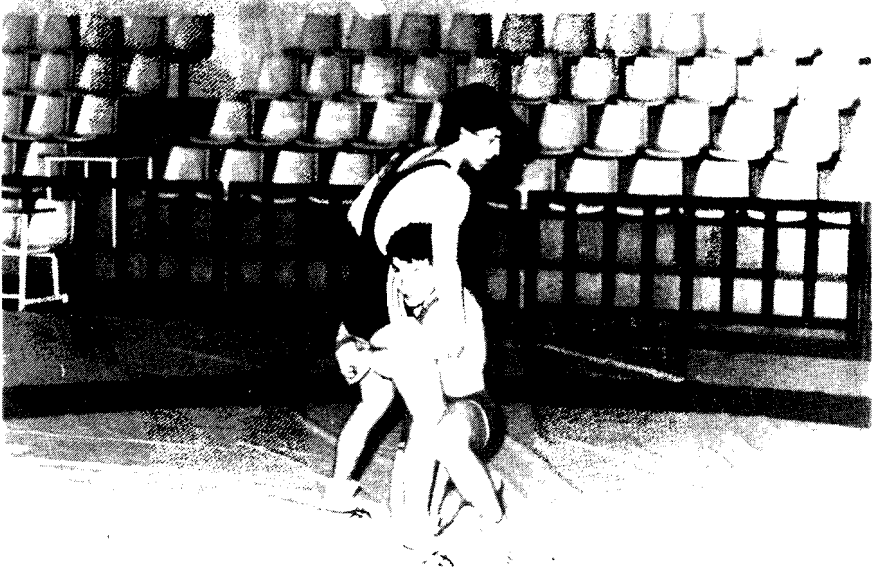


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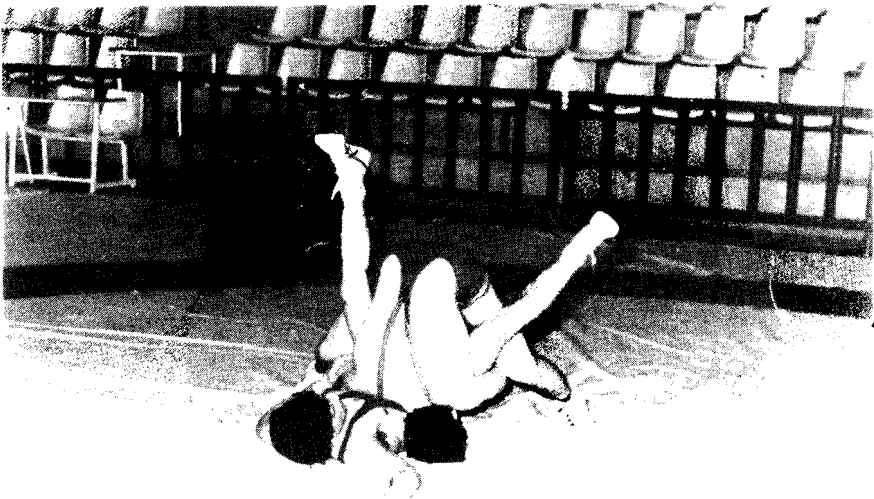


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In the second round, the injured athlete suffered another throw through the chest by his opponent, but subsequently carried out for the first and only time a throw of his opponent, again by a grip through his chest (Phot. No. 5-6). In Phase 6 he is seen hitting the mat violently on his head.

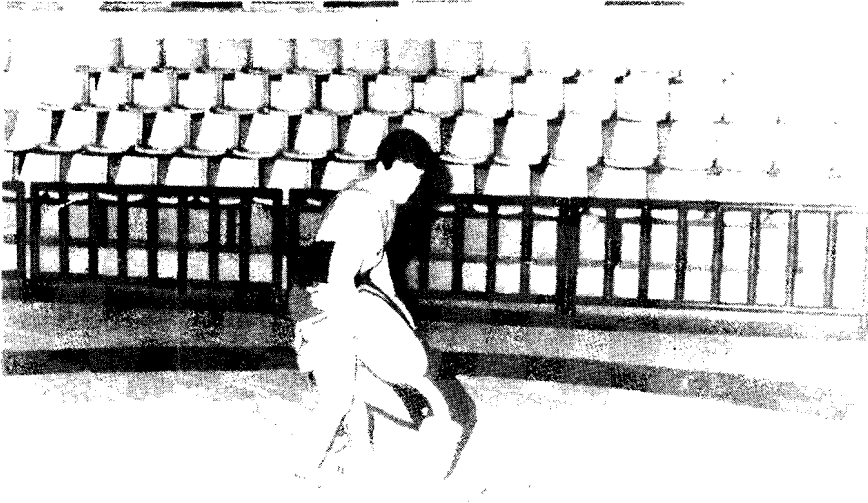


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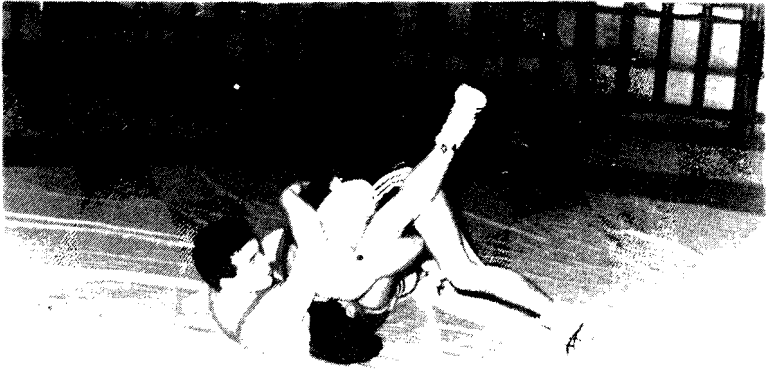
The injured wrestler then suffered another throw through the chest of his opponent (Phot. No. 7-8), leading to a bridge (Phot. 9-10) and immediately an effort by his opponent to overthrow the injured wrestler who was in an inferior disadvantaged position by a head grip (simple Nelson) (Phot. No. 11). Phases No. 10 and 11 also seem to create conditions for neck injury.



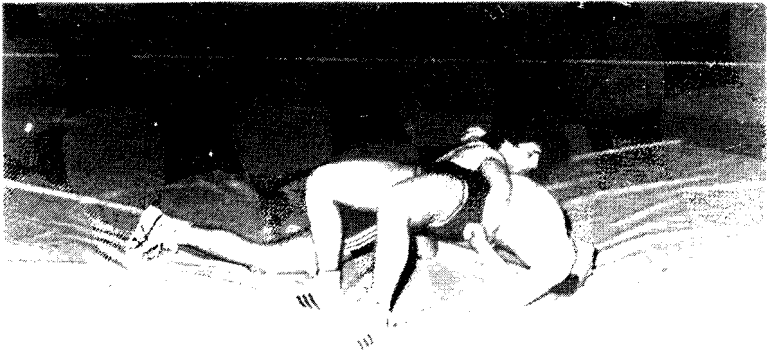
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The injured athlete subsequently, due to his passivity and after being reprimanded, was placed in the inferior disadvantaged position (Phot. No. 12). His opponent attempted to overthrow him (Phot. No. 13) at the

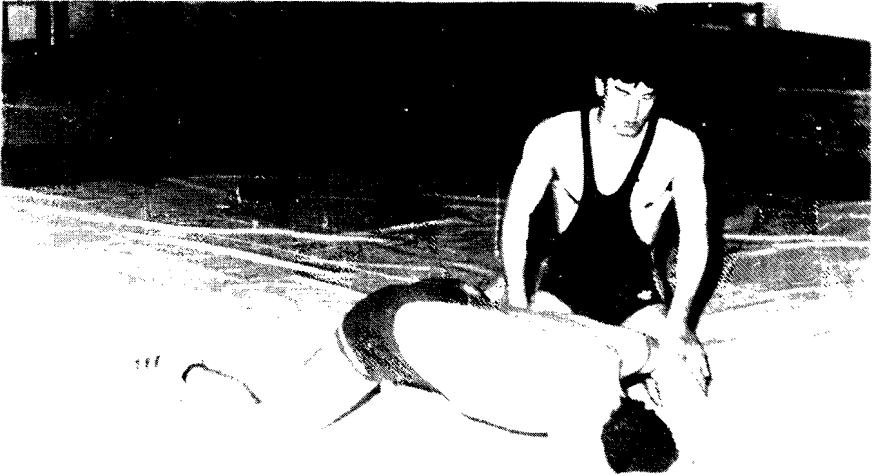


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time when his head was trapped between the mat and his right forearm: a moan was heard from the injured wrestler, the aggressor stopped all action and the victim remained immobile in the position shown in Phot. 14, at which time the competition was stopped.



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Less than 5 sec after suspension of the match, the physician attendant to the competition was at the side of the injured athlete. From a close angle he observed and noted the pallor and fibrillations of the muscles of the athlete's face, as well as mydriasis of his eyes, and the absence of pulse and breathing. Loss of consciousness was also confirmed.

The unconscious athlete received in vain, first air care: artificial respiration and sustained external massaging of the heart and was carefully transported by ambulance to the hospital, where the athlete's death was confirmed.

CAUSES, MECHANISMS AND PREDISPOSING FACTORS LEADING TO THE WRESTLER'S INJURY AND DEATH

The cause of the injury of the athlete, leading to his almost instantaneous death, was his faulty technique during the match and in particular the wrong position of his head at the moment when he was in the lower disadvantaged position (Phase No. 13) and his opponent was attempting to overthrow him by force.

In this particular case, the external traumatic factor, the sudden and

powerful action exerted by the athlete on the offensive, put into action a mechanism mainly flexing and rotating the victim's head, resulting in the injury.

An injury, however, especially a fatal one, would be extremely unlikely were it not for predisposing factors, which paved the way to the kind of cause and effect leading to the injury of the neck segment at the particular moment.

From descriptions of the incident, some particularly unfavorable predisposing factors for injury were revealed:

- lack or inadequate warming up and early fatigue of the athlete,
- minor injuries in the region of the victim's neck during the phases preceding the main injury, and
- competing against a wrestler of greater training, age and superior fighting level.

The pathophysiological mechanism responsible for the wrestler's death in this case, according to all indications, was lesion of the vertebral arterial wall, during overflexion of the head with a rotational component, resulting in ischaemia of the brain stem and standstill of vital functions.

The violent overflexion of the victim's head, as shown by the postmortem examination (necropsy and necrotomy), damaged the neck muscles from the 3rd cervical vertebra to the occiput, fractured-dislocated the 2nd and 3rd facet joints and ruptured the homolateral segment of the cervical ligament, injured the 1st intervertebral ligament and the homolateral sector of the posterior longitudinal ligament, exposing the spinal cord, which showed no apparent damage, and finally brought about a postpharyngeal hemorrhage of considerable extent, probably due to damage or rupture of vertebral arteries.

Ischaemia and infarction as well, are rare complications of manipulation of the upper part of the cervical spine, usually due to compression of vertebral artery(ies), vascular spasm and lesions of the vascular wall.

Lesion of the vascular wall of cervical artery(ies) seems to be inevitably connected to sudden death due to cerebrovascular insufficiency, while compression of vertebral artery(ies) and vascular spasm are possibly responsible for transient symptoms.

Amtoft-Nielsen and Amtoft-Nielsen (1987), very recently reported two cases (one patient died and the other had temporary symptoms) and reviewed the literature. Their two cases and this case are added to the 57 thoroughly described cases presented in the literature including 13 fatalities.

Average age for these cerebrovascular accidents is remarkably low,

while symptoms appear very soon after manipulation in about 90% of the cases, suggesting that vascular spasm plays a significant role in the development of the initial symptoms.

Injuries resulting from cervical spine manipulation depend on the magnitude and direction of the applied forces and on the stability of the spine, which in turn depends on the integrity of the intervertebral disks, joints and ligaments. These structures are very resistant to traumatic forces, which cause compression, distraction, extension or flexion of the spine. They are, however, very vulnerable to rotational and horizontal shearing forces (Roaf, 1960).

The nature of the injury fully explains the instantaneous death of the young athlete and the failure of the first aid given to him. For the same reason whatever the specialised medico-surgical treatment could be, no possibility for survival of the athlete would be expected.

All indications and descriptions available lead to the conclusion that the action of the athlete on the offensive, during the fatal phase, as well as all his other actions, were legal. Injuries of this kind in wrestling, therefore, can be effectively managed only by protection of the wrestler, and any remedial attempt after injury, however specialised and immediate, is doomed to fail.

MEASURES FOR PROTECTION OF WRESTLERS FROM SERIOUS OR FATAL INJURY OF THE CERVICAL SEGMENT OF THE VERTEBRAL COLUMN

Protection of wrestlers, especially the young, from serious or fatal injury of the cervical region of the vertebral column, which, it should be noted, is injured very often in wrestling bouts, can be effective with implementation of a set of measures (see Pahtas and Rontoyannis, 1987), the main ones being:

- a. Careful and general warming up of the athlete, always indispensable, by performing a series of exercises of the cervical segment, as well as specific warming up with wrestling bridges etc. before training and the actual fight;
- b. Methodical and systematical preparation of the wrestler as regards technique and tactics, by going through special exercises for falls, bridges, etc.
- c. Balanced development of strength of agonistic and antagonistic muscles of the region of the neck.

- d. Careful organisation of the training sessions and the contests by ensuring that certain fundamental conditions as regards organisation and method are met and by taking measures useful for protecting the wrestlers from injury, relating to:
1. the athletic activity space proper,
 2. correct guidance of the athlete regarding the training technique
 3. correct selection of opponent wrestlers taking into account their chronological and training age in combination with their body weight and general preparation level,
 4. evaluation of the fatigue level of wrestlers during matches and training,
 5. avoiding the use of weight reduction techniques in adolescent wrestlers less than 17 years old,
 6. systematic and periodic medical examination to detect small injuries predisposing to clinical injury,
 7. the care used in the athletic re-education of wrestlers after completion of their recovery from injury,
 8. ensuring the correct microclimate inside the arena,
 9. ensuring an adequate number of referees and umpires at the matches (about 22 referees-umpires for 2 matches),
 10. precise knowledge by trainers, wrestlers and referees of permissible wrestling grips, which when executed improperly may lead to injury.

SUMMARY

The circumstances of the sudden death of a young healthy wrestler in the course of a wrestling match are described. The death occurred due to acute ischaemia of the brain stem as a result of the acute interruption of blood flow to his vertebral-basal system, as a consequence of the injury or rupture of vertebral arteries, after injury of the neck.

This interruption of the irrigation of the brain stem with blood provoked the sudden cease of the vital functions and of course the death of the athlete.

The cause of the injury to the neck of the wrestler was the wrong position of his head (it was trapped between the mat and his own forearm), at the moment when the athlete was at the inferior disadvantaged position and his opponent was exerting a powerful but permissible effort to overthrow him. The combination of the wrong position of the

head of the injured athlete and the forceful action of the wrestler on the offensive resulted in the overflexion and rotation of the head of the former and the (inevitable) demaging of his neck.

Various predisposing factors effectively contributed to the injury, the main ones being the lack of warming up of the athlete, the premature fatigue of the athlete, minor injuries at the cervical segment of the vertebral column during the phases preceding the main injury, and the confrontation with an opponent of greater training age and superior fighting level.

Due to the nature of the injury and the consequent sudden ischaemia of the athlete's brain stem, death was inevitable and all otherwise correct efforts to offer first aid assistance were doomed to fail.

The only way to deal with similar incidents, very rare indeed, is to implement the set of preventive measures described.

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