

RECONSTRUCTION WITH CATALEPTIC RIGIDITY-A CASE REPORT

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Abstract

Cadaveric spasm is a muscular stiffness involving a group of voluntary muscles which occurs at the moment of death due to the intense physical effort and extreme psychological stress. The cause still remains unknown. In case of cadaveric spasm, the clenched fist may be seen tightly holding a cigarette, blades of grass, clothing or some other object. It has medico-legal importance because it records the last act of life.

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Cadaveric spasm is a controversial topic that describes immediate rigor mortis, involving one group of voluntary muscles in a final desperate act associated with intense physical effort or extreme psychological stress ¹. Cadaveric spasm (synonyms: instantaneous rigor, instantaneous rigidity, cataleptic rigidity) is a form of muscular stiffening which occurs at the moment of death and which persists into the period of rigor mortis. It is used to describe the instantaneous tightening of a hand or other body part at the time of death. Though its cause is unclear, yet it can be explained as for relaxation to occur, the amount of ATP required is more than the amount required for contraction of muscles. After muscular exhaustion, when ATP is either completely exhausted or reduced prior to death, relaxation of the muscles becomes impossible. That is the reason why the primary relaxation phase is escaped and muscle stays in contract

mode in cadaveric spasm ². Accordingly a forceful agonal contraction or seizure is converted almost immediately into tight rigor without preceding primary flaccidity. In such cases, labeled as cadaveric spasm, the clenched fist may be seen tightly holding a cigarette, blades of grass, clothing or some other object ³. It has medico-legal importance because it records the last act of life. It seems confined to those deaths that occur in the midst of intense physical and/or emotional activity, though how the latter can lead to instant post-mortem rigor is quite inexplicable. It presumably must be initiated by motor nerve action, but for some reason there is a failure of the normal relaxation. The phenomenon usually affects only one group of muscles, such as the flexors of one arm, rather than the whole body. Marked depletion of glycogen stores in the muscle by violent exertion immediately before death can hasten the onset of muscular rigidity. Most cases of cadaveric spasm occur in similar circumstances ⁴.

Cadaveric spasm is seen in a small proportion of suicidal deaths from firearms, incised wounds, and stab wounds, when the weapon is firmly grasped in the hand at the moment of death. In such circumstances the

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Fig. 1: Spectacle firmly held in one hand

gripping of the weapon creates a presumption of self infliction of the injuries. This state cannot be reproduced after death by placing a weapon in the hands. It is also seen in cases of drowning when grass, weeds, or other materials are clutched by the deceased. In this circumstance, it provided proof of life at the time of entry into the water. Similarly, in mountain fatalities, branches of shrubs or trees may be seized. In some homicides, hair or clothing of the assailant may be found in the hands of the deceased⁵.

Case Report

On external examination of a dead body, it was noted that a spectacle firmly held in one hand of the deceased [Fig 1] and the other hand was found firmly grasping the seam of his shirt [Fig 2]. It was a case of homicide where the deceased was killed by some unknown person (s). Upon examination we noted a cavity deep chop wound exposing the fractured cranial vault, underneath brain tissue to the exterior over the top of his head. Two abrasions were noted over the body apart from the chop wound. The clothes were stained with blood and mud. The buttons of the shirt were intact. There was a small tear at the upper, inner end of his left side shirt pocket. Shirt



Fig. 2: Other hand firmly grasping the shirt

pocket was empty. Other clothes were unremarkable. Other external findings were unremarkable. Internally, a faint contusion with irregular border was noted over the front surface of the liver and the brain injury consistent with the injury by a heavy, sharp cutting weapon corresponding to external injury. Apart from these findings, remaining findings were unremarkable.

On enquiring with the investigating officer, it was found that the deceased was a resident of a village where his dead body was found. He was last heard at 8:30 PM the previous night. He was supposed to come home at 10 PM. The next day morning the dead body was found on the outskirts of the village. At the place of offense, the sandals of the deceased were found 25 ft away from the dead body. No other articles were found near the dead body having evidentiary value.

Discussion

In medicine a spasm is a sudden, involuntary contraction of a muscle, a group of muscles, or a hollow organ such as a heart, or a similarly sudden contraction of an orifice⁶. It most commonly refers to a muscle cramp which

is often accompanied by a sudden burst of pain, but is usually harmless and ceases after a few minutes. Cadaveric spasm, also known as postmortem spasm, instantaneous rigor, cataleptic rigidity, or instantaneous rigidity, is a rare form of muscular stiffening that occurs at the moment of death, persists into the period of rigor mortis and can be mistaken for rigor mortis⁷. Cadaveric spasm is a condition in a dead body in which the muscles of the body which were in a state of strong contraction immediately before death, continues to be so contracted at the moment of death and after death, without passing through the stage of primary relaxation. Thus, it is not just stiffening of muscles like rigor mortis. The muscles are in a state of contraction in cadaveric spasm. The spasm involves one or a group of muscles of the body usually, but occasionally the involvement is more extensive and though very rare, in the peculiar circumstances muscles of the whole body may be involved. The spasmodic contraction of the muscles reflects antemortem state of excitement of mind, fatigue, nervous exhaustion etc.

The cause is unknown, but is usually associated with violent deaths happening under extremely physical circumstances with intense emotion⁸. In case of rigor mortis, when a muscle is relaxed, the myosin heads are returned to their "high energy" position, ready and waiting for a binding site on the actin filament to become available. Because there is no ATP available, previously released calcium ions cannot return to the sarcoplasmic reticulum. These leftover calcium ions move around inside the sarcomere and may eventually find their way to a binding site on the thin filament's regulatory protein.

Since the myosin head is already ready to bind, no additional ATP expenditure is required and the sarcomere contracts. When this process occurs on a larger scale, the stiffening associated with rigor mortis can occur. It mainly occurs during high ATP use. Marked depletion of glycogen stores in the muscle by violent activity, prior to the death can hasten the onset of muscular spasm⁴.

Cadaveric spasm may affect all muscles in the body, but typically only groups, such as the forearms, or hands. Cadaveric spasm is seen in cases of drowning victims when grass, weeds, roots or other materials are clutched, and provides proof of life at the time of entry into the water. Cadaveric spasm often crystallizes the last activity one made prior to death and is therefore significant in forensic investigations, e.g. holding onto a knife tightly. In the present case the deceased was found dead with one hand holding the spectacle and in the other hand the deceased was holding the seam of his shirt. The postmortem findings and from the scene of crime details it was deduced that the deceased might have got down from the bus, and on his way to his house, he might have been attacked by some unknown persons who might have tried to rob him. The tear in the inner part of his shirt might have been caused by the effort of the attackers to take the contents of his pocket. The shirt was intact without tearing of the buttons. It can be said that there was no scuffle between the assailants and the deceased at the time of his death. The deceased might have tried to run by holding the spectacle in his hand and the seam of his shirt when the sandals have knocked out of his foot.

The fear of death after being attacked by the assailants and the physical activity in the form of running by the deceased at the time of death might have resulted in the contraction of muscles forming cadaveric spasm. The role of cadaveric spasm not only helps in establishing the manner of death, but also helps to reconstruct the event.

Conclusion

Cadaveric spasm is usually associated with violent deaths in circumstances of intense emotional and physical stress. It not only help in establishing the manner of death, but also helps in reconstructing the event enable the investigating officer to investigate specific direction.

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