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"Medicolegal Masquerade" a ruptured brain arteriovenous malformation mimicking homicide: A case report

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ABSTRACT

A potential source of confusion in medicolegal death investigations arises when death from natural causes occurs in circumstances that suggest violence. Consequently, the investigating pathologist is confronted with distinguishing between natural disease and violence or a combination of both. The pathologist should ascertain whether the data collected during the medicolegal death investigations corroborates or contradicts the circumstances surrounding the death. This case report aims to show an approach to cases where death from natural causes occurs under circumstances that suggest that violence. History and circumstances surrounding the death were obtained from the investigating police officer, coroner's order for postmortem examination, and relatives. A postmortem examination was conducted on the decedent following the practice manual for medicolegal death investigations at the State Forensic Pathologist's Office. We report a case of brain hemorrhage due to ruptured arteriovenous malformation that was reported as a homicide. This case shows the importance of correctly interpreting postmortem findings in determining the cause and the manner of death in criminally suspicious deaths. This case is an example where disease mimics trauma. It is imperative for the pathologists in such instances to search for any possible signs of recent and old injuries that may confirm the violence. The burden of acquiring historical, circumstantial, and medical data to reach valid opinions of the cause and manner of death lies with the pathologist. The cause and manner of death must be expressed so that the criminal justice system is well served.

Introduction

An arteriovenous malformation (AVM) is an anomaly in which there is a tangle of blood vessels fed by arteries and drained by veins without intervening capillaries [1]. An AVM may be situated in any organ of the body, including the brain. Brain AVMs manifest in young to middle-aged adults but can present at any age. The incidence of brain AVMs is 1.12–1.14 per 100,000 person-years [2]. They are usually asymptomatic, detected incidentally on imaging, or may present with symptoms such as dizziness, recurrent headaches, seizures, focal neurological deficit, or intracranial hemorrhage [3,4].

A potential source of confusion in medicolegal death investigations (MLDIs) arises when death from natural causes occurs in circumstances that suggest violence. Consequently, the pathologist involved in MLDI is confronted with distinguishing between natural disease and trauma or a combination of both [5,6].

Ever present in the minds of pathologists involved in MLDIs is whether the data collected during the MLDIs corroborates or contradicts the circumstances surrounding the death. False-positive or negative impressions of homicide usually result from an inadequate MLDIs. Thus, it is essential to conduct comprehensive MLDIs if deaths are not to be diagnosed as homicides when they are, in fact, a result of natural causes [5].

This case report shows the importance of correctly interpreting postmortem findings in determining the cause and the manner of death in criminally suspicious deaths.

We report a case of brain hemorrhage due to a ruptured AVM that was reported as a homicide.

Materials and method

History and circumstances surrounding the death were obtained from the investigating police officer, coroner's order for postmortem examination, and relatives. A postmortem examination was conducted on the decedent following the Practice Manual for Medicolegal Death Investigations at the State Forensic Pathologist's Office. Permission was

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obtained from the Office of the State Forensic Pathologist to write a case report.

Results

Case description

This 24-year-old-woman was admitted to the emergency department at a tertiary hospital with a history of sudden onset of severe headache and loss of consciousness. Her sister also reported that the deceased had been in a physically abusive marriage and that three (3) days before admission, neighbors heard an argument in the house.

On admission, she was unconscious and died three (3) hours later. The coroner was informed, and an inquiry was made into the death.

On postmortem examination, a standard external examination was performed, and no injuries were present. A formal internal examination revealed no injuries. Special dissections, including, musculocutaneous dissection of the anterior torso, layered dissection of the neck and face in an avascular field, posterior neck dissection, musculocutaneous dissection of the posterior torso, musculocutaneous dissection of the extremities, and removal of the cervical spinal cord showed no injuries.

The significant findings at autopsy were to the brain. Subarachnoid hemorrhage was present on the cerebral convexity in the right frontal and parietal lobe regions, distinctly demarcated from the occipital region. A dilated vein was present on the right parietal cortex (see Fig. 1). On sectioning, intraparenchymal hemorrhage and numerous dilated vascular spaces within the right frontal and parietal lobe were identified (see Fig. 2).

Histologic examination of the brain showed dilated vascular spaces filled with blood. The vessels were malformed. Around the normal-appearing vessels was perivascular hemorrhage (see Fig. 3).

The cause of death was attributed to ruptured brain AVM.

Discussion

The establishment of a cause and manner of death was of utmost importance in this case. A misdiagnosis of a non-existent homicide would have placed the accused in jeopardy and initiated a police investigation not justified by MLDI facts. Conversely, failure to adequately determine the part played by violence would have resulted in the accused going scot-free and justice not being served [5].

In this case, in which there are no witnesses and a claim of physical abuse by a relative to the deceased, an extensive examination is necessary to ascertain that trauma was not present [5]. This case's evaluation required the highest degree of analytical skill involving a rigorous consideration of history, circumstances, and Postmortem (PM) findings [6]. The hypothesis of the manner of death as homicide was based on the history and circumstances [7]. However, special dissections at PM did not show any sign of old or new injuries to confirm the circumstantial evidence of repeated physical abuse. The PM further revealed a natural disease-brain AVM complicated by rupture.

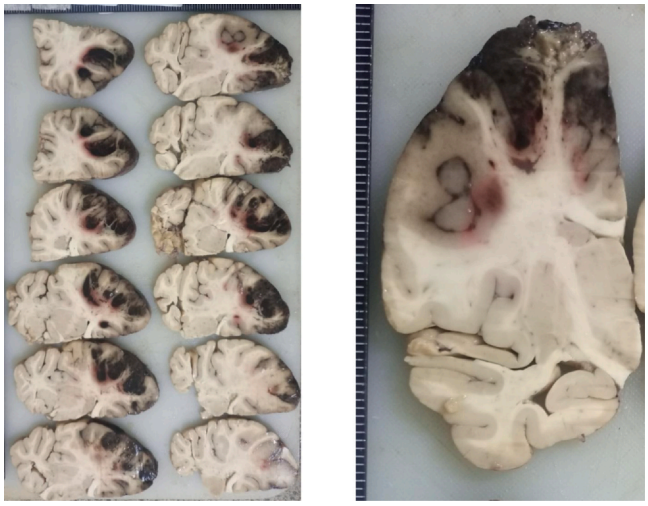

Fig. 2. Cut sections showing intraparenchymal haemorrhage.

This case shows the importance of correctly interpreting PM findings in determining the cause and the manner of death in criminally suspicious deaths. The subarachnoid and intraparenchymal hemorrhage may be erroneously diagnosed as a blunt impact trauma to the head by the unwary pathologist. This case is an example where natural disease (brain AVM) mimics trauma [7]. It is imperative for the pathologists in such instances to search for any possible signs of recent and old injuries that may confirm the violence [5].

The burden of acquiring historical, circumstantial, and medical data to reach valid opinions of the cause and manner of death lies with the pathologist. The cause and manner of death must be expressed so that the criminal justice system is well served [5,6].

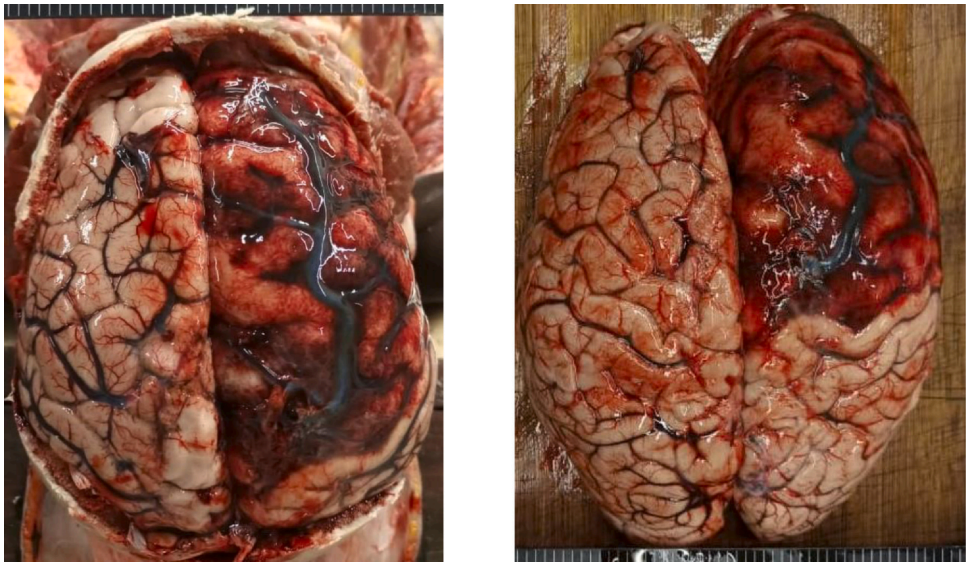

Fig. 1. Gross appearance of brain.

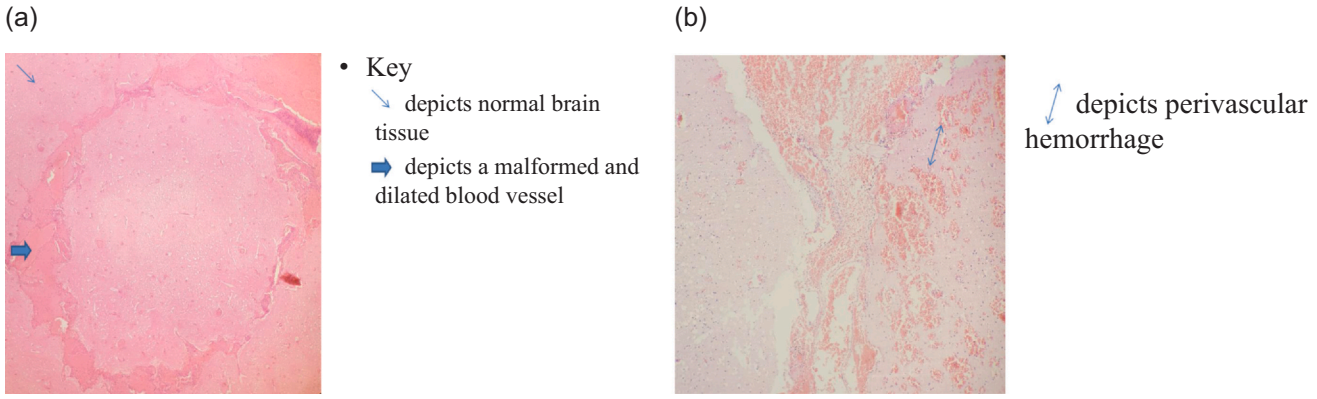

Fig. 3. (a) Micrographs of the brain showing malformed, dilated vascular spaces filled with blood. (b) Micrographs show perivascular haemorrhage.

Conclusion

Pathologists need to correctly interpret the history, circumstances, and the PM findings to differentiate homicides from deaths due to natural causes.

Key learning points

1. Natural disease mimicking trauma.
2. The role of the pathologist in distinguishing natural disease from trauma.
3. Approach to cases that present as apparent homicides but are natural causes.

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CRediT authorship contribution statement

Aaron Nyirenda: Conceptualization, Validation, Formal analysis, Resources, Data curation, Writing - original draft, Writing - review & editing, Visualization. **Cordilia Himwaze:** Conceptualization, Validation, Formal analysis, Resources, Data curation, Writing - original draft, Writing - review & editing, Visualization. **Luchenga Mucheleng'anga:** Conceptualization, Methodology, Validation, Formal analysis, Investigation, Resources, Data curation, Writing - original draft, Writing - review & editing, Visualization, Project administration.

Conflict of interest

The authors declare no conflict of interest.

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