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Acta Medicinae Legalis et Socialis

IMPRENSA DA UNIVERSIDADE DE COIMBRA
COIMBRA UNIVERSITY PRESS

ACADEMIA INTERNATIONALIS MEDICINAE LEGALIS

COIMBRA 2010

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A RARE CASE OF TRAUMATIC LACERATION OF INTRACRANIAL VERTEBRAL ARTERY IN ABSENCE OF PATHOLOGIES AND DIRECTED TRAUMAS TO THE HEAD

Abstract: We present a rare case of death of a young healthy man, due to massive cerebral haemorrhage from the breaking of the intracanical vertebral artery, followed to a scuffle in which there were not produced directed traumas of such violence to explain the laceration of the vessel with a direct bruising mechanism.

A very thorough study of the case allowed us to exclude structural weaknesses of the part of the interested artery and obliged to assume a mechanism of abnormal mobilization of the head by traumatic origin that determined an abnormal stretching of the vessel with consequent laceration of the same one with lethal outcome. We presented the intra-vitam cerebrovascular imaging study and the post-mortal MRI examination and one possible reconstruction of the dynamic. Only the combined use of many radiological and histopathological techniques can assumed complex aetiopathogenetic mechanisms in the genesis of intracranical vascular injuries, excluding predisposing natural factors.

Case report

On the second of February 2008, in the Saturday morning a prosecuting attorney of Swiss Canton Ticino Procuration asked us to visit a twenty-two years old boy at Bellinzona's Hospital. The boy was assaulted by three young boys, around midnight, during citizen Carnival's celebration.

When we arrived at the hospital, around ten a.m., the doctor told us that the cerebral death observation period has already began. Patient brain CT scan pointed out a massive brain haemorrhage, with the discharge of the contrast liquid from left vertebral artery with very abundant cerebral aedema. (Fig 1,2)

The neurological examination demonstrated the absence of brain and brainstem reflexes, and a Glasgow Coma Scale of three.

We proceeded to visit accurately the young boy, who presented:

- at the left fronto-temporal region a slender reddish abrasion; (Fig 3)
- at the chest, at right parasternal and at left lateral region two slender erithematous lesions few centimetres wide;

- at the left elbow a 1 centimetre exchoriation;
- at the right hand, in correspondence of the 3rd, 4th and 5th metacarpalphalangeal articulation, other little exchoriations; (Fig 4)
- at the front face of the left leg, three little abrasions of 3 centimetres maximal dimension.

In the evening of the same day was declared the death of the boy and we gave positive opinion for the organs explantation, after previewing all done examinations. So, at Sunday morning, heart, lungs, liver, pancreas and kidneys were explanted.

In the Monday morning, we performed the autopsy (Fig 5). During external examination, besides the lesions pointed out the day before, we saw:

- at the distal third of the left arm, on the posterior face, an irregular 8 x 5 centimetres wide ecchymosis (Fig 6);
- at the right gluteal region an irregular 5 x 3 centimetres ecchymosis.

The autopsy revealed, beside the absence of intrathoracic and intra-abdominal organs:

- a slender haematic infiltration of the left deep scalp tissues and the left temporal muscle, under the bruise described before (Fig 7);
- a very abundant sub-arachnoid haemorrhage. The whole brain was taken and fixed in formalin buffered solution in order to do other specialistic examinations (Fig 8,9);
- at the neck region, in absence of visible injuries, beside the routinary section, we did a postero-lateral section of the skin, that pointed out a slender haematic infiltration of superior fascicles of left trapezius muscle, of splenius capitis and the semispinal capitis;
- another skin postero-median section pointed out a slender haematic infiltration of median muscles deep fascicles and of its contiguos left portion (Fig 10).

After other two weeks, we proceeded to the exposition of brainstem and cerebellum vascular structures, removing the coagulated blood to locate the cerebral haemorrhage source.

This research was done with the help of a neuroradiologist, who ri-edited the CT examination done at the Bellinzona's Hospital and he indicated us the probable point of the vertebral artery laceration (Fig 11,12,13).

So, we catheterized the distal tract of the left vertebral artery and we injected water with slow pressure and we saw the discharge at the intracranial tract of the left vertebral artery, about two centimetres distally to the basilar artery. We observed a laceration in the lateral slope of the artery wall of 0.3 centimetres length. We observed also an hypoplasia of the right vertebral artery, an antomical variant widely described in literature (Fig 14).

After this study we took same samples of the vessel's wall to perform histological examinations by an expert pathologist. These examinations pointed out no alterations of vessel structures, due to both genetic and acquired diseases that could cause a reduced tensil strength of the wall to moderate trauma (Fig 15,16).

Conclusions

In conclusion the cause of death was certainly the cerebral haemorrhage from intracranial left vertebral artery laceration. The slender injuries found on the corpse, bring us to assume that the vessel lesion was caused by a very quick and abnormal movement of neck and head, determining extreme traction on the artery wall behind the tension maximum limit of the vessel and so its laceration.

This hypothesis was supported by the signalling of same similar cases published in international journals, in which the intracranial vertebral artery laceration was caused by minor traumas (also the whiplash), in absence of genetic diseases (such as Marfan and Elher-Danlos syndrome) or acquired diseases (such as aneurysm) of the vessel.

In this case the movement was determined, like to demonstrate in court, by three boys who landed some punches and lashed out at the victim. The sentence of first degree acknowledged boys' guilt, sentencing them to ten years' imprisonment.

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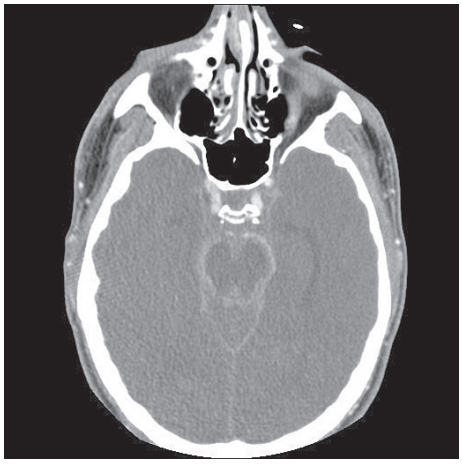

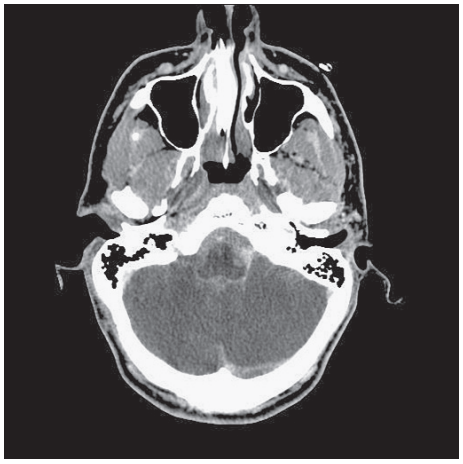

Figure 1,2 – brain CT scan: a massive brain haemorrhage, with the discharge of the contrast liquid from left vertebral artery with very abundant cerebral aedema.

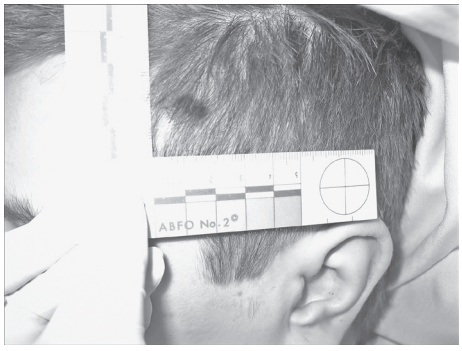

Figure 3 – a slender reddish abrasion at the left fronto-temporal region.

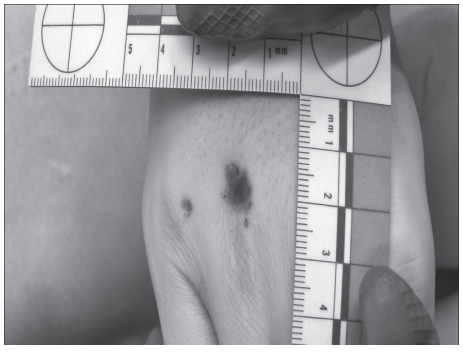

Figure 4 – little exchoriations at the right hand, in correspondence of the 3rd, 4th and 5th metacarpalphalangeal articulation

Figure 5 – the cadaver before the autopsy.

Figure 6 – irregular 8 x 5 centimetres ecchymosis at distal third of left arm, on posterior face.

Figure 7 – a slender haematic infiltration of left deep scalp tissues and left temporal muscle.

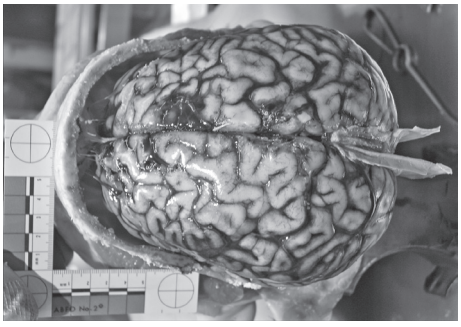

Figure 8 – in situ brain: a very abundant sub-arachnoid haemorrhage.

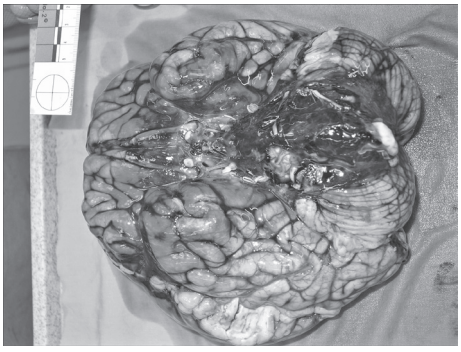

Figure 9 – isolated brain: cerebellum and brainstem haemorrhage.

Figure 10 – skin postero-median section: a slender haematic infiltration of median muscles deep fascicles and of its contiguos left portion.

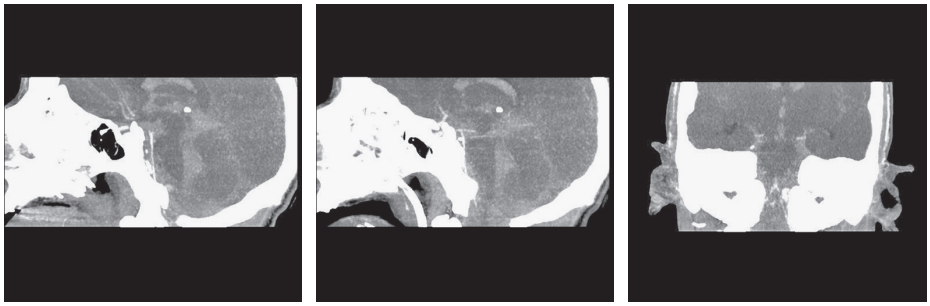

Figure 11-12-13 – ri-editing by neuroradiologist of CT scan done at the Bellinzona's Hospital; the specialist indicated us the probable point of vertebral artery laceration.

Figure 14 – the injection of water in left vertebral artery: the discharge of liquid from laceration.

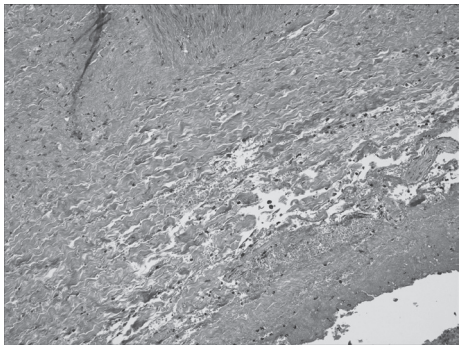

Figure 15 –histological examination (200x): normal vessel's wall of left vertebral artery.

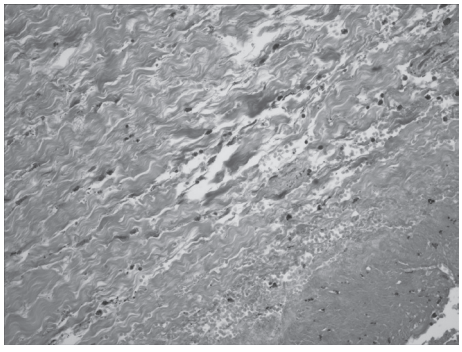

Figure 16 – histological examination (400x): further magnification of vessel's wall of left vertebral artery.