Abstract

Lesions after blunt cervical trauma could be, infrequently, associated with complications that require a discussion under clinical and legal medical point of view. Vertebral artery dissection as a serious consequence of a cervical trauma is a rare complication of patients with blunt injury mechanisms. Artery lesions could be frequently initially unrecognized or they may present a variety of symptoms ranging from a simple pain involving neck to ischemic lesions and cerebral ictus. Arterial dissection can cause ischemic stroke either by thromboemboli forming at the site of injury or as a result of hemodynamic insufficiency due to severe vascular stenosis or occlusion.
In medical literature several injury hypotheses which may cause a dissection of the arterial walls of vertebral arteries have been analyzed. Among them, repeated micro-traumatism which, acting on already altered wall, cause the dissection. Some jobs or sports are characterized by this risk because they imply frequent and repeated flexo-extension movements or head rotations. Also a single minor trauma, such as a blunt cervical trauma following car accident, could cause the dissection of the vertebral arterial wall.

The case reported concerns a 43 year-old man who suffered a bruising trauma following a car accident (a bumper-to-bumper crash with an articulated lorry). The reported symptomatology consisted of pain along the rachis and on the back on the neck and a diagnosis of cervical whiplash was made. After the worsening of the symptomatology, neurological tests revealed right hemiataxia and dysarthria. Succeeding MRI scanning with angiographic sequences revealed a dissection of the left vertebral artery with a hyperdense lesion of the right cerebellar hemisphere, as an outcome of an infarct in the area of a postero-inferior cerebellar artery. Vertebral artery stretch during trauma is a possible pathogenic mechanism that could explain some aspects of the whiplash symptom complex and serious consequences.

At the present this issue shows many controversial points from a pathogenetic point of view. The described uncertainties and the rareness of this kind of injury may explain the “superficiality” of a doctor giving first-aid to a patient with cervical whiplash and “generic” symptoms and it could be related to possible economical benefits consequent from insurance indemnity.

However the persistence of symptoms or the negative evolution of the same suggests that it wasn’t the “usual whiplash invented for compensation purposes” and that late complications of an injury of the walls of encephalic arteries must be taken into serious consideration specially under clinical point of view.

**Abstract**

Le lesioni derivate da un trauma da “colpo di frusta” possono essere, sia pure infrequentemente, associate a complicanze che per gravità non possono non rappresentare oggetto di discussione, oltre che dal punto di vista clinico, anche sul piano medico legale. La dissecazione della arteria vertebrale come conseguenza di un trauma cervicale è un evento raro, che, clinicamente può passare inosservata o presentarsi in modo improvviso con una sintomatologia variegata e causata dal semplice dolore al collo sino alla comparsa di lesioni ischemiche cerebrali e ictus. La dissecazione arteriosa a carico delle arterie vertebrali può determinare una lesione ischemica sia con meccanismo tromboembolico sia determinando un’insufficienza emodinamica dovuta a stenosi od occlusione. Rispetto alle modalità lesive sono state avanzate svariate ipotesi idonee a causare la dissecazione delle pareti vasali dell’arteria vertebrale. Tra queste vengono annoverati i microtraumatismi ripetuti, come avviene in alcune mansioni lavorative o in determinati sport, che, agendo su una parete già alterata, determinano la dissecazione. La lesione della parete vasale può anche derivare da un unico trauma, anche di relativa modesta entità, come nel caso del colpo di frusta del rachide cervicale.

Il caso in discussione tratta di un uomo di 43 anni che riportava un colpo di frusta del rachide cervicale a seguito di tamponamento da parte di un autoarticolato, essendo la vittima alla guida del proprio automezzo. Solo a distanza di qualche tempo le immagini dell’angio-RM rivelarono la dissecazione delle pareti dell’arteria vertebrale sinistra con gli esiti di infarto all’emisfero cerebellare destro, corrispondente al territorio della arteria cerebellare posteriore inferiore. Dal punto di vista ezio-patogenetico la spiegazione presenta ancora aspetti da chiarire e le relative incertezze che ne derivano, così come l’infrequenza di tali lesioni traumatiche, possono giustificare un comportamento "superficiale" da parte del sanitario che presta le prime cure e che nell’ottica di un trauma banale trascura segni obiettivi e strumentali utili a prevenire la successiva comparsa di complicanze. Tale atteggiamento è talora connesso al fatto che il colpo di frusta cervicale è troppo spesso associato alla ricerca di benefici economici a carattere risarcitorio da parte del paziente con o senza la compiacenza del medico stesso. Tuttavia il persistere di una sintomatologia o l’evoluzione negativa del caso deve far ritenere che non si tratti del “solito colpo di frusta” con finalità lucrative e l’insorgenza di un complesso di sintomi sospetti deve essere presa in seria considerazione prima di tutto sul piano clinico, oltre che, in seconda battuta, sul piano medico-legale.
Introduction
Vertebral artery dissection ad a consequence of a trauma occurs in approximately 1% of all patients with blunt injury mechanisms, and it could be frequently initially unrecognized or it may present a variety of symptoms ranging from a simple pain involving neck to ictus. Arterial dissection can cause ischemic stroke either by thromboemboli forming at the site of injury or as a result of hemodynamic insufficiency due to severe stenosis or occlusion (1).
In the most serious hypotheses, diagnosis is often rapid, while in the other cases subtle symptoms such as vertigo (57%), unilateral facial paresthesia (46%), cerebellar signs (33%) and visual field defects (15%) could produce initial diagnostic doubts related and they may imply also a wrong clinical assessment (2).
In medical literature several injury hypotheses which may cause a dissection of the arterial walls of vertebral arteries have been analyzed. Among them, repeated microtraumatism which, acting on already altered wall, cause the dissection: for example, it has been noticed that some jobs such as drivers or some sports such as tennis, sailing and archery are characterized by this risk because they imply frequent and repeated flexo-extension movements or head rotations (3).
The vessel wall injury may also derive from a single trauma, such as whiplash injury to the cervical rachis or manipulations of the rachis during chiropractic treatment. The first case is quite rare, while the second one is reported in many academic articles, perhaps also in order to point out the requirement of a specific technical training or to safeguard said technique from subjects who practice it without a qualification (4,5,6).

Case report
In Legal Medicine experience it is quite frequent to assess the outcomes of cervical whiplash. Almost all of them with limited permanent consequences, as shown by the studies with numerous events of this kinds. Sometimes and depending on the seriousness of initial injuries, some more complex cases are brought to our notice, as it is the case reported below. This case refers to a 43 year old man who suffered a bruising trauma following a car accident (a bumper-to-bumper crash with an articulated lorry). A diagnosis of cervical whiplash was made a peripheral hospital. The reported symptomatology basically consisted of pain along the rachis and on the back on the neck, in addition to an understandable state of anxiety related to the recent trauma.
The medical history did not reveal any previous illness, with the exception of moderate arterial hypertension. The patient led a normal life, did not regularly play any sport and had a sedentary job. After the impact, he did not lose consciousness. On his own admission, the visit at the hospital was mainly a precaution. The routine X-ray examination of the cervical rachis did not show any skeleton alterations, but only limited alterations due to arthrosis. He was prescribed to wear a rigid collar for approximately ten days and anti-inflammatory drugs in case of need.
On the days following the trauma, besides the persistence of the painful symptomatology, the patient started to show dizziness, sensation of visual acuity blurring and fatigue. The doctor prescribed a further period of rest and pain-relieves in case of need. In order to spent a period at rest, the patient stayed in a resort for a short time. Worried by the worsening of his symptomatology, he went to a nearby hospital where he underwent some neurological tests, which revealed right hemiataxia and dysarthria. An MRI scanning with angiographic sequences revealed a dissection of the left vertebral artery with a hiperintense lesion of the right cerebellar hemisphere, as an outcome of an infarct in the area of the postero-inferior cerebellar artery. He was treated with just a symptomatic therapy and rest, as previously recommended. Close clinical follow ups revealed a favourable evolution with minimun cerebellar signs.
In his report, forensic doctor admitted the causal relationship with the car accident and an indemnity. The causal relationship between the accident and the vascular injury was justified in particular with a criterion of chronological order and on the basis of the lack of provable pre-existing vascular alterations which could explain the artery injury.

Discussion
The case analysis cannot set aside anatomical reference which are indispensable to explain the dissection of the arterial wall.
The course of vertebral arteries renders them particularly vulnerable to injury from mechanical trauma. In general, from their entry at approximately C6, the vertebral arteries ascend within the transverse foramina of the cervical vertebrae, where they are enclosed and relatively fixed. They are thus protected for most of their extracranial course until their exit from C2. To damage to this part of vertebral artery required large traumatic forces. The artery passes through the C2 intervertebral foramen to the more laterally located intervertebral foramen of C1. At their exit from C2, the vertebral artery is exposed to large shear and tensile forces during cervical movement, in particular rotation and lateral flexion.

The walls of the vertebral artery, like all human blood vessels, consist of three layers and the composition of the vertebral artery varies among its length, probably in response to the different demand along its course. The different stiffness of each of the three layers may contribute to the complications from minor trauma as well as from manipulation (7) or whiplash trauma (8), even though the review of the literature has led to criticized this kinds of conclusions.

Therefore, Haneline et al (9), maintained that a healthy vertebral artery cannot be damaged by traumas of this order (the author refers in particular to chiropractic manoeuvres, whose “damaging capacity” is assimilated to that of cervical whiplash).

As far cervical whiplash is concerned, it has been highlighted that several symptoms related to it cannot always find a valid explanation. However, it has been assumed that vertebral artery stretch during trauma is a possible pathogenic mechanism that could explain some aspects of the whiplash symptom complex (9).

According to Bassi and Lattuada (10), also in the forms with a traumatic aetiology such as those under discussion, the dissection of the arterial wall presupposes a pre-existing anomaly on it, or even a genetic predisposition related to connective tissue disorders (10,11).

**Conclusions**

At the present the issue shows many controversial points from a pathogenetic point of view. The described uncertainties and the rareness of this kind of injury may explain the “superficiality” of a doctor giving first-aid to a patient with cervical whiplash and “generic” symptoms, such as those reported in the case under discussion. This not careful behavior is not guilty and could be related to possible economical benefits consequent from insurance indemnity.

However the persistence of symptoms or the negative evolution of the same must suggest that it wasn’t the “usual whiplash invented for compensation purposes”.

This conclusion is also related to the act n.27/12, which reformed the article n.139 of "Codice delle Assicurazioni" (relating insurance liability), with the aim of restrict abuses and unjustifiable economical benefits.

In the case reported, the conclusion was definitely favorable and the case was resolved also under the point of view of medical jurisprudence. However late complications of an injury of the walls of encephalic arteries must be taken into serious consideration specially under clinical point of view.
References


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