

COMPLEX MECHANISMS IN ROAD TRAFFIC ACCIDENTS CONCERNING PEDESTRIANS. A CASE STUDY

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Abstract

Pedestrian injuries vary according to vehicle type, position during the accident, and pedestrian's age, thus determining complex aspects by associating multiple types of traumas. In forensic practice, it should be noted that the lesion-producing mechanisms recorded among pedestrians are most frequently mixed, reason for which a correct and careful examination of the victim must be supported by the characteristics of the vehicle involved in the accident, as well as by other elements at the crime scene. It is necessary to thoroughly examine the injuries, an analysis that should always be characterized by a dynamic interpretation, directly related to the mechanism of accident occurrence, with case-by-case individualization, to result in the clarification of conditions difficult to grasp at a superficial interpretation. This article aims to briefly review the main lesion mechanisms in case of pedestrians, to emphasize on the importance of understanding the complexity of these injuries, in order to elucidate – as accurately as possible – the circumstances of such an ill-fated event.

Keywords: *forensic practice; pedestrians' injuries; lesion-producing mechanism*

Introduction

Road traffic accidents are among the main topics in the field of medicine, due to the frequency, gravity, and therapeutical methods encountered concerning them. It is well-known that they affect the active age group; they account for the first cause of death among young people [1].

The entire evolution of the automobile – higher speeds, materials, new components – has led to an increase in the complexity of lesion-producing mechanisms during road traffic accidents. The role of the coroner/ME thus becomes a major one, along with the role of judiciary bodies, in order to determine the causality of accident-producing mechanisms as accurately as possible.

The subject of forensic expertise is represented – first of all – by the body lesions observed at an accident's victim, in relation to the various situations at the scene, to the type and particularities of the vehicle, as well as to a series of additional examinations (the examination of clothes, of alcohol level; the examination of various biological traces, etc). Highly detailed and thorough examinations of the aforementioned avoid errors that may entail a wrong legal classification of the offences [2-5].

A complete and thorough analysis of the lesions displayed by the victim is conducted mostly when an expert must assess a traumatised body, in the absence of the circumstances and the conditions where the lesions occurred, as well as of the victim's history.

This paper represents a brief overview of the main lesion-producing mechanisms regarding pedestrians involved in road traffic accidents; it aims at highlighting the importance of

identifying and understanding the manner in which the lesions occurred, in order to clarify the circumstances of such an ill-fated event as accurately as possible.

Pedestrians' lesions - the analysis of the lesion-producing mechanism

The lesions of pedestrians are different depending on the type of vehicle, on the person's position at the time of the event, and on the height of pedestrians, thus determining complex aspects by associating several types of traumas, the mechanism of which is in most cases associated and which – once explained – leads to the elucidation of the road traffic accident.

The data resulted from the investigation at the scene – either by the competent bodies or by the coroner – can be extremely useful. At the place of the impact (between the vehicle and the body) the clothing may have traces of oil, rust, paint, just as on the involved part of the vehicle – spoiler, radiator, wing, etc. – one may find fibres from the victim's victim, traces of blood, hairs, and other biological products.

The consistency between the lesions and the impact level must be researched and studied, just as that of the print-like lesions left by the vehicles on the body (traces of tires, headlights, radiator, etc.) or left by the body on the vehicle (e.g., the trace of the head on the windshield, biological blood traces, tissues). Suspicious biological traces will be sampled from the vehicle, as well. All of the aforementioned actions are meant to determine the human origin, the gender, the identity of the victim, etc.

Pedestrians are often hit, run over, thrown in the air and even hit a second time; hence, it is very difficult – from a forensic standpoint – to determine the lesions incurred in each sequence.

Collision is the most common mechanism encountered. The lesion is featured at the level of the impact area between vehicle and the victim's body. The morphology, topography, and gravity of these lesions depend on the speed of the vehicle, on their type, and on the victim's particularities.

During the external examination of the body, mostly when the victim is wearing winter clothes, lesions can be minimal. Hence, the anatomical formations must be sectioned deeply in order to determine their precise character and extent. They are often represented by superficial ecchymoses and/or excoriations, the shapes of which can mimic the fabric of the victim's clothes. When they are absent, the coroner cannot certainly determine the victim's position at the moment of the impact: with the back to the vehicle; facing the vehicle; to the right, to the left, or in parallel with the vehicle [3].

Depending on the part of the vehicle concerned by the impact, the lesions can be localised at various levels. In this respect, those involving the spoiler are always low, at the level of the lower limbs; the spoiler width is accurately illustrated through an ecchymosis, an excoriation, or even hematomas and fractures. When impact occurs at the level of the wing, the upper third of the limbs or the pelvis are impaired, depending on the type of vehicle (car/truck). When the victim wears winter clothes, lesions are barely perceptible; upon the external examination, a simple non-homogeneous ecchymosis may be noted, (it can also feature deep hemorrhagic infiltrates when tissues are sectioned).

Special attention must be paid to the primary lesions produced by the impact with rear part of trucks or with their corner. The resulted lesions are very serious, given that they affect all anatomical elements (soft areas, bones, and contents); they are usually located on the sides of the head, (on rarer occasions, in the occipital or frontal area). In this case, a new issue arises: differential diagnosis with the blunt force lesions produced by an active blow using a blunt object (aggression, homicide, etc.), including the producing mechanism as such. Depending on topography, the most common localisation concerning blunt force is at the level of the vertex.

Passive blow injuries concern usually the anteroposterior or lateral areas and they are generally unique [4-8].

The radiator or mask of trucks causes lesions that – upon external examination – imitate accurately and entirely the structure and form, thus representing an essential piece of information in the identification of the vehicle, in case of accidents with unknown author.

The collision effect may be followed by falling. This mechanism is present only in case of very low speed of the vehicle responsible or in case of collision on a very small surface. The type, the localisation, and the level of the lesions are similar to those resulted from collision/throw mechanism; the craniocerebral lesions are rarer and less severe. Usually, the lesions are not lethal. During the falling phase, victims react in diverse manners: with natural defence reactions, thus featuring air twists (rotations), making it possible to fall on the side of the collision.

When the vehicle has a great speed upon the moment of the accident – namely, over 40-50 km/h – the collision is full; there is no time for braking and the victim is thrown several meters away. Logically, the resulting lesions will be all the more serious – most often fatal – as the crashing speed is higher, hence the throwing follows. The severity degree of the throw-caused lesions depends on the surface on which the victim is thrown, as well as by the speed of the vehicle, determining a certain throwing force of the body. In this respect, higher velocity – implicitly entailing a higher kinetic force on the body – along with a rough and irregular falling surface causes lesions with maximum gravity, polymorphism, and size. On the other hand, the lower the speed of the vehicle – and the force on the body, implicitly – and the more buffering falling surface (water, snow), the less intense and less extended lesions; they may even be absent.

From a morphological and topographical perspective, the throwing-caused lesions are encountered most commonly at the level of the head, followed by the thorax and then by the rest of the body segments. Head injuries may be a first indicator for the coroner, suggesting that the lesions were due to the compression mechanism. These lesions are featured in the focal point; the skull may even be deformed on one side, sometimes appearing as a flattened skull, with single or multiple concussion wounds, with weak vital character, featuring numerous splinters penetrating the soft pericranial issues, through which the cerebral substance herniates. In what concerns the thorax, the throwing-caused lesions can be mistaken for compression lesions or height-falling lesions. These aspects are important to know mostly when we are dealing with bodies left on public roads or dissimulated as such (intentionally left on public roads). Hence, we may notice rib cage deformities, with the presence of excoriations or bruises on the body. The post-mortem internal examination points out unipolar sanguine infiltrates (in compression, they are bipolar) at the level of thoracic soft tissues, mostly subjacent to prominent areas (in compression, this repartition is no longer present), multiple rib fractures (never all of them), on one line bi- or unilaterally (in compression, they are always bilateral and fractured on two lines, often impairing all ribs). The lesions of the internal organs are more intense in a compression, with lung, vessels, and bronchial ruptures; during a fall, bronchial ruptures are dominant; whereas throwing leads to pulmonary ruptures. In a fall from a height, the impact usually concerns one of the sides; ribs do not feature fractures grouped on one line and very seldom bilaterally. It is necessary to corroborate these elements with the rest of the featured lesions, as well as with the data collected from the research conducted at the scene.

The distance to which a victim is thrown depends on the victim's angle upon the impact and while being thrown in the air. Dynamic studies have been carried out in relation to the throwing distance; they have reported that – at a speed of 50 km/h – a victim's position in an angle of 45 degrees leads to a throwing distance of around 20 meters [5-10]. A victim's angle of 45 degrees during the impact determines the greatest throwing distance. In this case, the throwing-caused lesions are extremely serious, due to the significant kinetic force provided to the body.

Most often, they are represented by craniocerebral traumas, chest and abdomen lesions. The analysis of this types of lesions along with the clarification of the lesion-producing mechanism – depending on the type of vehicle – are of an even greater importance in case of hit-and-run accidents.

The impairment of the vertebral column can occur during both the impact and the throwing phase. The localization of blunt fractures is diverse, depending on the level of the trauma, while those produced by throwing are more frequent at the level of the spine [6, 11-17]. A throwing of the vertex leads to the hyperflexion of the vertebral column, thus causing a fracture at this level; thus, we may only find fractures of the vertebral arches or vertebral dislocations through the rupture of ligaments, leading to the medullary compression or dilaceration. The impairment of the dorsal spine is rare; usually, just one vertebral body is affected, as a consequence of the irregular throwing plane. It may be associated with rib fractures, limited to a couple of ribs and localised paravertebrally. Direct blow may produce vertebral fractures when the trauma is significant, when the weight and the speed of the vehicle are great, while the throwing phase is very powerful. Spine lesions can also be due to the irregularity of the ground where pedestrians fall, along with the position of landing off or even due to the contraction of the various muscle groups during the trauma.

The runover-compression lesions are extremely serious and they almost always lead to death. In case of the cephalic extremity, it is completely crushed. We encounter ecchymoses and excoriations with particularities similar to those of the vehicle wheel and a series of cracked, even scalped wounds. Due to the intracranial pressure, the cerebral substance comes out through the wounds formed. The head is flattened and pressed down; hence, the identification represents a difficult matter. The craniofacial portion coming in contact with the ground features diverse ecchymoses and excoriations, more seldom wounds. In case of chest compression, rib fractures are featured, the fragments of which may puncture the heart and the lung, entailing secondary hemothorax and hemopericardium.

Children have a more elastic rib cage; thus, they may not display bone lesions, but injuries incompatible with life (ruptures of organs, lung, heart, bronchia, trachea, aorta, oesophagus). In case of abdominal compression, lesions may not be discovered during external examinations; very seldom, the coroner may find a couple of excoriations or ecchymoses. It is worth highlighting here sanguine infiltrates at the level of the dorsolumbar area by sectioning the soft paravertebral tissue. Compression is undergone by the organs, thus leading to ruptures and explosions of cavitory organs, which entails immediate death. Furthermore, special attention must be paid to the solar plexus. The pelvis and the organs comprised in the abdomen are injured constantly in case of double-tired vehicles; particular elements may be featured, such as the following: fractures of the last rib pairs; increase in the size of bicrete and bispinous diameters with fractures localized at the level of the sacroiliac, ischiopubic joints, pubic symphysis. The appearance of the bone lesions at the level of the pelvis may cast doubts: it is necessary to know that in a fall from a height, the sacroiliac fractures are usually unilateral and more frequently ischiopubic [6].

In case of vehicles with metal wheels, we often notice complete sectioning; the contact with the body may still be present through cutaneous flaps, due to the extraordinary skin elasticity, featuring remarkable resistance during rollover by the wheel. In this case, extended parchmentlike areas are featured, which requires a careful analysis of the vital response, in order to identify a potential dissimulation.

There are also less frequent mechanisms, such as minor collisions and dragging. Whereas concerning the dragging mechanism, the lesions are somewhat typical, in what concerns the minor collision mechanism, it is very hard to prove them from a forensic perspective. The gravity

of the trauma is provided by secondary lesions, produced by falling or getting thrown in the air; those due to the minor collision may be absent. However, the minor collision injuries can be represented by fine ecchymoses or excoriations situated on the sides of the limbs, corresponding to the height of the vehicle responsible.

Regularly, the dynamic of the victim's body during a road traffic accident depends on the impact level: below the barycentre, at the level of the barycentre, and above the barycentre.

The most common road traffic accidents are those where the impact occurs below the barycentre, situated below the abdominal area, case in which the lesions are produced in three successive phases: hitting, swinging, and throwing. A victim's calf is the main localisation of the hitting lesions and – depending on the impact force – one may point out ecchymoses, hematomas, wounds, and fractures situated on the same side as the impact. Often, the distance from the focal point of the fracture and the victim's heel corresponds to the height of the vehicle's spoiler, but one also has to consider the error factor represented by the reduction of the height between the ground and the spoiler while braking. We encounter frequently the uni- and bilateral calf fractures with a triangular comminuted fragment, based in the direction from which the impact occurred. It must be taken into account that the moving direction of the fractured fragments provides important indicators concerning the position victim/car upon the moment of the accident.

Over time, the vehicles have acquired a rounded shape; hence, the print-like lesions – playing the role of marker – are encountered ever more rarely. Therefore, in case of old vehicles, the lesions may have the appearance of a typical print left by the light, the radiator, or certain metallic ornaments.

The swinging lesions cause – most frequently – the victim's death. The initial position of the body is vertical and – by hitting by the spoiler of the vehicle – the body is practically thrown and laid on the vehicle hood, which continues its ride. At this point, the hood – especially the windshield and its rim – cause very serious craniocerebral traumas. Wounds at the level of the scalp are deep; skull fractures feature important gouges; they are multi-splintered and the subjacent cerebral substance is also impaired. This sequence also features similar lesions to the falling injuries; lesions at the level of prominences, frequently situated at the level of palms, elbows, dorsal side of the hands and knees. The vehicle may run over the victim when the speed is high; the victim may be found behind the vehicle.

The throwing-caused lesions are most frequently localised on the opposite side of the impact lesions with the vehicle. However, in rather many situations, when a victim rolls on the ground, lesions are dispersed on the entire body.

The severity degree of the throwing-caused lesions depends on the surface on which the victim is thrown, as well as by the vehicle of the vehicle, providing a certain throwing speed to the body. In this respect, higher velocity – implicitly entailing a higher kinetic force on the body – along with a rough and irregular falling surface entails lesions with peak gravity, polymorphism, and size. On the other hand, the lower the vehicle velocity – and the force on the body, implicitly – and the more buffering falling surface (water, snow), the less serious and less extended lesions; they may even be absent.

It may even be stated that sometimes it is difficult to determine the accident-producing mechanism, due to the throwing lesion polymorphism, along with the chaotic distribution of the lesions produced in the first two sequences. Once more, we emphasise on the importance of getting to know the details related to the scene and of correlating them with the victim's lesions, in order to determine accurately the dynamic of road traffic accidents.

Collision at the level of the barycentre appears either when the vehicle is taller (truck, bus), or when the victim is shorter. There are two successive mechanisms, namely: collision and throwing.

Collision occurs at higher level or at the level of the femur or of the pelvis, respectively. Some statistics state that incidence is higher in case of ischiopubic fractures. Throwing in this type of impact is direct; it does not involve swinging, which would take over a lot of the kinetic energy transferred onto the body. Whereas swinging provides the victim's body with an irregular motion, thus mitigating significantly the seriousness of the lesions produced in this stage; in case of collisions at the level of the barycentre, its absence makes the throwing direct, with maximum transfer of kinetic energy from the vehicle onto the body and with providing a regular and lanyary motion to it.

Collision above the barycentre is mostly encountered among children, given that they are shorter. In this case, too, there are two sequences of the trauma: collision putting the victim's body to the ground, followed by runover.

The most commonly affected area by the collision is the thoracic region, namely spinal fractures and rib fractures, which may cause pulmonary lesions, through the puncturing of fractured rib fragments. Besides this area, we may also observe upper limb impairments, the most common being the humerus fracture. This stage may produce itself lethal lesions and, when this does not occur, the next stage – runover – has the role of completing the death-causing character.

Case presentation (part of the personal forensic docket)

Investigation data include the following: R.G., male, aged 45; he was hit by a Peugeot vehicle during a passing manoeuvre. R.G. was pronounced dead at the scene

The external examination of the body highlights the following signs of violence:

Right hemifacies:

1. fronto-temporo-zygomatic bone prominences – excoriated, discontinuous papules, light red hue, with similar shape to a demilune; medial concavity measuring 19/6 cm; big cranio-caudal axis with temporo-zygomatic highlight; covered by a thick hematic crust (Fig. 1);

2. outer ear (auricle), median third of the helix – discontinuous excoriation, measuring 3 cm in length, covered by hematic crust;

3. dental avulsion 1:1 with hemorrhagic gum infiltrates (Fig. 2);



Fig. 1. Excoriations covered by a thick hematic crust



Fig. 2. Dental avulsion 1:1

Left hemifacies:

4. outer third eyebrow arch – solution of superficial continuity, with demilune shape; superolateral concavity, featuring minimum dehiscence of 0.1 cm, with a length of 1.5 cm, covered by thick dark-red hematic crust (Fig. 3);

5. temporal process – irregular light-red excoriation, measuring 2/3 cm, with the big transverse axis;

6. outer ear (auricle), median third of the helix – solution of superficial continuity, with bruised edges, covered discontinuously by reddish hematic crust, with a length of 4 cm;



Fig. 3. Superficial wound

Right hemibody:

7. right upper limb, median ½ lateral edge of the arm – pale-purple ecchymosis, with irregular and non-uniform shape, with edges diffusing in the perilesional tissues, measuring 5/2 cm, with the long axis transverse and slightly oblique, ascending from right to left;

8. iliac crest – excoriated papules (more or less rectangular shaped, with irregular edges), well-delimited, red-yellowish hue, measuring 10/7 cm, with the long axis parallel with the one of the iliac crest (Fig. 4);

9. inferiorly from the internal malleolus – solution of superficial continuity, well-delimited, with more or less of an oval shape, measuring 3/1 cm, with the long axis oriented obliquely, ascending from right to left (Fig. 5);



Fig. 4. Excoriated areas



Fig. 5. Superficial wound

Left hemibody:

10. clavicular – light-red discontinuous excoriated papules, measuring 17/6 cm, with the long axis obliquely oriented, ascending from right to left, extending on an area with visibly elevated irregular and purple teguments; inferolaterally, teguments are pale-purple, on a surface of 7 cm²; elevation is maximum at acromioclavicular level, namely 3 cm (Fig. 6);

11. left upper limb in 30°-angle abduction and minimum internal rotation;

12. iliac crest – excoriated dark-red papules, more or less oval shaped, well-delimited by the adjacent tissues, measuring 10/5 cm, with the long axis situated along the iliac crest (Fig. 7);

13. posteriorly and inferiorly from the external malleolus – 2 solutions of superficial continuity, well-delimited by the adjacent tissues, oval shaped, both measuring 2/1 cm, with the long axis oriented obliquely, descending from right to left in case of the posterior one and with the long axis obliquely oriented, ascending from right to left, in case of the inferior one;



Fig. 6. Pale-purple teguments with excoriated areas



Fig. 7. Excoriated dark-red areas

Various signs:

- bilateral hypochondrium, right side, and right iliac fossa, lateral edge median third of the right lower limb: multiple dehydrated reddish-yellow areas, with rather regular shape, well-delimited by the adjacent tissues, featuring irregular shapes, measuring between 3-6/4-10 cm (Fig. 8);

- periumbilical area: discrete reddish-yellow papules, with the appearance of parallel strips, some of them punctiform on certain areas, with the long axis obliquely oriented, ascending from right to left and measuring 28/15 cm;



Fig 8. Multiple dehydrated reddish-yellow areas

Head and cranial cavity:

The soft epicranial tissues parietally bilaterally display slight and discontinuous hemorrhagic infiltrates, on a surface of 1 cm² on the right side, and 7 cm² on the left side; for the rest, the soft epicranial tissues have a pink-whitish hue on the internal side; they are shiny and moist and they include multiple irregular – some intertwined – purple petechia; temporal muscles are reddish-brown, with fibrillary appearance in section, intact except for the lower third of the left temporal muscle which features a slight hemorrhagic infiltrate;

The leptomeninges is smooth; it lost transparency and shine; its entire surface is reddish (Fig. 9);

The brain displays flattened circumvolutions and fuzzy intergyral spaces; in section, petechial rushes are noticed, but they disappear after washing down with water;

The entire surface of the cerebellum and of the brainstem is reddish; in section, small petechial rushes are present, but they disappear after washing down with water; the medulla is completely sectioned at the level of the foramen; at this level, small petechial rushes are present, but they fail to disappear after washing down with water, given that the area is tumefied (Fig. 10);



Fig. 9. Reddish leptomeninx



Fig. 10. Reddish brainstem and cerebellum with petechial rashes

The thorax and the thoracic organs:

The soft thoracic tissues and the left skeletal muscles are massively infiltrated on the posterior side; the right ribcage features the following fractures: C1 rib 2 cm paravertebrally, C2 rib on the posterior axillary line and the paravertebral line; and C3 rib axillary on the paravertebral line, all of them with hemorrhagic infiltrate. The left ribcage also displays fractures: on the parasternal line C1 rib; on the anterior axillary line the following ribs: C3, C4, C5, C6, C7, C8, C9; on the median axillary line the following ribs: C1, C2, C3, C4, C5, C6, C7, C8, C9, C10; on the posterior axillary line the following ribs: C3, C4, C5, C6, C8, C9, all with massive hemorrhagic infiltrates. At the level of the left hemithorax, multiple bone fragments are present, (they penetrate the pleural cavities and the pulmonary parenchyma) (Fig. 11);

The oesophagus has a white-greyish mucosa; the posterior wall features hemorrhagic infiltrate in the upper half; the lumen is free;

The lungs are anaemiated and their consistency is spongy; elasticity and crepitations are reduced; upon sectioning and expressing, fluid blood drips in a very small amount; the costolateral side of the left lung displays multiple solutions of continuity, with dilacerated edges, continuing in the intraparenchymal area on a length of 1-2 cm, consistent with the afore-described rib fractures (Fig. 12);

The upper side of the diaphragm corresponding to the right hepatic lobe displays hemorrhagic infiltrates on a surface of 5cm²;



Fig. 11. Ribcage fractures



Fig. 12. Multiple solutions of continuity of the left lung

The abdomen and the abdominal organs:

The abdominal wall is intact; the peritoneal cavity is free; the parietal and the visceral peritoneum are intact; the psoas minor and psoas major muscles, the iliacus and the quadratus lumborum muscles feature massive hemorrhagic infiltrates, especially on the left side (Fig. 13);

The liver has a thin, transparent capsule; the right hepatic lobe lost its structure; the consistency is low on a surface of 10 cm²; for the rest, the surface displays a reddish-purple colour; in section, the parenchyma has the same colour; the lobular structure is present (except for the right hepatic lobe), from which red-blackish fluid blood drips, in a minimum amount (Fig. 14); The spleen has a very low consistency, of a reddish-purple hue; 80% of the structure is lost, mostly on its left side (Fig. 15); The perirenal fat features massive hemorrhagic infiltrates bilaterally, especially on the left side; kidneys decapsulate easily, leaving a smooth and anaemiated decapsulation surface; in section, they are pale brown; the cortico-medullary limit is partially blurred (Fig. 16);



Fig. 13. Massive hemorrhagic infiltrates in muscles



Fig. 14. Hepatic ruptures

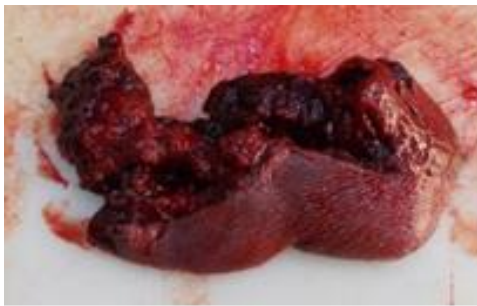


Fig. 15. Spleen dilacerations



Fig. 16. Perirenal fat with massive hemorrhagic infiltrates

The skeleton:

The bones of the pelvis and of the limbs appear intact, except for the left acromioclavicular joint, where abnormal mobility – with multiple bone crepitations – has been observed spontaneously; at this level, the muscle tissue has massive hemorrhagic infiltrates.

The vertebral column features cervically a transverse bone discontinuity – at atlanto-axo-occipital level – with right anterolateral dehiscence, with hemorrhagic infiltrate and with blurred edges, diffusing in the perilesional tissue.

The requested additional examinations comprised histopathological examination and toxicological examination.

Consequently, the forensic report has determined that the death was violent. It was caused by the atlanto-axo-occipital disjunction, accompanied by the brainstem cross-sectioning. The traumatic lesions occurred through collision-runover, followed by the victim's dragging, during a road traffic accident. There is a direct cause relationship between the traumatic lesions and the

subsequent death. The toxicological examination did not show the presence of ethylic alcohol (zero blood alcohol level).

Conclusions

In forensic practice, it is important to consider that the lesional mechanisms encountered among pedestrians are most commonly mixed and complex, reason for which an accurate and careful examination of the victim must be also supported by the characteristics of the vehicle involved in the accident, as well as by other elements featured at the scene.

Upon synthesising the aforementioned aspects, the importance of getting to know various lesional particularities featured in road traffic accidents becomes obvious. In all cases, it is mandatory to research the crime scene, the particularity of the vehicle having produced the accident, the local conditions, as well as the causes of the accident.

In this respect, it is essential to examine the lesions thoroughly; we should always interpret them dynamically, in direct correlation with the accident-producing mechanism, with case-to-case individualizations, all in order to clarify certain conditions that often appear unclear and difficult to grasp at a superficial interpretation.

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