МОРФОЛОГИЧЕСКОЕ ИССЛЕДОВАНИЕ ПО УСТАНОВЛЕНИЮ МЕХАНИЗМА, ПРИЖИЗНЕННОСТИ И ДАВНОСТИ ОБРАЗОВАНИЯ ПОВРЕЖДЕНИЙ ПОЧЕК ПРИ ТУПОЙ ТРАВМЕ ЖИВОТА

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Аннотация: Почки являются одним из наиболее часто травмируемых органов забрюшинного пространства при травме живота тупыми предметами. Основная задача судебно-медицинских исследований при механических повреждениях — установление механизма, прижизненности и давности образования травмы.

Ключевые слова: *тупая травма, повреждение почки, разрыв почки, морфология, патоморфология.*

QORIN BO‘SHLIG‘INING TO‘MTOQ SHIKASTLANISHI BILAN BUYRAK SHIKASTLANISHINING MEXANIZMINI, HAYOTIYLIGINI VA DAVOMIYLIGINI ANIQLASH BO‘YICHA MORFOLOGIK TADQIQOTLAR

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Annotatsiya: Buyraklar qorin bo‘shlig‘i to‘mtoq narsalar bilan shikastlanganda retroperitoneal bo‘shliqning eng ko‘p shikastlanadigan organlaridan biridir. Mexanik shikastlanishlar bo‘yicha sud-tibbiy tadqiqotlarning asosiy vazifasi shikastlanish mexanizmini, hayotiyligini va davomiyligini aniqlash.

Kalit so‘zlar: *to‘mtoq travma, buyrak shikastlanishi, buyrak yorilishi, morfologiya, patomorfologiya.*

MORPHOLOGICAL STUDY TO DETERMINE THE MECHANISM, VIABILITY, AND AGE OF KIDNEY INJURIES IN BLUNT ABDOMINAL TRAUMA

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Annotation: Kidneys are one of the most frequently traumatised retroperitoneal organs in abdominal blunt force trauma. The main task of forensic investigations in mechanical injuries is to establish the mechanism, viability, and age of trauma formation.

Keywords: *blunt trauma, kidney injury, kidney rupture, morphology, pathomorphology.*

Introduction: The kidneys are one of the most frequently traumatised retroperitoneal organs in abdominal blunt force trauma [2]. The main task of forensic investigations in mechanical injuries is to establish the mechanism, viability and age of injury [1]. In recent decades, there have been works devoted to kidney injury, but the morphology of injuries of this organ remains unexplored to solve the question about the peculiarities of the mechanisms of eye injury formation [3]. Besides, in the literature [4] there are no reliable criteria by which it is possible to establish the lifetime and age of formation of kidney injuries, including taking into account the influence of some additional factors, such as shock, on the development of reactive changes. Pathomorphological assessment of reactive changes, inflammation, regeneration and organisation of injured tissues is the basis for expert determination of the viability and age of formation of mechanical injuries [5]. Assessment of the revealed pathomorphological changes, which are formed in different terms of the posttraumatic period, is carried out taking into account the peculiarities of responses to trauma, developing in the body [6]. The association of bone lesions in diabetic patients with the underlying disease is confirmed by studies in a population of diabetic children. Dystrophic changes have been found in tubular and flat bones [7]. In most cases, there is delayed bone age, delayed bone ossification, and osteoporosis, most pronounced in children with a severe course of the disease [8]. However, according to most researchers, osteopenia is the earliest sign of bone system damage. In recent years, the number of cases of sudden death against the background of the development of diabetes mellitus has been increasing.

The aim: To investigate a morphological comprehensive survey to establish the mechanism, viability and age of kidney injuries in blunt abdominal trauma.

Methods: The data from 30 experimental studies on the modelling of kidney injury on an isolated organ were analysed. The obtained morphological data were compared with those from practical expert observations with known circumstances of trauma. To reveal the signs indicating the lifetime and age of trauma, pathomorphological changes in 60 cases of kidney trauma with different durations of the posttraumatic period were evaluated. The peculiarities of inflammatory morphodynamics were established by employing comparative analysis of pathomorphological changes in soft tissue haemorrhages (in the projection of the injured kidneys) and in the parenchyma of the injured kidneys, taking into account the duration of the period from the moment of injury and before death. Kidney trauma may be accompanied by massive blood loss. At the final stage, we compared the revealed pathomorphological changes on practical and experimental materials. The mean values, their errors and the reliability of differences (Student's t-criterion) were calculated. To reveal the peculiarities of mechano- and morphogenesis of injuries in kidneys at blunt trauma we analysed the sectional material of the thanatological department of the Andijan Regional Bureau of Forensic Medical Examination obtained from 60 corpses of persons who died as a result of mechanical trauma accompanied by kidney injuries. Kidney damage was associated with blunt trauma to the body as a result of various transport accidents, falls from heights, as well as the impact of hard blunt objects with a limited traumatic surface.

Results: It has been established that in 52% of observations in the presence of kidney injuries, there were no external injuries in the projection of the organ location. Experimental studies on isolated organs and sectional observations with known circumstances of trauma allowed us to determine that the character of kidney injuries reflects the main types of deformation, which the organ undergoes at the moment of trauma. Morphological features of injuries in the zone of compression and stretching of the kidney parenchyma help to establish the specific mechanism of injury formation. It has been established that stretching of the kidney parenchyma is characterised by the formation of ruptures with even, steep, well-matched edges, and rupture of the capsule corresponding to the rupture of the parenchyma. The walls of the ruptures reflect the structure of the kidney in the form of columns, with the formation of ruptures of the capsule and kidney parenchyma occurring parallel to the main rupture. The process of kidney compression is characterised by the formation of ruptures with irregular edges and elements of kidney tissue crushing, inconsistency of the capsule damage with the organ parenchyma damage, and the structureless surface of the parenchyma damage with small scattered areas of columnar structure. As a result of this work, an algorithm for describing kidney injuries is proposed, taking into account the structure of the organ and its anatomy-topographical features. In the research part of the 'Expert's Conclusion' it is necessary to describe all lesions of skin and soft tissues of the lumbar region revealed during external examination.

When describing the traumatised kidney it is necessary to indicate the following: a) localisation of each of the detected injuries about anatomical formations of the organ: surface, pole, edge, relation to the gate; b) orientation of the longitudinal aspect of each of the detected injuries; c) nature of the injury: haemorrhage, capsular fissure, rupture, tear, detachment, fragmentation, crushing; d) shape of the lesion, applying the generally accepted geometric terminology; e) size: length, width, depth; f) morphological properties of the lesion: nature of edges, ends, walls and bottom of the rupture; g) integrity of the kidney capsule (if the capsule is damaged, the ratio of the capsule rupture to the parenchyma). It should be noted that morphological signs characterising the zones of compression and stretching are more clearly defined during the examination of the kidney previously fixed in 10% neutral formalin. At microscopic examination performed within the period up to 1 h, in the zone of the injured organ, haemorrhage with clear contours of erythrocytes, walled location of single neutrophils in microvessels and perivascularly is observed. In the period from 1 to 3 h, a focal perivascular leukocytic reaction with irregular distribution of neutrophils is formed. In addition, vacuolated dystrophy of the proximal tubule epithelium and focal necrobiotic changes are detected. In the period from 3 to 6 h, there is haemolysis of form elements in the central part of the haemorrhage, fibrin masses prolapse, diffuse leukocytic infiltration, as well as increasing volumetric density of destructive changes in the epithelium of proximal tubules, exceeding 50%. In the period from 6 to 12 h, we observed the expansion of the perifocal zone of posttraumatic haemorrhage, and leukocytic infiltration with an increase in the number of macrophages, as well as a significant increase in the severity of diffuse leukocytic reaction in the area of haemorrhage. In the period from 12 to 24 h, the formation of a pronounced polymorphous cellular reaction with a predominance of neutrophils in the infiltrate, as well as an increase in the volume density of destructive changes in the epithelium of proximal tubules exceeding 80% was detected. Comparative evaluation of pathomorphological changes in experimental modelling of kidney injury allowed to reveal of the comparable morphodynamics of changes in human kidneys, and the modelling of injury in laboratory animals. The features of demarcation inflammation in soft tissues were characterised by the predominance of neutrophils in all the above-mentioned time intervals after injury. In haemorrhagic shock more informative was the fact of revealing more pronounced dynamics of inflammatory and reactive changes in comparison with normovolemic state. Comparative evaluation of the revealed reactive changes in the experiment allowed us to suggest that at mechanical trauma on the background of normovolemia, there was a more active cellular reaction of soft tissues than in kidneys. This was evidenced by significant differences in the numerical density of infiltrates of perifocal zones of haemorrhages.

The mentioned features of morphodynamics are explained, in our opinion, first of all, by the peculiarities of the course of redox, metabolic and trophic processes associated with organ-tissue specificity. In addition, it should be noted an increase in the volume density of destructive changes in the perifocal zone of renal parenchyma with the predominance of dystrophic changes compared to necrotic ones. Thus, starting from 12 h after the injury, the volume density of these changes exceeded 50% and reached the value of about 60% by the end of the first day. As it was noted, in conditions of haemorrhagic shock the change of cell populations is more intensive. Such morphodynamics in normal and haemorrhagic shock conditions is explained by the activation of the sympathetic-adrenal system under massive blood loss. In addition, in haemorrhagic shock, we observed earlier development of necrobiotic changes of tubular epithelium and tubules outside the trauma zone. When comparing the indicators of numerical density of perifocal infiltrates, it was noted that against the background of shock phenomena the cellular reaction developed much more actively. The conducted study allows us to conclude that the deformation experienced by the kidney at blunt trauma is accompanied by stretching of the organ parenchyma and is characterised by the formation of ruptures with even plumb comparable edges. Tears in the capsule correspond to tears in the parenchyma; the walls of the formed tears reflect the structure of the kidney in the form of columns. Compression of the renal tissue at its deformation is characterised by the formation of ruptures with uneven edges, having signs of crushing; ruptures of the capsule do not correspond to ruptures of partially structureless parenchyma with single sections preserving the columnar structure. Pathomorphological evaluation of reactive changes in the kidney at blunt trauma in sectional observations and in the experiment allowed to single out characteristic lifetime morphological changes:

Post-traumatic haemorrhages, disruption of the integrity of the structure of the tubules, tubules and vessel walls, haemorrhage into the capsule of the tubules, anaemia and collapse of capillaries of the loops of the tubules, the presence of blood in the lumen of distal and proximal tubules, acute circulatory disorders with the formation of microthrombi, oedema of the parenchyma and stroma of the organ. Morphodynamics of inflammatory changes of the kidney in a human in different terms after blunt trauma is characteristic: - up to 1 h - haemorrhages with clear contours of erythrocytes, walled location of single neutrophils in microvessels and perivascularly; - from 1 to 3 h - formation of focal perivascular leukocytic reaction and uneven distribution of neutrophils in posttraumatic haemorrhage, vacuolar dystrophy of proximal tubule epithelium with single micronecroses; - from 3 to 6 h - haemolysis of foramen elements in the central part of the haemorrhage, fibrin masses prolapse, focal-diffuse leukocytic infiltration, increase in the volume density of destructive changes in the epithelium of proximal tubules exceeding 50%; - from 6 to 12 h - expansion of leukocytic infiltration with an increase in the number of macrophages in the perifocal zone, a significant increase in the severity of diffuse leukocytic reaction in the zone of posttraumatic haemorrhage; - from 12 to 24 h - formation of polymorphous cellular reaction with predominance of neutrophils in the infiltrate, an increase in the volume density of destructive changes in the epithelium of proximal tubules, exceeding 80%.

The comparative assessment of pathomorphological changes in experimental simulation of soft tissue and kidney trauma allowed to reveal the following: a) dynamics of pathomorphological changes in the kidney, comparable with those in humans; features of demarcation inflammation in soft tissues, characterised by predominance of neutrophils at all periods of the study; b) more pronounced dynamics of reactive and inflammatory changes in hypovolemia, caused by massive blood loss, with the development of haemorrhage and haemorrhage in the kidney. The presented data can be informative in cases of isolated renal trauma, especially in the absence of skin and subcutaneous base injuries in the projection of the organ location.

Conclusion: Based on the above stated we can say that there is an inverse correlation between IBS and morphofunctional state of the thyroid gland. In the presence of CHD, there is activity in the thyroid tissue, and decreased activity in the node - hypofunctional state, as the node thickens and increases in size, these changes intensify and go in parallel with metabolic changes in the myocardium. These states limit the adaptive capacity of the thyroid gland, which can be observed in hypothyroidism and causes a severe course of cardiovascular disease.

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