

THE COMPARATIVE MORPHOMETRIC ANALYSIS OF AGE-RELATED CHANGES IN THE MICROSTRUCTURE OF THE LIVER IN EXPERIMENTAL TRAUMATIC SHOCK

Dgebuadze M. A.

*Tbilisi State Medical University, Georgia
Department of Human Normal Anatomy*

Introduction. It is generally known that the liver belongs to organs that are particularly sensitive to shock; multiple organ failure in shock is very common [5]. Today, the morphology of the liver in various forms of shock is studied well enough. However structural changes of the liver in shock is less frequently studied in the age-aspect. Existing literature data demonstrate complexities of geriatric trauma patients [4]. Is indicated on the rapid deepening of torpid phase of traumatic shock at an early age, at the same time the most severe morpho-functional changes were detected in adult dogs [2]. The late stage of shock has been studied very little as well.

The Aim of research was to study age-related changes in the microstructure of the liver in experimental traumatic shock using histological and morphometric methods.

Material and methods. Experiments were carried out on 17 outbred unanesthetized 6-8 month juvenile (6) and 3-5 years of age sexually mature (11) dogs of both sexes. The shock was caused by the method W. Cannon [3]. On the soft tissues of the thigh of the dog blows in the quantity necessary for permanent decrease in systemic arterial pressure to the level of 40-50 mm Hg were struck. All experimental animals before the trauma, as well as control dogs, before taking of liver tissue for examination, were fixed on the operating table in the supine position. Under local anesthesia with 0, 5% solution of novocaine was allocated the right carotid artery, then it was cannulated and connected with U - shaped mercury manometer Louis for recording of arterial pressure; left femoral artery and a vein were also cannulated. Liver tissue was taken at the time of reducing the

systemic blood pressure of 25-30 mm Hg by surgical biopsy. The duration of the shock at the time of reducing the systemic blood pressure of 25-30 mm Hg in the sexually mature dogs was 38 minutes up to 1 hour 3 minutes, in the juvenile dogs - 23 to 30 minutes.

Pieces of liver were fixed in Carnoy's fluid. Up to 5 milimikron paraffin sections were stained with haematoxylin and eosin, as well as by Van Gieson's method. For morphometric evaluation of the liver was used the method of "Visual classification under statistical control" [1]; was applied ocular gride "VC-4". Hepatocytes were categorized into 4 visually distinguished from each other classes: N1 - normal hepatocytes, N2 - hepatocytes in the stage of granular dystrophy, N3 - hepatocytes in the stage of vacuolar dystrophy, N4 - hepatocytes in the stage of necrosis. For each classes were estimated mean volume and standart deviation in percent. Differences were considered significant at p values less than 0.05.

Experiments complied with regulations concerning the use of animals for research purposes.

Results. It was established that in experimental traumatic shock microstructure of liver of sexually mature dogs in general is normal but on the background of the normal microstructure were encountered dystrophic and necrobiotic changes of hepatocytes, disorders of intraorganic hemodynamics, increased vascular permeability and edema, which are of a focal character. It should be noted that in most cases the regions of portal triads saved more than other parts of lobules, higher expression of distrophic-necrotic changes of hepatocytes in the centrilobular regions of the liver were observed.

Enlarged, overflowed with blood sinusoids sometimes dramatically compress beam systems, hepatocytes in such beams are atrophic; around the interlobular vessels marked leukocyte infiltration of the stroma and parenchyma (Fig. 1, a). In liver of sexually mature, as well as juvenile dogs, granular dystrophy of hepatocytes were observed (Fig. 1, b).

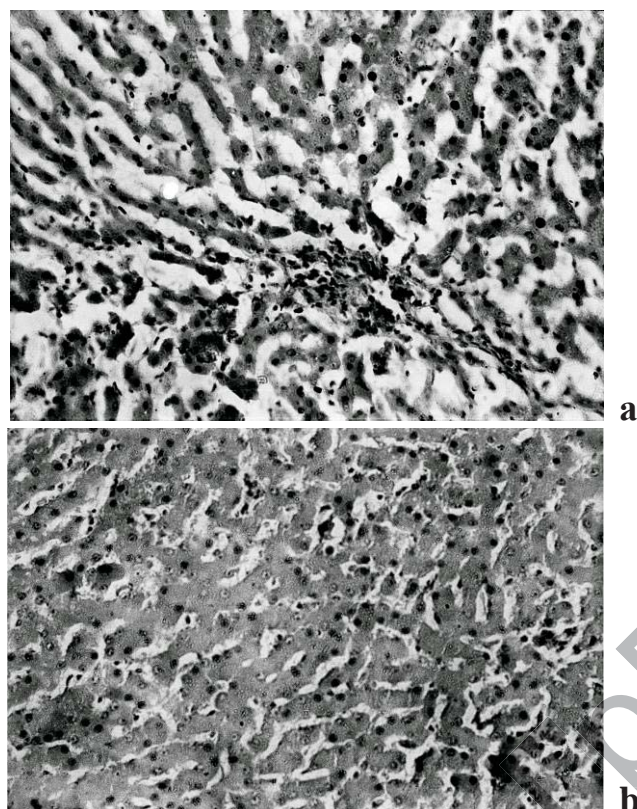


Fig. 1. The microstructure of the liver in experimental traumatic shock.

(a - sexually mature dogs , b - juvenile dogs).

a - Histo-lymphocytic infiltration around the portal vessels; atrophy of beams of hepatocytes. b. - Granular dystrophy of hepatocytes in all parts of hepatic lobule.

a, b - Haematoxylin and eosin, magnification: x400.

Morphometric study has shown that mean volume of normal hepatocytes in sexually mature, as well as in juvenile dogs is statistically significantly decreased in comparison with the control; thereby in juvenile dogs measured value was statistically significantly greater. In sexually mature dogs mean volume of hepatocytes in the stage of granular and vacuolar dystrophy was statistically significantly greater. Necrotic processes of hepatocytes are detected only in liver of sexually mature dogs (Fig. 2).

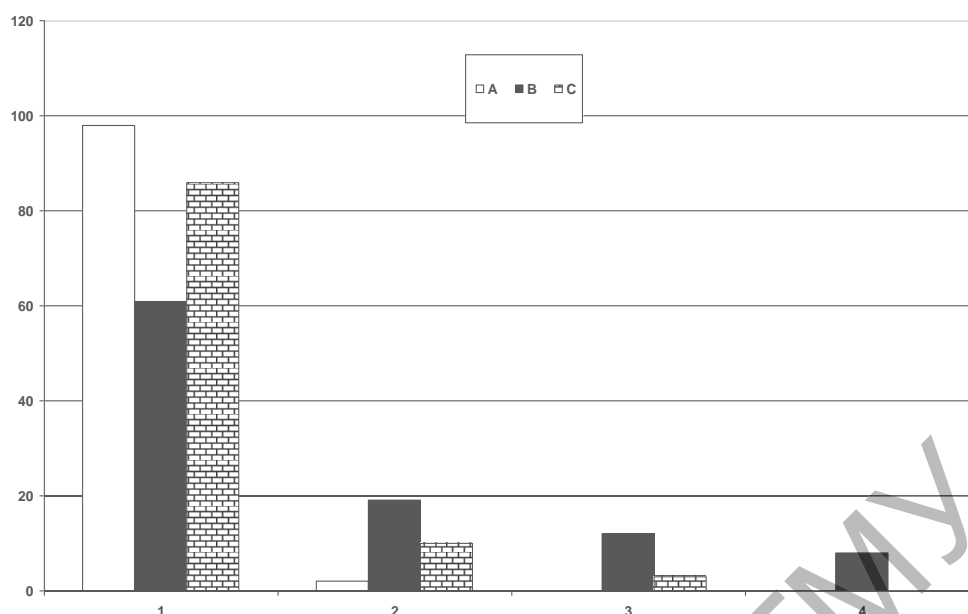


Fig. 2. Mean volume of morphological classes of hepatocytes in control (A) and in experimental shock (B -sexually mature dogs, C - juvenile dogs). 1 - normal hepatocytes, N2 - hepatocytes in the stage of granular dystrophy, N3 - hepatocytes in the stage of vacuolar dystrophy, N4 - hepatocytes in the stage of necrosis

Conclusions.

1. In experimental traumatic shock microstructure of liver of sexually mature dogs in general is normal but on the background of the normal microstructure were encountered dystrophic and necrobiotic changes of hepatocytes, disorders of intraorganic hemodynamics, increased vascular permeability and edema, which are of a focal character .

2. Traumatic shock in the liver of sexually mature, as well as of juvenile dogs causes the similar, non-specific changes but expression degree of those differ each other: more profound changes observed in the liver of sexually mature dogs

Literature:

1. Дгебуадзе М. А. Количественная оценка динамики морфологических изменений в гепатоцитах при травматическом шоке / М. А. Дгебуадзе, С. Б. Стефанов, З. И. Кацитадзе // Тез. докл. конфер. молодых ученых ин - та эксперим. морфологии им. А. Н. Натишвили АН ГССР. - Тбилиси, - 1984. - с.70-73.

2. Ухлин В. А. Морфологические изменения в сердечной мышце, печени и почках при тяжелом травматическом шоке у растущего и взрослого организма // Тр. Горьковского мед. ин-та. – Горький, 1976. – Вып. 80. – С. 20-34.

3. Cannon W. B. Traumatic shock / W. B. Cannon. – New York London Appleton, 1923. – 201 p.

4. Complexities of Geriatric Trauma Patients / T. Dalton, M. R. Rushing, M. E. A. Escott, B. J. Monroe // JEMS. – 2015. - Vol. 40, № 11 (2).

5. Early hyperglycemia predicts multiple organ failure and mortality but not infection / J. L. Sperry, H. L. Frankel, S. L. Vanek et al. // J. Trauma. - 2007. - Vol. 63, № 3. - P. 487-493.

РЕПОЗИТОРИЙ ГРГМУ