

Confocal microscopy of periodontal tissue in intrauterine growth retargation

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Intrauterine growth retardation (IUGR) is one of the problems of modern perinatology, with frequency varies in different countries from 3 to 24% of mature and 18 to 46% of immature infants. At the same time somatic pathology in children can often be attributed to a violation of prenatal development or early neonatal life. Adverse effects are characterized by difficulty IUGR postnatal adaptation, breach formation in the nervous, cardiovascular, and other functional systems. Obviously, the pathological changes of circulation, which are observed in intrauterine growth retardation lead to injury in all organs and systems. To succeed in the early diagnosis of dystrophic and inflammatory periodontal diseases, as a result of the progression of microcirculatory disorders, is of great importance to an adequate assessment. Microscopic visualization allows objectively assess the functional and morphological state of dental tissues of different methods. Microscopic methods based on the principle of confocal and fluorescence microscopy, provide the ability to obtain images of thin optical sections from different depths of tissue and restore the three-dimensional topology of the internal structures. This causes their highly informative and indispensable for the study of biological tissues.

The **aim** of this work was to study the morphofunctional state of periodontal with IUGR and comparing data obtained by combining the method of a light field in transmitted light and confocal microscopy.

Materials and methods. The study was performed on rats line of animals whose mothers of spontaneous hypertension, which is known to be one of the most frequent causes of placental insufficiency, and, as a consequence, IUGR. The comparison group included rats with usual weight, in the investigated group was included low body weight at birth rats, which was below the median weight (6.84×10^{-3} kg) of body was lower more than 20%. Each group included 37 animals on.

Immediately after birth, rats were subjected to primary anthropometric measurements: to produce animal weighing, measuring length and tail length. Second anthropometric study of experimental animals was performed at 1, 14 and 35 day of the animal's life.

Results. The study of slides derived from the experimental rats on day 1 after birth in the investigated group, there are marked changes in the morphofunctional state of the microcirculatory bed. Vascular bed was of uneven blood circulation. Along with the desolate and the sleeping vessels present highly advanced blood-filled capillaries. Indicated the presence of small clots in the lumen of blood vessels, which are more localized in post-capillaries and venules. Processes of formation of new vessels are not pronounced.

In confocal microscopy in the samples of the control group there is a gradual branching vessels, which is not observed in the investigated group. It was also confirmed the presence of small clots localized in post-capillaries and venules, which in some cases completely occlusive vascular lumen. Thanks to the high resolution and contrast of the image reconstructed by confocal microscopy revealed thickening of the walls of blood vessels, which may be a consequence of the initial sclerotic processes of vessels and perivascular spaces.

When comparing subgroups of animals derived from the experiment on the 14th day after birth, found that the state of the microvasculature of periodontal tissues are quite similar to the above described, though more uniform compared with infants. In the study group, along with the desolate dilated vessels met and spasm and overflowing with blood. In the perivascular space of these vessels were observed petechial hemorrhages. But in many cases the processes of formation of new vessels in the study group were focal intense.

Since the images obtained by confocal microscopy, have high contrast and lack of artifacts inherent in other methods, the maximum projection of the color-coded depth is clearly an intense process of formation of new vessels. Also confirmed the presence of petechial hemorrhages in the perivascular space of such vessels.

Confocal microscopy reveals uneven blood flow microcirculatory bed vessels, dilated thrombus extension and the rats of the study group. In this case, blood clots have a sufficiently large extent. Maximum projection of a color-coded depth reveals an intense process formation of new vessels.

In animals, derived from the experiment at day 35 after birth, the state of the microvasculature animal study group as a whole meets the control animals. However, in the perivascular space are observed more pronounced sclerotic processes.

Thus, a comparison of different methods of microscopy shows the main advantage of confocal microscopy - the possibility of three-dimensional structure of the sample, which gives a comprehensive overview of the studied processes. However, due to the inaccessibility and high cost of equipment, such studies should be seen as an extension of the method and, if possible, be combined with transmitted light microscopy to obtain a complete picture of the properties and morphology of typical samples. The work established new facts effects of IUGR as microvascular periodontal disorders, which may be the basis of pathological processes in the mouth further ontogenesis. Injuries of the microcirculatory bed lead to the appearance of ischemia lesions at birth, followed by rearrangement of the periodontal tissues and sclerotic changes in relatively early stages of ontogeny (during the work of the 14th and 35th day of life rats). As a result of changing the adaptive properties of the tissue and creates the preconditions for the development of inflammatory and degenerative lesions.

Conclusions.1. Our work determined new facts effects of IUGR as microvascular periodontal disorders, which may be the basis of pathological processes in the mouth further ontogenesis. Injuries of the microcirculatory bed lead to the appearance of ischemia lesions at birth, followed by rearrangement of the periodontal tissues and sclerotic changes in relatively early stages of ontogeny (in our work for the 14th and 35th day of life). As a result of changing the adaptive properties of the tissue and creates the preconditions for the development of inflammatory and degenerative lesions.

2. The results of this study suggest that confocal microscopy is the most informative method of visualizing tissue maxillofacial region. However, due to the inaccessibility and high cost of the equipment, such studies should be seen as an extension of the method and, if possible, be used in conjunction with microscopy in transmitted light for a full understanding of the optical properties and morphological characteristics of the samples.