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CASE REPORT

Visualisation and Evaluation Study of Some Patients Arteriosclerosis Microvessel with Coronary Artery Disease at Coronary Artery Bypass Grafting

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ABSTRACT:
Visualization of coronary microvessel at ischemic disease still remains actual. There is necessity for additional study of arteriosclerosis microvessels.
The byoptates of auricular right atria of patients with coronary artery disease were taken at coronary artery bypass grafting. The epoxy slices were obtained from material treated by the method of transmission electron microscopy and fixed in epoxy resins with further staining by Azur II and viewed under light optical microscope.
Analysis of the images obtained during this study identified different arteriosclerotic damages, with negative phenomena of convolute formation in the walls of arteriolas and formation of de Novo arteriolas from previous one, by intussusception type that could also lead to ischemia.
Evaluation on 5-degree scale of pathological growth of vessels microcirculatory bed as well as provided 1-2 images could help during analyze of arteriosclerotic damages, identification of pathological process direction in each patient case.
This will improve medical treatment of such patients in postsurgical period.
Keywords: coronary artery disease, microvessel; images, evaluation in score, light optical microscop

Introduction:

Coronary artery disease is usually associated with larger epicardial coronary arteries. However, studies have shown an important role of coronary microvascular dysfunction.[2,8] Abnormal dilatory of coronary microvesels, microvascular spasm and extravascular compensative forces have been identified as pathogenic mechanisms in both chronic and acute forms ischemic heart disease.[3]

Clinical studies of over the past 2 decades have high listed the importance of coronary microvasculature and the significance of coronary microvasculature disease.

coronary microvasculature disease refers the structural and functional abnormalities in coronary microvasculature can impair proper function and lead to cardiac ischemia.[9]

In human coronary microcirculation is not visualized with routine invasive and noninvasive imaging tools.[1]

Clinical studies over the past 2 decades have high listed the importance of coronary microvasulature and the significance of coronary microvasculature disease. Coronary microvasculature disease refers the structural and functional abnormalities in coronary microvasculature can impair proper function and lead to cardiac ischemia.

However, the field lass far in our understanding of pathophysiology and consequently in direct therapies.[9]

The investigators leverage their extensive and robust prior effort to develop quantitative coronary microvascular imaging methods to probe the underling biology of coronary microvasculature disease.[5]

Methods:

All procedures involved human subject were approved by the institutional review board bioethical committee (Yerevan State Medical University, RAA) conformed to the Legal Aspects of Research Ethics and Science in European Community directive (2001/20 EC).

Small pieces of auricular right atria of patients with CAD, from 4 patients were taken at routine cardiosurgical procedures.

Biopsy material has been treated by the method used in transmission electron microscopy. Semithin epoxy slices obtained on ultracut Richard and stained by Azur II (1), were investigated under light optical microscope and estimated by 5-degree scale of vessels pathological growth (intussusception type). 2,4

Case:

1. PATIENT - MALE 74 YEARS OLD.
The small and large blood vessels were presented. In large vessels with large lumen of profile with unequal thickened wall and expresses tortuosity.

Connection of opposite walls of such vessels is forming a new profile lumen in a vessel wall.
Insignificant pathological growth from 1 to 2 score.

2. PATIENT- MALE 67 YEARS OLD.
Blood vessels with wide lumen and significant thickening of wall. In the wall of such vessels forming convolute, consist different profiles lumen from large to small.3 Growing vessels cover and isolate single groups of cardiomyocytes, The big quantity of vessels with small lumen of profile and insignificant diameter of lumen of profile and insignificant thickening of wall is presented. Medium pathological growth 2 score.

3. PATIENT - MALE 67 YEARS OLD.
Large blood vessels with extended lumen of profile and sharply thickened crimped vessels wall. In some vessels wall of convolute consist 3-5 lumen of profiles.

In other the process of convolute formation is presented. In small vessels with not large profiles lumen and insignificant thickness of wall take place.

Constriction formation between vessels walls, when 2 profiles are presented but the vessel is not divided,
Significant pathological growth 3 score,

4. PATIENT - MALE 57 YEARS OLD.
Blood vessels with different width of profile lumen. Some vessels walls are thickened and constricted. Opposite walls are connected to each other.

Typical is formation De Novo vessels when they are practically separated and located very close to each other. Such vessels profile diameter varies from big to small one, which show the inequality of division process.

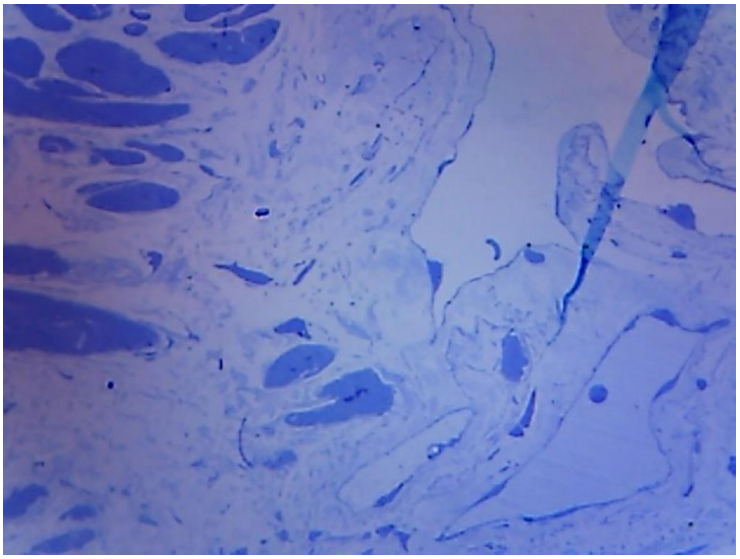

Fig 1: Convolute in the vessel wall x400

Significant pathological growth 3-4 scores.

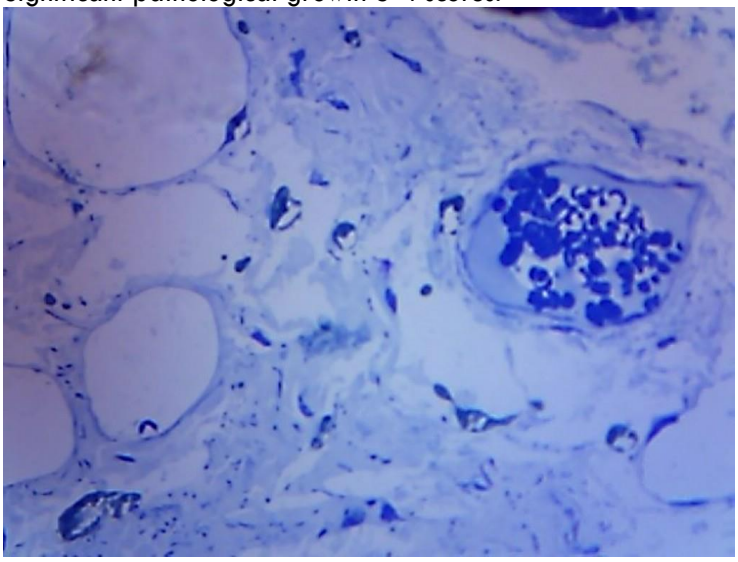

Fig 2. The vessels further will be divided. X400

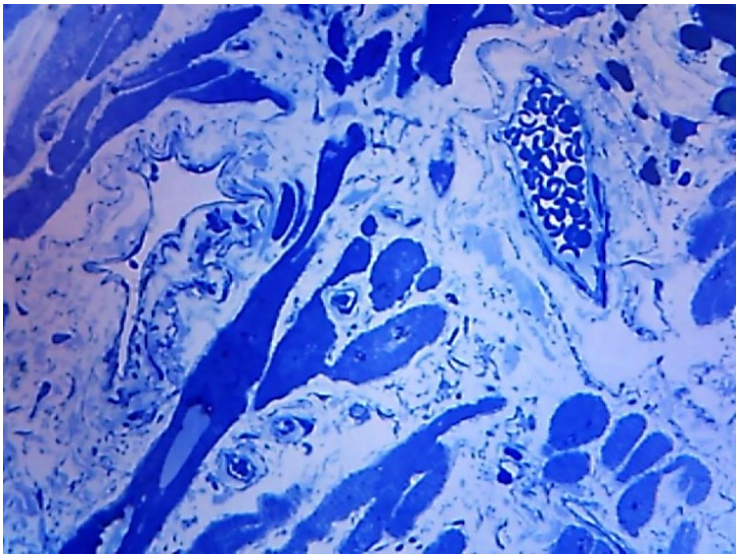

Fig 3. Formation of de Novo vessels x400

Discussion

Myocardium of right atrii routineously resected during cardiosurgical procedures is a carrier of important information according myocardium conditions and its microcirculation bed at different heart disease. This was proved in the end of 20th century in institute of surgery named by Mikaelyan, and later in institute of biochemistry named by Buniatyan.

These basis knowledges let us come closer for investigation of microcirculatory bed at heart ischemic disease.[6,7] The question of getting of microvasculation images is quite difficult despite numerous studies in this direction. [1,9]

The staining method of biological tissues proposed by us was quite efficient in approach to this problem, that let us complete presented data about microvessel arteriosclerosis, especially arterioles.[4]

Microvessel arteriosclerosis at coronary artery disease observed in all investigated cases. However, there are viewable differences. So, if in first patient case there are single connection of opposite walls of vessels, in other patients cases it is more visible and lead to a convolute formation.
Deserving of attention was manifesting of arteriosclerosis arterioles presented by formation of convolute (fig 1,) in arterioles walls, which could disrupt the blood flow, dividing as well as forming of new arterioles by intussusception type, from previous one (fig, 2,3).

Two negative processes of arteriosclerosis microvessel could take place in same patient case. Or could be presented just one of them. Could be as already formed arterioles by De Novo type, divided with different lumen diameter, or be in a process of division (fig 2,3).

The presence of convolute in arterioles wall could lead to blood flow disturbance. The presence of new arterioles could lead to ischemia.

Sure, as have shown the results of investigation of structural reorganization of microcirculatory bed of patients with coronary artery disease is individual.

According to the obtained figures it is complicated to make prognosis of further development of arteriosclerosis damages. There was necessity to evaluate this process in score. The scale of pathological growth of vessels by intussusception type give us opportunity for deeper analyzing and evaluation of obtained data.[5,7]

What will it give to patient? The obtained figure and its evaluation given to patients' medical card will be helpful for cardiologist for correction further postsurgical medical treatment.

Conclusion

Images and evaluation in scores of microcirculatory beds of myocardium of patients with coronary artery disease obtained at arteries bypass grafting identify arteriosclerotic damages and systemizing it, which open more wide opportunities for therapeutic treatment of such patients and the preventing possible complication.

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