Biomolecular methods in comparison to bacteriological methods using to establish the etiology of infective endocarditis via investigating affected valve tissues

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Introduction: Infective endocarditis (IE) is difficult to diagnose and associated with high mortality. In the majority of cases, the effectiveness of the therapy is based on the verification of etiological agent in blood. It is reported that infectious agents, which are found in the valve tissue and those found in the bloodstream are not always identical. To make etiologic diagnostics more precise we suggest using biomolecular methods, such as polymerase chain reaction (PCR).

Objective: to investigate peculiarities of bacteriological and biomolecular methods used to establish the etiology of IE.

Methods:

8 consecutive patients verified IE (DUKE 2015) City hospital №64, Moscow 2012 - 2017

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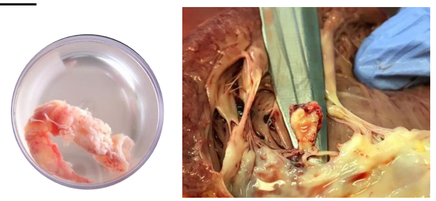
Blood sampling in a volume of 25 ml, three times, with an interval of 30 minutes, from three different peripheral veins.

- biomolecular (PCR or PCR with follow-up sequenition) tests
- bacteriological tests

The PCR method with hybridization and fluorescence detection of results was used to detect DNA of:

- ❑MSSA and MRSA species of *S. aureus;*
- ❑MRSA species of coagulase-negative *Staphylococcus spp.*;
- ❑*Enterobacteriaceae* (*E.coli*, *Klebsiella spp.*, *Proteus* spp.);
- ❑ *Staphylococcus spp*. and *Streptococcus spp*.;
- ❑*A.baumanii*, *K.pneumoniae*, *P.aeruginosa*,
- ❑*Candida* (*C.albicans*, *C.glabrata*, *C.krusei*,);
- ❑*E. faecium, E.faecalis*.



Intra-operation photos: affected valve tissue

Results:

The average duration of bacteriological test was 5-7 days, PCR – 4-6 hours, PCR with follow-up sequenition – 1-2 days.

Blood		Valve tissue	
Bacteriological method	PCR	Bacteriological method	**PCR**
S.aureus MSSA	S.aureus MSSA	S.aureus	**S.aureus**
S.aureus MSSA	S.aureus MSSA	S.aureus	**S.aureus**
E.coli	E.coli	E.coli	**E.coli**
S.aureus MSSA	Staphylococcus spp.	S.aureus (MSSA)	**S.aureus MRSA + MSSA K.pneumoniae, C.glabrata**
S.gallolyticus	S.gallolyticus MRCoNS , E.coli	K.pneumoniae, E.faecium	**S.gallolyticus, A.baumanii K.pneumoniae, C.glabrata E.coli, MRCoNS**
S.aureus MSSA, S.epidermidis,C.albicans	S.aureus MSSA, MRCoNS	S.aureus	**S.aureus MRSA+MRCoNS , C.albicans**
E.columbae	S.gallolyticus	K.oxytoca, E.columbae, S.aureus	**S.gallolyticus S.aureus MRSA+MRCoNS**
G.haemolysans	**S.constellatus**	**K.pneumoniae**	**S.constellatus, S.aureus MRSA E.coli , K.pneumoniae**

Conclusions:

Investigation of affected valve tissues, resected for etiological agent identification in 8 IE patients, demonstrated a wider specter of bacteria than in blood culture. This is probably caused by the presence of bacterial biofilms on affected valves. Biomolecular methods demonstrated wider possibilities in comparison with traditional bacteriological techniques.

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