UDK 619:616.988:614.47

LABORATORY TESTING METHODS FOR BRUCELLOSIS

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ABSTRACT. Brucellosis is a widespread, polyetiological zooanthroponosis, an extremely dangerous infectious disease with various transmission routes, characterized by damage to many organs and systems, mainly the musculoskeletal system and the nervous system, intoxication of the body and the manifestation of allergies, as well as the development of the infectious process, which in most cases becomes chronic, often subsequently leading to disability in patients. The main importance of brucellosis diagnostics is that it helps to detect the disease early, provide proper treatment, and prevent widespread complications that can pose a serious threat to the patient's health. The main diagnostic methods include laboratory blood tests (general and biochemical), as well as bacterial culture, PCR, and serological studies to detect brucellae or antibodies to them in blood, urine, and other biological fluids.

Keywords: Bacteriological method, blood culture, Wright reaction, Ifa, Coombs reaction, acute brucellosis, chronic brucellosis.

ЛАБОРАТОРНЫЕ МЕТОДЫ ДИАГНОСТИКИ БРУЦЕЛЛЕЗА

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АННОТАЦИЯ. Бруцеллез – широко распространённый, полиэтиологичный зооантропоноз, чрезвычайно опасное инфекционное заболевание с различными путями передачи, характеризующееся поражением многих органов и систем, преимущественно опорно-двигательного аппарата и нервной системы, интоксикацией организма и проявлением аллергических реакций, а также развитием инфекционного процесса, который в большинстве случаев переходит в хроническую форму, нередко приводя впоследствии к инвалидизации пациентов. Основное значение диагностики бруцеллёза заключается в её способности своевременно выявить заболевание, назначить адекватное лечение и предотвратить развитие распространенных осложнений, представляющих серьёзную угрозу здоровью пациента. К основным методам диагностики относятся лабораторные исследования крови (общий и биохимический), а также бактериальные посевы, ПЦР и серологические исследования для

выявления бруцелл или антител к ним в крови, моче и других биологических жидкостях.

Ключевые слова: бактериологический метод, гемокультура, реакция Райта, ИФА, реакция Кумбса, острый бруцеллез, хронический бруцеллез

Introduction. In practice, it is often difficult to distinguish brucellosis from other diseases accompanied by an increase in body temperature. In 30-40% of patients, it takes 1 to 3 months for the diagnosis to be made. This situation causes unnecessary suffering for the patients. Delays in diagnosis are also caused by patients' late referral to medical institutions. A comprehensive assessment of the symptoms of baldness, epidemiological factors that cause brucellosis, and laboratory tests is one of the main conditions for diagnosing brucellosis.

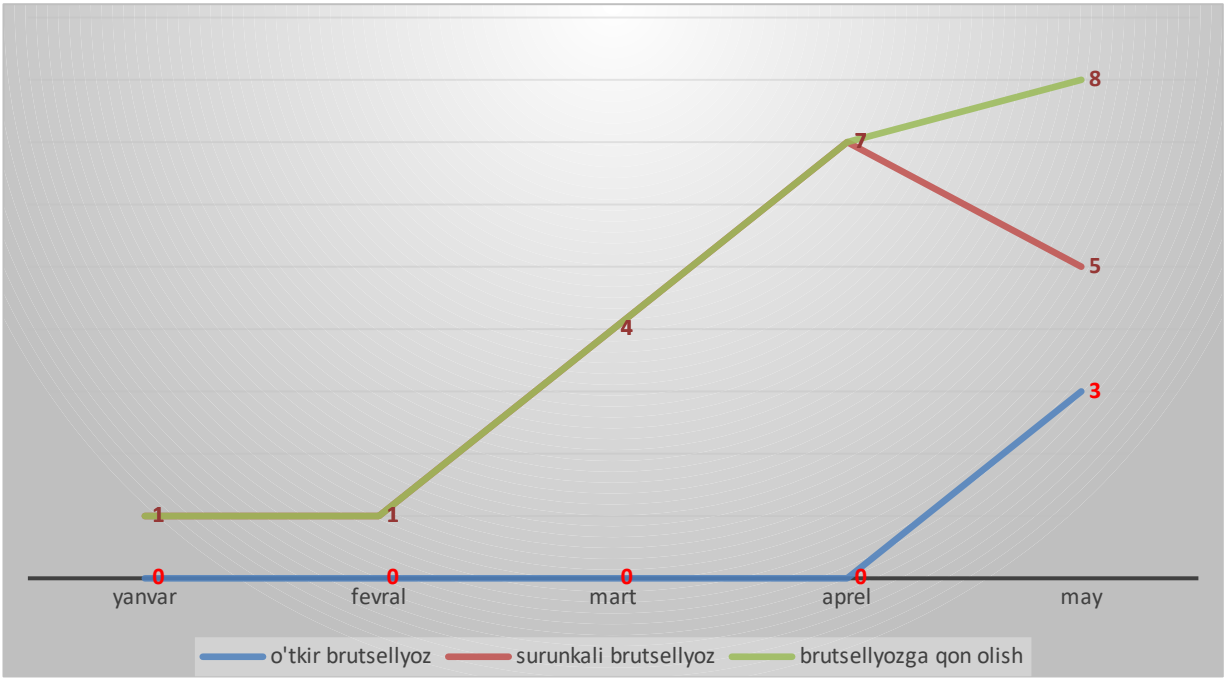
Bacteriological method:

Isolation of Brucella culture from biomaterial obtained from a patient is the gold standard of diagnosis.

Blood, bone marrow, cerebrospinal fluid, tissue puncture or other body biofluids obtained from a patient can be used as material for culture. According to the relevant documents of the Ministry of Health of the Republic of Uzbekistan, patients with elevated body temperature for more than three days should be tested for brucellosis by culture (hemoculture) on clinical nutrient medium, even in the absence of relevant epidemiological indications.

Blood culture in chronic brucellosis often gives a low positive result. If the patient has an unexplained febrile condition, serological tests for brucellosis are negative, and there are appropriate epidemiological indications, bone marrow culture instead of blood is more likely to give a positive result for brucellosis. However, obtaining the biomaterial itself is painful and carries a high risk of complications, and it is a method that requires special qualifications from the doctor. Therefore, this method is not used in a number of endemic countries.

Within 1–2 weeks after the onset of the disease, IgM and then IgG antibodies appear. Antibody titers can remain high for a long time even against the background of treatment and negative blood culture. Therefore, in the fight against brucellosis, it is difficult to determine the stage of the disease and the background of treatment.



In areas endemic for brucellosis, antibody titers can remain high due to the continuous ingress of microbes into the body.

Although a rapid decrease in IgG titers is considered an indicator of successful treatment, the preservation of the titer, on the contrary, indicates the activity of the infectious process. In patients with local complications, antibody titers decrease very slowly. During the period of exacerbation of the disease, IgG and IgA titers increase, but IgM titers do not increase.

Serological tests:

- Wright reaction (PA)
- Rose-Bengal test
- Hedelson reaction
- Coombs's reaction
- IFA

Titer	Interpretation
<1:40	Negative (no infection
1:80	Doubtful or early infection
≥1:160	Positive (suggestive of active brucellosis
≥1:320	Strongly positive (acute brucellosis

Platelet Agglutination Reaction - Rose Bengal Test

The Rose Bengal test is commonly used in Western countries and in veterinary medicine as a rapid test.This test is useful when the patient has not previously been exposed to Brucella, but is of little value in areas where people are frequently infected or endemic.The agglutination of inactivated stained cells of B. abortus with IgG or IgM antibodies in patient samples.The agglutination reaction is read within 4 minutes.The Rose Bengal test is considered a screening test in endemic areas.

A positive serum result must be confirmed by a more sensitive ELISA test.

Interpretation. The presence of agglutination indicates a titer of antibodies to Brucella greater than 25 IU/ml.

- Specificity 71% to 80%
- Sensitivity 78% to 100%

Conclusion. The longer the disease lasts, the lower the percentage of positive results of serological tests. In cases where bacteriological analysis and Wright's reaction give negative results, Coombs's reaction or ELISA is used in patients with suspected brucellosis. Used in chronic and clinically nonspecific forms of brucellosis.

This reaction identifies incomplete antibodies. Titrated antiglobulin serum is used.

First, Wright's reaction is performed. Then, at least three tubes are taken from the first dilutions that gave a negative result or at least three tubes from those that gave a low positive result. Centrifuge, wash the precipitate three times, add antiglobulin serum, and incubate for 20 hours. A 2+ agglutination titer in a 1:50 dilution is considered diagnostic. This test is not used in our country due to the scarcity of reagents. 2-mercaptoethanol testis used to differentiate acute and chronic brucellosis.

IFA is more sensitive than Wright's reaction in the diagnosis of chronic brucellosis and post-brucellosis conditions. In the acute phase of the disease, Wright's and Rose-Bengal reactions are more reliable and cheaper.

Although ELISA detects Ig well during the acute phase of the disease, it can give a false positive result if the patient has rheumatoid factor or a false negative result if the patient has a high level of IgG in a patient with brucellosis.

Therefore, it is necessary to determine both IgM and IgG immunoglobulins in patients.

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