

COMPLEX APPROACH BASED ON PHAGOTHERAPY IN THE TREATMENT OF PURULENT-INFLAMMATORY COMPLICATIONS DEVELOPING AFTER CESAREAN SECTION

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Abstract: This study presents a complex approach based on phagotherapy in the treatment of purulent-inflammatory complications following cesarean section. The growing problem of antimicrobial resistance among nosocomial pathogens, including *Staphylococcus aureus*, *Escherichia coli*, and *Klebsiella pneumoniae*, significantly reduces the effectiveness of standard antibiotic therapy and necessitates alternative treatment strategies. Bacteriophages represent a promising therapeutic option due to their high specificity, safety profile, and lack of negative impact on normal microbiota, which is particularly important during lactation.

The aim of the study was to evaluate the clinical effectiveness of phagotherapy in combination treatment of postoperative purulent-inflammatory complications after cesarean section. A total of 60 postpartum women were included in the study and divided into two groups: a main group receiving complex phagotherapy (n=30) and a control group receiving standard antibiotic therapy (n=30). The study was conducted at the maternity department of the Asaka District Medical Association.

The results demonstrated a significant improvement in the main group. Fever duration decreased from 4.5 days in the control group to 2.8 days in the phagotherapy group. Primary wound healing was achieved in 93% of patients receiving phagotherapy compared to 76% in the control group. The average hospital stay was reduced by 2.2–2.4 days. Microbiological analysis revealed that 88% of isolated strains were sensitive to bacteriophages, while more than 65% showed resistance to conventional antibiotics. Elimination of pathogenic microorganisms was observed in 85% of cases under phagotherapy.

In conclusion, phagotherapy significantly improves clinical and microbiological outcomes in the treatment of purulent-inflammatory complications after cesarean section. It accelerates recovery, enhances wound healing, and reduces hospital stay. Due to its safety and effectiveness, especially during lactation, phagotherapy can be recommended as an important component of standard therapeutic protocols.

Keywords: Phagotherapy, Bacteriophages, Cesarean section complications, Purulent-inflammatory complications, Antibiotic resistance, Postoperative infections, Obstetric infections, Lactation safety

Relevance of the Topic

- **The Problem of Antibacterial Resistance:** Today, the resistance of nosocomial infections and pathogenic microorganisms (*Staphylococcus aureus*, *Escherichia coli*, etc.) to traditional antibiotics has increased sharply. In many cases, antibiotic therapy



does not yield the expected results, which complicates the treatment process and causes it to last longer.

- **Selective and Safe Action of Bacteriophages:** Phagotherapy is considered a worthy alternative to antibiotics. Bacteriophages selectively destroy only certain types of pathogenic bacteria (selectivity), do not damage the normal microflora of the body, and have no toxic effects. This is particularly important for women during the lactation (breastfeeding) period, as many antibiotics can pass into breast milk and negatively affect the infant's health.
- **Innovative Significance:** The application of the latest achievements in microbiology and biotechnology into obstetric practice, forecasting complications, and their targeted (target) treatment is one of the priority directions of modern medicine.

Research Objective

To optimize the results of treating purulent complications after cesarean section using phagotherapy under conditions of pathogenic microorganisms' resistance to antibiotics, to substantiate the principles of safe therapy during the lactation period, and to scientifically justify the role and effectiveness of phagotherapy in the complex treatment of purulent-inflammatory complications after cesarean section.

Research Materials and Methods

- **Research Base:** Maternity department of the Asaka District Medical Association.
- **Sample:** 60 women (30 in the main group – phagotherapy, 30 in the control group – standard therapy).
- **Main Results:**
 - **Duration of Fever:** While it was 4.5 days in the control group, it was reduced to 2.8 days in the phagotherapy group.
 - **Suture Healing:** Primary healing was observed in 93% of cases in the phagotherapy group (76% in control).
 - **Hospital Stay Duration:** Decreased by an average of 2.2 days when phagotherapy was applied.

"According to data from the maternity facility of Asaka district, Andijan region, the clinical effectiveness significantly increased as a result of using complex phagotherapy in patients with purulent-inflammatory complications after cesarean section. In the main group where bacteriophages were used, normalization of body temperature was observed 1.6 times faster compared to the control group ($p < 0.05$). Also, as a result of microbiological examinations, the elimination of pathogenic microorganisms (*Staph. aureus*, *E. coli*) after phagotherapy was recorded in 85% of cases, which allowed for a reduction in the hospital stay from an average of 7.4 days to 5.2 days."

Research Results and Their Discussion

During the conducted research, the clinical condition of 60 patients treated for complications after cesarean section surgery at the Asaka district maternity department was analyzed.

1. Microbiological Landscape: Analysis of smears taken from patients showed that the main causative agents of purulent-inflammatory processes are *Staphylococcus aureus* (42%), *Escherichia coli* (28%), and *Klebsiella pneumoniae* (15%). More than 65% of the isolated strains showed resistance to traditional antibiotics (penicillin and cephalosporin groups), however, high sensitivity to specific bacteriophages was identified in 88% of cases.



2. Dynamics of Clinical Indicators: In the main group where phagotherapy was used in complex treatment, the disappearance of symptoms occurred faster than in the control group:

- **Duration of Fever:** Averaged 2-8 days in the main group, and 4-5 days in the control group .
- **Pain and Swelling in the Suture Area:** By the 3rd day, it significantly decreased in 93% of patients in the phagotherapy group, whereas in the control group, this process continued until the 5th-6th day.

3. Laboratory Monitoring: In the general blood analysis of the main group, normalization of leukocytosis and ESR (erythrocyte sedimentation rate) indicators was observed 2 days earlier than in the control group. The level of C-reactive protein (CRP) decreased rapidly under the influence of phagotherapy, indicating the cessation of the systemic inflammatory response.

The obtained results show that the use of phagotherapy in the treatment of purulent-inflammatory complications after cesarean section in the conditions of Asaka district, Andijan region:

- Effectively eliminates antibiotic-resistant strains;
- Accelerates the regression of clinical symptoms by 1.5–2 times;
- Reduces the hospital stay of patients by an average of 2.4 days.

Conclusion

1. **Microbiological Analysis Results:** According to data from the maternity facility of Asaka district, Andijan region, more than 65% of the pathogenic microorganisms (*Staph. aureus*, *E. coli*) that are the main causes of purulent-inflammatory complications after cesarean section showed resistance to traditional antibiotics. At the same time, high sensitivity (88%) of these strains to specific bacteriophages was identified.
2. **Clinical Effectiveness:** As a result of including phagotherapy in the complex treatment, the disappearance of clinical symptoms (fever, pain, intoxication) in patients of the main group accelerated by 1.5–1.8 times compared to the control group. The normalization of body temperature averaged 2.8 days in the main group.
3. **Rehabilitation and Economic Benefit:** The use of phagotherapy served to increase the primary healing of postoperative sutures up to 93.3%. This, in turn, allowed for a reduction in the hospital stay of patients by an average of 2.4 days and a decrease in economic costs for medications.
4. **Practical Recommendation:** Taking into account the safety of bacteriophages, their lack of negative impact on lactation, and high selectivity, it is advisable to include them as an additional component in the standard protocol for treating complications after cesarean section.