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НОВЫЙ ДЕНЬ В МЕДИЦИНЕ
NEW DAY IN MEDICINE**

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EVALUATION OF RESPIRATORY THERAPY EFFECTIVENESS IN PREGNANT PATIENTS WITH COMMUNITY-ACQUIRED PNEUMONIA

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✓ Resume

The effectiveness of respiratory therapy was studied in 56 pregnant patients with respiratory failure (RF) caused by community-acquired pneumonia (CAP). Clinical-objective, laboratory, instrumental, and radiological data were evaluated. The study confirmed the safety and efficacy of non-invasive ventilation (NIV) compared to invasive mechanical ventilation (IMV) and highlighted the insufficiency of standard oxygenation methods. Furthermore, this method proved advantageous when operative delivery was performed under regional anesthesia.

Keywords: Pregnancy, pneumonia, respiratory failure, regional anesthesia, respiratory therapy.

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✓ Rezyume

Shifoxonadan tashqari zotiljam (ShTZ) bilan og'rigan 56 ta homiladorlarning nafas yetishmovchiligida respirator terapiya samaradorligi o'rganildi. Klinik-obyektiv, laborator-instrumental va rentgenologik tekshirish natijalari baholandi. Respirator terapiyada invaziv o'pka sun'iy ventilyatsiyasiga nisbatan noinvaziv o'pka ventilyatsiyasining xavfsizligi va samaradorligi, hamda oddiy oksigenatsiya usullarining samarasizligi tasdiqlandi. Shuningdek, operativ tug'ruq regional anesteziya ostida bajarilganda ham bu usul afzaldir.

Kalit so'zlar: Homiladorlik, zotiljam, nafas yetishmovchiligi, regional anesteziya, respirator terapiya.

ОЦЕНКА ЭФФЕКТИВНОСТИ РЕСПИРАТОРНОЙ ТЕРАПИИ У БЕРЕМЕННЫХ ПАЦИЕНТОВ С ВНЕКЛАССИФИКАЦИОННОЙ ПНЕВМОНИЕЙ

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✓ Резюме

Изучена эффективность респираторной терапии у 56 беременных с внебольничной пневмонией и дыхательной недостаточностью. Оценены результаты клинко-объективных, лабораторно-инструментальных и рентгенологических данных. Доказаны эффективность и безопасность неинвазивной искусственной вентиляции легких по сравнению с инвазивной искусственной вентиляции легких, а также низкая эффективность простых способов оксигенации. Наряду с этим данный способ имеет преимущества, и при необходимости оперативного родоразрешения под регионарной анестезией.

Ключевые слова: Беременность, пневмония, дыхательная недостаточность, регионарная анестезия, респираторная терапия.

Relevance

Non-specific lung diseases in pregnant women, particularly community-acquired pneumonia (CAP), are among the most common and potentially fatal non-obstetric infectious diseases. Despite conflicting data regarding its prevalence and outcomes compared to the general population, CAP significantly impacts maternal and fetal health, often leading to preterm birth. Severe cases necessitated by clinical progression require hospitalization [5, 7, 9].

The progression of CAP is frequently accompanied by a decline in respiratory efficiency. This is further complicated by the anatomical and physiological changes of pregnancy: elevation of the diaphragm, limited diaphragmatic excursion, increased strain on the cardiovascular and respiratory systems, and restricted movement of the lower pulmonary segments during the third trimester. Consequently, respiratory failure develops in 50% of these pregnant patients. When associated with CAP, acute respiratory failure (ARF) can progress rapidly, serving as an indication for mechanical ventilation (MV) [2, 6, 4].

In recent years, while tracheal intubation (TI) and invasive MV have been the standard treatments for ARF, it has become possible to improve the effectiveness of respiratory therapy without endotracheal or tracheostomy tubes. This approach is known as non-invasive ventilation (NIV) [1, 6].

NIV utilizing positive pressure through nasal or face masks provides a high-quality "patient-ventilator" interface. Modern practice widely adopts positive pressure NIV. Research consistently indicates that complication rates with NIV are significantly lower than those associated with traditional invasive MV [8, 10].

Key advantages of NIV include: the patient remains fully conscious; avoidance of "mechanical" and infectious complications related to intubation; preservation of natural upper airway defense mechanisms and physiological cough; and maintenance of the patient's ability to speak, swallow, eat, and expectorate. It also ensures patient comfort and eliminates the need for muscle relaxants or heavy sedation. While invasive MV is critical in obstetric practice for managing ARF in CAP, it possesses several drawbacks.

Study Objective: To study and improve the effectiveness of respiratory therapy in pregnant patients with ARF caused by community-acquired pneumonia.

Materials and methods

The study included 56 pregnant patients (aged 19–34, mean age 26.3 ± 2 years) with CAP, treated at the Samarkand State Medical University Multidisciplinary Clinic and Samarkand City Maternity Complex No. 3.

The patients were divided into two groups: Main Group (n=28): Received NIV in conjunction with regional anesthesia. Control Group (n=28): Received standard humidified oxygen therapy via face mask or nasal cannula (flow rate 4–6 L/min, up to 10–15 L/min). Gestational ages were 23–26 weeks (25%), 27–33 weeks (30,4%), and 34–39 weeks (44,6%). Clinical symptoms included cough (12,3%), fever (65,2%), sore throat (5,4%), dyspnea (15,3%), and nausea/vomiting (1,8%). Chest X-rays revealed unilateral pneumonia in 32 cases (57,1%) and bilateral involvement in 24 cases (42,9%). Comprehensive clinical, laboratory, and instrumental examinations were performed (CBC, UA, Biochemistry, Coagulation profile, Ultrasound of organs/uterus, Chest X-ray, Spirography, and Uterine Doppler) pre- and post-treatment. For the first group, spinal anesthesia was performed at the L₃₋₄ level using 12,5–15 mg of Longocaine Heavy (Hyperbaric Bupivacaine). To prevent aortocaval compression syndrome, a 15–20 left lateral tilt was maintained on the operating table. Surgery commenced 6–8 minutes after injection.

Hemodynamic parameters (MAP, HR, SpO₂) were monitored via Mindray uMEC 15. Respiratory function (RR, Minute Ventilation, Tidal Volume) was monitored using the Mindray SV350 ventilator. Observations were conducted across five stages: (I) Pre-operative, (II) On the operating table, (III) Prior to incision, (IV) Post-delivery, and (V) Post-operation. Statistical analysis was performed using Student's t-test ($p < 0,05$).

Results and discussion

Respiratory therapy was guided by the patient's general condition (cyanosis, RR, HR) and pulse oximetry (SpO₂). Criteria for ICU transfer included:

- Rapid progression of respiratory failure (RR >25 bpm, SpO₂ <92%).
- Failure to maintain SpO₂ >92% despite high-flow oxygen (10–15 L/min).
- Persistent SpO₂ <90% with auxiliary muscle use, altered consciousness, or the need for NIV/intubation.

In the Main Group, NIV was administered (Model YH-830) for durations ranging from several hours to 1–3 days. Settings were individualized, typically maintaining a positive airway pressure of 5–8 cm H₂O. CPAP mode was used to prepare patients for weaning.

Table: Comparative Respiratory and Hemodynamic Parameters

Parameter (Mean)	Stage 1: Admission (Main / Control)	Stage 2: Post-Treatment (Main / Control)
RR (per min)	28,1 / 26,1	19,6 / 22,7
SpO ₂ (%)	89,8 / 91,2	97,8 / 96,4
Pulse (per min)	96,6 / 93,1	80,2 / 82,8
MAP (mmHg)	107,5 / 104,5	102,5 / 103,8

In the Main Group, NIV successfully resolved respiratory failure in 26 patients (92,1%) within the first few hours. Two patients (7,1%) with severe CAP required NIV for 24 hours to reach physiological targets. In the Control Group, standard oxygen therapy was sufficient for 22 patients (78,6%) with Grade I RF. However, 6 patients (21,4%) developed worsening Grade II RF and were subsequently switched to NIV. Four patients (14,3%) in the Main Group underwent scheduled C-sections. These were performed successfully under spinal anesthesia (15 mg Longocaine Heavy) while maintaining NIV, with positive perioperative outcomes.

Conclusion

In pregnant patients with Grade I-II respiratory failure due to CAP, the early application of NIV reduces the progression of RF and the need for invasive MV. While standard oxygen therapy is often sufficient for Grade I RF, it failed in 21,4% of Grade II cases, requiring a transition to NIV. Utilizing NIV for respiratory support in patients requiring surgery significantly reduces perioperative complications.

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