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Nursing problems of patients undergoing venous-venous ECMO therapy

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Abstract

ECMO (Extracorporeal Membrane Oxygenation) is an extracorporeal gas exchange method that, despite many, carries the risk of many complications. ECMO is a modern intensive care method which in many cases is the last resort for the patient. Care and supervision are provided by a multidisciplinary team of specialists: physicians, perfusionists, nurses. The aim of the article was to present ECMO nursing care and the principles of care and care during and after ECMO therapy.

Keywords: ECMO, extracorporeal circulation, nursing care

Introduction

ECMO (Extracorporeal Membrane Oxygenation) is a highly invasive method that is fraught with many complications, it is a form of extracorporeal cardiac support [1,2]. The most important task of ECMO therapy is blood oxygenation and the elimination of carbon dioxide outside the patient's system [3]. During ECMO therapy is important cooperation of many professionals. The team responsible for the condition of the system is a cardiac surgeon and anesthetist, a perfusionist who is responsible for the proper functioning of the entire system and a nurse who is caring a patient with ECMO therapy [4-6]. Infections that may occur while using ECMO can worsen the results of the therapy. Due to proper care of the patient, the risk of in-hospital infections decreases. For patients with long-term therapy it is important to conduct clinical studies to confirm clinical improvement [4-6,7]. The article presents the nursing problems of patients undergoing venous-venous ECMO therapy. This type of therapy is used during respiratory failure, where all other ways of improving gas exchange have failed [2].

Nursing care in patients undergoing extracurricular gas exchange by venous-venous type, in the conditions of Intensive Care Unit (ICU)

Nursing diagnosis: The patient's venous-vein cannula for ECMO. **Care goal:** Proper care of the cannula and care to prevent infection. **Care plan**: Observing and evaluating the location of the cannula for inflammation (redness, edema, etc.), changing the dressings around the cannula with extreme caution, preserving the aseptic and antiseptics, controlling and observing the puncture for possible bleeding, watching the extremities for warming, mobility, color, heart rate control[7].

Nursing diagnosis: Impaired gas exchange **Care goal:** Reaching proper respiratory status **Care plan**: Maintenance of respiratory patency, maintenance of acid and alkaline balance, monitoring of respiratory rate and depth, observation of extra respiratory muscles, movements of nasal swabs, every 1-2 hours checking for airway obstruction, constant control of blood oxygenation using a pulse oximeter, checking arterial blood gas parameters, checking for cyanosis (this symptom may be unreliable in hypothermia patients!), controlling sedative and anesthetic effects on respiratory function, ECMO patients after attention Symptoms of mental disorders such as anxiety, agitation, insomnia - these symptoms may also indicate hypoxia! Each arterial blood gas score consulted with perfusionist and physician present during ECMO therapy[7].

Nursing diagnosis: Patient exposed to complications associated with ECMO therapy. **Care goal:** Early detection of symptoms that endangers the life and health of the patient. **Care plan:** operation of the device (drainage control - presence of air, roller work-damage, oxygenator-coagulation) including perfusionist assistance, control of hemodynamic parameters and vital parameters of the patient, monitoring of respirator parameters and recording in the observation card, observation of the neurological condition of the patient, depth of sedation, draining of the limbs in such a way as to prevent bedsores and possible pathological changes of large quantities of blood products and blood products according to medical orders, collection and control of laboratory tests according to ordered medical

appointments, ACT control every 2 hours (standard 180-200 sec.), arterial blood gas monitoring, observation and measurement of basic life parameters[7].

Blood pressure and heart rate should be measured by the blood method. It is necessary to use mechanical ventilation. The patient's body temperature should be measured multiple times during on-call duty. In addition, the patient's diuresis and state of consciousness should be monitored and all measurements recorded on the patient's observation card. In spite of the lack of logical contact with the patient, he should be informed about every care and treatment performed. In addition, laboratory tests (morphology, coagulation, glucose, electrolytes, creatinine) should be collected daily. Gasometric tests should be taken every 2 hours, as is the ACT study, whereby the perfusionist, in consultation with the anesthetist, will determine the flow of heparin infusion[7].

Nursing diagnosis: Diagnosis of nursing: Established vascular access - Central puncture, intraarticular injection and HD injection **Care goal:** Maintaining patency, measuring vital signs, frequent collection of laboratory tests, and preventing complications associated with vascular catheters. **Care plan:** At the admission to the ward, the anesthesiologist assumes access to a large venous catheter - central puncture, intraarticular injection for blood pressure and blood pressure monitoring and pulse rate, insertion of HD injection, choice of equipment with proper diameter reduces the risk of bleeding, changing the dressings according to needs and recommendations, preservation of aseptic and antiseptics during all care activities (disinfection, sterile dressings), observation whether there is redness, swelling, sounds - observations recorded in the central injection, to prevent clotting (500 mL 0.9% Na Cl + 2.5 thousand heparin), date and place of insertion[7].

Nursing diagnosis: Occlusion of the secretion in the bronchial tree. **Care goal:** prevention of occlusion of the intubation tube and excessive accumulation of secretions in the bronchial tree. **Care plan:** Daily correct and delicate oral toilet of the patient using Octanidol, change of attachment of the intubation tube as needed, aspiration of bronchial secretion by catheters according to need, sterile principles, control of arterial and peripheral arterial blood oxygen saturation, control of pressure in the balloon of the intubation tube, documentation, noting the results of suction (features of secretion, color, odor, volume), use of closed suction system, quantity control, depth of breath and respiratory effort.

Nursing diagnosis: Increased tendency to bleeding **Care goal:** Prevention of bleeding **Care plan:** Control of dressings for congestion and punctures for hematoma formation and development and change as necessary, control of coagulation of the patient by taking laboratory tests and ACT - observations recorded in medical records, monitoring of urinary bleeding, stool, sputum, vomiting nasal bleeding, epilepsy, diarrhea or pathological bruises on the skin (DIC), patient life monitoring (increase in heart rate at bleeding and CTK decrease) [7].

Nursing diagnosis: Risk of infections **Care goal:** Prevention of infections **Care plan:** Observing and reporting any signs of infection such as redness, warming, body temperature rise, monitoring of laboratory findings such as WBC, white blood cell smear, protein concentration, albumin concentration, culture results, CRP results, PCT, skin price for

possible lesions, accurate proper hydration and hydration of areas of the skin that are particularly prone to change, evaluation of the amount and coloration of respiratory secretions, compliance with all rules of aseptic and antiseptics, informing family and loved ones about compliance with hygiene rules when visiting a patient, isolating a patient[7].

Nursing diagnosis: Risk of skin disorders due to lying down **Care goal:** Prevention of skin lesions / bedsores **Care plan:** Assess the risk of developing pressure ulcers according to Torrance's scale, use of preventive equipment - antihypertensive mattress, supports and wedges to stabilize the position of the patient, changes in the position of the patient as often as 2 hours, but taking into account the condition of the patient (position of the cannula for ECMO therapy), proper skin care - frequent skin moisturizing, keeping the skin clean after every fecal discharge (exposure to chemicals from the urine), pressing the area exposed to pressure ulcers, precisely laid patient bed, well-draped sleepers and sheets, high protein diet, in the event of the first signs of bedsores, the use of specialized dressings and gels and liquids for the cleaning and moistening of wounds, recording the treatment plan of the site of skin damage, the choice of appropriate dressing to the healing phase of the possible wounds[7].

Nursing diagnosis: Difficult eating of the patient. **Care goal:** Satisfy individual nutritional needs and appropriate hydration of the patient. **Care plan:** Pretreatment of the probe into the stomach (initially left to drain), appropriate selection of probe size, appropriate selection of the type and calorific value of feed administered p.s., always check for gums and proper positioning of the stomach, record the amount of food and possible overdoses. Parenteral nutrition in the right amount and composition to provide daily nutritional requirements. Repeat the day for oral and gastric toilets several times a day. which was left to drain[7].

Nursing diagnosis: Risk of electrolyte and metabolic disorders **Care goal:** Prevention of electrolyte and metabolic disorders **Care plan:** Control of patient's life parameters (decrease BP, increase in CVP value), control of urine and stools, control of abdominal obesity, control of laboratory results (electrolyte level, glycemia), control of the effect of medicinal products (diuretic effect on cardiac function), fluid control every hour. In case of cardiac arrhythmias or hypotension, inform doctor. Control sedation, stomach drainage to prevent swelling and possible pathological changes, transfusion of blood and blood products according to medical orders, and control of laboratory tests according to ordered medical appointments, ACT control every 2 hours (accepted range 180-200 sec.), arterial blood gas monitoring, observation and measurement of vital parameters[7].

Nursing diagnosis: The patient's anxiety about his own health and life **Care goal:** Reduce anxiety **Care plan:** Be present when the patient expressing fear, Enabling contact with family and loved ones, Allowing contact with a psychologist, If necessary, Inclusion of pharmacological treatment according to assess whether there are symptoms of depression and, if necessary, to consider with the doctor psychiatric consultation, Observation of the patient[7].

Nursing diagnosis: Inability to self-care **Care goal:** Satisfy the needs of the patient in daily activities, to maintain hygiene **Care plan:** Performing a whole-body toilet (nurse with the help of perfusionists), oral care (for example, using Octanidol) - preventing pulmonary

inflammation of the hospital, percussion and buttocks, moisturizing the patient's skin using olive oil, Sudocrem and Linomag, change of pampers and disposable sleepers and daily change of bed linen, prevention of anti-bedstead by the use of variable pressure mattress, risk assessment of position change (cannula positioning), Informing the patient of any care taken, carefully performed care (if it is possible), calm and confident, providing the patient with the presence, care and interest, and enabling him to contact the family and the clergy, providing the patient with appropriate conditions for sleep and rest[7].

Nursing diagnosis: Lack of cooperation in the treatment of patients in sedation **Care goal:** Establishing a relationship and attempting to work with a patient and preventing a patient from becoming involved **Care plan:** Establishing a therapeutic relationship, Informing the patient of each activity, in case of psychomotor agitation, informing the physician of the necessity of direct coercion, preventing withdrawal or withdrawal of ECMO therapy cannula, central and peripheral puncture, keeping the patient informed about where they are and why they are trying to get feedback, whether the patient understands what we are talking about (eg nodding), showing concern and empathy.

Nursing diagnosis: Impairment of the verbal communication process, resulting from the assumed intubation tube. **Care goal:** Enabling non-verbal communication with the environment **Care plan:** Explain patient why he/she cannot talk, showing concern and interest, using alternative forms of communication writing on paper, asking the patient to show the subject he needs, trying to read the lips, communication boards, etc. Providing an environment conducive to communication card paper, pen, not very loud radio, explanation of care procedures [7].

Conclusions

With the introduction of innovative methods, treatment in intensive care units requires the continuous development of new standards for the management of patients at risk for health and life. Often, doctors are divided about the treatment of ECMO patients, as the condition of the patient is deteriorating overnight. ECMO proves its effectiveness in treating acute respiratory failure and heart failure. Successes and failures should be reported, as this is helpful to doctors from other hospital units where treatment is provided. With this information, we provide each other with information about possible failures [8]. ECMO systems are complex and expensive, so there are few hospitals in Poland that are suitable for this type of therapy. However, it is important to remember that ECMO therapy is a great hope for patients who qualify for such treatment but at the same time ECMO is a huge challenge for any interdisciplinary team that is working with this device [9, 10]. Cianchi's research shows that severe respiratory failure requiring VV-ECMO support has been very successful [11]. The woman referred to in the Brodie and Bacchetta article, requiring ECMO V-V support, has gone a long way, but once again ECMO has proven effective in treating respiratory failure [12]. In recent years, the need for extracorporeal gas exchange has increased considerably. ECMO has become an invaluable tool for the care of adults and children with severe respiratory failure, resistant to conventional therapy [13, 14]. The presence of a nurse and proper care of the patient during ECMO therapy is extremely

important. It is precisely the care and care that can be affected greatly. to reduce the occurrence of complications.

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