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SIGNIFICANCE OF CARDIOPROTECTIVE MECHANICAL VENTILATION IN PATIENTS IN THE COMATOSE PATIENTS

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Abstract

This article discusses the significance of SPM in patients with traumatic brain injury, changes in the respiratory and cardiovascular systems of the patient's body after prolonged mechanical ventilation. In total, 295 patients with craniocerebral injuries have been treated in the Department of Neuro-Resuscitation of the Republican Scientific Center for Emergency Medical Assistance to the Bukhara branch this year. In 85 of these patients, an IVDS device was connected. During the examination of 49 patients, 20 showed various changes in the cardiovascular and respiratory systems. The article describes X-ray studies, laboratory studies and ECG changes in these patients.

Keywords: ALV, closed craniocerebral injury, IVS cardioprototype, X-ray studies, laboratory studies, ECG.

Introduction

The basis of intensive therapy in neurosurgery is the prevention and treatment of secondary cerebral ischemic attacks. In their prevention, it is of great importance to ensure the function of external respiration adequate to the needs of the affected brain. Insufficient minute volume of breathing can cause hypoxia, at the same time, hyperventilation can also be dangerous due to hypocapnia and spasm of cerebral vessels. Modern breathing apparatus allows for effective auxiliary ventilation of the lungs while maintaining the spontaneous rhythm of the patient. But we must not forget that in case of injuries and diseases of the central nervous system, the principles of respiratory support developed in general resuscitation for various variants of primary lung damage cannot be fully transferred to neuro-resuscitation. It should be remembered that without directed pharmacological and / or surgical effects on the underlying pathological process, the effectiveness of treatment of respiratory disorders is significantly lower.

Objective: to study the effect of artificial ventilation and some types of assisted ventilation on cerebral hemodynamics and intracranial pressure in patients with severe traumatic brain injury (TBI).[8,12]

Material and methods: Surveys have shown that most of these patients are aged from 30 to 50 years, and among them patients 45+1-48+1 there are many changes from the cardiovascular system during the year. Most patients have hypotensive complications from the cardiovascular system, there is a sharp decrease in intracranial pressure, and constant parameters of the apparatus, hemodynamic and respiratory parameters are monitored. 50-55% of cases of decreased blood pressure and the occurrence of ischemic changes in the heart in the early stages of ventilation in complicated patients.

Indications for ventilator and VIVL were not only an increase in respiratory failure, but also the progression of neurological disorders. Clinical and neurological examination, control of laboratory parameters (general blood analysis, acid-base state of the CBS), including arterio-venous oxygen difference (AVDO2) and hemoglobin oxygen saturation in the jugular vein bulb (SjO2) were carried out in all patients in dynamics. [22, 23] To study the gas composition, capillary, arterial, and venous blood taken from the internal jugular vein was examined. Blood sampling from the jugular vein was carried out by puncture method from v.jugularis interna on the 1st, 3rd and 5th days. The parameters of the blood gas composition were recorded at least 4 times a day during the entire period of respiratory support. The indicators of the blood gas composition were studied on the Analyze blood gas apparatus (USA). AVDO2 was calculated by pulse oximetry and hemoglobin oxygen saturation in the blood of the jugular vein, as well as by comparison with the gas composition of arterial blood. [13, 15, 16, 17] In the postoperative period, all patients underwent ventilation with Savina, Evita 2+ devices (Dreager, Germany) against the background of standard intensive care. At first, the IPPV (Intermittent Positive Pressure Ventilation) mode was used – intermittent ventilation under positive pressure. Subsequently, various ventilation modes were individually applied: BIPAP (Biphasic Positive Airway Pressure) – two-phase www.sta.uz Shoshilinch tibbiyot axborotnomasi, 2011, No. 2 41 positive airway pressure, SIMV (Synchronized Intermittent Mandatory Ventilation) – synchronized intermittent mandatory ventilation. Ventilation parameters: fraction of inhaled oxygen (FiO2) not lower than 40-45%, peak inhalation pressure (Pins) from 10 to 30 mbar, PEEP from 2 to 10 mbar. At the same time, an invasive measurement of intracranial pressure (ICP) was performed in all patients using the IIND 500/75 device (Triton-Electronics, Russia) during the entire period of respiratory support. Monitoring of hemodynamic parameters (blood pressure, mean arterial pressure, heart rate) was carried out by Nihon Cohden (Japan) and Datex Ohmeda (USA) devices. If necessary, pressor amines in conventional dosages were used to increase systemic blood pressure, and 3% hypertonic sodium chloride solutions in an average dose of 5.3 ml/kg were used to prevent brain edema. Cerebral perfusion pressure (CPP) was calculated by the formula: CPP = CPP - ICP, where: ICP - intracranial pressure, CPP – mean arterial pressure, which is calculated by the formula: CPP = (BP system + 2ADdiast) / 3.

Results and Discussion

In the works devoted to the prognosis and outcomes of treatment in patients with TBI who underwent ventilation, only the fact is indicated that the results of treatment in this category of patients depend on the initial severity of the patient and the role of timely and adequate respiratory support is not reflected[19]. Unreasonable use of hyperventilation leads to hypocapnia, which causes vasoconstriction and a decrease in cerebral blood flow [22, 23, 25] A decrease in cerebral blood flow following vasospasm will be more pronounced in the affected areas of the brain. Thus, the metabolism and oxygenation of cells that are already in a state of apoptosis deteriorates — an ischemic cascade and secondary ischemia of the brain parenchyma develop [6,20]. At with a decrease in cerebral blood flow, the utilization of oxygen by neurons increases, and the SP2 index decreases. In this regard, an increase in AVD O2 may reflect the potential danger of ischemic changes

[20, 22, 26] With forced ventilation of the lungs, an increase in intra-thoracic pressure will lead to a decrease in cardiac output and an increase in ICP [2,4,6]. These two factors will certainly lead

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to a decrease in the CPD. Optimization of respiratory support methods in patients with subarachnoid hemorrhage (SAH) deserves close attention, since the mortality rate among patients with cerebrovascular pathology who underwent ventilation is very high and, according to the literature, ranges from 49 to 93% [3]. Patients with acute cerebral circulatory disorders often have hypoxia and impaired independent breathing, which worsens the outcome, therefore patients should be intubated and transferred to a ventilator [18,21,26]. Indications for tracheal intubation and artificial lung ventilation are not only respiratory, but also cerebral insufficiency. In patients with severe brain damage, including those with SAC, there are features of respiratory support, which include a wide range of respiratory disorders of central origin, as well as the need to maintain the concentration of carbon dioxide in blood plasma in a narrow therapeutic range in order to avoid cerebral ischemia due to hypercapnia. When performing a ventilator, two tasks are solved: maintaining adequate gas exchange and preventing lung damage. The purpose of the ventilator is to ensure sufficient oxygenation of arterial blood (RaO2 — 100 mmHg. and more) and maintenance of carbon dioxide tension (RaSO2) within 33-40 mm Hg. With intact lungs, the respiratory volume should be 8-10 ml per 1 kg of ideal body weight, the pressure at the height of inspiration — no more than 30 cm of water, positive pressure at the end of exhalation — 5 cm of water, minute volume respiration is 6-8 l/min, and the oxygen content in the respiratory mixture is 30-50% [7-9]. It is important to avoid episodes of a decrease in RaSO2 below 30 mmHg, since hypocapnia leads to a decrease in cerebral blood flow and cerebral ischemia [16, 22, 26]. The choice of respiratory support mode is carried out individually. As a rule, in the course of respiratory therapy, ventilation modes are periodically changed depending on the needs of the patient. It is believed that the expediency of using a ventilator is associated not only with overcoming respiratory disorders, but with the possibility of using hyperventilation mode to affect the tone of the pial capillary vessels, to increase peripheral vasoconstriction and thereby reduce volume of intracranial fraction of blood flow, which leads to an increase in craniospinal compliance and a decrease in intracranial hypertension [2, 4]. There is evidence that it is necessary to use ventilation modes with volume control. The problem of optimal minute volume of lung ventilation for patients with neurosurgical pathology is discussed in the literature. In the study of A.A. Belkin et al. (2005) it was shown that the use of volumetric ventilation in patients with acute cerebral insufficiency is accompanied by a significant increase in the hydrodynamic resistance of the pial vessels of the brain, which may be due to the effect of ventilation on the increase in pressure in the cerebral venous system and on the autonomic innervation of cerebral vessels [9, 10, 14] E.A. Kozlova et al. (2005) studied the autoregulation of cerebral circulation in patients in the acute period of severe TBI as a guideline for controlling the parameters of artificial lung ventilation. They showed the possibility of a directed change in the autoregulatory reactions of the cerebral arteries by changing the CO2 level and determined the conditions for an optimal ventilation regime that optimizes the state of cerebral circulation [1, 11, 18]. A.V. Oshorov et al. (2004) propose a differentiated approach to the use of hyperventilation in the acute period of severe TBI, depending on the state of cerebral blood flow. The authors note that the use of hyperventilation to combat intracranial hypertension in vasospasm leads to a temporary decrease in ICP, but at the same time causes changes in cerebral blood flow that do not correspond to the oxygen needs of the brain, a decrease in CPD, which increases the risk of ischemic damage to brain tissue.This requires multiparametric monitoring of cerebral functions as a prerequisite for the strictly justified use of hyperventilation during intensive therapy of intracranial hypertension [1, 5, 6, 7, 8, 19, 20] Thus, there is practically

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no complete picture of the changes occurring in the brain in patients with TBI during ventilation, the influence of respiratory support parameters on the state of the brain and the outcomes of treatment of patients with TBI. It is especially important to solve these issues in order to prevent the occurrence of hypoxemia and hypoxia of the brain, as the leading causes of secondary ischemic episodes that worsen the course and prognosis of neurosurgical pathology. Rational respiratory therapy, along with other intensive care methods, will help to avoid this based on the results of comprehensive monitoring of the functional state of the brain and its life support systems.[24] All of the above determines the relevance of research in this area in order to develop optimal methods of respiratory support, which is based on long-term artificial ventilation of the lungs of patients with TBI.

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