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Intensive Therapy of the Respiratory Failure Arising after the Plasty of Large Ventral Hernias

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Short Communication

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Introduction

The pressure within the abdominal cavity is normally little more than atmospheric pressure [1-3]. However, even small increases in intra-abdominal pressure can have adverse effects on renal function, cardiac output, hepatic blood flow, respiratory mechanics and intracranial pressure [4-6]. Significant increases in intra-abdominal pressure are seen in a wide variety of conditions commonly encountered in the intensive care unit [7]. Abdominal compartment syndrome describes the combination of increased intra-abdominal pressure and end-organ dysfunction, has a high mortality [1,4,8]. One of the post-operational complications of the plastics of large ventral hernia is the development of respiratory failure (RF) [9]. This is caused by increased intra-abdominal pressure (IAP), encountered in 62% of patients with large ventral hernia. Prognosis herein is substantially determined by timely compensation of the respiratory malfunction of lungs [7,9].

There search objective – is to define the efficiency of noninvasive artificial ventilation of lungs (NAVL) during RF, arising after the plasty of larger ventral hernias.

Keywords: Respiratory failure; Intra-abdominal pressure; Noninvasive ventilation

Abbreviations: IAP: Intra-abdominal pressure; RF: Respiratory failure; AH: Abdominal hypertension; RV: Respiratory volume.

Materials and Methods

During the period 2007-2014 168 patients with ventral hernia underwent surgical treatment in SSC named after M.A. Topchubashev. Next post- operational period was complicated by acute RF in 62 patients out of them (36.9%), who made the main group of research. 20 patients who underwent operation because of peptic ulcer of stomach and duodenum were in control group, without any malfunction of respiratory system. Measurement of IAP was conducted by transvesical method before and after NAVL session. Defining IAP higher than 8 cm H_2O was considered as the presence of abdominal hypertension (AH).

Results

The RF diagnosis was established by existence of the following criteria, besides the clinical picture: the oxygenation index (PaO_2/FiO_2<300), $PaCO_2$>45 mm Hg, pH<7.35, respiratory volume (RV) <5 ml/kg, RR>25 a minute. The patients in the main group were divided into 3 groups depending on IAP level. 32 patients with IAP being within 10-15 cm H_2O were included in the I group – mild degree of AH, and 21 patients with IAP being within 16-20 cm H_2O, that corresponded to AH moderate severity were included in the II group. 9 patients with IAP higher than 20 cm H_2O - severe degree of AH were included in the III group.

NAVL began with a standard setting PEEP=5 cm H_2O

and FiO_2=50%. The duration of the session was 4 hours with intervals of 90 minutes. 5 stages were distinguished during the NAVL: I – RF diagnosing; II - the beginning of NAVL; III – setting of optimal NAVL mode; IV –completion of NAVL and V- transition from NAVL mode to spontaneous respiration. It was decided to use NAVL in case; there exist deterioration in two of the following indicators (in the background of respiration by air):

- PaO_2 being less than 55 mm Hg
- PaO_2/FiO_2 less than 280
- $PaCO_2$ more than 45 mm Hg
- pH of arterial blood less than 7.35
- RV less than 4 ml/kg
- RR (respiratory rate) more than 25 a minute.

Positive dynamics were noticed in general condition of patients from the beginning of stage II. During stage III the patients' condition began to improve considerably according to clinical and also gas exchange and hemodynamic indicators. The skin and visible mucous got normal coloring, the humidity of skin was gone, RR and tachycardia decreased, $PaCO_2$ decreased to 44.2±1.3 mm Hg, PaO_2 increased up to 96.2±0.5%, PaO_2/FiO_2 =276.5±5.1indicated the elimination of arterial anoxemia which was present before ($p<0.01$). It became possible to separate patients from respiratory mask during 54.5±2.5 minutes in stage IV. Respiration was gradually stabilized in 96.4% of patients in stage V, PaO_2/FiO_2 indicator was inclined to normalization.

Conclusion

Thus, it was established that applying NAVL after the plasty of large ventral hernia was effective and enabled to refuse a trachea intubation.

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