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NON-SPECIFIC CHEMICAL PLEURODESIS IN TREATMENT OF PATIENTS WITH PLEURAL EFFUSIONS OF DIFFERENT ETIOLOGY

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НЕСПЕЦИФИЧЕСКИЙ ХИМИЧЕСКИЙ ПЛЕВРОДЕЗ В ЛЕЧЕНИИ ПАЦИЕНТОВ С ПЛЕВРАЛЬНЫМИ ВЫПОТАМИ РАЗЛИЧНОЙ ЭТИОЛОГИИ

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Abstract. Pleural effusion (PE) is an abnormal accumulation of fluid between the visceral and parietal layers of the pleura. PE is a symptom of more than 80 different diseases, thus affecting doctors of various specialties. Chemical pleurodesis is an artificial induction of an aseptic inflammatory process by introducing various chemical agents into the pleural cavity in order to obliterate the pleural cavity. Despite the fact that the history of pleurodesis is more than a century old, there is still a search for the most effective, safe and affordable sclerosant. Develop our own technique of chemical pleurodesis. Evaluation the efficacy and safety of using iodopovidone as a pleurosclerosant. The study was conducted on the basis of the clinic named after I. K. Akhunbaev National Hospital of the Ministry of Health of the Kyrgyz Republic in the department of thoracic surgery. The study included 51 patients with PE of various etiologies, who were treated in the department from September 2019 to February 2023. PE in all cases had a refractory course. All patients underwent drainage of the pleural cavity, after complete expansion of the lung, a chemical pleurodesis procedure was performed with a 10% solution of iodopovidone. After this manipulation, we evaluated the effectiveness and safety of the technique. An effective technique is possibility to reduce the volume of pleural fluid and, as a result, remove drainage from the pleural cavity. In 45 cases out of 51, the technique was effective, which amounted to 88.2%. It is important that the procedure was accompanied by minimal side effects in the form of pain and temperature reaction. Chemical pleurodesis with iodopovidone is an effective, safe and affordable method in the treatment of patients with refractory PE.

Аннотация. Плевральный выпот (ПВ) — это патологическое накопление жидкости между висцеральным и париетальным листками плевры. ПВ является проявлением более 80 различных заболеваний, таким образом, затрагивая врачей различных специальностей. Химический плевродез — это искусственная индукция асептического воспалительного процесса, путем введения в плевральную полость различных химических агентов, с целью облитерации плевральной полости. Несмотря на то, что истории плевродеза более века, до сих пор, идет поиск наиболее эффективного, безопасного и доступного склерозанта. Цель исследования. Разработать собственную методику химического плевродеза. Оценить эффективность и безопасность применения йодповидона в качестве плевросклерозанта. Исследование проводилось на базе клиники им. И. К. Ахунбаева Национального госпиталя

Министерства здравоохранения Кыргызской Республики в отделении торакальной хирургии. В исследование попал 51 пациент с ПВ различной этиологии, находившийся на лечении в отделении в период с сентября 2019 года по февраль 2023 года. ПВ во всех случаях имел рефрактерное течение. Всем пациентам было проведено дренирование плевральной полости, после полного расправления легкого проводилась процедура химического плевродеза 10% раствором йодповидона. После данной манипуляции нами оценивалась эффективность и безопасность методики. Эффективной методика является, если после ее проведения удастся уменьшить объем отделяемой жидкости и, как правило, удалить дренаж из плевральной полости. В 45 случаях из 51 методика оказалась эффективной, что составило 88,2%. Немало важно, что процедура сопровождалась минимальными побочными эффектами в виде болевого синдрома и температурной реакции. Химический плевродез йодповидоном является эффективным, безопасным и доступным способом в лечении пациентов с рефрактерным течением ПВ.

Keywords: pleural effusion, exudate, transudate, pleurodesis, iodpovidone.

Ключевые слова: плевральный выпот, экссудат, транссудат, плевродез, йодповидон.

Introduction

Pleural effusion (PE) is a pathological accumulation of fluid in the pleural cavity, which occurs under the influence of various factors that upset the balance between its formation and absorption. PE is a symptom of more than 80 different diseases [1]. Covering a large number of diseases of various organs and systems, the problem of diagnosing and treating PE is a hot topic for doctors of various profiles. Particular interest to the doctor of the thoracic profile is PE refractory to the main treatment. Often, such a course of PE occurs in malignant tumors, when there is a primary lesion of the pleura, as well as in secondary lesions with metastases. Transudative PE also have a recurrent course, especially in congestive heart failure, liver cirrhosis, and chronic kidney disease [2].

Traditional treatment of the underlying disease is not always effective, especially in patients at the terminal stage of cancer, as well as in chronic heart, liver and kidney failure, when organ transplantation is the only radical treatment. Palliative treatment is reduced to the correction of plasma oncotic pressure, the introduction of diuretics, as well as the restriction of salt in the diet.

PE is manifested by shortness of breath, dry cough, discomfort and pain in the chest. In such cases, in order to stop respiratory failure, a pleural puncture procedure is performed. Thoracocentesis is an effective method of emergency relief of respiratory failure. However, if the underlying cause of PE is not treated, the condition is more likely to recur. In addition, along with the evacuated liquid, protein and protein fractions are eliminated, which indirectly reduces oncotic pressure and leads to a “vicious circle” of PE formation. By itself, thoracocentesis carries the risk of complications such as pain shock, pneumothorax, bleeding and infection, and if repeated procedures are necessary, this risk increases significantly. In this case, the question arises of drainage of the pleural cavity, which in turn leads to an uncontrolled loss of fluid and, as a result, the patient becomes chained to the pleural tube. Based on the foregoing, it becomes clear that the treatment of refractory PE is a topical issue to this day [8].

Pleurodesis is the process of proliferation of connective tissue between two layers of the pleura, leading to obliteration of the pleural cavity. Pleurodesis, according to the method of influencing the pleura, can be mechanical, physical and chemical. Pleurodesis can also be

spontaneous, when after the installation of a pleural drainage, self-gluing of the pleural sheets occurs. During surgical operations on the lungs, especially with bullous emphysema, pleurodesis methods are often combined, for example, mechanical pleurodesis is supplemented with chemical [3, 9].

Chemical pleurodesis (CP) has been actively used in the last few decades, it has found its active use in the treatment of malignant pleural effusion, as well as in recurrent pneumothorax. Despite a large number of publications, there is still no consensus on the ideal pleuroscerosant, and the issue of the use of CP in transudative PE remains poorly understood [4]. The most popular method of CP worldwide is talc pleurodesis, while talc is intended specifically for this procedure and its particles do not enter the systemic circulation [5]. Recent studies have shown the effectiveness of the use of cytostatics, interleukin, skin glue, sericin [6]. The lack of production of these drugs in our country makes them inaccessible. Promising from this point of view is nonspecific CP with iodopovidone, which is no less effective [7].

The aim of the present review

Evaluation of the effectiveness of iodopovidone as an agent for CP in the treatment of patients with refractory PE of various etiologies. Assess the safety of iodopovidone during the induction of pleurodesis. Identify common signs in patients in which CP was not effective.

Material and methods.

This study was made on the basis of the clinic named after I. K. Akhunbaev of the National Hospital of the Ministry of Health of the Kyrgyz Republic (MHKR) in the department of thoracic surgery, from September 2019 to February 2023. The study included 51 patients. All of them had a long history of the disease, despite the main treatment, PE was recurrent, which led to multiple thoracentesis procedures. The age of patients ranged from 41 to 84 years; the average age was 61.4 ± 3.6 . The number of women was 29 (56.9%) and men 22 (43.1%).

Patients with established hypersensitivity to iodine preparations, thyroid diseases were excluded. Since the CP procedure is not included in the MHKR clinical protocols and was performed for the first time, informed consent was taken from all patients.

All patients underwent drainage of the pleural cavity at the most optimal point, established by X-ray and ultrasound. A 24 fr Apexmed drain was placed in the pleural cavity to evacuate the fluid. Within 48-72 hours, clinical and radiological control of the complete expansion of the lung was performed. Patients who failed to achieve full lung re-expansion were excluded from the study.

For the purpose of anesthesia, before the introduction of pleuroscerosant, 1% lidocaine solution in a volume of 50 ml was injected intrapleurally, the drainage tube was closed for 20 minutes, and the patient was recommended to change the position of the body every 5 minutes and make active respiratory movements. Next, the anesthetic was removed and a mixture of 1% lidocaine solution in a volume of 50 ml and 10% iodopovidone solution in a volume of 20 ml was introduced into the pleural cavity with an exposure of 2 hours.

Safety was assessed according to the following criteria: pain response, hemodynamic parameters, body temperature response. Efficiency was assessed by the volume of discharge from the drainage and the possibility of removing the tube. CP was considered effective if the fluid volume was reduced to 100 ml, which made it possible to remove the chest tube.

Results

Statistical data processing was performed using IBM SPSS Statistics 28.0 program.

Fluid accumulation was caused by malignancy in 27 cases (52.9%), hepatic hydrothorax in

13 patients (25.5%), congestive heart failure 6 patients (11.8%) and chronic kidney disease in 5 cases (9.8%).

The safety of CP was assessed in terms of heart rate, systolic blood pressure (SBP), body temperature, and pain response. For comparison, the values were recorded before the procedure, in the first 24 hours after the procedure, and between 24 and 48 hours after the procedure. The result of the CP safety assessment is shown in Table.

Table

MAIN INDICATORS OF HEMODYNAMICS, BODY TEMPERATURE AND PAIN RESPONSE

<i>Indicator</i>	<i>Before the procedure</i>	<i>First 24 hours after procedure</i>	<i>24-48 hours after procedure</i>
Pulse, beats/min	76,3±8,8	77,2±7,1	75,9±6,3
Systolic blood pressure (SBP), mm Hg	118,4±8,2	118,2±7	116,4±7,1
Body temperature, °C	36,6±0,1	36,8±0,3	36,6±0,1
Pain according to VAS	0,4±0,1	2,2±1	0,4±0,5

After statistical processing of the data, it can be statistically significantly ($p > 0.05$) that the introduction of iodopovidone does not lead to a change in the main hemodynamic parameters. Statistically significant ($p < 0.05$) there is an increase in body temperature, but within day ($p > 0.05$) body temperature indicators return to their original value. A similar situation was observed with body temperature, after the introduction of pleurosclerosant, pain intensified ($p < 0.05$), within 24-48 hours the pain syndrome was non-violating ($p > 0.05$).

In 45 cases (88.2%), CP was successful, in these patients the drain was removed, the average number of days with a drain was 6.2 days, with 2.8 days before the administration of a chemical agent, and 4.3 days after. The average duration of hospitalization was 8.4 days.

In 6 cases (11.8%), it was not possible to remove the drainage from the pleural cavity due to persistent exudation. These patients were united by the presence of ascitic fluid in the abdominal cavity. Thus, the main factor in the failure of CP in our study was the migration of ascitic fluid into the pleural cavity and, as a result, a change in the concentration of pleurosclerosant. It follows that patient with ascites, before the CP procedure, are shown to perform laparocentesis to drain the abdominal cavity.

Discussion

The use of CP in pleural effusions has been studied for several decades, but there is still no consensus on the methodology of implementation, as well as on the choice of a chemical agent. The use of CP in transudative PE is poorly understood, in the Russian-speaking segment there are single publications devoted to this issue. This issue is especially relevant for our country, where pleurodesis procedures have not been carried out before

The introduction of 50 ml of 1% lidocaine solution for pain relief has a good analgesic effect and does not have side effects associated with the absorption of the anesthetic. 20 ml of 10% iodopovidone solution together with 50 ml of 1% lidocaine solution have the necessary local irritant effect with minimal pain. CP with iodopovidone is an effective method of treatment the refractory and recurrent course of PE and does not cause significant clinical manifestations associated with an inflammatory reaction of the pleural sheets.

The presence of ascites makes it difficult to carry out CP, since the migration of ascitic fluid through diaphragm defects becomes the main mechanism for the accumulation of fluid in the pleural cavity. Even a small volume of ascitic fluid is able to migrate into the pleural cavity, which

is associated with negative pressure in the pleural cavity.

Conclusions

1. Iodpovidone is an effective, safe and affordable chemical agent for pleurodesis in PE of various etiologies;
2. The main side effects are temperature reaction and pain syndrome, their manifestation is minimal, the duration is no more than 48 hours;
3. The presence of ascites requires additional attention to patients, since the inability to evacuate free fluid from the abdominal cavity leads to the failure of CP.

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