

ORIGINAL ARTICLE

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Evaluation of pleural effusions developed after abdominal operations

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Abstract

Respiratory problems may develop after abdominal operations. It is more common especially in upper abdominal surgeries than in lower abdominal surgeries. In this study, patients with pleural effusion developed after abdominal operations were evaluated retrospectively in terms of etiology and drainage indications. A total of 56 patients who underwent abdominal surgery between March 2012 and November 2018 with pleural effusion were included in the study. Age, sex, smoking history, concomitant diseases, operative diagnoses, and operations performed and treatment results of the patients were recorded. 19 (33.9%) of the cases were female, 37 (66.1%) were male, and the mean age was 52.5±12.16 (24-82). In the postoperative period; pleural effusion developed in 12 (21.4%) bilaterally, in 15 (26.8%) on the right side, and in 29 (51.8%) on the left side. 18 (32.1%) of the cases underwent liver cyst and tumor surgery; 15 (26.8%), splenic surgery; 17 (30.3%), gastric tumor surgery; 2 (3.6%), calculous pouch-cholecystitis surgery; and 4 (7.1%), colon-rectum surgery. Fluid transfer to the intrathoracic area may occur due to the high intra-abdominal pressure as a result of the disruption in the integrity of the diaphragmatic peritoneal face after abdominal surgery. Additionally, hypoalbuminemia in the postoperative period has a role in the development of pleural effusion. Pleural fluid drainage may be required to prevent possible morbidities and mortalities in such cases.

Keywords: Abdomen surgery, pleural effusion, thoracostomy, drainage

Introduction

Respiratory system complications are common after abdominal operations. There are more respiratory problems especially in the upper abdomen operations than in the lower abdomen. Common respiratory disorders include bronchospasm, long-term mechanical ventilation support, atelectasis, acute bronchitis, pneumonia, pulmonary embolism, pneumothorax, and pleural effusions [1,2]. In this study, pleural effusions developed after abdominal operations were retrospectively evaluated in terms of etiology and drainage indications.

Materials and Methods

A total of 56 patients who underwent abdominal surgery between March 2012 and November 2018 with pleural effusion were

evaluated retrospectively. Age, sex, smoking history, concomitant diseases, operative diagnoses, operations were performed and the treatment results of the cases were recorded. Preoperative and postoperative chest radiographs of the cases and thorax computed tomography of some cases due to their etiology were compared (Figure 1).

19 (33.9%) of the cases were female, 37 (66.1%) were male, and the mean age was 52.5±12.16 (24-82). SPSS 16.00 software was used for statistical evaluation.

Ethics Committee approval was obtained from local committee for the study (approval no: 2449, date: 20.06.2020). Patient information was scanned retrospectively from the general surgery files; therefore, written consent was obtained from the patients for our study.

Results

In the postoperative period; pleural effusion developed in 12 cases (21.4%) bilaterally, in 15 cases (26.8%) on the right side, and in 29 cases (51.8%) on the left side. Dyspnea (74%) was the most common symptom, which was followed by cough (16%), chest pain (9%) and hemoptysis (1%). 18 (32.1%) of the cases

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underwent liver cyst and tumor surgery; 15 (26.8%), splenic surgery; 17 (30.3%), gastric tumor surgery; 2 (3.6%), calculous pouch-cholecystitis surgery; and 4 (7.1%), colon-rectum surgery (Table 1).

Table 1. Distribution of pleural effusion developed after abdominal surgery

Abdominal surgery	Number of patients	
	(n)	%
Liver Cyst and Tumor	18	32.1
Spleen	15	26.8
Stomach Tumor	17	30.4
Calculous pouch – cholecystitis	2	3.6
Colon-rectum	4	7.1
Total	56	100

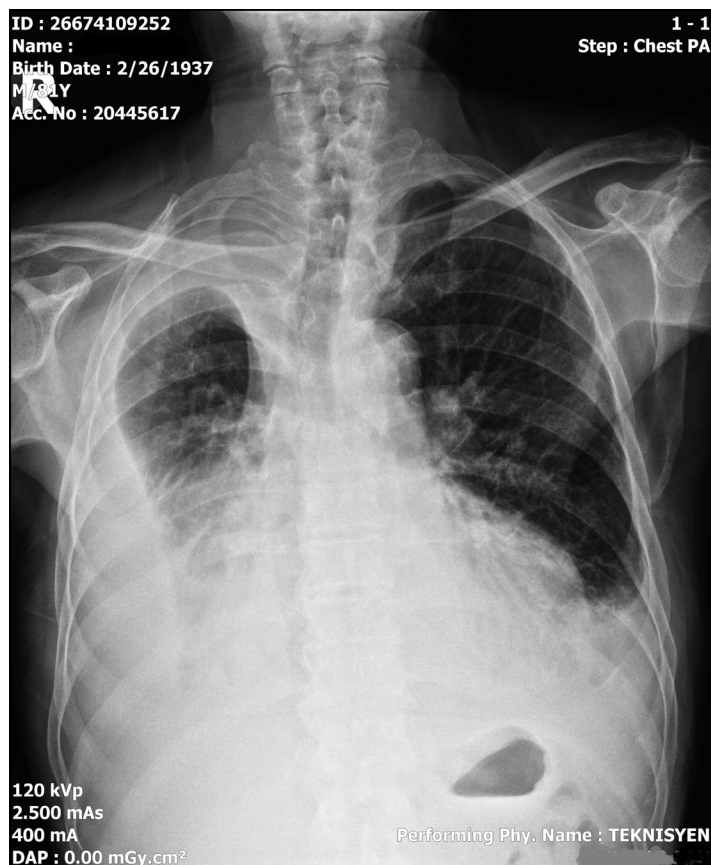


Figure 1. Postoperative chest radiography showing pleural effusion

48.2% of the cases had been smoking. 7 of the patients had diabetes mellitus, 13 had hypertension, 5 had a cardiac failure, and 2 had renal failure. 4 cases with pleural effusion underwent thoracentesis, 39 cases underwent catheter thoracostomy, and 8 cases underwent tube thoracostomy-closed underwater drainage due to massive, loculated and purulent pleural fluid. Pleural effusion regressed spontaneously in 4 cases. 37.5% of the pleural effusions were of transudate nature and 62.5% were of exudate nature. Atelectasis secondary to pleural effusions developed in all cases. Severe respiratory distress was detected in 4 cases above 60 years of age with a history of smoking, and they were admitted to the intensive care unit. Mortality due to pulmonary embolism after cholecystectomy was found in only one patient.

When the serum albumin and protein values of the cases before and after the operation were compared, it was found that these values were below the normal values of the patient in the postoperative period

(n:12, 21.43%). All of the cases were above 58 years of age and had comorbidities, which was found statistically significant ($p<0.05$).

Discussion

Pleural effusions, which are defined as pleural fluid accumulation in the pleural space, are common and frequently encountered chest surgery pathologies during the consultation. Although they are formed due to various reasons, they are mainly caused by disruption of the continuity of the pleural membrane or the dynamic balance of the pleura [3,4].

Chest radiography is the first and best radiological imaging technique in the evaluation of the pleura. Ultrasonography is the best diagnostic tool in showing fluids in very little amounts and to locate the fluids [5].

Observation, thoracentesis, tube thoracostomy, thoracoscopy or thoracotomy are the commonly applied methods for the treatment of pleural effusions [6].

In our cases, the majority of the postoperative pleural effusions were diagnosed on the control chest radiographs performed due to shortness of breath and very few of them were diagnosed on control upper abdominal computed tomography performed to detect primary diseases. All symptomatic cases with massive pleural effusion underwent catheter/tube thoracostomy (n:47). Pleural fluid was evacuated by thoracentesis in 4 cases, while it was spontaneously regressed in 4 cases due to its transudate characteristics. None of the patients required thoracoscopy/thoracotomy.

Pleural effusion may occur due to lung diseases or systemic diseases. The most common causes of pleural effusion are congestive heart failure, pneumonia and cancer. They are followed by pulmonary embolism, viral diseases, coronary by-pass surgery, cirrhosis, diseases involving the abdominal organs and uremia [7]. Tumors cause pleural effusion through their systemic effects such as hypoalbuminemia [8].

Pleural effusion developed in only 2 of the cardiac pathology cases (n=5), while it developed in both renal failure cases (n=2), and catheter drainage was performed for them.

Pleural effusion secondary to hypoalbuminemia developed in 12 patients in the postoperative period. After albumin supplementation, the existing pleural fluid regressed.

Hartz et al. reported that pleural effusion may be present without the accumulation of intraabdominal fluid. In these patients, the fluid entering the pleural cavity is probably as much as the total acid formation. The most common operations in the upper abdomen are performed due to liver biliary tract pathologies. In these operations, due to the limitation of exploration of the arcus costarum and the diaphragmatic dome, the peritoneal hanging ligaments of the liver are frequently mobilized by surgeons, and sufficient visibility is provided. As a result of this procedure leading to the disruption of the integrity of the diaphragmatic peritoneal layer, the extra-peritoneal subphrenic distance has a direct relationship with the abdominal cavity and fluid diffusion from the abdominal cavity to the thoracic cavity occurs through the small pores present in the diaphragm, which enables direct involvement of the abdominal and thoracic cavities [9].

The increase in the difference between intra-abdominal and intra-chest pressure due to decreased intestinal peristalsis and pain in the postoperative period is another factor facilitating the diffusion of intra-abdominal fluid into the pleural space. In patients who underwent liver surgery in addition to normal pathophysiologic sodium and water retention in the postoperative period, the formation of transient portal hypertension due to hepatic edema and increased total splanchnic and portal vascular resistance may lead to fluid accumulation in the abdomen and to the diffusion of this fluid into the pleural space [10].

Although there are studies that report different results, it is reported by most of them that there is a decrease in albumin and protein levels with age, and that nutritional disorders especially, the presence of many chronic diseases and decreasing skeletal muscle amount especially play an important role especially in elderly individuals [11,12].

There are several risk factors that are effective in the development of complications after abdominal operations [13-15]. It was emphasized in many studies that the data obtained in the clinical evaluation of the preoperative period are important in determining and reducing the risk of postoperative respiratory complications [16-18].

Kocabas et al. stated that the most important data in determining the risk of postoperative respiratory complications were obtained as a result of preoperative clinical evaluation of the respiratory system. The incidence of postoperative pulmonary complications in patients undergoing non-thoracic major surgery is between 10-30% [19].

Percutaneous nephrolithotomy (PNL) interventions performed by the urology clinics as in the specific surgical procedures in many branches cause pleural damage and may lead to unwanted intrathoracic complications such as pneumothorax, pleural effusion and injury to the lower lobes [20].

PNL is performed in two ways as subcostal and supracostal. It has been reported that subcostal interventions have advantages over supracostal interventions such as being easier to perform in technical aspects, not leading to intercostal artery injury, and having a lower risk of lung and pleural injuries, while supracostal interventions have a higher risk of pleural or lung injuries [21].

Bjurlin et al. found that two patients developed hydro-pneumothorax requiring a chest tube after PNL in their series of 214 cases. They reported pleural injury findings in chest radiology and fever and shortness of breath according to clinical results [22].

In our cases, too, shortness of breath and chest pain were the most common findings in the postoperative period. While pleural effusion with exudate characteristics was detected in 62.5% of our cases, 37.5% had pleural effusion with transudate characteristics.

Conclusion

The peritoneal side of the diaphragm may be disrupted after abdominal operations. The fluid transition may occur from the abdominal region with high pressure into the thoracic cavity with negative pressure through the pores in the diaphragm. Additionally, protein deficiency due to postoperative changes in feeding patterns, and therefore hypoalbuminemia may cause pleural effusion. It is of

vital importance to provide the necessary supportive treatments and/or invasive procedures such as pleural fluid drainage in order to prevent possible morbidity and mortality in such cases.

Conflict of interests

The authors declare that they have no competing interests.

Financial Disclosure

All authors declare no financial support.

Ethical approval

Ethics Committee approval was obtained from University of Health Science Turkey, Istanbul Training and Research Hospital for the study (approval no: 2449, date: 20.06.2020).

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