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Application of Pleural Drainage Catheter Single-Center Experience of Chest Diseases

Burcu Özdemir[1], Levent Özdemir[2]* and Bilge Akgündüz[3]

[1]Department of Chest Disease, Iskenderun State Hospital, Turkey

[2]Department of Chest Diseases, Dörtyol State Hospital, Turkey

[3]Atatürk Chest Diseases and Thoracic Surgery Training and Research Hospital, Turkey

***Corresponding author:** Levent Özdemir, Department of Chest Diseases, Dörtyol State Hospital, Hatay, Turkey, Tel: 5333888984; Email: levent2408@mynet.com

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Abstract

Background/Aims: General features, and complications related to the catheter of patients undergoing pleural drainage catheter in Chest Disease Clinic were evaluated.

Material and Methods: Data of 40 patients who underwent pleural drainage catheter (Pleuracan(R)) at the State Hospital Chest Disease Clinic between January 2015 and April 2020 were analyzed retrospectively.

Results: The mean age of the study participants was 70.4±14.1 years, 13 were female and 27 male. Twenty-two patients had benign (17 had parapneumonic effusion, 4 had heart failure, 1 had rheumatoid arthritis) and 18 had malign (11 had lung cancer, 4 had breast cancer, 1 had mesothelioma, 1 had colon cancer, 1 had cervical cancer) etiology. In patients with benign etiology, the mean duration of hospitalization was 8.3(3-16) days, while the mean duration of hospitalization in patients with malignant etiology was 14.1(4-25) days. While Pleuracan(R) remained in with a mean of 2.3 (1-9) days in patients with benign etiology, the mean duration of Pleuracan(R) stay in malignant patients was 6.8 (2-25) days. Chemical pleurodesis was applied to 7 of 17 patients with a diagnosis of malignancy. After the procedure, pneumothorax in 1 patient, expansion defect in 1 patient (due to the endobronchial lesion), and air leakage due to patient-induced Pleuracan(R) dislocation in 1 patient were detected. Pleuracan(R) could not be removed due to the arrival of too much fluid as a daily amount in 1 patient. It was found that one patient had undergone an operation due to the parapneumonic effusion returning to empyema and being loculated.

Conclusion: Pleural drainage catheter, a minimally invasive method, frequently used by Thoracic Surgery, could be used safely in Chest Disease Clinic too.

Keywords: Pleural drainage catheter; Thoracic Surgery; 40 patients; Chest Diseasess

Introduction

Pleural effusion is a common condition that occurs in primary lung diseases or other organ pathologies in chest disease practice [1]. Pleural drainage catheter (Pleuracan$^{(R)}$) is a procedure often implemented by Thoracic Surgery, which is minimally invasive, tolerable, comfortable, and allows less pain and length of stay and can be applied in the emergency room, intensive care unit, and clinic bedside [2]. In our study, we evaluated the general features, and complications related

to the catheter of patients undergoing pleural drainage catheter in the Chest Disease Clinic retrospectively.

Materials and Methods

Between January 2015 and April 2020, in State Hospital Chest Disease Clinic, 40 patients, in whom symptoms occurred due to different etiologies and surgery, or any other treatments were not considered initially and pleural drainage catheter (Pleuracan(R)) were applied were assessed retrospectively. Patient data was reached by entering the ICD 10 diagnostic code from the hospital's information processing. The patients over 18 years old and with massive effusion (groups B, C, and D) were included in the study where, Inclusion criteria for the study were as follows: e.g, (a) Patients over 18 years old, (b) Patients with massive effusion, (c) Patients with pleural effusion that does not regress or that does recur despite medical treatment, (d) Patients with pleural effusion and shortness of breath. Informed written consent was obtained from all patients before the procedure. (Pleuracan(R)) (Pleurocan, B. Braun, Melsungen, Germany), is an 8-10 French and 2.7X450 mm sized radiopaque catheter made of polyurethane. It includes a two-way faucet, double valve insert, drain bag, and 60 mm injector parts (Figure 1).

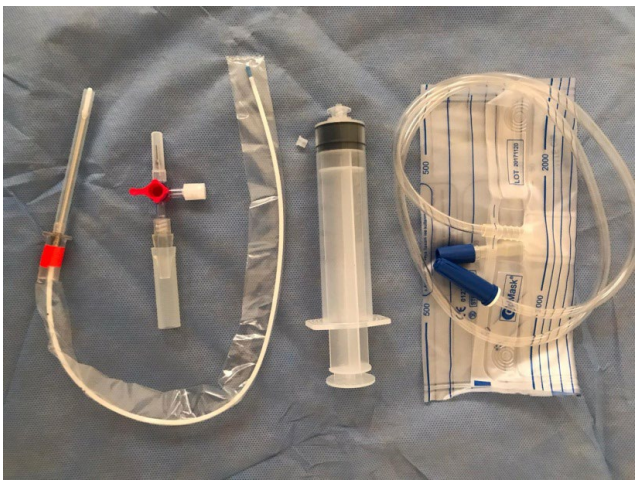

Figure 1: Pleurocan set.

In our clinic, Pleuracans® were placed at the mid scapular, midaxillary, or posterior axillary line in sitting or lying position relative to the clinical condition of the patient. Local anaesthesia was performed to all patients with 2% lidocaine before the procedure. After the procedure, the catheter was fixed to the skin with a 2-0 suture (Figure 2). Drainage under control has been limited to daily 1000-1500cc to avoid re-expansion edema. We performed control of posteroanterior chest X-ray to all patients and checked the location of the catheter and any complications immediately after the procedure. Chemical pleurodesis with oxytetracycline or talc was applied by obtaining consent from patients with malignant effusion etiology.

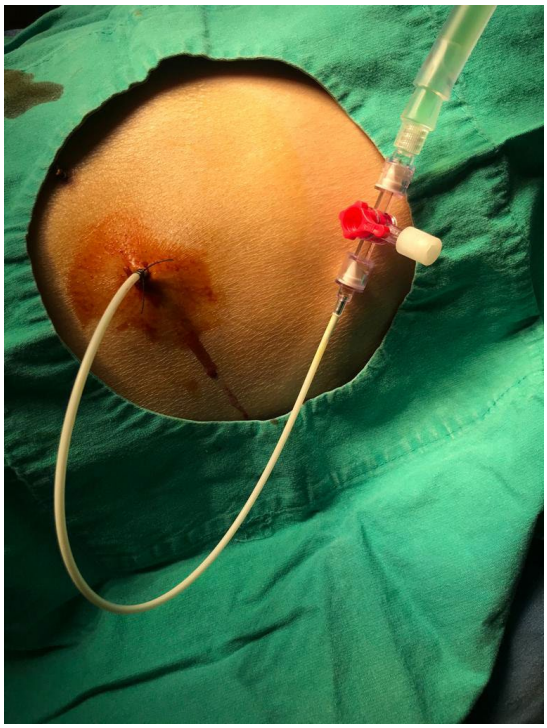

Figure 2: Midaxil applied in supine position.

Results

Data of 40 patients with a mean age of 70.4 ± 14.1 years, of 13 were female and 27 were male, who underwent pleural drainage catheter (Pleuracan(R)) at the State Hospital Chest Disease Clinic were evaluated retrospectively. Twenty-two patients had benign (17 had parapneumonic effusion, 4 had heart failure, 1 had rheumatoid arthritis) and 18 had malign (11 had lung cancer, 4 had breast cancer, 1 had mesothelioma, 1 had colon cancer, 1 had cervical cancer) etiology (Table 1). In patients with benign etiology, the mean duration of hospitalization was 8.3(3-16) days, while the mean duration of hospitalization in patients with malignant etiology was 14.1(4-25) days. While Pleuracan(R) remained in with a mean of 2.3 (1-9) days in patients with benign etiology, the mean duration of Pleuracan(R) stay in malignant patients was 6.8 (2-25) days. Pleural fluid was on the right in 23 patients, on the left in 16 patients, on both sides in 1 patient. Chemical pleurodesis was applied to 7 of 17 patients, who were diagnosed as malignancy (4 with oxytetracycline, 3 with talc) (Figures 3-6).

	n (%)
Age	70.4± 14.1
Gender	
Woman	13 (%32.5)
Male	27 (%67.5)
Etiology Bening	
Parapneumonic effusion	17 (%42.5)
Heart failure	4 (%10)
Rheumatoid arthritis	1 (%2.5)
Malignant	
Lung carcinoma	11 (%27.5)
Breast carcinoma	4 (%10)
mesothelioma	1 (%2.5)
Colon carcinoma	1 (%2.5)
Cervix carcinoma	1 (%2.5)
Bening / hospitalization time	8.3(3-16) day
Bening / pleurocan duration	2,3(1-9) day
Malignant / hospitalization time	14.1(4-25) day
Malignant / pleurocan duration	6.8 (2-25) day

Table 1: Demographic data.

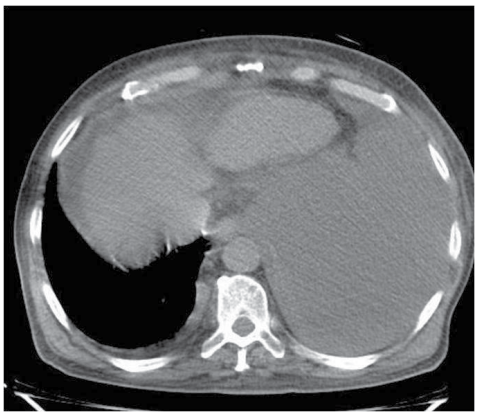

Figure 3: Thorax tomography, before pleurocan.

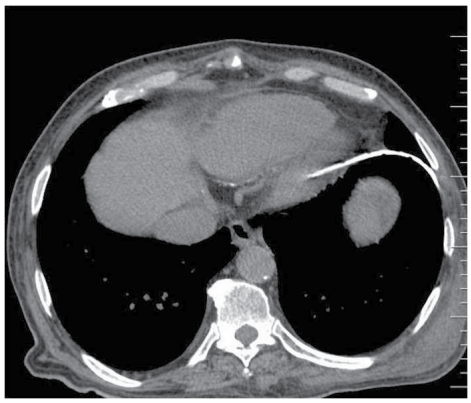

Figure 4: Thorax tomography, after pleurocan.

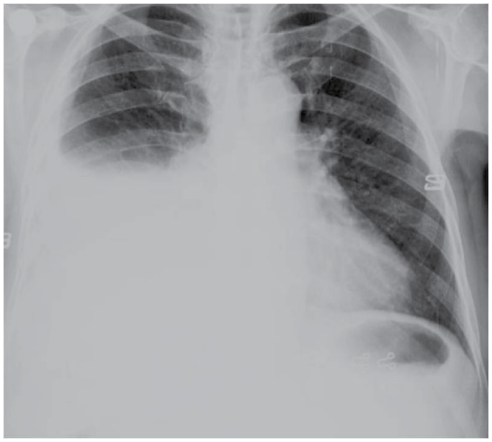

Figure 5: Postero-antero chest X-ray, before pleurocan.

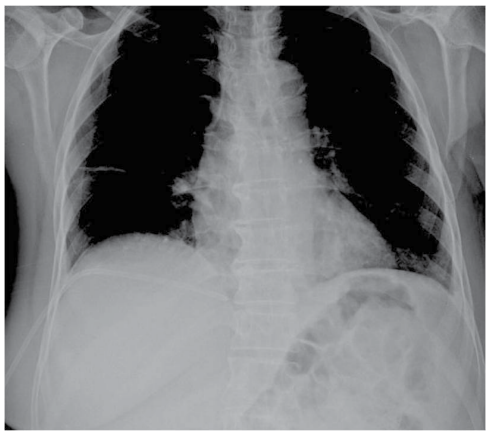

Figure 6: Postero-antero chest X-ray after pleurocan.

After the procedure, pneumothorax in 1 patient, expansion defect in 1 patient (due to the endobronchial lesion), and air leakage due to patient-induced Pleuracan(R) dislocation in 1 patient were detected. Pleuracan(R) could not be removed due to the arrival of too much fluid as a daily amount in 1 patient. It was found that one patient had undergone an operation due to the parapneumonic effusion returning to empyema and being loculated.

Discussion

In our study, we found Pleuracan(R) application would be able to apply by chest disease specialists and to reduce the hospitalization duration of patients without causing major complications. Generally, Pleuracan(R) catheter application is often preferred in the drainage of benign pleural fluids or loculated fluids. Thoracentesis, the first method that comes to mind for therapeutic drainage of uncomplicated effusions, is easily implemented by chest disease specialists

in outpatient or inpatient. However, chest tube drainage or drainage procedures with small catheters is usually carried out by thoracic surgeons. Pleuracan(R) application is in the group of minimally invasive procedures, and it is a method that could be easily applied in outpatient or inpatient, and recurrent benign and malignant pleural fluids without requiring thoracic ultrasonography unless loculation is considered [3]. In this study, we showed that chest disease specialists also could make Pleuracan(R) applications.

According to our literature information, the most common cause of the pleural effusion is heart failure [4,5]. In our study, while the drainage process with Pleuracan was the most applied in fluids that develop due to benign pleural effusions, of those effusions, parapneumonic ones were the most commonly encountered. Interestingly, massive effusions due to heart failure respond well to medical treatment and show regression quickly [6]. In parapneumonic effusions, the first treatment option is antibiotic therapy; however, due to the low passage of antibiotics to the pleural cavity and the development of empyema, regression may be late or cause sequelae, such as pleural thickening [7,8]. At the same time, massive effusions due to heart failure are mostly seen in patients followed up in the emergency room [9]; because effusion due to heart failure develops faster than parapneumonic effusions and disrupt the patients' clinical status. Besides, our study participants consisted of patients who were diagnosed before and applied to our outpatient clinic, hospitalized in the chest disease service, or consulted from other services. Therefore, in the present study, drainage applied to regression-free or recurrent effusions despite efficacious treatment. The second most common reason for pleural effusion is malignant pleural effusions, including especially breast and lung cancer [10,11]. Similar to the literature, in our study, too, malignant pleural effusion was established to be in second frequency. Nevertheless, in our study, massive pleural effusion due to lung cancer was most frequently observed than breast cancer. It can be explained by the fact that patients included in the current study consist of patients in the chest disease clinic, also that selection bias.

Pleural drainage applications due to pleural effusion are known to shorten the duration of hospitalization [12,13]. In our study, this time in the drainage of benign pleural effusions was 8.3 days. In a study, the mean duration of hospitalization in pleural effusions related to infection was reported to be 17 days [14]. Our study supported that pleural drainage shortened hospital stay in patients with parapneumonic effusion. After drainage of malignant pleural effusions with Pleuracan(R), hospital stay was determined as 14.4 days and was compatible with the literature [15].

The most common complication due to pleural interventions is pain (6-12%) [16]. No pain complication was noticed in our patients. Procedural pneumothorax is seen with a frequency of 3-9% [17]. In our study, this rate was 2.5%, and it was a lower complication rate than the literature. The infection development rate associated with pleural catheter applications was reported as 4.8% in a study of larger patient series [18]. In our study, complications were developed in a patient who was followed up with parapneumonic effusion (2,5%) since empyema. This may suggest that there is a complication of parapneumonic effusion rather than iatrogenic infection. Re-expansion pulmonary edema frequency is accounted for 0-1%; we could not detect in our cases [16]. Organ damage or hemothorax, one of the most feared complications, was not seen during the procedure or follow-up. Pain, fever, shortness of breath, and respiratory failure symptoms related to the chemical agent could be noted in patients undergoing chemical pleurodesis [19]. These symptoms were not ascertained in any of our cases. The low frequency of complications related to the procedure demonstrated that Pleuracan(R) application could be made safely by chest disease clinicians.

Conclusion

Chest disease specialists could easily apply a pleural drainage catheter in both malignant and benign massive pleural fluids. Pleural drainage catheter is a minimally invasive method, shortening hospital stay with low risk of complications, which can be easily applied by chest disease specialists in both malignant and benign massive pleural fluids. Our study also provides important clues for future studies in the investigation of the effectiveness of the Pleuracan(R) application compared to other pleural fluid drainage methods.

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