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# Pigtail catheter alternative option for malignant pleural effusion other than pleurodesis: a case series

## Abstract

Patients with malignant pleural effusions should have pleural drainage as the preferred course of treatment. There are still issues in treating people who have malignant pleural effusions. There are several approaches for treating malignant pleural effusion. The following management methods are available: thoracentesis, implantation of a chest tube or indwelling pleural catheter, pleurodesis, and observation. Pigtail catheter use has emerged as a practical option that is less invasive, less uncomfortable and has fewer procedure-related problems other than pleurodesis. The purpose of this case series was to examine the effectiveness of pigtail catheter use in patients with malignant pleural effusion.

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**Keywords:** pigtail catheter, malignant pleural effusion, pleurodesis, chest tube

## Introduction

A frequent side effect of advanced cancers, especially lung, breast, and ovarian carcinomas, is malignant pleural effusions [1]. Dyspnea and a decline in quality of life are brought on by the accumulation of pleural fluids in the pleural space, which significantly reduces lung vital capacity [2]. Symptomatic alleviation or avoidance of hospitalization, along with the most effective use of available medical resources, should be the main aim of treatment for these patients [3]. Even though malignant pleural effusion frequently indicates advanced and progressing malignancy, many of these individuals have extremely poor prognoses [4]. Advanced cancer often results in malignant pleural effusions, which are a common clinical issue for these patients and are associated with a poor prognosis and a lower quality of life [5].

Therefore, managing malignant pleural effusion in a way that quickly resolves symptoms and preserves quality of life is crucial to the overall care of patients with advanced cancer [6]. The standard of care for malignant pleural effusions remains to be pleurodosis, thoracentesis, implantation of a chest tube, or an indwelling pleural catheter (IPC) in most hospitals [7]. With pigtail catheters, the technique is less stressful,

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results in less discomfort and scarring during and after the procedure, and is likely to cause fewer procedure--related complications due to their greater flexibility and smaller diameter [8]. This case series objective was to assess pigtail catheter use as an alternative in patients with malignant pleural effusions other than pleurodesis.

## Case presentation

### Case 1

A 24-year-old female patient known case of carcinoma ovary with malignant pleural effusion was involved in this case study. Based on tissue histological biopsies, the patient has been diagnosed with primary malignancy. Chest radiography and the patient's clinical presentation of dyspnea led to the diagnosis of malignant pleural effusion. Before the tiny bore pigtail catheter was inserted, informed consent was obtained. Using both open and aseptic methods, a tiny bore pigtail catheter with a size of 16 Fr was placed. At the site of the incision, a 2% lidocaine local anesthetic was administered without the addition of adrenaline. The safety triangle, which includes the *latissimus dorsi*, the border of the *pectoralis major*, and the fifth intercostal space, or the nipple line, was incised on the skin by two centimeters, and the incision deepened till the intercostal space. The syringe was attached to an 18-gauge needle. The needle was pressed until the effusion could be freely aspirated during aspiration. The 18-gauge needle was then removed using it as a landmark. A 16 Fr pigtail catheter was then placed after the tract had been dilated with a vascular dilator. The dilators were taken out once the pigtail catheter was inserted. Using Silk 0 suture, the pigtail catheter was secured to the skin. A pigtail catheter attached to a low-pressure suction at negative 20 cm $H_2O$ was used to start the pleural fluid drainage process.

After the procedure, the patient had a plain chest radiograph done to evaluate the location of the pigtail catheter and to identify any urgent complications that required medical attention. Pleural fluid was sampled, and the sample was sent for analysis in cytology and biochemistry. For two hours, the pleural fluid was still being drained. If the volume reached 1.5 liters before the 2-hour window, drainage was stopped. Chest radiography was conducted for evaluation following the removal of the pigtail catheter. A chest radiograph was taken to check on the patient followed by two weeks. Chest radiography results and patient symptoms were the foundation for the case report's success. If there was no accumulation of pleural fluid on the chest radiograph taken two weeks after the procedure, it was deemed successful. If the patient was asymptomatic despite a modest quantity of pleural fluid accumulation on follow-up chest radiography, this was deemed a partial success. If chest radiography revealed reaccumulation of fluid causing symptoms and the requirement for repeated pleural drainage, the surgery was deemed unsuccessful.

### Case 2

A 38-year-old female patient known case of carcinoma lung with bone metastasis with malignant pleural effusion was involved in this case study. Histopathological biopsy revealed the patient's primary malignancy. Chest radiography and the patient's clinical presentation of dyspnea led to the diagnosis of malignant pleural effusion. Before inserting the chest tube for pleurodosis, informed permission was obtained. In the fifth or sixth intercostal gap along the midaxillary line, a 2 cm incision was made. The incision was made parallel to the rib and at the top edge of the rib below. A trocar, a metal rod with a sharp tip that passed through the plastic tube's distal end, and a tube were put into the incision site and twisted and applied direct pressure to force the material into the pleural area. After being inserted into the pleural space, the tube was guided superiorly and posteriorly before being forceps clamped at the proximal end. The stitch was used to fix the tube after it had been properly positioned. The loose ends of the suture were wrapped around the tube's end and tied off, securing the tube to the chest wall. After that, the wound was covered, and the tube was secured with dry gauze and adhesive plaster. The chest tube was attached to an underwater seal that allowed the effusion to drain gradually — no more than one liter in the first thirty minutes — in order to prevent pulmonary edema following thoracocentesis (re-expansion).

After the procedure, the patient had a plain chest radiograph done to evaluate the location of the chest tube and to identify any urgent complications that required medical attention. Pleural fluid was sampled, and the sample was sent for analysis in cytology and biochemistry. The patient had an injection of 2% lidocaine into the pleural area prior to the administration of Bleomycin. The pleural area was then filled with sixty units of diluted Bleomycin diluted in fifty milliliters of normal saline. After adding bleomycin, the chest tube was clamped for ninety minutes. After the medicine was injected, the location approach was not altered to distribute bleomycin uniformly.

After the drainage was completed for two hours, the chest tube was unclamped, and the catheter was taken out. Notwithstanding the quantity of pleural

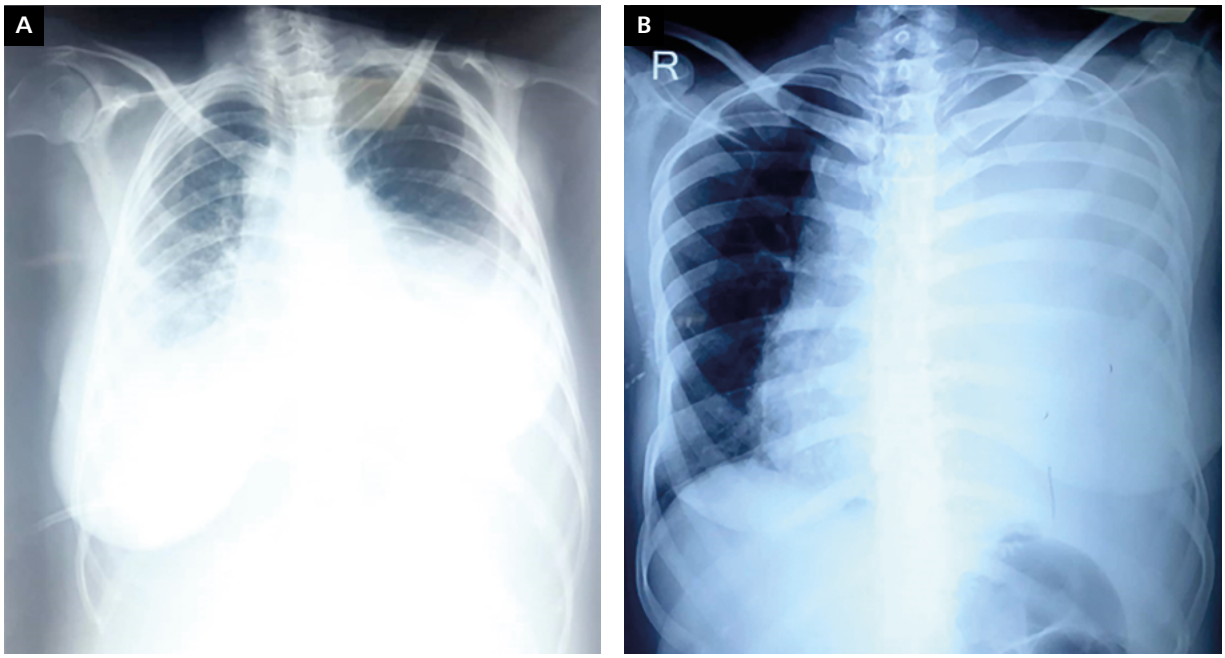


**Figure 1A, B.** Chest radiography with malignant pleural effusion [9]

fluid drained, the pleurodesis procedure was performed. Following bleomycin instillation, the amount of pleural fluid evacuated was not related to the removal of the chest tube. Following the removal of the chest tube, an evaluation was conducted using chest radiography (Figure 1) [9]. Repeat chest radiography was performed on the patient every two weeks. A radiologist examined every chest radiograph. The results of the chest radiography and the patient's symptoms were the case report's main points of success. If there was no accumulation of pleural fluid on the chest radiograph taken two weeks after the procedure, it was deemed successful (Figure 2) [10].

## Discussion

This case series sought to assess the function of a chest tube for pleurodosis in a patient with malignant pleural effusion as well as the usefulness of a pigtail catheter in this condition. A variety of techniques have been employed for the drainage or evacuation of pleural fluid; these techniques include pleuroperitoneal shunting, thoracocentesis, tube thoracostomy (chest tube), and most recently, the use of small-diameter catheters [11]. The most popular method is to drain a large bore chest tube and then use different chemicals to do chemical pleurodesis [12]. This procedure has a high risk of infection, which includes extended hospital stays for inpatients, restricted movement due to the pleural drainage device, fevers from inflammation of the pleura, and

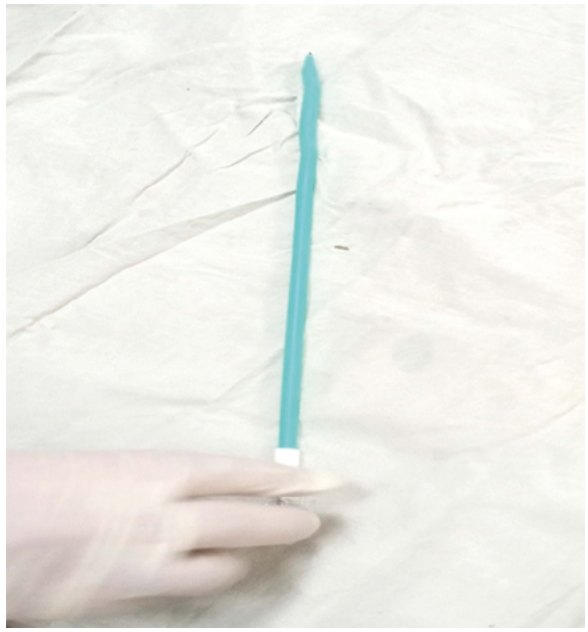

**Figure 2**. Pigtail catheter [10]

severe discomfort from the chest tube and surgical incision [13].

Pleural effusions happen between the parietal (outer) layer of the pleura, which is attached to the chest wall, and the visceral (inner) layer of the pleura, which is attached to the lungs [14]. Normally, there is no "pleural space"; instead, a small amount of pleural fluid (10–20 mL) lubricates the spaces between the pleura. The visceral pleura continuously absorbs fluid

that is continuously transferred from the parietal pleura through the pleural gap. After that, the fluid is emptied into the lymphatic system [15]. When primary cancer patients develop metastases to the pleural space, the Starling forces that control the re-absorption of fluid in the pleural space can become disrupted, leading to notable changes in fluid balance or shifts.

Pleurodesis is a surgical procedure used to completely destroy the pleural gap by inducing fibrosis of the pleura by chemical or mechanical methods [16]. In order to prevent two fluids from re-accumulating, the sclerosing agent forms a pleuritis that connects the visceral and parietal pleura and drains the pleural space to prevent the requirement for recurrent thoracocentesis hospital stays [17]. Chemical pleuritis is a common symptom of effective sclerosing drugs. The ability of anti-tumor drugs to cause pleuritis appears to be the mechanism of control of effusion, even though many of them have been employed successfully as sclerosing agents. Many sclerosant drugs, such as talc powder, bleomycin, tetracycline, quinacrine, silver nitrate, and many more, have been used to induce pleural symphysis in Pleurodesis [18]. A flexible, small-bore pigtail catheter has become a viable substitute for thoracostomy, pleural drainage, and pleurodosis. This technique is less stressful and leaves fewer scars both during and after the placements. A pigtail catheter is indicated for drainage of malignant pleural effusion (MPE) in the following situations: Symptomatic relief in dyspnea due to a large pleural effusion, recurrent effusions, poor overall prognosis that is limited life expectancy and aim for short-term relief without invasive procedures, inoperable or unstable patients. It may also result in fewer procedure-related problems, including discomfort, fever, and dyspnea. When the malignant pleural effusion was drained from both individuals, the same reaction was observed; there was no sign of a recurrence or recollection of the pleural fluid.

Lin et al. [19] carried out a retrospective assessment of patients on mechanical ventilation in the emergency department and intensive care unit who had pigtail catheter drainage as their initial treatment for malignant pleural effusion. In this study, 68.6% of pigtail catheter drainage procedures were successful. Aziz et al. [20] found that pleural fluid can typically be successfully drained using pigtail catheters. Its bedside method, reduced cost, and reduced time required make it better than traditional chest tube placement in many ways. Cantin et al. [21] found that Pigtail catheters had an 88% success rate in managing pleural effusion, indicating the safety and efficacy of pleural drainage under radiological supervision for pleural effusion and pneumothorax. Ghoneim et al. [22] found that the pigtail catheter's value in malignant pleural effusion pleurodesis. In contrast to the conventional intercostal tubes, they discovered that Pigtail catheters could be regarded as a safe, simple, bearable, and efficient alternative technique for pleurodesis of malignant pleural effusions. Ahmed et al. [23] found the Pigtail catheter's function in patients with encysted empyema. They discovered that the safe, easy, and effective method of draining malignant pleural fluid and encysted empyema might be the use of a pigtail catheter. Additionally, draining that fluid is advised.

## Conclusions

Malignant pleural effusions can be safely and effectively drained with pigtail catheter insertion. Comparing pigtail catheterization to pleurodosis for malignant pleural effusions, it is safe, simple, pleasant, and efficient. Good knowledge of imaging techniques and anatomy is required for successful procedures. In the future there is a need to conduct single or multicentric studies, having a large sample size with a long follow-up period using even better scales, to get more authentic, conclusive, and accurate results.

## Article information and declaration

### *Acknowledgments*
None.

### *Author contributions*
The authors have contributed equally.

### *Conflict of interest*
The authors declare no conflict of interest.

### *Ethics statement*
This procedure is carried out with the patient's full and informed permission. The patients have agreed on the form that her pictures and other clinical data may be published in the journal.

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None.

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