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# Use of tunnelled pleural catheter for palliative treatment of malignant pleural effusion: Experience of a third level hospital

## Abstract

**Introduction:** Pleural effusion is a manifestation of advanced cancer that is associated with symptoms whose control requires adopting different strategies. This study aimed to characterize the population of patients with malignant pleural effusion who underwent placement (or insertion) of a tunnelled pleural catheter to alleviate dyspnoea, describe the experience of its use and evaluate the 30-day hospitalization rate for pleural effusion and the percentage of early and late complications.

**Patients and methods:** This study is a series of cases with cancer taken to implantation of a closed pleural drainage system during the year 2020 in a third level hospital in Colombia.

**Results:** Eight patients underwent this procedure, in whom implantation was successful. Pleural effusion due to breast cancer was the main indication. No late catheter complications were recorded given the high 30-day mortality, despite a low LENT (LDH, ECOG, neutrophilia and tumour type) score in some patients.

**Conclusions:** The indwelling tunnelled pleural catheter is useful in the palliative treatment of malignant pleural effusion with few complications. It is necessary to evaluate the performance of the LENT scale in the study population, given that despite a low score, the 30-day mortality rate was high.

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**Key words:** indwelling pleural catheter, malignant pleural effusion, metastatic cancer, palliative care

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## Introduction

Malignant pleural effusion is a sign of advanced cancer associated with difficult to control symptoms, which occurs in 15% of patients [1]. The main associated malignant neoplasms are lung and breast cancer, which account for approximately 65% of cases [2]. Dyspnoea is one of the most common symptoms, is difficult to control and is often refractory to pharmacological management. It increases disability and functional limitation and is related to worse survival and deterioration of quality of life [3].

The initial approach is ultrasound-guided evacuative thoracentesis, by which large volumes of fluid can be removed, allowing lung re-expansion and symptom improvement. However, the only way to prevent the fluid from continuing to accumulate is to control cancer. Because of this, this procedure is only palliative and should be repeated each time patients have symptoms that limit their functionality. The most frequent complications of this procedure are pneumothorax (in 6% of cases), haemothorax (2%), and less frequent, such as re-expansion pulmonary oedema [4].

There are other options, such as a pleural catheter, pleurodesis, and pleurectomy [5]. The choice depends on pre-surgical risk, functional status as measured by ECOG (Eastern Collaborative Oncology Group) and life expectancy [6].

The pleural catheter is preferred in patients with a life expectancy greater than one month and less than 6 months since in this survival range the catheter is associated with fewer hospitalization days and less need for subsequent thoracentesis when compared to pleurodesis [7]. With a safety profile similar to that of thoracentesis, its main complications are pneumothorax, subcutaneous emphysema, bleeding, and infections, which occur in 2.8–6% of cases [8]. One of its main advantages is that it can generate spontaneous pleurodesis in up to half of the patients [9].

There is experience with its use in the United States, where an adequate safety profile [10] and good cost-effectiveness have been reported. European studies have shown that it is an outpatient procedure that reduces hospitalizations and re-interventions [11]. However, in Latin America, there is little experience with the use of the catheter for the palliative management of pleural effusion [12, 13]. This study aimed to describe a case series of patients with malignant pleural effusion from a referral centre who were taken to insertion of an indwelling tunnelled pleural catheter. Specifically, to describe 30-day survival after implantation, the need for recurrent thoracentesis, and early and late complications associated with the procedure.

## Patients and methods

The present study is a case series of cancer patients who underwent implantation of a closed indwelling pleural catheter system between January 2020 and December 2020 in a third level hospital in Colombia. All adult patients who underwent catheter implantation with a diagnosis of malignant pleural effusion (positive cytology for malignancy or pleural biopsy with tumour infiltration) to palliate dyspnoea measured with the mMRC (modified Medical Research Council) scale, who had an ECOG and LENT score (LDH, ECOG, Neutrophilia and Tumour type) with dyspnoea measured with the mMRC (modified Medical Research Council) scale were included. Patients in whom 30-day follow-up by medical records could not be guaranteed were excluded. This study was evaluated and accepted by the Institutional Ethics Committee. Medical devices were paid for by patient insurance.

Sociodemographic characteristics, type of cancer, anticancer and palliative treatment were collected. The catheter was implanted using the ultrasound-guided Seldinger technique. The first drainage was done in a collector and thereafter patients or family members, previously trained, did the drainage at home using the disposable closed collection systems supplied with the catheter. After catheter implantation, chest radiography was routinely performed to assess positioning and immediate complications.

Emergency room visits and outpatient controls were reviewed to verify late complications or the generation of spontaneous pleurodesis. A telephone follow-up was performed 30 days after the procedure to evaluate complications, symptom control, rehospitalizations and catheter status.

## Statistical analysis

Categorical variables are described as absolute values and percentages, continuous variables are described as means and standard deviations. No hypothesis tests were performed for group comparison, due to the descriptive characteristics of the group.

## Results

Eight patients with an indication for pleural catheter placement were included in the case series. Table 1 shows the clinical characteristics of the patients. The majority were female (62.5%) with primary breast tumours (50%). Fifty per cent of the patients were underweight and malnourished. All patients had a high comorbidity index, measured by the Charlson index, greater than 6. It is important to highlight that 66.7% of patients were receiving chemotherapy and,

**Table 1. General characteristics of the patients**

Patient	Sex	Age (years)	BMI [kg/m <sup>2</sup> ]	Location Right	Primary tumour	Charlson U	Chemo- therapy	Type of CHEMO	Analgesia	LENT
					*Location		Yes			
1	F	54	32.7	B	Breast adenocarcinoma	7	x	A	T	4
2	M	78	24.2	R	Follicular thyroid carcinoma	9	x	TKI	O	6
3	F	71	18	B	Breast adenocarcinoma	9	x	A	T	3
4	M	87	19.05	R	Non-Hodgkin's mantle-cell lymphoma	9			T	2
5	F	42	17.78	R	Breast adenocarcinoma	6	x	A	T	4
6	F	69	27	R	Melanoma	8			Ac	6
7	M	53	20.8	R	Lung adenocarcinoma	8	x			5
8	F	61	17.9	B	Ovarian adenocarcinoma	7	x	A T	T	4

M — male; F — female; R — right; B — bilateral; A — anthracyclines; T — taxanes; TKI — tyrosine kinase inhibitor; Tr — triple analgesia with acetaminophen; opioid and pregabalin; Ac — acetaminophen; O — opioid; HR — hormone receptors; CHEMO — chemotherapy

**Table 2. Catheter-associated complications and survival**

Patient	Complications		Re-hospitalization	Time to re-hospitalization	Survival days	Spontaneous pleurodesis
	Type	Yes	Yes	Days		
1	No				> 30	No
2	No		x	4	7 days	No
3	No				18 days	No
4	No				Unknown	No
5	No				25 days	
6	Yes	Pain	x	7	14 days	No
7	No				> 30	No
8	No				> 30	Yes

despite this, persisted with recurrent pleural effusion. Fifty per cent of patients required triple multimodal analgesic management for cancer pain.

Analysing patient outcomes, there was only one complication during the first week, due to pain at the insertion site, which required in-hospital analgesic management six days after catheter placement (Table 2). The patient died 14 days after catheter insertion, due to acute pulmonary thromboembolism.

Twenty-five per cent (n = 2) required hospitalizations related to underlying disease and associated

complications not related to catheter placement. The first patient required hospitalization for symptomatic hypocalcaemia and oedematous syndrome, and the second for pain and pulmonary thromboembolism. No late complications were documented after 30 days, such as catheter dislodgement or fracture, haemothorax, bleeding from the insertion site, or local infection. 62.5% of patients had a survival of fewer than 30 days after catheter placement. In this case series, only one patient had spontaneous catheter-associated pleurodesis, after which the catheter was removed without complications.

## Discussion

Experience with the use of pleural catheters in Latin America is scarce, with few case series published in Mexico and Brazil [12, 13]. This is the first series describing the intervention in the Colombian population. LENT is a validated scale for assessing survival in patients who are to undergo pleural procedures; a higher score indicates worse survival [14]. The results obtained in this series show high 30-day mortality, even in patients with low LENT scores predictive of good survival. This finding could be attributed to the low nutritional component.

When making a comparison with the results of other series, similar findings were found concerning sociodemographic characteristics. In Pakistan [15] it was found that the majority of patients with malignant pleural effusion were women with breast cancer, up to 52%, a finding similar to ours. However, a very small percentage were receiving chemotherapy (39%). Mortality during follow-up was 85%, whereas in the present study series it was 62%. In the United Kingdom [16] most malignant strokes occurred in women, but the main related tumour is of pulmonary origin, with only 13% of cases secondary to breast cancer. The mean survival was 141 days, much better than that of the present series, in which only 37% were alive 30 days after catheter insertion. In Germany [14], 67% of the patients were women, 30.6% of the cancers were represented by primary ovarian tumour, which also differs from this series, in which only one case corresponded to a primary ovarian tumour, and 49% of the effusions were of right laterality, similar to the present series. The pleurodesis rate reported in the series ranges from 16–50% [12–14], but in this series, only one patient presented spontaneous pleurodesis (12.5%).

There was a low complication rate in the series. The complications described differ depending on the series reviewed. Abrão et al. [12] reported 49% complications, mainly infections (52%), followed by catheter tamponade (18%). According to Páez-Codeso et al. [13], complication rate was 4.4%, and Frost et al. [17] it was 13.4%: infections (5.6%), empyema (2.5%), outflow tract, and tunnelitis (0.9%). The present series showed few complications, possibly due to the short survival.

This is one of the few Latin American series and the first Colombian series on the use of pleural catheters. However, it is necessary to emphasize the descriptive nature of the study, with multiple uncontrolled variables that can lead to erroneous conclusions. For this reason, the findings of this series should be only considered for the generation of exploratory hypoth-

eses on the use of pleural catheters. In addition, this study shows another limitation in the patient experience, at the time of insertion, patient follow-ups were based on medical records; follow-up protocol had just been submitted due to the recent implementation of this technique, and useful questionnaires in this scenario could be EORTC QLQ-C30 and EORTC QLQ-C15 [15, 16]. The importance of this paper lies in the availability of this resource for the palliative management of patients with tumorous pleural effusion. It is a reference to evaluate the survival of patients with tumour pleural effusion by applying the LENT score.

## Conclusions

To conclude, it is important to mention that the use of the indwelling pleural catheter is a palliative intervention that is safe in several series. It requires proper patient selection, especially the estimation of expected survival. In the present series, there was little relationship between the LENT score and survival, an assessment that needs to be evaluated in another study.

### Declaration of conflict of interests

The authors declare that there is no conflict of interest.

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