Editorial

Extending the indications for indwelling pleural catheters: a tube for all seasons

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Comment on: Reinoso J, Aftab G, Vijayan K, *et al.* Indwelling pleural catheters for persistent pleural effusions secondary to post lung resection for malignancies. J Thorac Dis 2023;15:2469-74.

Keywords: Pleural effusion; indwelling pleural catheter (IPC); pleurodesis; non-malignant pleural effusion

Submitted May 10, 2022. Accepted for publication Jun 19, 2023. Published online Jun 30, 2023.
doi: 10.21037/jtd-23-765
View this article at: https://dx.doi.org/10.21037/jtd-23-765

Indwelling pleural catheters (IPCs) were first introduced over 20 years ago as an alternative to chemical or surgical pleurodesis for the palliation of dyspnea associated with malignant pleural effusions (1). The catheters have an internal fenestrated portion located within the pleural space, a middle portion which lies within a subcutaneous tunnel, and an external portion with a valve which can be used for drainage. Once inserted IPCs allow patients to drain pleural fluid intermittently at home using a vacuum bottle. They are typically placed in the outpatient setting using local analgesia and may be inserted in patients with poor performance status, often improving the performance status enough to allow further treatment of the underlying condition (1-3). Multiple studies have shown IPCs to be effective for palliating dyspnea associated with malignant pleural effusions (2,4,5). Their effectiveness for treating dyspnea in patients with malignant effusions has been shown to be equivalent to that of chemical pleurodesis, and they offer some advantages over pleurodesis in terms of initial cost and length of hospital stay (6-9). In around half of patients with malignant effusions, consistent pleural drainage using IPCs can induce spontaneous pleurodesis (SP). This is defined in most studies as a decrease in the volume of fluid drainage to <50 mL for three or more drainage attempts in the absence of worsening dyspnea or reaccumulation of fluid on imaging studies (4,5,10). The mechanism of SP is thought to be related to inflammation within the pleural space caused by presence of a foreign body, the catheter (11). Complications of IPCs for malignant effusions are generally minor, with catheter clotting or malfunction and minor infections being the most common (5). The overall rate of infection of IPCs in patients with malignant effusion is 5% with very low risk of mortality (5,12,13). This history of success has led to the recommendation of IPCs as a first-line option for dyspnea in malignant effusion by multiple international guidelines (14,15).

The success of IPCs for dyspnea in patients with malignant effusions has led to much interest in their use for patients with recurrent non-malignant pleural effusions. The majority of these have been case series or small, retrospective cohort studies (16-21). At least one meta-analysis has been done, although given the low quality of the included studies and the large amount of heterogeneity among them its findings may not be generalizable (22). While the underlying etiology of the effusions varied across studies, heart failure and hepatic hydrothorax were the most common causes (22). Almost all reported significant improvements in dyspnea and a reduction in the need for subsequent pleural interventions. The rate of spontaneous

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pleurodesis was variable, with reports ranging from 28% to 87% (19,20,22). The rate of complications also varied with an overall estimate of infection of around 5% in most studies, although those patients with hepatic hydrothorax may have a slightly higher rate of infection (17,20,22).

Absent from all of these reports are any studies evaluating the use of IPCs for recurrent post-surgical pleural effusions. Between 1% and 3% of patients undergoing lobectomy require repeat intervention for symptomatic post-operative pleural effusion (23,24). Management typically involves therapeutic thoracentesis which may be repeated as needed for the minority of such effusions that are recurrent. For those post-operative effusions that continue to recur management can be challenging. While an individual thoracentesis has low procedural risk, serial thoracentesis procedures over time do carry additive risk. The need for ongoing invasive pleural procedures is also inconvenient and costly. It is not known if IPCs are effective for palliating dyspnea in those patients who have recurrent post-operative pleural effusions and whether they can help achieve SP in such patients. Reinoso and colleagues have begun to fill in this knowledge gap with their paper in the *Journal of Thoracic Disease* from March 2023 (24).

In this study their group reports its experience with a series of 12 patients with recurrent symptomatic non-malignant pleural effusion after lung resection for cancer who underwent IPC placement for palliation. They included only those post-resection subjects who had recurrent effusions within 90 days of surgery and required further intervention after a second therapeutic thoracentesis. All included patients were determined to have non-malignant effusions based on pleural fluid cytology. Patients who met the above criteria underwent IPC placement in the outpatient setting with discharge on the same day. Their caregivers were trained to carry out IPC drainage and evacuated the effusions using vacuum bottles at home. Patients were given a strict drainage protocol to follow, initially draining daily until the output dropped below 500 mL per day and then every other day until below 50 mL per drainage consistently for several weeks. If at that time there was no reaccumulation of fluid the catheters were removed. Primary outcomes were spontaneous pleurodesis and symptomatic improvement. All 12 patients noted symptomatic relief, and all patients also eventually achieved SP. Catheters remained *in situ* for a median duration of 77 days. Among the secondary outcomes assessed were complications. Three patients (25%) had catheter occlusion that was able to be resolved by instilling fibrinolytics. Two patients (16.7%) had a local site infection related to the catheter, but no empyemas were reported. While these complications were fairly common, they were also minor. No patients required catheter removal for occlusion or infection (24).

Strengths of this study include a clearly defined patient population in which IPCs were only placed in those patients whose effusions recurred after two initial therapeutic thoracentesis procedures. This allowed the authors to exclude those patients who would have achieved SP without IPC placement. The group also followed a standardized drainage protocol designed to maximize the degree of drainage and therefore the odds of pleural apposition and subsequent successful pleurodesis. Finally, they used a standard protocol to determine the presence of SP and the need for catheter removal. The weaknesses of the study are as expected for an initial descriptive report. There are a relatively small number of patients recruited from a single center.

The authors are to be commended for their work examining the effectiveness of IPCs for recurrent non-malignant post lung resection pleural effusions. The growing literature examining the use of IPCs for symptomatic recurrent non-malignant pleural effusions has until now not included post-surgical patients. This paper provides support for further investigation in this direction. IPCs certainly are an attractive option for such patients. They offer effective palliation of dyspnea and an acceptable safety profile. The convenience of being able to drain symptomatic effusions at home rather than being required to come to the clinic or hospital for additional invasive procedures also seems to be desirable from a patient-centered perspective. This paper from Reinoso and colleagues is a good first step towards clarifying the use of IPCs in this context. It will hopefully lead to larger studies in the future that better define the role of IPCs for post lung resection pleural effusions.

Acknowledgments

Funding: None.

Footnote

Provenance and Peer Review: This article was commissioned by the editorial office, *Journal of Thoracic Disease*. The article did not undergo external peer review.

Conflicts of Interest: The author has completed the ICMJE

uniform disclosure form (available at https://jtd.amegroups.com/article/view/10.21037/jtd-23-765/coif). The author has no conflicts of interest to declare.

Ethical Statement: The author is accountable for all aspects of the work in ensuring that questions related to the accuracy and integrity of any part of the work are appropriately investigated and resolved.

References

1. Putnam JB Jr, Walsh GL, Swisher SG, et al. Outpatient management of malignant pleural effusion by a chronic indwelling pleural catheter. Ann Thorac Surg 2000;69:369-75.
2. Ost DE, Jimenez CA, Lei X, et al. Quality-adjusted survival following treatment of malignant pleural effusions with indwelling pleural catheters. Chest 2014;145:1347-56.
3. Khaleeq G, Musani AI. Emerging paradigms in the management of malignant pleural effusions. Respir Med 2008;102:939-48.
4. Tremblay A, Michaud G. Single-center experience with 250 tunnelled pleural catheter insertions for malignant pleural effusion. Chest 2006;129:362-8.
5. Van Meter ME, McKee KY, Kohlwes RJ. Efficacy and safety of tunneled pleural catheters in adults with malignant pleural effusions: a systematic review. J Gen Intern Med 2011;26:70-6.
6. Davies HE, Mishra EK, Kahan BC, et al. Effect of an indwelling pleural catheter vs chest tube and talc pleurodesis for relieving dyspnea in patients with malignant pleural effusion: the TIME2 randomized controlled trial. JAMA 2012;307:2383-9.
7. Demmy TL, Gu L, Burkhalter JE, et al. Optimal management of malignant pleural effusions (results of CALGB 30102). J Natl Compr Canc Netw 2012;10:975-82.
8. Freeman RK, Ascioti AJ, Mahidhara RS. A propensity-matched comparison of pleurodesis or tunneled pleural catheter in patients undergoing diagnostic thoracoscopy for malignancy. Ann Thorac Surg 2013;96:259-63: discussion 263-4.
9. Penz ED, Mishra EK, Davies HE, et al. Comparing cost of indwelling pleural catheter vs talc pleurodesis for malignant pleural effusion. Chest 2014;146:991-1000.
10. Wahidi MM, Reddy C, Yarmus L, et al. Randomized Trial of Pleural Fluid Drainage Frequency in Patients with Malignant Pleural Effusions. The ASAP Trial. Am J Respir Crit Care Med 2017;195:1050-7.
11. Warren WH, Kim AW, Liptay MJ. Identification of clinical factors predicting Pleurx catheter removal in patients treated for malignant pleural effusion. Eur J Cardiothorac Surg 2008;33:89-94.
12. Fysh ETH, Tremblay A, Feller-Kopman D, et al. Clinical outcomes of indwelling pleural catheter-related pleural infections: an international multicenter study. Chest 2013;144:1597-602.
13. Wilshire CL, Chang SC, Gilbert CR, et al. Association between Tunneled Pleural Catheter Use and Infection in Patients Immunosuppressed from Antineoplastic Therapy. A Multicenter Study. Ann Am Thorac Soc 2021;18:606-12.
14. Feller-Kopman DJ, Reddy CB, DeCamp MM, et al. Management of Malignant Pleural Effusions. An Official ATS/STS/STR Clinical Practice Guideline. Am J Respir Crit Care Med 2018;198:839-49.
15. Bibby AC, Dorn P, Psallidas I, et al. ERS/EACTS statement on the management of malignant pleural effusions. Eur J Cardiothorac Surg 2019;55:116-32.
16. Srour N, Potechin R, Amjadi K. Use of indwelling pleural catheters for cardiogenic pleural effusions. Chest 2013;144:1603-8.
17. Chen A, Massoni J, Jung D, et al. Indwelling Tunneled Pleural Catheters for the Management of Hepatic Hydrothorax. A Pilot Study. Ann Am Thorac Soc 2016;13:862-6.
18. Bhatnagar R, Reid ED, Corcoran JP, et al. Indwelling pleural catheters for non-malignant effusions: a multicentre review of practice. Thorax 2014;69:959-61.
19. Chalhoub M, Harris K, Castellano M, et al. The use of the PleurX catheter in the management of non-malignant pleural effusions. Chron Respir Dis 2011;8:185-91.
20. Shojaee S, Rahman N, Haas K, et al. Indwelling Tunneled Pleural Catheters for Refractory Hepatic Hydrothorax in Patients With Cirrhosis: A Multicenter Study. Chest 2019;155:546-53.

21. Frost N, Ruwwe-Glösenkamp C, Raspe M, et al. Indwelling pleural catheters for non-malignant pleural effusions: report on a single centre's 10 years of experience. BMJ Open Respir Res 2020;7:e000501.
22. Patil M, Dhillon SS, Attwood K, et al. Management of Benign Pleural Effusions Using Indwelling Pleural Catheters: A Systematic Review and Meta-analysis. Chest 2017;151:626-35.
23. Bjerregaard LS, Jensen K, Petersen RH, et al. Early chest tube removal after video-assisted thoracic surgery lobectomy with serous fluid production up to 500 ml/day. Eur J Cardiothorac Surg 2014;45:241-6.
24. Reinoso J, Aftab G, Vijayan K, et al. Indwelling pleural catheters for persistent pleural effusions secondary to post lung resection for malignancies. J Thorac Dis 2023;15:2469-74.

Cite this article as: Lazarus DR. Extending the indications for indwelling pleural catheters: a tube for all seasons. J Thorac Dis 2023;15(7):3501-3504. doi: 10.21037/jtd-23-765