Pneumonia

EDITORIAL

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Chest drainage or repeated thoracentesis for pleural infections: a clinical dilemma

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Abstract

Pleural infection is a key clinical challenge, especially in immunocompromised patients and in those with pulmonary comorbidities. Its incidence has increased owing to antibiotic resistance and aging of the population. While international guidelines recommend chest tube (CTD) placement for complicated parapneumonic effusions (CPPE), the optimal strategy for fluid drainage is debated. Repeated therapeutic thoracentesis (RTT) could be an alternative to help patient mobility and reduce infectious risk.

Studies on RTT demonstrated efficacy similar to that of CTD, mainly when combined with intrapleural fibrinolytic therapy and DNase, whereas others showed higher treatment escalation rates. In the issue of the Journal, Charron et al. show that RTT, combined with IPFT and DNase, decreases both pleural drainage duration and hospital stay when compared with chest drainage, without increasing mortality, surgical referral, or complication rates. However, methodological concerns, including variability in pleural infection definition, retrospective design, and centre-dependent treatment strategies, might limit the generalizability.

Large-scale randomized controlled trials are needed to definitively establish its role.

Keywords Pleural infections, Parapneumonic effusion, Empyema, Thoracentesis, Chest tube drainage, Intrapleural fibrinolytic therapy

Main text

Pleural infections are caused by the replication of bacteria in the pleural space [1]. Severe outcomes can occur in case of clinically inappropriate management, especially in immunocompromised and in those with pulmonary comorbidities [2]. Their incidence has recently increased owing to antibiotic resistance and demographic factors (elderly) [3–6]. International guidelines recommend a diagnostic thoracentesis in case of a parapneumonic effusion (PPE) or a suspected pleural infection [6–8]. pH measurement is suggested when diagnostic aspiration of parapneumonic effusion does not yield frank pus. In case of a high risk of pleural infection or of a complicated parapneumonic effusion (i.e., pH ≤ 7.2), prompt chest tube drainage (CTD) is recommended. When pH values range from 7.2 to 7.4 lactate dehydrogenase (LDH) should be measured, whereas higher pH is associated with a low clinical risk. If pH analysis cannot be carried out, measurement of pleural fluid glucose can help detect high-risk cases (i.e., < 3.3 mmol/L). In case of persistent pleural fluid collection despite the drainage, intrapleural fibrinolysis with tissue plasminogen activator (TPA) and DNase therapy are recommended [6, 7].

However, its management is a matter of debate, especially the method for fluid drainage.

Repeated therapeutic thoracentesis (RTT) might have advantages, from the possibility of a concomitant

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diagnostic and therapeutic approach to the evacuation of multiple loculated pleural collections in the same operative session, improved patient mobility, ambulatory management, low infectious risk, and increased cost-effectiveness. Conversely, RTT does not provide continuous drainage and requires a technical intervention, increasing procedural demands VS. a nurse-managed CTD. Additionally, RTT increases cumulative procedural risk (e.g., pneumothorax) due to repeated interventions, although complications are usually mild.

The current evidence is observational and retrospective. Ferguson et al. evaluated less than 50 patients, half of whom subsequently required chest tube insertion or surgery, with a mortality rate of 9% [9]. Simmers et al. evaluated a similar sample size and described an effectiveness of 86% for post-pneumonic empyema, and 69% for non-pneumonic empyema [10].

Storm et al. who compared RTT combined with saline lavage and CTD showed a few complications (e.g., pleuro-cutaneous and bronchopleural fistulas) and a shorter hospital stay [11].

More recent studies assessed RTT with intrapleural fibrinolytic therapy (IPFT) and DNase for complicated parapneumonic effusions: Letheulle et al. found a success rate of 81% and a low complication rate [12].

Paz et al. reported that urokinase combined with DNase (RTT-UD) was associated with a faster resolution of fever, shorter hospital stay, and drainage of larger volumes of pleural fluid [13].

Despite this evidence supporting RTT, CTD is still recommended in the available guidelines. Although RTT may be appealing for its minimally invasive nature, potentially useful for outpatient management, and supporting greater patient mobility, it suffers from the lack of standardized protocols and the procedural risk of repeated interventions. Its operator-dependent and fragmented application may also hinder reproducibility and broader clinical implementation. In contrast, CTD allows for continuous drainage and standardized administration of intrapleural therapies, such as fibrinolytics and DNase, whose efficacy has been demonstrated in large randomized controlled trials [14, 15]. To date, no large-scale randomized trial has confirmed the efficacy and safety of RTT for pleural infections.

A recently published feasibility randomized trial compared RTT and CTD, and a reduced length of hospital stay and shorter intravenous antibiotic exposure was achieved for the RTT arm [16].

In a recent issue of the Journal, Charron et al. described a retrospective, multicenter, propensity-matched study on 78 patients with pleural infection. RTT, when combined with IPFT and DNase, reduced both the duration of pleural drainage (6 VS. 9 days; OR: 1.41) and hospital stay (15 VS. 21 days; OR: 1.28) when compared with CT [17].

The study shows several limitations, from the definition of pleural infection (clinical symptoms and fluid characteristics, with [4, 5] the inclusion of cases with risk of false cases of pleural infection, affecting the interpretation of the findings) to the retrospective observational design, and potential inherent selection and information biases. Furtermore, despite the propensity-score matching, treatment assignment was center-dependent (thoracentesis with urokinase in one center; chest tube insertion with alteplase in another), hindering the interpretation of outcome differences (intrinsic efficacy of the drainage or institutional differences in clinical practice).

Nevertheless, despite these methodological concerns, this evidence confirms the potential benefits of RTT as an alternative to chest tube drainage for pleural infections.

However, high-quality evidence from large-scale randomized controlled trials is lacking, and current international guidelines do not yet endorse RTT as the standard of care. Robust, adequately powered, randomized trials are key to evaluate the efficacy, safety, and optimal role of RTT.

Abbreviations

PPE	Parapneumonic Effusion
CPPE	Complicated Parapneumonic Effusion
CTD	Chest Tube Drainage
RTT	Repeated Therapeutic Thoracentesis
LDH	Lactate Dehydrogenase
TPA	Tissue Plasminogen Activator
IPFT	Intrapleural Fibrinolytic Therapy
RCT	Randomized Controlled Trial
RTT-U	Repeated Therapeutic Thoracentesis with Urokinase
RTT-UD	Repeated Therapeutic Thoracentesis with Urokinase and DNase

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