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ORIGINAL ARTICLE

# Iatrogenic pneumodesis: Gelfoam flux inoculation in focal benign cavitary lung lesion



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## KEYWORDS

Gelfoam;  
Lung cavity;  
Percutaneous;  
CT chest

**Abstract** *Background:* Pulmonary air-space containing cavities signify major disuse that hold gas exchange functions back and bring about recurrent suppuration.

*Purpose:* The aim of this work is to evaluate the impact of percutaneous local inoculation of focal benign cavitary lung lesions with synthetic material (gelfoam) guided with chest computed tomography (CT) on the patient outcome based on clinical, laboratory, functional and radiological parameters.

*Patients and methods:* A prospective simple randomized controlled trial was conducted on twenty eight patients with focal benign cavitary lung lesion less than 10 cm in diameter in whom surgical resection was contraindicated or refused. They were subdivided into two groups: group I (medically treated): 14 patients were followed up for three months with medical prophylaxis with quinolone plus clindamycin and group II (gelfoam inoculated): 14 patients percutaneous locally injected with gelfoam under CT guidance for a single session.

*Results:* Gelfoam inoculated group (group II) presented more prevalence over medically treated group (group I) in the reduction of the frequency of infective exacerbations (71.42%), absence of leukocytosis (85.7%), functional improvement (42.85%), reduction of cavity size (57.14%) and cavitary obliteration (35.71%). Both groups were matched regarding the absence of hemoptysis and negative sputum cultures with high percentage (92.85%). However, reduction of the frequency of hospitalization predominated in group I. Significant statistical differences were present in radiological parameters only (reduction of size (0.042) and cavity obliteration (0.002). Success rate of procedure in the studied group was (35.71%).

*Conclusion:* Percutaneous gelfoam injection may share in staged palliation and weeding out of pulmonary cavitary lesions with simple noninvasive image guided procedure.

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## Introduction

Cavities and cysts are commonly encountered lesions in the lung on chest radiography and chest computed tomography

CT. The differential diagnosis of such lesions is variable since many different processes of acquired or congenital origin can cause these abnormalities. Cysts and cavities are seen as foci of decreased lung density with well defined walls [1,2]. In contrast, emphysematous airspaces usually lack such perceptible walls (bullae and blebs are exceptions) [3]. From the pathological point of view a cavity has been defined in as a gas-filled space within a zone of pulmonary consolidation or within a mass or nodule, produced by the discharge of a necrotic part of the lesion via the bronchial tree and radiographically as a lucency within a zone of pulmonary consolidation, a mass, or a nodule; hence, a lucent area within the lung may or may not contain a fluid level and is surrounded by a wall, usually of variable thickness [4]. Cavities larger than 6 cm in diameter or if symptoms last more than 12 weeks with appropriate therapy, have little chances for only conservative healing, and surgical therapy should be well thought-out, if general condition allows [5]. Surgical resection of lung cavity is the treatment of choice for about 10% of patients. It is indicated in ineffectively treated lung abscess more than 6 weeks, suspicion on cancer and size more than 6 cm. Lobectomy is the resection of choice for large or central position of abscess. Atypical resection or segmentectomy are satisfactory procedures, if it is possible to remove complete abscess and if necessary surrounding lung tissue with necrotizing pneumonia [6]. Results of surgical treatment depend mostly on the general condition and immunity of patient. Mortality rate after surgical resections is about 11–28% [7]. Minimal invasive surgical procedures, such as video assisted thoracoscopy is a method of choice for peripheral localization of lung abscess without pleural adhesions and fibrothorax. Consequences of this surgical procedure are satisfactory, but this intervention requires general anesthesia, double lumen endotracheal tube [8]. Overall mortality in lung abscess treatment is about 2.0–38.2% [9] with important roles of patient age, malnutrition, comorbidity, immunity, appropriate antibiotics and supportive therapy. The usage of intra-cavitary fibrinolytic agents (streptokinase, urokinase) is not recommended, because the possibility of bronchopulmonary or bronchopleural fistula can occur [10].

Gelfoam sterile compressed sponge is a water-insoluble, hemostatic device prepared from purified porcine skin gelatin, and capable of absorbing up to 45 times its weight of whole blood [11]. The absorptive capacity of gelfoam is a function of its physical size, increasing as the size of the gelatin sponge increases [12]. So our objective in this research was to evaluate the impact of percutaneous local inoculation of focal benign cavitory lung lesions with synthetic material (gelfoam) guided with chest computed tomography on the patient outcome based on clinical, laboratory, functional and radiological parameters.

### Patients and methods

A prospective simple randomized controlled trial was conducted on twenty eight patients with focal benign cavitory lung lesion in whom surgical resection was contraindicated or refused. They were admitted in Chest Medicine Department Mansoura University Hospitals during the period from December 2014 to January 2016. They were subdivided into two groups:

*Group I (medically treated group):* 14 patients were followed up for three months with medical prophylaxis in the form of (levofloxacin 500 mg/day and clindamycin 300 mg twice/day for five days per month) [13].

*Group II (gel inoculated group):* 14 patients were percutaneous locally injected under CT guidance with gelfoam flux for a single session.

The cases will be selected on a randomized basis according to time of medical consultation one for group I and second for group II. Patients signed their written consents after detailed explanation of the study protocol. Local ethical approval had been obtained; clinical, laboratory, functional and radiological evaluation was conducted three months after the procedure.

#### *Inclusion criteria:*

The term cavity is used to refer to an air-containing lesion with a relatively thick (>4 mm) wall or within an area of a surrounding infiltrate or mass while cyst wall ranged from 2 to 4 mm in thickness [14].

Lung cavity less than 10 cm in diameter and >4 mm in wall thickness or cyst <10 cm in diameter (2–4 mm wall) due to:

- (1) Chronic lung cavity >3 months due to pyogenic or fungal infections.
- (2) Chronic tuberculous lung cavities after verification of smear and culture negativity.
- (3) Simple non infected lung cyst.
- (4) Cavitory lung lesions due to (rheumatoid arthritis, sarcoidosis or Wagner's granulomatosis).
- (5) Patient refused or contraindicated for surgery.

#### *Exclusion criteria:*

- (1) Malignant lung cavity.
- (2) Other pulmonary air-space containing cavities (emphysematous bullae, blebs, localized pneumothorax and pneumatocele).
- (3) Huge cavity more than 10 cm in diameter.
- (4) Cavity with fluid level.
- (5) Presence of active infection proved by fever, suppuration and leucocytosis.

The patients were evaluated with the following parameter before and after the end of the three months following the procedure.

#### *Clinical parameter*

- (1) Reduction of the frequency of infective exacerbations (purulent sputum >1 cup per day/fever/wheezes) less than one per month.
- (2) Reduction of the frequency of hospital admission less than one visit in 3 month duration.
- (3) Absence of hemoptysis.

#### *Laboratory parameter*

- (1) Absence of leukocytosis white blood cell count <11,000/cubic mm.
- (2) Negative sputum culture (aerobic and anaerobic media and BACTEC).

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