



## EFFECTIVENESS OF INTRAPLEURAL INSTILLATION OF MESNA FOR ADHESIOLYSIS IN MULTI LOCULATED PLEURAL EFFUSIONS, PARA PNEUMONIC EFFUSIONS AND EMPYEMA: OUR EXPERIENCE

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### ABSTRACT

Pleural effusion is abnormal accumulation of pleural fluid in pleural space. Drainage of pleural effusion is difficult in case of multiloculated effusion and multiloculated empyema. Medical thoracoscopy is indicated in cases of multiloculated pleural effusion and multiloculated empyemas. We studied effectiveness of MESNA (2-mercaptoethane sulfonate Na), a chemical that breaks disulfide bond, to cause adhesiolysis and hence avoid thoracoscopy in such patients. Our study was aimed to find out the success rate of adhesiolysis in cases of multiloculated pleural effusion and multiloculated empyema.

In our study, 15 patients were studied of which 10 had multiloculated pleural effusion, and 5 had multiloculated empyema. A success rate of 90% and 40% were observed in multiloculated effusion and multiloculated empyema respectively.

**Keywords:** Adhesiolysis, MESNA, Thoracoscopy, multiloculated effusion, multiloculated empyema

### INTRODUCTION

The pleural fluid loculations are produced by fibrin membranes that makes drainage of the pleural space difficult. The theory behind the use of intrapleural fibrinolytics is that they will destroy the fibrin membranes and facilitate drainage of the pleural fluid. Many years ago, Tillett et al. reported that the intrapleural injection of streptokinase and

streptodornase facilitated pleural drainage in patients with empyemas<sup>1</sup>. In the late 1970s, Bergh et al. reported the results with the intrapleural injection of streptokinase alone in 12 patients with empyema<sup>2</sup>. They reported radiologic improvement in 10 of their 12 patients.

MESNA (2-mercaptoethane sulfonate Na) is an organosulfur compound. It is used to prevent cyclophosphamide induced hemorrhagic cystitis. In recent past its role as mucolytic and fibrinolytic is being extensively studied. It acts in a manner similar to cysteine, breaking the disulfide links on the macromolecules responsible for the viscosity of mucus secretions. It also has anti-oxidant properties. MESNA has been recently validated for chemically assisted tissue dissection during surgery or invasive procedures. Chemically assisted dissection of tissues: an interesting support in abdominal myomectomy<sup>3</sup>. MESNA has been successfully used to ease abdominal myomectomies and excision of endometrial cysts<sup>3,4</sup> in ENT (OTO RHINO LARYNGOLOGY) surgery, topical MESNA could be widely used, from ear and skull base to head and neck diseases, in both outpatient and operating-room settings. In revision lumbar spine surgery, its use resulted in significantly easier surgery and reduction of postoperative complications<sup>5</sup>. Also it has shown to prevent capsule formation on implant in rabbit models<sup>6</sup>. Aerosol therapy with MESNA is widely studied for its use mucolytic property<sup>7,8,9</sup>. Intermittent aerosol therapy with MESNA has shown to decrease incidence of recurrent infection in

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patients with Cystic fibrosis<sup>11</sup>. Intratracheal instillation of MESNA reduced the airway pressure in patients on mechanical ventilator<sup>12</sup>.

Our study was aimed to find out the success rate of intrapleural instillation of MESNA for adhesiolysis in multi loculated pleural effusions and multi loculated empyema.

## MATERIALS AND METHODS

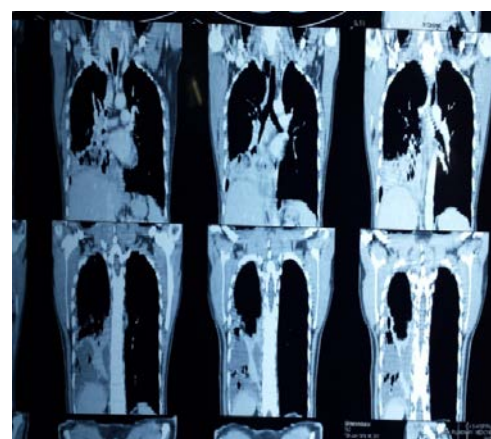
- Study period: August 2014 –February 2015
- Place of study: Patients admitted under Department of Pulmonary Medicine, S.V.S Medical College, Mahbubnagar, Telangana.
- Inclusion criteria:
  - Age 20-60 years
  - Moderate multiloculated pleural effusions and empyemas.
- Exclusion criteria:
  - Age <20yrs and >60yrs
  - minimal effusions
  - Critically ill patients
- All the patients were subjected to the following
  - Full history
  - Thorough clinical examination
  - Routine Lab investigations including prothrombin time, activated plasma thromboplastin time.
  - Pleural fluid investigations: biochemical, pathological, microbiological.
  - Chest X ray poster anterior view.
  - Ultrasound chest, Computed tomography chest
  - Patients whose Chest X ray PA ( POSTERO ANTERIOR VIEW) view was suggestive of multiloculated effusions (Figure 1) were selected for the studies according to criteria mentioned, multiloculation were confirmed by Ultrasound Chest (Figure 2) or Computed Tomography chest (Figure 3).
  - 1800 mg of MESNA i.e. 3 ampoules ( each ampoule contains 3ml and each ml contains 200 mg of MESNA) was diluted with 20ml of Normal Saline and was injected into the pleural cavity under ultrasound guidance and under local anesthesia with 2% lidocaine and under strict aseptic conditions.



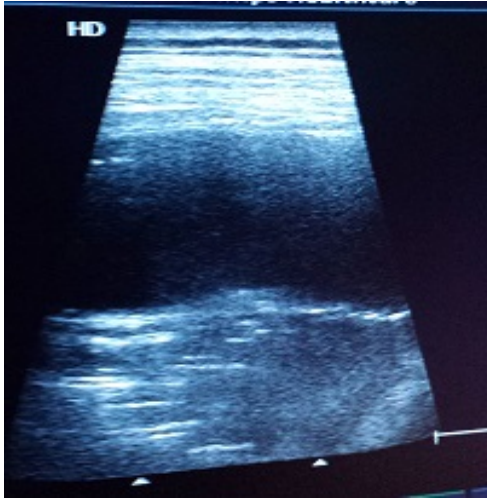
**Figure 1: chest x ray PA view showing Right multiloculated Effusion**



**Figure 2: Ultrasound chest showing pleural effusion with multiple septations**



**Figure 3: CT chest showing Rightsided multiloculated Thick collection**



**Figure 4: USG chest after instillation of MESNA for 3 days**



**Figure 6: ICD bag draining thick collection**

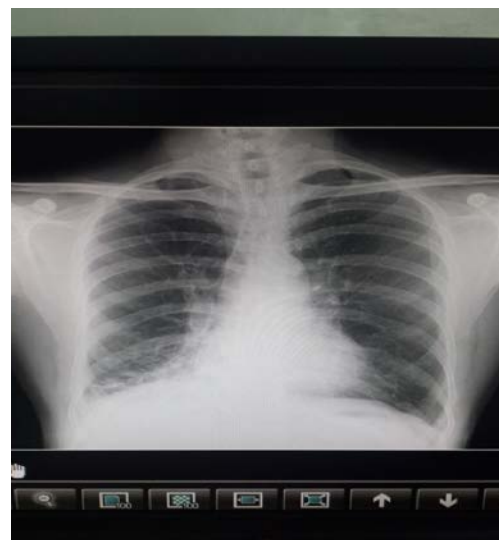


**Figure 5: Chest X ray PA view showing ICD in situ**

- The same procedure was repeated for three consecutive days in different pockets.
- Patients were then followed up with Ultrasonography to look for adhesiolysis.
- Once adhesiolysis was confirmed (Figure 4) an Intercostal drainage tube was inserted with an underwater seal till the entire fluid was drained(Figure 5,6).
- Complete drainage was confirmed by USG chest and chest xray PA view(figure 7)

## RESULTS

We included a total of 15 patients in our study of which 10 had multiloculated pleural effusion and 5



**Figure 7: Chest X Ray PA view after complete drainage of pleural fluid.**

had multiloculated empyema. Out of 10 patients with multiloculated pleural effusions, 9 could be successfully drained after adhesiolysis with MESNA with an ICD i.e. a success rate of 90%. In the remaining 1 case thoracoscopy was done. Out of 5 patients with multi loculated empyema, 2 could be successfully drained i.e. a success rate of 40%, in remaining 2 cases thoracoscopy was done and 1 case was referred to CT surgeon.

## DISCUSSION

Parapneumonic effusions are most common pleural effusions to loculate. Natural history of Parapneumonic effusion includes 3 stages 1) Exudative, 2) fibro purulent stage, 3) organizing stage. If antibiotic treatment is not initiated during exudative stage, it is during fibro purulent stage that most of loculi are formed. Loculated pleural effusions tend to have low glucose, low pH and high LDH (LACTATE DEHYDROGENASE) levels indicating closed tube thoracostomy drainage. But there are high failure rates even with tube thoracostomy as all locules are not drained mandating reinserting tube in other locule or Medical Thoracoscopy.

Intrapleural instillation of fibrinolytics is aimed to break the intrapleural fibrin membrane and facilitates drainage of loculated pleural fluid. Streptokinase, streptodornase, urokinase has been used for this purpose by many workers.<sup>1,2</sup> There are studies demonstrating mucolytic property of MESNA, due to disulfide bond breaking property.<sup>13</sup> We have instilled MESNA intrapleurally to examine its Adhesiolytic property.

In our study we could successfully drain multiloculated pleural effusions in 90% cases and multiloculated empyema in 40% cases. There was no major adverse reaction noted, except for cough following instillation of MESNA. Given the high efficacy and favorable complications rate, future applications in the surgical field are expected to increase.

## CONCLUSION

- In our observation at our hospital, we have seen that adhesiolysis with MESNA in case of multiloculated pleural effusion is very much effective. Intrapleural injection of streptokinase and streptodornase is associated with systemic side effects, including febrile reactions, general malaise, and leukocytosis,<sup>14</sup> while no such complications were seen with intrapleural injection of MESNA. In our institute where patients cannot afford thoracoscopy, MESNA has proved to be a very effective alternative without much complications

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