Iodopovidone pleurodesis: experience of a tertiary hospital in Kolkata

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ABSTRACT

Introduction: The management of recurrent pleural effusion or pneumothorax has always been a cause for serious concern among chest physicians. Among the wide variety of agents that are available for pleurodesis, povidone iodine is now perhaps the most sought after agent as it is cheap, easily available, effective and safe. This study was conducted to establish the efficacy and safety of povidone iodine as an agent for pleurodesis in patients with recurrent pleural effusion and pneumothorax.

Methods: A total of 38 consecutive patients with symptomatic malignant or recurrent pleural effusion and pneumothorax received povidone iodine for pleurodesis over a period of 18 months. The mean follow-up period was 10.2 months, with a standard deviation of 2.9 months.

Results: Out of the 38 patients, 29 had malignant pleural effusion, eight had recurrent pneumothorax and one had tubercular pleural effusion which was nonresponsive to anti-tubercular therapy. A complete response with no recurrence during follow-up was obtained in 34 (89.5 percent) patients. All the cases of failure had malignant pleural effusion. Three (7.9 percent) patients experienced intense chest pains after the installation of sclerosing agent, but they recovered with immediate symptomatic management.

Conclusion: Recurrent pleural effusion or pneumothorax due to any cause may be managed effectively and safely by chemical pleurodesis with povidone iodine. It may be considered as the agent of choice to achieve pleurodesis, especially in resource constrained countries like India, as it is inexpensive and easily available.

Keywords: malignant pleural effusion, pleurodesis, pneumothorax, povidone iodine

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INTRODUCTION

The management of recurrent pleural effusion or pneumothorax has always been a cause for serious concern among chest physicians as the symptoms, such as dyspnoea and chest pain, can be very distressing for patients, who may turn up frequently to undergo repeated interventions in order to get relief from their symptoms. The high cost and emotional trauma caused by these cases may sometimes result in a loss of faith in physicians. However, over the past several years, chemical pleurodesis has evolved as the most widely accepted treatment method for these problems, especially when the underlying cause cannot be rectified.[1] There are a wide variety of agents available for pleurodesis, such as tetracycline derivatives (doxycycline or minocycline), talc (insufflation or slurry), bleomycin, mitoxantrone, nitrogen mustard, silver nitrate, iodopovidone, dry killed *Corynebacterium parvum* and OK-432 (obtained from the Su strain of *Streptococcus pyogenes*).[2] However, each agent has its own set of advantages and disadvantages, and the agent that is to be used must be selected judiciously. Like any other drug, the criteria for selection of the agent for pleurodesis include its effectiveness, affordability, availability, ease of administration and safety profile.[3]

Iodopovidone, which is primarily used as a topical antiseptic, has gradually emerged as a very promising agent for chemical pleurodesis in the recent years. This study was conducted to establish the efficacy and safety of iodopovidone as an agent for pleurodesis in patients with recurrent pleural effusion and pneumothorax.

METHODS

The study was conducted at the Department of Chest Medicine, Radha Gobinda Kar Medical College and Hospital, Kolkata, India, from January 2005 to June 2006. A total of 38 patients who underwent pleurodesis with iodopovidone during this period were included in the study after informed consent was obtained from each patient. All the patients had either recurrent exudative pleural effusion of any cause or recurrent pneumothorax. The study was approved by the ethics committee of the hospital.

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Table I. Clinical demographics of the study patients (n = 38).

Variable	No. (%)
Age (years)	
< 50	7 (18.4)
50–60	19 (50.0)
> 60	2 (31.6)
Gender	
Male	24 (63.2)
Female	14 (36.8)
Diagnosis	
Malignancy	
Bronchogenic carcinoma	12 (31.6)
Metastatic adenocarcinoma	12 (31.6)
Breast carcinoma	4 (10.5)
Osteosarcoma	1 (2.6)
Pneumothorax	8 (21.1)
Tuberculosis	1 (2.6)

Table II. Distribution of deaths and complications in the study outcome groups.

Study outcome	No. (%)	
	Death	Complication
Complete response (n = 34)	10 (29.4)	2 (5.9)
Failure (n = 4)	4 (100.0)	1 (25.0)

The exclusion criteria in this study were patients with previous attempts at pleurodesis with other agents, those with known hypersensitivity to iodine, those in whom there was incomplete re-expansion of the lung after tube thoracostomy, highly moribund patients or those with very limited life expectancy, and those with known thyroid disease.

In each of the patients selected for this study, an intercostal tube (Romsons, Agra, Uttar Pradesh, India) of size 28F was inserted into the fifth intercostal space along the mid axillary line using the operative tube thoracostomy technique.[2] The fluid was allowed to drain out slowly through the water seal drainage system over the course of 48 hours to prevent the development of re-expansion pulmonary oedema. After complete drainage of the pleural fluid and confirmation of expansion of the lung, both clinically and radiologically, pleurodesis was performed with iodopovidone using the method described by Olivares-Torres et al in their study.[1] Also, in cases of recurrent pneumothorax, pleurodesis was performed only after ensuring that there was no broncho-pleural fistula and that the lung had expanded completely.

Each patient received pre-medication in the form of 2 mg/kg lidocaine (Xylocaine 2%, Astra Zaeneca, Bangalore, Karnataka, India) in 50 ml of normal saline solution through an intercostal chest tube. Only in some patients who were very apprehensive was 5 mg of intravenous midazolam (Mezolam, Neon Laboratories, Mumbai, Maharashtra, India) administered for sedation. The pleurodesis solution, containing a mixture of 20 ml of 10% iodopovidone (Betadine Aqueous paint 10%, Win Medicare, New Delhi, India) and 80 ml normal saline, was then injected into the pleural cavity through the chest tube. The solution was allowed to remain in the pleural cavity for about two hours by clamping the chest tube. After the clamp was removed, the residual fluid from the pleural cavity was drained out by applying negative pressure (–10 to –15 cmH_2O) through a suction pump (Romsons, Agra, Uttar Pradesh, India). The patient was observed until the lung had completely expanded and there was no residual pleural effusion or pneumothorax, which was confirmed by a chest radiograph. Only then was the chest tube removed. The patient was then followed up as an outpatient. During the follow-up period, the collection of fluid or air in the pleural space was considered a failure of pleurodesis. The mean and standard deviation was calculated using Excel 2003 (Microsoft Office, Redmond, WA, USA).

RESULTS

A total of 38 patients were included in this study, of which 24 (63.2%) were male. The mean age for the entire group was 55.8 ± 7.7 years. 29 (76.3%) patients had malignancy, either primary or metastatic (Table I). Out of these 29 cases, 12 patients had bronchogenic carcinoma, another 12 had metastatic adenocarcinoma, four had malignant pleural effusion secondary to breast cancer and one had osteosarcoma of the left ulna. Eight (21%) patients had recurrent pneumothorax, out of which six were primary and only two were secondary to emphysema. One (2.6%) patient was diagnosed to be a case of tubercular pleural effusion (the pleural fluid was exudate, with 91% lymphocytes and a high adenosine deaminase level, and a pleural biopsy showed granulomatous lesions), but there was repeated collection of pleural fluid in spite of adequate anti-tubercular drugs and oral corticosteroids.

There was complete response with no re-accumulation of fluid or air during follow-up in 34 (89.5%) patients. All the cases of failed pleurodesis had malignant pleural effusion. However, there were no failure cases among all the patients with recurrent pneumothorax. Only three (7.9%) patients developed intense pleuritic pain and systemic hypotension due to the irritating effect of the sclerosing solution on the pleural surface after it was instilled. However, the patients recovered with immediate symptomatic management (raising the foot end of the bed and intravenous fluids).

The mean length of follow-up was 10.2 ± 2.9 months. The serum iodine levels were not measured after the procedure, but none of the patients presented with signs and symptoms of hypo- or hyperthyroidism. Visual loss was not reported in any of the patients. 14 (36.8%) patients with malignant pleural effusion died during the follow-up (Table II). However, the post-procedure 30-day mortality rate was 0%.

DISCUSSION

Pleurodesis was first reported at the beginning of the 20th century,[4] and over the last 100 years, a wide variety of agents have been used for the procedure. In the recent past, iodopovidone has been found to be a very effective and acceptable agent for pleurodesis. The effectiveness of iodopovidone in pleurodesis has already been demonstrated by various studies from across the world.[1,5-8]

The exact mechanism of pleurodesis by a sclerosing agent is not completely understood. However, it has been shown that the initial events that take place after the intrapleural administration of a sclerosing agent include the denudation of mesothelial cells and the subsequent development of an exudative pleural effusion.[9,10] Thereafter, the complex sequence of events that take place include an acute inflammatory response to the local injury, followed by the regeneration of the damaged cells, and the wound strength is established by the migration of connective tissue cells, the synthesis of extracellular matrix proteins and finally, collagenisation.[11]

The efficacy of pleurodesis with iodopovidone without any significant adverse effects was 91.6% in a study conducted by Morales-Gomez et al,[5] and 64.2% in a study conducted by Kelly-Garcia et al.[6] In both these series, pleurodesis was performed through tube thoracostomy. In our study, the majority of the patients had malignant pleural effusions, and iodopovidone proved to be an extremely effective and safe agent for their pleurodesis. The efficacy of iodopovidone is at par with that of talc, but there is no fear of severe complications, such as acute respiratory distress syndrome, which occurs especially if the talc used has a smaller particle size (< 15μm).[12] Moreover, pleurodesis with iodopovidone can be performed under local anaesthesia with excellent tolerance and acceptability.

Some difficulty was experienced in the form of increased resistance while injecting the total volume of fluid (50 ml lidocaine solution + 100 ml iodopovidone solution) in the patients with recurrent pneumothorax. It is possible that patients with pneumothorax require lower amounts of the sclerosing agent for pleurodesis, but further studies are required in order to establish this.

From this study, it can be concluded that in resource constrained countries like India, iodopovidone may be the agent of choice for chemical pleurodesis in cases of recurrent pleural effusion and pneumothorax, as it is cheap, easily available, safe and highly effective. Cases of pneumothorax may require a lower amount of sclerosing agents for pleurodesis.

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