ORIGINAL RESEARCH PAPER

CTVS

PLEURODESIS WITH POVIDONE-IODINE: OUR EXPERIENCE IN MALIGNANT PLEURAL EFFUSION

KEY WORDS: Chemical Pleurodesis, Pleural Symphysis, Povidone-iodine, Malignant Pleural Effusion

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ABSTRACT

BACKGROUND: Malignant pleural effusion is a frequently encountered condition. One of the procedures to treat this condition is chemical pleurodesis.. Aim of the study is to evaluate efficacy and safety of povidine-iodine as an agent of chemical pleurodesis.

METHOD: Records of patients with malignant pleural effusion admitted in Assam Medical College and Hospital and treated by chemical pleurodesis using povidone-iodine in CTVS unit from January 2016 to December 2018 was reviewed and analyzed to document its efficacy and safety.

RESULTS: Total 30 patients had undergone povidone-iodine pleurodesis during this period. Overall success of the procedure was observed in 26 (86.67%) and the procedure failed in 4(13.33%). Complications noted were chest pain in 13.33% and fever in 6.67% patients.

CONCLUSIONS: Povidone-iodine is an effective and safe agent for chemical pleurodesis. It can be used to treat malignant pleural effusion.

INTRODUCTION

The malignant pleural effusion is a common complication of advanced malignant diseases[1]. According to one estimation, number of such patients may be as high as 100 per 100,000 population[2].Malignant pleural effusion is usually associated with limited survival and median survival of these patients ranges from 3 months to 12 months[3]. Accumulated fluid in the pleural cavity usually presents with symptoms of exertional dyspnoea and cough. Aim of the treatment at this stage is to improve the quality of life by evacuation of the fluid and prevention of its re-accumulation[4]. Any treatment at this stage should be simple and inexpensive[5].

One of the frequently practiced procedures at this terminal stage is chemical pleurodesis. It may be defined as a procedure of symphysis between the visceral and parietal layers produced by instilling various chemical agents into pleural cavity which prevent repeated accumulation of either air or fluid in the pleural space[6]. Among the chemical agents used, Povidone-iodine is found to be an effective and safe chemical agent[7, 8]. Moreover it is readily available in Indian market as an antiseptic solution and not costly[8]. The present study is undertaken to evaluate efficacy and safety of povidone-iodine as a chemical agent for pleurodesis in malignant pleural effusion.

MATERIAL AND METHODS

This is a retrospective observational study carried out in Assam Medical College & Hospital, Dibrugarh, Assam for a period of three years from January 2016 To December 2018. Ethical clearance was obtained from the Institutional Ethics Committee of Assam Medical College & Hospital, Dibrugarh, Assam.

PATIENTS

Charts of all the patients admitted in the hospital during this period for malignant pleural effusion and treated by pleurodesis using povidone-iodine were reviewed to collect information regarding patients demography, mode of presentation, etiology of cancer, method of diagnosis of malignant pleural effusion, complications of pleurodesis, outcome of this management and follow up record after 1 week, 1month and 3 months including chest X-rays. All patients included in the study were above 18 years and malignant pleural effusion was confirmed by cytology or pleural biopsy. All included patients had normal thyroid function and renal function tests. Only patients who had evidence of complete expansion of lung in CT scan of thorax done after thoracostomy tube drainage (using 28F chest tube) were included. Terminally ill patient with short life expectancy were excluded from the study. Total of 30 patients satisfied the above mentioned criteria in the specified period and were included in the study.

PROCEDURE OF PLEURODESIS

Pleurodesis performed by the following procedures were only accepted for the study.

After infiltration of area with 1% lignocaine injection, 28F thoracostomy tube was introduced in fifth intercostal space in mid-axillary line and connected to water-sealed drainage system. Once drainage was complete and complete re-expansion of lung was documented by CT scan of thorax, pleurodesis was performed. 20 mL of 10% topical solution of povidone-iodine (Betadine) was mixed with 80 mL of normal saline. To this was added 2 mg/kg of 2% lidocaine solution. This mixture was administered into pleural cavity through the thoracostomy tube and tube was kept clammed for four hours. During this period, position of the patient was changed repeatedly for even distribution of the solution over pleural surface. Side effects of pleurodesis were recorded. Thoracostomy tube was removed as soon as drainage decreased below 50 mL.

Because of the possibility of systemic absorption of iodine in povidone-iodine during the procedure, record of measur ement of serum levels of TSH, T3 and T4 after 1 week of pleurodesis were looked for.

Response to pleurodesis was categorized as (A) successful pleurodesis or (B) failed pleurodesis. (A) A successful procedure was defined as (i) complete success when there was symptomatic improvement of dyspnoea with complete radiological resolution of pleural effusion on follow up to three months or (ii) partial success when there was symptomatic improvement with mild recurrent pleural effusion (without any dyspnoea) that did not required any intervention up to three months. (B) Failed procedure was defined as recurrence of pleural effusion with recurrence of symptoms that required thoracostomy drainage or thorace ntesis within three months of follow up.

RESULT AND OBSERVATION

Thirty patients with malignant pleural effusion underwent

pleurodesis with povidone-iodine from January 2016 to December 2018 and were included in our study. The characteristics of population of our study are summarized in tables and figures. Fourteen (46.67%) patients were male and sixteen (53.33%) patients were female (Fig 1). Age of the patient ranges from 35 to 76 years and mean age of the patients was 59.8 ± 10.76 years. A comprehensive overview of age distributions is shown in TABLE.1

TABLE . 1 AGE DISTRIBUTION

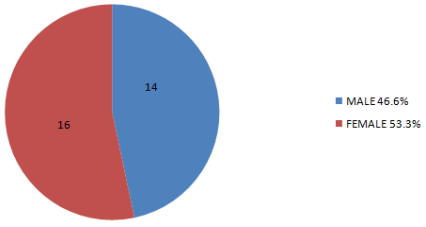
AGE IN YEARS	DISTRIBUTION	PERCENTAGE
21-30	-	-
31-40	1	3.3%
41-50	7	23.3%
51-60	8	26.7%
61-70	9	30.0%
71-80	5	16.7%
>80	-	-
TOTAL	30	100

Among the treated patients, primary cause of malignancy was Lung cancer in 10 (33.33 %) patients and breast cancer in 8(26.67%) patients. Other eitiology recorded were ovarian cancer in 4(13.33%) patients, Lymphoma in 2(6.67%) patients, mesothelioma in 2(6.67%) patients, gastric cancer in 1(3.33%) patient and malignancy of unknown origin in 3(10%) patients shown in TABLE.2

TABLE. 2

CAUSES	NO OF CASES	PERCENTAGE
LUNG CANCER	10	33.3%
BREAST CANCER	8	26.7%
OVARIAN CANCER	4	13.3%
LYMPHOMA	2	6.7%
MESOTHELIOMA	2	6.7%
GASTRIC CANCER	1	3.3%
UNKNOWN ORIGIN	3	10%
TOTAL	30	100%

FIG 1 Gender Distribution (n030)



Presenting symptoms of our patients were dyspnoea on exertion in 29(96.67%) patients, cough in 23 (76.67%) patients and chest pain in 22(73.33%) patients.

Presence of malignant pleural effusion was confirmed by pleural cytology in 23(76.67%) patients and by pleural biopsy in 7(23.33%) patients. Metastatic adenocarcinoma was documented in 18 patients.

Malignant pleural effusion occurred on right thoracic cavity in 20 (66.67%), on left pleural cavity in 9(30%) and bilaterally in 1(3.33%) patients.

Side effects of povidone-iodine noted were chest pain in 4(13.33%) and fever in 2(6.67%) patients. Repetition of thyroid function test done one week after pleurodesis did not show any abnormality after pleurodesis.

In our study, complete success of the procedure was noted 22 in (73.33%) and partial success in 4 (13.33%) patients. Therefore, overall success rate requiring no further interv ention for pleural effusion was observed in 26 (86.67%) pat ients. Procedure failed in 4(13.33%) patients. Three of these patients were treated by re-insertion of chest tubes while 4th one required repeated thoracentesis.

All of the 26 patients were alive till the end of one month. 1 of them died before completing third months and the cause of death was not related to recurrence of effusion. Other successful patients were followed up to three months and none of them developed recurrent pleural effusion on the side of pleurodesis.

DISCUSSION

Malignant Pleural Effusion is one of the common compli ca tions in advanced stages of many malignancies and diagnosis is done by detection of malignant cells in pleural fluid or by pleural biopsy. Primary carcinoma of lung, breast, ovary, stomach and lymphoma are causes of malignant pleural effusion in about 80% of Patients. In another 7% of patients, primary site of malignancy is not known[10]. However, almost all types of malignancies have been reported to cause malignant pleural effusion[11]. Metastatic adenocarcinoma is found to be the most common cause of malignant pleural effusion[12].

Though a small percentage of patients with malignant pleural effusion are asymptomatic, more than 75% of patients are symptomatic[13]. Usual presenting symptoms are dyspnoea on exertion, cough and chest pain. According to one study, more than 90% of them present with dyspnoea on exertion while 50% of them present with cough and chest discomfort[14]. The quantity and rate of accumulation of pleural fluid determines the severity of presenting symptoms[13].

Chemical pleurodesis is the best palliative treatment for malignant pleural effusion[15].The procedure of pleurodesis is successful in only those patients who have significant evidence of full expansion of lung after therapeutic aspiration[5]. Scarring, adhesions, obstructive atelectasis from an endobronchial tumor, multiple pleural loculations, or extensive intrapleural tumor masses prevent reexpansion of lung and hence patients with such conditions should not be included for pleurodesis[16].

For 70 years, many agents such as anti-neoplastics (e.g., nitrogen mustard, bleomycin), tetracycline derivatives, talc (slurry or insufflation), erythromycin, dry killed coryneba cte rium parvum, silver nitrate, and povidone-iodine have been used for inducing pleurodesis[17]. An ideal chemical agent for pleurodesis should have following properties (i) should be highly efficacious, (ii) should have a high molecular weight and chemical polarity, (iii) should have low regional and rapid systemic clearance, (iv) should give rise to a steep dose-response curve, (v) it should be inexpensive and easily accessible, (vi) it should be easy to administer, and well tolerated with minimal or no side-effects. No such agent has been discovered so far[18].

Practice of chemical pleurodesis using silver nitrate started from the beginning of the 20th century[19]. In a review of English literature, talc was found to be the most effective chemical agent for malignant pleural effusions, its complete success rate being 93%[6], but its use is associated with serious side effect including death[20]. Moreover, pharmaceutical talc (Steri-talc) not readily available in many countries including India[21].

Povidone-iodine is another chemical agent used frequently for pleurodesis. It is easily available in India and is an inexpensive topical antiseptic solution[9]. It was first used in 1991[22]. Its precise mode of action remains unknown[9]. Probably low pH (pH 2.97)[8] or the strong oxidative and cytotoxic properties[23] of the solution induces pleurodesis.

Importantly, povidone-iodine has minimal side effects. Side effects observed in our study were chest pain in 4(13.33%) and fever in 2(6.67%) patients. Hence total adverse events occurred in 6 (20%) pleurodesis procedures.

Though most of the studies have reported chest pain as side effect of iodine pleurodesis[24,25,26], one study did not observe a single incidence of chest pain after use of povidone iodine[27] while another study recorded chest pain in all of their patients after pleurodesis[21].

This variation in presentation may be due to different meth ods employed by investigators to relief pain[28].

Similarly fever was also reported as a side effect of iodine ple urodesis in many studies[27,29]. Other side effects reported were, dyspnea, hypotension and subcutaneous emphysema[24,30]. Topical solution of iodine may cause thyroid dysfunction due to absorption of Iodine through mucosal surface. However, in a study with 12 patients, no thyroid dysfunction was noted after pleurodesis with iodine solution[31]. In our study, thyroid function done after one week of pleurodesis did not detect any alteration of thyroid function. Iodine can sometime cause severe allergic reactions[21].We did not encounter such allergic reaction in our study. So far, no incidence of death has been reported after using povidone-iodine for pleurodesis[21].

One essential property for an ideal chemical agent is its high efficacy in achieving pleurodesis and various studies have reported high success rate of pleurodesis with povidone-iodine. One study reported complete success in 73.3% and partial success in 6.7% and failure in 20%[28]. Another study reported complete success of pleurodesis in 72.2%, partial success in 8.4% and failure in 19.4%[32]. A systematic review & meta-analysis which included 13 studies with 499 patients, also reported that the pooled success rate of povidone-iodine pleurodesis is 88.7%[26]. Result of our study also supported these findings. We achieved complete success in 73.33%, a partial success in 13.33% and overall success in 86.67%.

There were a few limitations of the study. First limitation is smaller sample size. Another limitation is follow-up record of patients only up to 3 months.

CONCLUSIONS:

we can conclude from the study that povidone-iodine is an effective agent for chemical pleurodesis with high success rate in malignant pleural effusion. It is well tolerated with minimal side effect. It fulfills many of the criteria of ideal chemical agents for pleurodesis and can be used for chemical pleurodesis in malignant pleural effusion.

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