Research Paper

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Pleuropulmonary Complications and Pulmonary Function Changes After Esophageal Variceal Sclerotherapy: An Experience From Upper Egypt

Medical Science

KEYWORDS : pleuropulmonary, complications, esophageal, sclerotherapy, varices, Egypt

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ABSTRACT

Background:To report our experience with pleuropulmonary complications and pulmonary function changes in patients underwent esophageal variceal sclerotherapy (EVS), in Upper Egypt.

Methods:Patients with bleeding varices who underwent elective EVS were followed up for pleuropulmonary symptoms, and were subjected to ABGs measurements and spirometric evaluation before EVS, which were compared to those 2 days, and 3 weeks after EVS.

Results: During a 3-years period, 188 patients were enrolled. Most reported symptoms were chest pain in 39%, dyspnea in 32.4%, and dysphagia in 26% of patients. Mediastinal widening was encountered in 33%, pleural effusion in 24%, and atelectasis in 16.5% of patients. Restrictive ventilatory defect was found early and late after EVS. Hypoxemia occurred early after EVS which improved after 3 weeks, with no changes in PACO2.

Conclusion: Our results showed pleuropulmonary complications and restrictive dysfunction similar to those reported in literature. These effects, were generally mild, well-tolerated by the patients, and with no mortality.

Introduction

Esophageal variceal sclerotherapy (EVS) became an established method of controlling bleeding worldwide following initial prospective studies.[1] It still represents an attractive therapeutic modality; particularly in developing countries, like Egypt.[2] Only few studies had reported pleuropulmonary complications[3-5] or pulmonary function changes[2,6] related to EVS. In this study, we aimed to report our experience with pleuropulmonary complications and pulmonary function changes, in patients who underwent EVS for bleeding varices, in Upper Egypt.

Patients and Methods

Patients

Assiut University hospital is a large tertiary hospital that serves many patients all over Upper Egypt. Patients with portal hypertension with bleeding esophageal varices are admitted to either the Internal Medicine Department, or the Department of Tropical Medicine, for endoscopic management of their bleeding varices. Through a 3-years period, patients performed elective EVS were studied for pleuropulmonary complications and evaluated for effects on the pulmonary functions. Enrolled patients were asked to report any symptoms related to pleuropulmonary complications, and underwent the following:

(1) Full clinical examination.
(2) Routine laboratory investigations before EVS.
(3) Chest X ray before, 2 days after, and 3 weeks after the procedure.
(4) Computerized tomography (CT) of the chest, if indicated.
(5) Spirometery before, 2 days after, and 3 weeks after the pro cedure.
(6) Measurement of arterial blood gases(ABGs) before, 2 days after, and 3 weeks after the procedure.

Exclusion criteria included:

(1) Patients with chest complaint before the study. (2) Patients with chronic lung diseases. (3) Current smokers. (4) Chest X ray abnormalities before the study.

The study was approved by the Local Ethical Committee and a written consent was obtained from all patients participated in the study.

EVS procedure[7,8]

After an overnight fast the procedure was performed, with medazolam (2 mg) administered intravenously as premedication just prior to sclerotherapy._Endoscopes (Pentax FG29 W, video endoscope Olympus EVIS lusira) and needle injectors (NM-200L-0421 Olympus) were used. Ethanolamine Oleate (5%) was the sclerosing agent utilized. Standard technique of sclerotherapy was used with either intravariceal or paravariceal injection of the sclerosing agent. The volume of the sclerosant used ranged from 1 to 25 mL, with an average of 7.5 ± 4.4 mL.

Spirometric and ABGs measurements

To study early and late changes in pulmonary functions related to EVS, spirometric and ABGs measurements were performed within 24 hours before EVS and compared to those 2 days and 3 weeks following the procedures.[2] Spirometric and ABGs measurements techniques were performed as per international recommendations.[9,10]

Statistical analysis

Data were analyzed using SPSS(version19). Data were presented as mean ± SD. Student's t-test was used to compare between two groups. $p < 0.05$ was considered to be statistically significant.

Results

Patients' demographic and endoscopic data

Between June 2011 and June 2014, a total of 188 patients who underwent 582 elective EVS sessions fulfilled the enrollment criteria and were included in this study. Table (1) shows the demographic, clinical and endoscopic data of the patients.

Pleuropulmonary complications of EVS

The most reported pleuropulmonary symptoms were chest pain in 73(39%) patients, dyspnea in 61 (32.4%) patients, and dysphagia and/or odynophagia in 49 (26%) patients**.** Fever was encountered in 34 (18%) patients. In the majority of patients however, those symptoms occurred in the first 24-48 hours, were well-tolerated and required no treatment. Table (2) shows these results. Mediastinitis and/or mediastinal widening was the most encountered finding, as it was found in 62 (33%) patients, followed by pleural effusion in 45(24%) patients, and atelectasis in 31 (16.5%) patients. On the other hand; bronchitis, pulmonary

infilterates, pneumonia, and empyema; were encountered in 8%, 7%, 3.2%, and 1.5% of patients, respectively. (Table 3) Notably, the later was encountered in 3 patients, all had esophageal perforation. Pleural effusions were more common in patients with ascites, those with chest pain for 24 hours, and those who received paravariceal injection. In most patients with pleural effusions (77%), however, the later were small in amout (ie <10% of the hemithorax) and resolved spontaneously. Remarkably, we did not report any patients' deaths due to pleuropulmonary complication(s) of EVS, during the whole follow up period of the study.

Early changes in spirometric and gasometric parameters

Comparison of spirometric and gasometric parameters between pre-procedure and 2 days post-procedure revealed the following; there was a highly significant (p<0.001) decrease in FEV1, FVC, and PEF. A significant decrease was noticed in FEF50 (p=0.045). There was a significant decrease (from 93.47± 2.74 to 82.94 ± 5.06; p=0.021) in PAo2 and SO2 (from 94.56±1.80 to 92.99±2.27; p=0.048) So2, while there was no significant difference in PACo2. (Table 4)

Late changes in spirometric and gasometric parameters

Comparison of spirometric measurements between pre-procedure and 3 weeks post-procedure revealed that; there was a highly significant (p<0.001) decrease in FEV1, FVC, and PEF, while there was a significant decrease in FEF50% (p=0.032). There was a significant decrease in PAo2 (from 93.47 ± 2.74 to 85.15 ± 4.61; p=0.034), while there was no significant difference in So2 and PACo2. (Table 5)

Table 1: Demographic, clinical, and endoscopic data of patients underwent EVS*

Data	No of patients (%)
Age	
Range (years)	19-72
Mean±SD	43±9
Gender	
Male	119 (63.3%)
Female	69 (36.7%)
Etiology of PH	
Schistosomal periportal fibrosis	124 (66%)
Liver cirrhosis	61 (32.4%)
Portal vein thrombosis	3 (1.6%)
Presenting bleeding	
Hematemesis	60 (32%)
Melena	21(11%)
Hematemesis & melena	107 (57%)
Ascites	119(63%)
No of patients for EVS sessions	
1-3 sessions	136 (72.4 %)
>3 sessions	52 (27.6 %)
Grades of esophageal varices	
Grade I & II	79 (42 %)
Grade III & IV	109 (58%)
Technique of sclerotharapy	
intravariceal	134 (71%)
paravariceal	13 (7%)
Intra-&paravariceal	41 (22 %)

*** EVS; esophageal variceal sclerotharapy, PH; portal hypertension**

Table 2: Pleuropulmonary symptoms in patients underwent EVS*

	No of patients (%)
Chest pain	73 (39%)
Breathlessness	61 (32.4 %)
Dysphagia/odynophagia	49 (26%)
Fever	34 (18 %)
Cough with or without sputum	27(14%)
Wheezes	6 (3.2 %)
Late expectoration of the sclerosant	4 (2.1 %)

Table 3: Clinical and radiographic signs in patients underwent EVS*_

	No of patients (%)
Mediastinitis/Mediastinal widening	62 (33%)
Pleural effusion	45 (24%)
Atelectasis	31 (16.5%)
Bronchitis	15 (8%)
Pulmonary infilterates	13 (7%)
Pneumonia	6 (3.2%)
Empyema	3 (1.5%)

Table 4: Spirometric and gasometric parameters in patients Underwent EVS before and 2 days after EVS*

	Before EVS	2 days after EVS	p value
FEV1	82.68±3.91	61.84±4.55	<0.001
FVC	73.03±12.22	52.17±11.11	<0.001
FEF25%	75.53 ± 6.03	74.22 ± 5.16	0.198
FEF50%	77.33±7.16	84.23±8.19	0.045
FEF75%	107.11±8.65	109.23±9.56	0.764
PEF	84.12±9.34	63.37±7.66	<0.001
PAO2	93.47 ± 2.74	82.94 ± 5.06	0.021
PACO2	34.34 ± 3.29	34.73 ± 3.21	0.521
O2Sat	94.56±1.80	92.99±2.27	0.048

Table 5 : Spirometric and gasometric parameters in patients Underwent EVS before and 3 weeks after EVS*

	Before EVS	3 weeks afterEVS	p Value
FEV1	82.68±3.91	75.46±5.47	<0.001
FVC	73.03±12.22	65.22±9.33	<0.001
FEF25%	75.53±6.03	75.13±5.11	0.706
FEF50%	77.33±7.16	88.16±4.67	0.032
FEF75%	107.11±8.65	108.18±7.66	0.941
PEF	84.12±9.34	72.12±6.87	<0.001
PAO2	93.47 ± 2.74	86.15±4.61	0.034
PACO2	34.34 ± 3.29	34.24±2.92	0.861
O2Sat	94.56±1.80	93.14±1.74	0.078

Discussion

Through a 3-years period, 188 patients admitted for elective EVS were studied for possible pleuropulmonary complications as well as evaluated for effects of the procedure on the pulmonary functions. To the best of our knowledge, this is the first study to report such findings in Upper Egypt.

In this study, chest pain, dyspnea, dysphagia and/or odynophagia, and fever, were reported in 39%, 32.4%, 26%, and 18% of patients, respectively. This is consistent with results reported in the literature.[3-5, 8] Sethy, *et al*[5], found that chest pain, dyspnea, and fever were recorded 38.46%, 30.54%, and 15.68% of patients, respectively. Importantly, in the majority of our patients, those symptoms occurred in the first 24-48 hours, were well-tolerated and required no treatment.[3,4]

Clinical and radiographic follow up of our patients revealed that mediastinitis and/or mediastinal widening was the most common finding (33%), followed by pleural effusion (24%), and atelectasis (16.5%). These findings are similar to those reported previously[3-5] Zeller and coworkers, found that mediastinal widening, pleural effusions, and atelectasis, were encountered in 35%, 27%, and 12% of patients, respectively.[4]

The most commom thoracic complications of EVS are pleural effusions and mediastinitis [3,7, 8]. Even when the intravariceal route is intended, a significant amount of sclerolsant can extravasate into the surrounding interstitial tissue,causing transmunal inflammation and varying degrees of tissue necrosis, with extension to the mediastinum and pleura.[3] Most patients with post-sclerotherapy effusions are asymptomatic with small effusions. Coexistent fever and/or ascites are not major risk factors for development of effusions. Risk factors for development of an effusion include the total volume of sclerosant injected in a given session and the volume (>1 ml) injected per site, but not the number of varices injected per session. The type of sclerosant used does not appear to be a factor, since effusions have been described following the use of all types of sclerosants.[3,5,,8,11] Kayama and colleages observed that post-sclerotherapy pleural effusions were associated with ascites, chest pain for 24 hours, total volume of the sclerosant, and submucosal injection of >4ml of sclerosant.[11]Interestingely, this is in concordance with our findings.

Our spirometric data revealed a restrictive ventilatory defect early after EVS which did not improve after 3 weeks. Gasometric evaluation revealed hypoxemia early after EVS which improved after 3 weeks, with no significant changes in PACo2.These results are consistant with those published in the literature [2,3,5,6,8] Restrictive ventilatory defect that occurs early after EVS can be explained by embolisation of the sclerosant to the pulmonary vessels. [2,3,6,12]

Samuels, *et al*[6] found a decrease of lung function one day after injection sclerotherapy. Recently, Rezk and El-Maleky, observed a restrictive ventilatory defect early after EVS, which did not improve after 3 weeks of EVS.[2] There is an evidence that sclerosant dissemination to the pulmonary and systemic circulation after intravariceal EVS occurs through oesophagogastric collaterals and the azygous-hemiazygous systems.[7]

One-third of cirrhotic patients with oesophageal varices were shown to have pre-existing pulmonary interstitial oedema and arterial hypoxaemia. EVS may further deteriorate pulmonary function and decreases the arterial oxygen content.[13] This may support the finding of hypoxemia early after EVS, observed in our patients. However, Barkin *et al*,[14] found no clinically significant changes after EVS, beyond those associated with routine upper endoscopy which, by itself, can cause oxygen desaturation in up to 44% of patients. Remarkably, we did not report any patients' deaths due to pleuropulmonary complication(s) of EVS, during the whole follow up period of the study.[7,8]

To summarize, our results were more or less similar to those reported in the literature. Those complications were generally mild, well tolerated by our patients and did not cause mortality (by themselves) to our cohort. These findings should be interpreted in the light of advantages of EVS as a procedure to control esophageal bleeding in patients with PH; EVS is cheap, easy to use, the injection catheter fits through the working channel of a diagnostic gastroscope, it can be quickly assembled, and does not require a second oral intubation. Additionally, there is a rapid thrombosis.[7] Notably, the advantage of EVS being cheap is of particular importance in developing countries, like Egypt.

Conclusion

Our results show similar rates of pleuropulmonary symptoms and complications related to esophageal variceal sclerotherapy, to those reported in the literature. EVS resulted in restrictive pulmonary dysfunction. All these effects, however, were generally mild, well-tolerated by the patients, and with no mortality.

Competing Interests

The authors declared no conflicts of interests

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