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RESEARCH ARTICLE

TREATMENTOPTIONS FOR SPONTANEOUS PNEUMOTHORAX

Efstathios K. Metaxas,[1] Dimitrios Paschalinos,[1] Nikolaos Pliakos,[1] Symeon Patsos,[1] Anna Eleftheriou,[1] Theodosios Kantas,[1] George Karakaidos,[1] Dimitrios Lioumpas,[1] Panagiota Pantoula,[2] Ioannis Provatas,[2] Konstantia Bouchra and [3]Sophia Ispanopoulou[3]

[1]Department of Thoracic Surgery, General Hospital of Nicaea-Piraeus, Greece; [2]Department of Pathology, General Hospital of Nicaea-Piraeus, Greece; [3]Radiology and Imaging Department, General Hospital of Nicaea-Piraeus, Greece

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***Corresponding author:**
Efstathios K. Metaxas

ABSTRACT

Background: Pneumothorax is air in pleural cavity.Spontaneous Pneumothorax may be primary or secondary. The aim of the study is to present our experience in management, therapy, options of treatment of Spontaneousprimary and secondary Pneumothorax. **Methods:** In a 30 year period a retrospective study took place. During the years1993 to 2024 (30 years) 1189 patients (978 male and 211female), treated for spontaneous (primary or secondary) pneumothorax in the department of Thoracic Surgery of the General Hospital of Nicaea-Piraeus. **Results:** In a 30 year period 1189 patients, 978 (82,253%) male and 211 (17,746%) female, age 17 – 87 years old mean age 38 years old.Only 155 patients of 1189 (12,699 %) received conservative treatment (oxygen administration, analgesic monitoring), while 1038 (87,300 %) were treated with chest drain insertion. The pneumothorax was located on the right in 723 patients (60,807%), on the left in 440 (37,005%), and on both sides in 16 (1,345 %).Operation underwent 278(23,380%) out of 1189 patients.The first five years of the study the operation rate was 10% but the operation rate the last five years of the study was 70%.The average patients age was 38 years old (max 87, min 17) while the average hospitalisation stay was 7.1 days (max 21, min 1).The elderly patients for spontaneous secondary pneumothorax had a longer stay in the hospital compared to younger population of the study. **Conclusion:** Conservative treatment observation O2 administration required 12,699% of the study population. The majority 87,300 % required chest drain insertion. Pleurodesis with blood is very useful for spontaneous pneumothorax treatment. Also its very helpful for small air leaks post thoracic surgery like lobectomies, decortication.Considered as alternative solution. Surgery required one fourth of the study population. Operation underwent 278(23,380%) out of 1189 patients).The elderly patients for spontaneous (secondary) pneumothorax had a longer stay in the hospital compare to younger population (primary) of the study.The first five years of the study the operation rate was 10% but the operation rate the last five years of the study was 70%.

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INTRODUCTION

Pneumothorax is air in pleural cavity.Spontaneous Pneumothorax may be primary or secondary.The aim of the study is to present our experience in management, therapy, options of treatment of Spontaneousprimary and secondary Pneumothorax.

METHODS

In a 30 year period a retrospective study took place. During the years 1993 to 2024 (30 years) 1189 patients (978 male and 211 female), treated for spontaneous pneumothorax in the department of Thoracic Surgery of the General Hospital of Nicaea-Piraeus.

RESULTS

In a 30 year period 1189 patients, 978 (82,253%) male and 211 (17,746%) female, age 17 – 87 years old mean age 38 years old. Only 155 patients of 1189 (12,699 %) received conservative treatment (oxygen administration, analgesic monitoring), while 1038 (87,300 %) were treated with chest drain insertion. Operation underwent 278(23,380%) out of 1189 patients. The first five years of the study the operation rate was 10% but the operation rate the last five years of the study was 70%. The pneumothorax was located on the right in

Table 1. Clasification of spontaneous pneumothorax

PRIMARY
Rupture of subpleural bullae.
SECONDARY
Emphysema
Chronic Obstructive Pulmonary Disease (COPD)
Cystic Fibrosis
Spontaneous rupture of oesophagus
Marfan's syndrome
Eosinophilic granuloma
Asthma
Lung Cancer
Lemfangioleiomyomatosis
Menstruation
Metastatic Cancer especially Sarcoma
Pneumonia and Pulmonary Abscess
Pneumocystis Carinii (AIDS)
NEONATAL

Table 2. Indications for surgical treatment

Insistent air leak
Recurrent Pneumothorax
First episode to patients with previous pneumonectomy
First episode to patients with high professional risk (miners aviators divers).

Image 1. Large Pneutmothorax On The Right

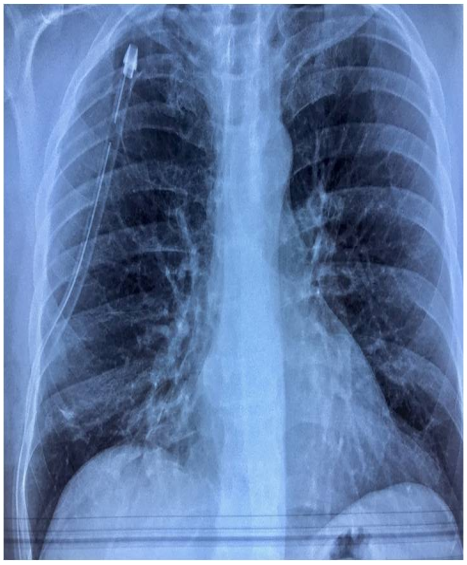

Image 2.Chest Drain Forlarge Pneutmothorax On The Right

Image 3. Chest drains (pezzer, pleural cath, usual drain).

Image 4. Autologous blood administsration through chest drain (blood patch)

723 patients (60,807%), on the left in 440 (37,005%), and on both sides in 16 (1,345 %). The average patients age was 38 years old (max 87, min 17), while the average hospitalisation stay was 7.1 days (max 21, min 1). Elderly patients had a longer stay in the hospital. There is an important positive ratio between the patient's age and the duration of hospitalisation ($r = 0.209$, $n = 1107$, $p < 0.001$). To mention that 28 of our patients relapsed two, three, or even four times. They were readmitted 69 times in total, 1 out of 4 having relapsed (25.09 %). The total hospitalisation stay was 598 days, with an

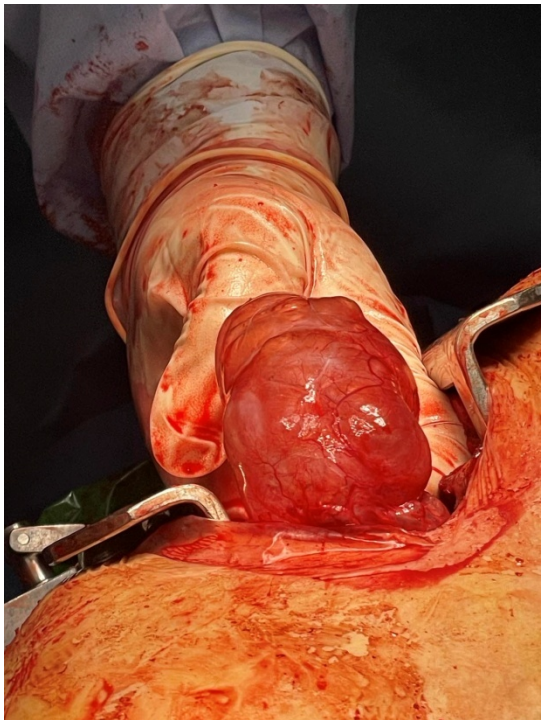

Image 5. Giant Bullae Excision

Image 6. Giant bullae

average of 21.35 days of hospitalisation. Also 19 out of 28 patients were admitted twice (16 male and 3 female). Upon admission, chest drain insertion was performed on all of them. All relapsed patients readmitted to the thoracic surgery department. Bronchoscopy underwent a small number of elderly patients due to secondary spontaneous pneumothorax. One male patient was treated successfully with chest drain insertion and 18 patients underwent bullectomy and pleurodesis uneventfully. (VATS or limited thoracotomy). Three elderly male patients, 84,85 and 87-year old, man who could not be treated surgically due to old age and other comorbidities received a blood patch successfully.

DISCUSSION

Pneumothorax is air leak in pleural cavity. Spontaneous Pneumothorax may me primary and secondary.[1,2] Hippocrates 5th BC suspected air in pleural cavity.[1] Galen he supported that was a lesion between two pleurae (parietal and visceral).[1] Versallius in 16th century knew about positive and negative pressure in thoracic cavity.[1] With the appearance of stethoscope by Laennec and the x-Ray from Roentgen, the diagnosis was proceed.[1] The term "Pneumothorax" was established in 1803 and the Lancet journal published the first x-Ray of pneumothorax in 1901[1]. Primary spontaneous pneumothorax occurs mostly in young people. It rarely occurs before puberty. Most common in male than female.[1] It is also related with smoking.[1,2]Patients are usually tall, thin with narrow shoulders. They also report, tightness, cough. Tachycardia, sweating, low blood pressure and paleness may be also present. Flatulence during percussion and reduction of respiratory whisper are typical of major pneumothorax.[1,2] The clinical examination varies to the severity of Pneumothorax. In case of tension Pneumothorax the mentioned findings and the displacement of the mediastinum to the healthy hemithorax are typical. The Tension pneumothorax diagnosis must be clinical. The early clinical diagnosis and on time chest insertion in tension pneumothorax can save patients life.[1,2]In case of a minor pneumothorax clinical findings may be misleading and the Chest radiography considered necessary. To mention that computer tomography of the chest considered gold standard for diagnosis because can show small pneumothoraxes that may be missed in common radiography. Also can show the blebs existence and bullaetoo.

Secondary spontaneous pneumothorax occurs mostly in older in age patients. Is related also with smoking.[1,2,3,4]Emphysema, COPD, Cystic Fibrosis, Spontaneous rupture of oesophagus, Marfan's syndrome, Eosinophilic granuloma, Asthma, Lung Cancer, Menstruation, Lemfangioleiomyomatosis, Metastatic Cancer especially Sarcoma, Pneumonia and Pulmonary Abscess, Pneumocystis Carinii (AIDS) also related with spontaneous secondary pneumothorax[1,2,3] (see table 1). Chronic Obstructive Pulmonary Disease (COPD), Lung Cancer, Chest infectionand Pulmonary abscess most frequent seen in patients related with secondary spontaneous pneumothorax.[1,2,3,4] Bronchoscopy may be very useful and helpful. These patients required prolonged hospital stay with increased morbidity. Secondary spontaneous pneumothorax occurs due to underlying chest diseases. Most commonly they are observed in patients with chronicobstructive pulmonary disease (COPD), which accounts for approximately 70% of cases.[1,3,5]A large primary pneumothorax can be tolerated for a few days to collapse, but a small secondary spontaneous pneumothorax on COPD and elderly patients above 70es may kill. Chest drain and oxygen considered first step. Operation bullectomy pleurodesis, lung volume reduction (thoracotomy, VATS, RATS) is indicated but not for all patients (comorbidities). Patients with secondary spontaneous pneumothorax and COPD aged around seventies consideredwithin high risk of morbidity and mortality.[1,3,5]Also operations considered within high risk of morbidity and mortality.[1,3,5]Older patients underwent oxygen therapy, chest drain insertion chemical pleurodesis, also pleurodesis with blood, plasma satisfactorily. Three elderly male patients, 84, 85 and 87-year old, man who could not be treated surgically due to old age and cardiorespiratory insufficiency and other

comorbidities, received pleurodesis with blood (40ml of autologous blood of the patient for 3 days), blood patch successfully.[1,3,6,7,8,9,10] Autologous blood pleurodesis reported as an effective but underused method by De Andrade et al.[7]Autologous blood pleurodesis for treatment of prolonged air leak in secondary spontaneous pneumothorax considered helpful byAghajanzadeh[8] and Ozpolat et al [9] too.Chamberset al[10]reported that blood pleurodesis is effective for determining the cessation of persistent air leak.Pathaket al[11] also supported the use of Autologous blood patch for prolonged air leak in spontaneous pneumothoraxes in the adolescent population. In COPD group of patients bronchoscopy and Bronchoscopic interventions may improve patients life.Bronchoscopy and Bronchoscopic techniqueslike, Endobronchial one-way valves, Lung volume reduction coils (LVRC), Airway bypass, Glue and biologics also Vapor therapy for lung volume reduction are Bronchoscopic interventions to treat severe COPD, have made great progress over the last decade offering benefit to patients with few treatment options available.[12] These various techniques have unique approaches that have uncovered some of the critical obstacles to success such as collateral ventilation and incomplete occlusion of the target lobe.[12] As these techniques advance, we may continue to see that in the wide spectrum of severe COPD patients, refinement of selection criteria for the respective techniques may have a significant impact on the results for the patient.[12] To mention that a 41 year old female post menstruation developed pneumothorax and within 32 hours operated for spontaneous secondary haemopneumothorax. Underwent bullectomy, stop of the bleeding point (adhesion), partial decortication of the apical pleura and pleurodesis. No diaphragmatic fenestrations found.[13]Shehad a good postoperative recovery and discharged home the forth postoperative day. Tobias et al[13] presented a case report with Catamenial Pneumothorax (intrathoracic endometriosis). A 37 year old woman with recurrent episodes ofspontaneous right-sided pneumothorax and chest pain that occurred close to her menstrual periodsdiagnosed with spontaneous secondarypneumothorax underwent operation for spontaneous haemopneumothorax. She underwent bullectomy pleurodesis and a couple of sutures to diaphragmatic holes - fenestrations successfully. Were found4 distinctfenestrations (the largest of which was 3 mm in diameter) that were freely communicating with the peritoneal cavity. These fenestrations were closed individually by suture ligation.

CONCLUSION

Conservative treatment, observation, O2 administration, required 12,699% of the study population. The majority 87,300 % required chest drain insertion. Surgery required one fourth of the study population. Operation underwent 278(23,380%) out of 1189 patients. The first five years of the study the operation rate was 10% but the operation rate the last five years of the study was 70%.

Elderly patients with spontaneous (secondary) pneumothorax had a longer stay in the hospital compare to younger populationof the study (primary). Pleurodesis with blood is very useful for spontaneous pneumothorax treatment. Also is very helpful for small air leaks post thoracic surgery like lobectomies, decortication. Considered as alternative solution speciallyin elderly, no fit for surgery patients.

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