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## RESEARCH ARTICLE

### FIRST AND SECOND RIB FRACTURES A TWENTY FIVE YEAR EXPERIENCE

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#### ABSTRACT

**Background:** To determine the importance of first and second rib fractures upon the causes, sex, age groups, associated injuries, morbidity and mortality. **Methods:** In a 25 year period a retrospective study took place. Thirty one (31) patients diagnosed with first and second rib fractures in General Hospital of Nicaea-Piraeus Agios Panteleimon Thoracic Surgery Department. **Results:** Between the years 1995 to 2020 (25years) 31 patients diagnosed with first and second rib fractures, 22 male (70,96 %) and 9 female (29,032 %), aged 26-79 years mean age 44 years. Aetiologic Factors. Traffic accident reported 28 (90,322%) patients, fall from high 3(9,677%) patients. Associated injuries. Rib fractures (medium and lower) 25, Sternal fractures 5, Flail chest 13, Pneumohaemothorax 19, Scapula bone fracture 11, Lung Contusion 23, Pneumomesopneumonium 1, Haemopericardium 1, Diaphragmatic ruptures 3, Haemoperitoneum 14, Head injuries 3, Vertebral fractures 7, Kidney injury – nephrectomy 1, Pelvis fractures 3, Upper extremities fractures 11, Lower extremities fractures 4. **Conclusion.** Most of the patients underwent chest drain insertion for Pneumohaemothorax. Otherwise conservative treatment for the majority of the patients, analgesic and anti-inflammatory medication, nebulizers, low molecular heparin, monitoring physiotherapy and early mobilization. The patients' hospital stay and the results of the treatment were determined mostly by the gravity of the associated injuries and the early diagnosis and management. Multi trauma patients required intensive care unit required longer stay in the hospital. There is no doubt about first and second rib fractures and associated injuries that the successful management needs to be done by a properly trained and experienced team. Attention should be given to collaboration to other specialties in the hospital like, general surgeons, neurosurgeons, orthopaedics for the management when operation required. Computer Ct Angiography (with contrast) and 3D Reconstruction = The Gold Standard. No major vascular trauma was noticed.

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#### INTRODUCTION

First and second rib fractures are not seen very often. When this happens, special attention should be given because of the comorbidities. Aim of this study to determine the importance of the first and second rib fractures upon the causes, sex, age groups, age, associated injuries, morbidity and mortality.

#### MATERIAL AND METHODS

In a 25 year period a retrospective study took place. Thirty one (31) patients diagnosed with first and second rib fractures, 22 male (70,96 %) and 9 female (29,032 %), aged 26-79 years in General Hospital of Nicaea-Piraeus Agios Panteleimon Thoracic Surgery Department

#### RESULTS

Between the years 1995 to 2020 (25years) 31 patients diagnosed with first and second rib fractures, 22 male (70,96

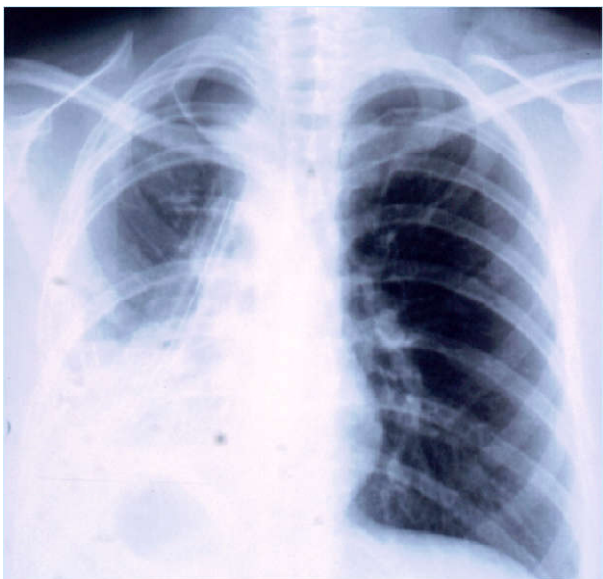
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%) and 9 female (29,032 %), aged 26-79 years mean age 44 years. Aetiologic factors. Traffic accident reported 28 (90,322%) patients, fall from high 3(9,677%) patients. Associated injuries. Rib fractures 25 (medium and lower), Sternal fractures 5, Flail chest 13, Pneumohaemothorax 19, Scapula bone fracture 11, Lung Contusion 23, Pneumomesopneumonium 1, Haemopericardium 1, Diaphragmatic ruptures 3, Haemoperitoneum 14, Head injuries 3, Vertebral fractures 7, Kidney injury – nephrectomy 1, Pelvis fractures 3, Upper extremities fractures 11, Lower extremities fractures 4.

**Table. 1**

Associated injuries
Rib fractures 25 (medium and lower)
Sternal fractures 5
Flail chest 13
Pneumohaemothorax 19
Scapula bone fracture 11
Lung Contusion 23
Pneumomesopneumonium 1
Haemopericardium 1
Diaphragmatic ruptures 3
Haemoperitoneum 14
Head injuries 3
Vertebral fractures 7
Kidney injury – nephrectomy 1
Pelvis fractures 3
Upper extremities fractures 11
Lower extremities fractures 4



**Fig 1. Rib fractures, traumatic haemothorax, and right chest drain insertion**

## DISCUSSION

First rib fractures are considered indicators of increased morbidity and mortality in major trauma. Fractures of the first and second ribs are rare but may be associated with serious damage to the brachial plexus of nerves, the subclavian vessels or associated with head, facial or thoracic aorta injuries (Albers, 1982; Woodring, 1982). A lower rib fracture is more likely associated with injuries to the diaphragm, liver or spleen (Woodring, 1982). Rib fractures usually occur from a direct blows to the chest such as during a motor vehicle collision or from a crush injury. Coughing or metastatic cancer may also result in a broken rib (Metaxas, 2014). The middle ribs are most commonly fractured.

These fractures are rarely life-threatening in themselves but can be an external marker of more severe visceral injury inside the abdomen and the chest (Metaxas, 2014). A simple chest radiography is standard for the diagnosis (Traub, 2007; Kea, 2013), Computer tomography is very useful because can diagnose other associated injuries (Kea, 2013; Gupta, 1997). Also CT angiography with contrast and 3D Reconstruction, considered the Gold Standard for injured vessels diagnosis (Kea, 2013; Gupta, 1997). This pain is often immediate. It is also aggravated by arm movement or taking deep breaths, because chest wall movement<sup>3</sup>. The treatment most of the time is conservative. Treatment involves, pain medications-nerve block, nebulizers, early immobilization, low molecular heparin (Metaxas, 2014; Efstathios, 2019; Efstathios, 2019). Most rib fractures heal completely by 6 weeks. Progressive use of the upper extremity is encouraged. Physiotherapy exercises required until full mobility is recovered (Metaxas, 2014). First-rib fractures are considered indicators for increased morbidity and mortality in major trauma (Ian Ayenga Sammy, 2017). According to one study based on information in the UK Trauma Audit and Research Network, first-rib fracture was a significant predictor of injury severity (Injury Severity Score >15) (Ian Ayenga Sammy, 2017). It is known that Sternal fracture acts by absorbing energy at the frontal thoracic wall protecting the great vessels, the heart and the lungs (Efstathios, 2006). This was demonstrated in article Sternal fracture with or without associated injuries. Assessment of the difference in the diagnosis and complications. Eighteen years of experience (nosocomial population). When the impact energy is high the sternal fracture can't absorb all the energy, so great vessels rupture takes place and usually cause death at the place of the accident.<sup>11</sup>This was demonstrated in article Sternal fractures and aortic rupture. A twenty year necrotomic material (necrotomic population). This means that when see patient with sternal fracture at the hospital likely no aortic rupture will happen. It is morewise to look for associated injuries which increase significant morbidity and mortality (Efstathios, 2019). This was seen in nosocomial and necrotomic population in the article True or myth? Sternal fractures and aortic rupture -A twenty year study. In present study no major thoracic vascular trauma was noticed. A necrotomic study may improve this study, can demonstrate the existence of vascular trauma. Most of the patients underwent chest drain insertion for Pneumohaemothorax. Clinical examination is the gold standard prior to Chest radiography if patient is stable and able to go for CXR. A sonography in the emergency room may be very helpful especially to haemodynamically unstable patients and unable to be transferred to the X-ray or and CT department, for the early diagnosis of traumatic pneumothorax +/- haemothorax. The same also can be done for the abdomen if necessary (Tam, 2005).

## Conclusion

Most of the patients underwent chest drain insertion for Pneumohaemothorax. Otherwise conservative treatment for the majority of the patients, analgesic and anti-inflammatory medication, nebulizers, low molecular heparin, physiotherapy and early mobilization and monitoring. The patients' hospital stay and the results of the treatment were determined mostly by the gravity of the associated injuries and the early diagnosis and management. Multi trauma patients required intensive care unit required longer stay in the hospital. Attention should be given to collaboration to other specialties in the hospital like, general surgeons, neurosurgeons, orthopaedics for the management when operation required.

There is no doubt about first and second rib fractures and associated injuries that the successful management needs to be done by a properly trained and experienced team. Computer Ct Angiography (with contrast) and 3D Reconstruction = The Gold Standard.

No major vascular trauma was noticed.

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