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*Thoracic Surgery*

# Analysis of Thoracic Pathologies and Anomalies in the Turkish Population

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**Abstract**

The aim of this autopsy-based study was to determine the prevalence of chest wall deformities and pulmonary pathologies in the Turkish population. The study was set on a consecutive autopsy series (n=784), with no history of thoracic trauma, thoracic operation, or known pulmonary disease, performed between December 2001- March 2003 at the Istanbul Forensic Medicine Institute of the Ministry of Justice of the Republic of Turkey. Chest wall deformities; pleural adhesions; bullous, nodular, and cavitary lesions; masses and abscess formations in the lungs were evaluated. There were 21 pectus excavatum (2.7%), 4 pectus carinatum (0.5%), and 5 vertebral column deformities (0.7%). Pleural adhesions were detected in 254 cases (32%), being minimal in 172 (22%) and massive in 82 (10%). The prevalence of bullous lesions was 14.3% (n=112). The pathological examination results of the 12 palpated masses (1.53%) revealed lung cancer in 6 (0.74%), tuberculoma in 5 (0.63%), and metastatic lung tumor in 1 (0.12%). Of 64 nodules (8.1%), there were 40 enlarged intraparenchymal lymph nodes (5.1%), 7 tuberculomas (0.89%), 5 hamartomas (0.63%), 2 sarcoid nodules (0.25%), 1 amyloid nodule (0.12%) and 1 lipoma (0.12%). Of 17 cavitary lesions (2.2%), there were 8 pneumonic abscesses (1.02%), 7 tuberculous cavities (0.9%), and 2 cystic bronchiectasis (0.28%). In the Turkish population, the prevalence of congenital chest wall deformities, enlarged intraparenchymal lymph nodes, and undiagnosed pulmonary infection ratios are comparatively high. Thoracic surgeons may face pleural adhesions in one out of three people who have had no history of pulmonary diseases.

**Keywords**: autopsy, coin lesion, pulmonary, infection, pulmonary tuberculosis

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## INTRODUCTION

Autopsy studies are performed to demonstrate all external and internal abnormalities, malformations, and diseases, and to obtain samples for histological examinations, and any other necessary investigations [1]. Most diseases, such as tuberculosis and lung cancer, have different demographical and geographical distribution throughout the world. There has been no autopsy-based study about thoracic wall anomalies and pulmonary pathologies concerning our country, prior to this study. This study was performed to determine the prevalence of thoracic wall anomalies and intrathoracic and pulmonary pathologies in the Turkish population.

## MATERIAL AND METHODS

Three thousand seven hundred and fifty autopsies were performed between December 2001 and March 2003. Cases who were admitted more than 24 hours after their death, those who died because of thoracic trauma, and those with history of thoracic operation or pulmonary disease (as stated in their medical records or by their relatives) were excluded. The remaining 784 cases were included in the study.

All autopsies were performed according to the protocol of legal autopsy cases of the Ministry of Justice: Following the inspection and palpation of the chest, any chest wall deformity was noted, if present. Then, a midline thoracoabdominal incision was done. The tissues were taken back to the lateral edge of the neck and to the outer third of the clavicles. Over the thorax, the tissues, including pectoral muscles, were flayed off to the midaxillary line in the upper part and even further posteriorly towards the costal margin. Any costal or sternal deformities were noted. The thorax was opened by first disarticulating both sternoclavicular joints. The ribs were cut through lateral to the costochondral junctions from a point on the costal margin to the sternoclavicular joints. Sternum was lifted and dissected away from the mediastinum. The pleural cavities were inspected, and any pleural adhesions were noted and classified as minimal if they were few in number and as massive if they obliterated most of the pleural cavity. The heart and lungs were harvested en-bloc, and separated from each other. Following inspection and palpation of the lungs, bullous lesions, masses (>3cm) and nodules (<3cm), cavities and abscesses were noted, if present. Wedge resections were performed to excise all the lesions, in order to obtain a pathological diagnosis. Tissue samples were fixed in 10% formaldehyde solution and examined by the pathologists of the Institute.

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**Table 1.** Causes of death in 784 autopsy cases

| Causes of death | N | % |
|---|---|---|
| Cranial and abdominal trauma | 172 | 22 |
| Intoxications[1] | 125 | 16 |
| Gunshot injuries | 110 | 14 |
| Hanging | 86 | 11 |
| Cardiac and vascular pathologies | 86 | 11 |
| Penetrating injuries | 55 | 7 |
| Pulmonary pathologies[2] | 32 | 4 |
| Drowning | 16 | 2 |
| Others[3] | 102 | 13 |

[1] Including food, drug, and carbon monoxide poisoning
[2] Cases whose autopsies revealed the presence of pneumonia and pulmonary edema
[3] Cranial aneurysms, hepatic and renal diseases, tumor-related deaths, and unknown causes

## RESULTS

Of 784 cases, 592 were males (75.5%) and 192 were females (24.5%), with a mean age of 37 (range, 1 to 93). The causes of death are listed in Table 1. Cranial and abdominal trauma was the leading cause of death (22%), followed by intoxications (16%) and gunshot injuries (14%).

Physical examination showed 21 pectus excavatum (2.7%, 17 males and 4 females), 4 pectus carinatum (0.5%, 4 males), and 5 vertebral column deformities (0.7%, 2 males and 3 females). There were no bifid costae or sternal cleft deformities.

Pleural adhesions were detected in 254 cases (32%). Adhesions were minimal in 172 cases (22%) and massive in 82 cases (10%). They were unilateral in 133 cases (52%) and bilateral in 121 (48%).

Bullous lesions were detected in 112 cases (14.3%); 57 (50.9%) were bilateral, and 55 (49.1%) were unilateral.

The results of pathological examination of the 12 palpated masses (1.53%) are given in Table 2, and revealed 6 lung cancers (0.74%), 5 tuberculomas (0.63%), and 1 metastatic lung tumor (0.12%). The abdominal autopsy of the latter case showed the presence of renal cell carcinoma.

Sixty-four nodules (8.1%) were detected during the autopsy. They are listed in Table 3. There were 40 enlarged intraparenchymal lymph nodes (5.1%), 7 tuberculomas (0.89%), 5 hamartomas (0.63%), two sarcoid nodules (0.25%), one amyloid nodule (0.12%) and one lipoma (0.12%). For the remaining 8 cases (1.53%), the pathological examination revealed 4 calcific (0.51%), 2 fibrotic (0.25%), and 2 necrotic nodules (0.25%) without any definitive diagnosis. Forty intraparenchymal lymph nodes were detected in 19 cases with the following distribution: 4 nodules in 2, 3 in 4, 2 in 7, and 1 in 6 cases.

Concerning the 17 cavitary lesions (2.2%), the pathological examination revealed 8 pneumonic abscesses (1.02%), 7 tuberculous cavities (0.9%), and 2 cystic bronchiectasis (0.28%).

A total of 19 cases of tuberculosis (2.4%) were detected in the autopsy of 784 people previously known as healthy. Also, in 29 of the cases (3.7%), pulmonary pathologies related to infectious diseases such as tuberculosis, pneumonia, and cystic bronchiectasis were found.

## DISCUSSION

The first result of this study has shown that the prevalence of pectus carinatum is comparable to the literature data, while the prevalence of pectus excavatum and kyphoscoliosis are higher [1,2]. It is difficult to explain in particular why the prevalence of pectus excavatum is almost 10 times higher than in the literature. A possible explanation is that even the minimal deformities were reported in our series.

Janssen et al. performed videothoracoscopy in patients with spontaneous pneumothorax, and found that in patients without any visible pulmonary pathology, 10% had pleural adhesions [3]. Our prevalence is higher: 32% of the cases had pleural adhesions, with 12% being minimal and 10% massive. It seems that one of three healthy Turkish people has some degree of pleural adhesions.

In the study of Tylen et al. high resolution computed chest tomography was performed to investigate the pulmonary parenchyma of 57 smokers and 32 non-smokers [4]. Bullous emphysematous changes were detected in 44% of smokers and in 3% of non-smokers. Although the cigarette smoking history was unremarkable in our cohort of study, bullous lesions were detected in 14.3% of the cases.

Primary or metastatic lung cancers can present themselves as nodular densities, masses, or cavitary lesions on radiological examinations [5]. We palpated and excised 12 masses (1.5%), of which six were primary (50%) and one metastatic (8.3%) lung cancer. The remaining five were tuberculomas (41.7%).

The prevalence of solitary pulmonary nodules is unknown, but there is an appreciable prevalence of asymptomatic benign nodules in the general population [6]. Our prevalence was 8.1%, and all the nodules were of benign diseases.

**Table 2.** Results of pathological examination of the excised masses

| Results of pathological examination | N | % |
|---|---|---|
| Lung cancer | 6 | 0.76 |
| Tuberculosis | 5 | 0.63 |
| Metastatic lung tumor | 1 | 0.12 |
| Total | 12 | 1.51 |

**Table 3.** Results of pathological examination of the excised nodules

| Results of pathological examination | N | % |
|---|---|---|
| Lymph node | 40 | 5.1 |
| Tuberculosis | 7 | 0.89 |
| Hamartoma | 5 | 0.63 |
| Sarcoidosis | 2 | 0.25 |
| Lipoma | 1 | 0.12 |
| Amyloid nodule | 1 | 0.12 |
| Others[1] | 8 | 1 |
| Total | 64 | 8.11 |

[1]Calcific, fibrotic, and necrotic nodules without any definitive diagnosis

The prevalence of pulmonary hamartoma has been reported to be 5% in a surgery-based study and 0.32% in an autopsy-based study [7,8]. We found five hamartomas (0.63%) in our series. Arrigoni et al. reported two lipomas in 130 (1.5%) patients who underwent surgical resection of benign tumors [9]. We had one lipoma, thus our prevalence was 0.12%. Nodular pulmonary amyloidosis is a rare entity: Higuchi et al. collected 34 cases in Japanese literature and added one of his own [10]. Our prevalence was 0.12% (n=1).

Bankoff et al. resected 96 nodules detected in computed chest tomography via minithoracotomy, and the pathological examination showed 18% to be enlarged intraparenchymal lymph nodes [11]. They proposed that antigenic stimuli, usually from inhaled dust, were the cause of this enlargement. Of 64 nodules in our series, 62.5% were enlarged intraparenchymal lymph nodes. The incidence of smoking in the Turkish adult population (62% in males, 24% in females) is high, and this may be one reason for this higher enlarged intraparenchymal lymph node ratio [12].

Infectious and inflammatory diseases such as tuberculosis, pneumonia, and cystic bronchiectasis can cause development of cavitary pulmonary lesions [13]. Of our 17 cavitary lesions (2.2%), pathological examinations revealed eight cases of pneumonia (1.02%), seven tuberculoma (0.89%), and two cystic bronchiectasis (0.25%).

We demonstrated 19 cases of tuberculosis (2.4%) in individuals previously known as healthy. Furthermore, in 29 cases (3.7%), infectious pulmonary diseases such as tuberculosis, pneumonia, and bronchiectasis were detected. We can state that in the Turkish population, the undiagnosed pulmonary infection ratio is significantly high. This may be another reason for such a high number of enlarged intraparenchymal lymph nodes in our series.

The result of this autopsy-based study revealed that, in the Turkish population, the prevalences of congenital chest wall deformities, enlarged intraparenchymal lymph nodes, and undiagnosed pulmonary infections are higher than those of the literature data. In addition, thoracic surgeons who deal with Turkish patients should especially consider the high prevalence of pleural adhesion.

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