

FINDINGS FROM A LARGE SCALE LUNG MICROFILM STUDY IN YOUNG SOLDIERS. IS TUBERCULOSIS COMING BACK?

Original Article

GENÇ ASKERLERDE GENİŞ ÖLÇEKLİ BİR AKCİĞER MİKROFİLM ÇALIŞMASININ BULGULARI: TÜBERKÜLOZ GERİ Mİ GELİYOR?

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ABSTRACT

Purpose: We aimed to reveal the real incidence of the pulmonary tuberculosis infection in our country with this large scaled retrospective study in young Turkish male population.

Material methods: This study is based on microfilm reports written by radiologists who examined 143221 young men aged 18-26 before enlisting in mandatory military service between 2005 and 2012. According to the configuration, generally, fibronodular changes were recorded as sequela findings. However mass, mass-like consolidation or infiltrative lesions were regarded as active lesions and they were included as positive for tuberculosis infection. Significant findings for tuberculosis and other incidental findings were recorded and analysed.

Results: Objective parenchymal abnormalities found were as follows: pneumonic consolidation (n=61), pleural effusion (n=6), lung atelectasis (n=5), abnormalities indicating sequela to tuberculosis infection (n=53), pulmonary nodule (n=32), parenchymal mass lesion (n=7), hilar mass opacity (n=7) and bronchiectasis (n=16).

Conclusion : Data from this large scale study showed that 0.12% of the young population still have lesions related to tuberculosis despite the nation-wide efforts to eradicate this disease since 1950s.

Key words: Tuberculosis; incidence; screening; radiography.

ÖZET

Amaç: Bu çok geniş katılımlı retrospektif çalışma ile Türkiye'deki genç erkek topluluğunda, tüberkülozun gerçek insidansını ortaya çıkarmayı amaçladık.

Materyal ve Metod: Bu çalışma, 2005-2012 yılları arasında zorunlu askerlik görevine katılmadan önceki muayeneleri yapılan ve mikrofilmleri radyoloji uzmanları tarafından raporlanan, yaşları

18-26 yıl arasında değişen 143221 genç erkek olgunun verilerine dayanmaktadır. Konfigürasyonları dikkate alındığında, genel olarak fibronodüler değişiklikler sekel olarak kaydedildi. Bunun dışında, kitle, kitle benzeri konsolidasyonlar, infiltrasyonlar aktif lezyonlar olarak kabul edilip tüberküloz açısından pozitif bulgu olarak kaydedildi. Tüberküloz veya diğer insidental bulgular açısından anlamlı veriler kaydedildi ve değerlendirildi.

Bulgular: Objektif parankimal anormallik olarak kaydedilen bulgular; pnömonik konsolidasyon (n=61), plevral efüzyon (n=6), atelektazi (n=5), tüberküloz sekeli anormallikler (n=53), pulmoner nodül (n=32), parankimal kitlesel lezyon (n=7), hiler kitlesel opasite (n=7) ve bronşiektazi (n=16).

Sonuç: Bu çalışmada, 1950'li yıllardan bu yana devam eden eradikasyon amaçlı, ulusal çaplı mücadeleye rağmen, genç topluluğun %0.12'sinde hala tüberküloz ile ilişkili parankimal lezyonlar bulunduğu tespit edilmiştir.

Anahtar Kelimeler: Tüberküloz; İnsidans; Tarama; Radyografi; genç erişkin topluluk.

INTRODUCTION

Young men in Turkey undergo a routine medical examination before enlisting in mandatory military service. This study involves a retrospective evaluation of reports included in the respective lung microfilms generated for archival purposes. We aimed to establish the real incidence of the pulmonary tuberculosis without caring acute or chronic nature of it as a disease that deserves attention for being dangerous since last century. Additionally, we briefly mentioned some incidental findings and variations among this young population to enhance the value of the study. Additionally, all aspects that we have been detected were compared and evaluated with literature information with the aim of representing large population's lung parenchyma.

MATERIAL METHODS

This study is based on records lung microfilm reports written by radiologists who examined 143221 young men aged 18-26 before enlisting in mandatory military service between September 2005 and July 2012, retrospectively. Only, recent years' images were obtained in a digital unit, the rest was obtained in analog systems. This retrospective study was approved by the local ethics committee. Only those reports with abnormal findings were included in this study. The other reports generated in the same period were excluded as they were labeled normal.

The reports included in our study were generated by 9 different radiologists. The selected data were entered into excel sheets.

According to the configuration, generally, fibronodular changes were recorded as sequela findings. However mass, mass-like consolidation or infiltrative lesions were regarded as active lesions. Some representative figures were selected for better reader cooperation (**Figure 1**).

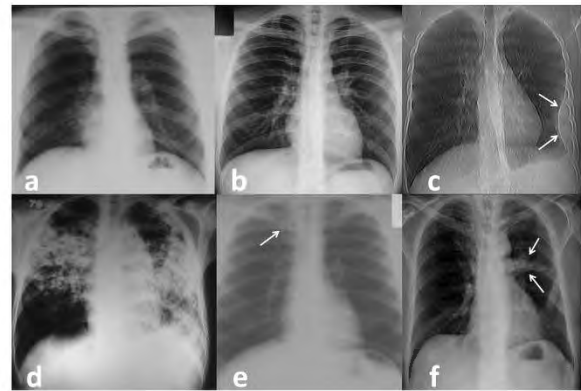


Figure 1. Conventional and digital microfilm samples of different cases which are confirmed during treatment and follow-up (CR : Computerized radiography, DR: Digital Radiography) a) An analog image evaluated as normal b) A DR image evaluated as normal. Counter to the resolution difference between the two films, there is no critical problem in evaluating the parenchymal aeration. c) In CR, observing pleural effusion with convex contours is present in lower lateral left zone (arrows). d) In the analog image, a case of bilateral central

predominance, in which consolidation extending to peripheral zone and hilar repletions supporting hilar lymphadenomegaly (confirmed sarcoidosis). e) In the upper right zone, an analog film image of apical fibrolinear pattern, which one can show sequel alterations (arrow). f) On the left perihilar zone, peribronchovascular consolidation (between arrows) the case shown (confirmed tuberculosis).

It was assumed that all existing findings were related to tuberculosis since the chance of primer mass or metastasis was extremely low in this demographic group. Evaluations were done after all findings were acquired. Although nontuberculous pneumonia might be a cause for consolidation or infiltration, it is possible to differentiate ordinary pneumonia from the tuberculous pneumonia with clinical and laboratory findings. During the mandatory military service, in our country, acute pneumonia cases are directly sent to the emergency services for conventional lung roentgenography and then treated-controlled accordingly by the related physician. We analyzed the data assuming that this condition is also applied for our cases as well. In some cases, even though there are multiple pleuroparenchymal findings, only lesion based prevalence is analyzed on account of the frequency of pathologies.

RESULTS

The most commonly identified subjective findings were as follows: coarsened parenchymal densities (n=298), suspicious-nonconfirmed inhomogeneous increased density thorough the parenchyma (n=291), and mediastinal nonspecific widening (n=42). Air trapment (n=5), heightened diaphragm (right n=22, left n=4) and situs inversus totalis (n=19), alveolar microlithiasis (n=2) and alveolar proteinosis (n=1) were also recorded. According to the findings alveolar microlithiasis (n=2) and alveolar proteinosis (n=1) is rarely seen.

In a total of 79 cases (right=54 and left n=25), there was a mention of costophrenic sinus blunting. Rather than the minimal asymmetry or minimal blunting reports, obliterated or totally closed terms

are regarded positive as objective findings for costophrenic sinus abnormality.

So, nonspecific, nondiagnostic signs were described in 0.52% of 143221 cases when specific images like situs inversus totalis (n=19), alveolar microlithiasis (n=2) and alveolar proteinosis (n=1) are not included. The findings that can be deemed objective for lung parenchyma were as follows: pneumonic consolidation (n=61), pleural effusion (n=6), lung atelectasis (n=5), abnormalities indicating sequela to tuberculosis infection (n=53), pulmonary nodule (n=32), parenchymal mass lesion (n=7), hilar lymphadenopathy-mass opacity (n=7) and bronchiectasis (n=16).

Signs which support the possibility of previous disease (n=53) or active (n=118) tuberculosis was found when bronchiectasis cases are not included in the study.

Cardiomegaly (n=33), rotoscoliosis – without measured angles- (n=90), azygos lobe variation (n=352) were also recorded as abnormal findings in examined reports. All of these findings and related ratios that not related with tuberculosis infection also were recorded for being very striking and interesting findings as a marker for young Turkish population.

DISCUSSION

Tuberculosis is a common and contagious-lethal disease that attacks primarily lungs. In 2007 to 2010, the number of new tuberculosis patients is believed to be 9.27 million cases; incidence is 137-139/100.000 in the world, 29/100.000 in Turkey, respectively (1, 2). Diagnosis of the disease relies on radiology as well as microscopic examination and microbiological culture of body fluids (3). Radiologic evaluation of large population may be possible with microfilm screening of the lungs in some countries like Turkey. It is essential in our country to check the young recruited soldiers before the involvement to duty.

However, a literature research shows that there is no prior work that presents findings from retrospective evaluation of microfilm records, this study was conducted based on the records from both our hospital where medical examinations are performed for candidate soldiers, most of whom came from the eastern provinces. Excluding the subjective findings such as coarsened parenchymal signs, as like non-homogeneous increase in parenchymal density or mediastinal widening (n= 631) there were 53 cases (0.04%) with findings of calcified upper lobe granulomas-fibronodules which could be attributed to sequela to prior tuberculosis infection. Additionally, considering that a total of 118 cases were found to include lesions that can be attributed to tuberculosis such as pneumonic consolidation, pleural effusion, lung atelectasis, demarcated pulmonary nodule, parenchymal mass lesion, hilar mass opacity; 0.08% of the entire population evaluated in our study had microfilm records that displayed active changes due to tuberculosis.

In 2011, tuberculosis infection in Turkey is calculated as 28/100.000 in WHO reports (4). In our study, even only sequel cases is two times more in amount, the number of cases diagnosed active lesion is beyond four times more. We assume that the most important factor is that the population which we studied lives under poor economic conditions and consists of families for whom living in crowded housing is traditional for eastern side of the country. Because of these distinctions, even though incidence has declined slightly in Turkey's overall population throughout the last 10 years according to WHO results, frequency is more than predicted in the eastern provinces (4).

The analysis about pulmonary alveolar microlitiasis (PAM) in 2003 only, 69 cases was reported all over the Turkey, if proportionated this to updated population of Turkey, it was revealed that PAM was significantly prevalent in our study population (5). In spite of the focus of our

study was not abovementioned topic, and microfilm reports are not definitive diagnostic tool for this abnormality; PAM and other rare diseases which are not included into evaluation in our study are need to be studied in extended series in cooperation with other clinical fields.

The fact that our rates are higher in comparison with other local scanning findings which comprises fewer cases regarding young population, may be due to incorporated lesions which might be nonspecific (even though there are objective images such as consolidation or infiltration) to the tuberculosis group (6). On the other hand, cohabitation of crowded populations can also be a factor in raising the possibility of contagion. As we mentioned in the limitations part of our study, current data should be evaluated by considering microfilm reporting information may not stabile among the readers. Chosen young male population may not accurately represent whole population. However, despite the high incidence among the cases which were young, healthy and suitable for mandatory service that normally supposed to be in lower incidences should alarm us about rising again of tuberculosis. Whereas, the microfilm protocol of imaging, deep inspirium images without expirium and lateral position images, lack of optimal resolution in every hastily obtained graphs and missing of written consent due to retrospectivity are the major handicaps of our study.

The number of situs inversus totalis cases was calculated as 19. It followed 0.01% rate in population and the rates of meta-analysis (8). Situs inversus totalis usually does not cause any significant morbidity to an individual. However, its timely diagnosis is crucial for correct interpretation of future symptoms and the results of diagnostic procedures (9).

Based on the findings, only a small rate of dorsal rotoscoliosis (n=90, %0.063) and a relatively high cardiomegaly (n=33, 0.023%) could be attributed to non-

optimal positioning of forms in microfilm cabins. Therefore, they were not considered as cardiac or mediastinal pathologies.

The limitations of this retrospective study may arise from several challenging factors. First and foremost of these factors comprises included the variety in experience levels of reporting physicians, poor resolution of microfilms, lack of information about the nodule sizes and lack of corresponding digital or analog anatomical images. Although we can assume that the radiologists who generated reports had sufficient training to read the corresponding exams, there is no study for other challenges mentioned above. Readers of this article should bear this in mind. In the examined young adults, lesions were attributed to tuberculosis since the possibility of a primary lung nodule and/or mass were very low. We also assumed that other rare possibilities such as lung hamartoma would not show a statistically significant difference. The procedure followed during medical examination of candidate soldiers required that chest X-ray be acquired and the patient be referred to Pulmonary Diseases Department in cases of suspicion of non-tuberculosis related pneumonic infiltration; we assumed that patients in this category were excluded – automatically- from the study.

CONCLUSION

This study provided numbers for parenchymal pathologies and thoracic anomalies based on retrospective evaluation of a very large number of participants from 18-26 years-old demographic group. Our data showed that 0.12% of the young population still have lesions related to tuberculosis despite the nation-wide efforts to eradicate this disease since 1950s. Tuberculosis, as a contagious disease which is mandatory to report, has been on the rise in the West due to the HIV incidents since 1980s. Our study shows that the Turkey is under risk and the incidence is still high as well.

Although it is found that tuberculosis incidence is higher than predicted in this retrospective study in which the active lesions which are found objectively in microfilm analysis are correlated directly with the tuberculosis infection; it is suggested that populations should be scanned with confirmed microbiological tests especially among crowded populations and localizations which are affected by poverty and crowded housing.

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