

論文審査及び最終試験又は学力の確認の結果の要旨

甲・㉔	氏名	三浦 聖高
学位論文名	Comparison of the Chest Computed Tomography Findings Between Patients with Pulmonary Tuberculosis and Those with Mycobacterium avium Complex Lung Disease	
学位論文審査委員	主査 副査 副査	北垣 一 佐野 千晶 玉置 幸久
<p>論文審査の結果の要旨</p> <p>肺結核は感染力が強く、非結核性抗酸菌症は感染力が弱いことから、臨床症候の類似した両疾患を識別することは極めて重要であるが、これまで鑑別は容易でないとされていた。</p> <p>申請者は非結核性抗酸菌症の80%以上であるMycobacterium avium、Mycobacterium intracellulare肺感染症 (MAC症) の胸部CT画像所見と肺結核患者の画像所見を比較し、その鑑別点を明らかにすることを試みた。</p> <p>2005年から2015年に島根大学医学部付属病院で診断基準を満たしたMAC症100例、肺結核42例を後ろ向きに調査した。胸部CT所見を粒状影、結節影、粗大陰影、空洞病変、つぼみ兆候、気管支拡張、気管支拡張と連続する粒状影、気管支拡張と連続する粗大陰影、石灰化、胸水に分け、さらに両肺を計8区域に分けて評価した。結果は呼吸器専門医2名、放射線科専門医1名による合議で決定した。</p> <p>MAC症では女性が多く、免疫不全症例が有意に少なかった。CT所見で両疾患で類似したのは粒状影、粗大陰影、空洞病変の頻度だった。一方MAC症では広範囲な気管支拡張、気管支拡張と連続する粒状影、粗大陰影が有意に多かった。また、肺結核では石灰化、胸水が有意に多かった。病変部位はMAC症では右中葉と左舌区に、肺結核では右上葉、左上区に多かった。以上から胸部CTでMAC症と肺結核を鑑別することは可能と考えられた。本研究の結果は臨床的有用性が高く学位授与に値すると判断した。</p> <p>最終試験又は学力の確認の結果の要旨</p> <p>申請者はMAC症100例と肺結核42例の胸部CT所見を詳細に解析し、臨床的に類似する両者を鑑別できる臨床的に有用な知見を見出した。周辺知識も豊富で学位に値すると判定した。(主査：北垣 一)</p> <p>申請者は、症状が類似したMAC症と肺結核とのCT画像における特徴の差異を明らかにした。病変所見に加え、部位、広がり、気管支拡張像などの所見組み合わせを解析し、臨床的に簡便な鑑別点を新たに示した。これらの知見は、画像読影の経験が乏しい医師にとって隔離を要する肺結核の除外診断に有用であることが、高く評価できる。抗酸菌症の病態との関連ならびに細菌学といった関連領域の知識も有しており、学位授与に値すると認める。(副査：佐野千晶)</p> <p>申請者は、臨床的に鑑別が重要なMAC症と肺結核との特徴の違いについて、CT画像の所見からアプローチし、所見の性状と部位をもとに解析し、臨床的に有用な鑑別ポイントに関する新知見を示した。感染症学や画像診断学など関連領域の知識や能力も有しているとともに、プレゼンテーションならびに質疑応答では十分な科学的思考力、分析力、表現力を立証しており、学位授与に値すると判断した(副査：玉置幸久)</p>		

(備考) 要旨は、それぞれ400字程度とする。

学位論文の要旨

氏名 三浦 聖高

学位論文名 Comparison of the Chest Computed Tomography Findings Between Patients with Pulmonary Tuberculosis and Those with *Mycobacterium avium* Complex Lung Disease

発表雑誌名 Respiratory Investigation
(巻, 初頁～終頁, 年) (58, 137-143, 2020)

著者名 Kiyotaka Miura, Megumi Nakamura, Yasuyuki Taooka, Takamasa Hotta, Megumi Hamaguchi, Tamio Okimoto, Yukari Tsubata, Shunichi Hamaguchi, Takashige Kuraki, Takeshi Isobe

論文内容の要旨

INTRODUCTION

The number of nontuberculous mycobacterial lung disease (NTMLD) patients has reportedly increased worldwide in recent years. In Japan, *Mycobacterium avium* complex lung disease (MACLD) caused by infection with *Mycobacterium avium* or *Mycobacterium intracellulare* accounts for about 85% of cases of NTMLD. Respiratory physicians often encounter MACLD during routine practice. While, the morbidity rate of pulmonary tuberculosis (PTB) is still higher in Japan than in other developed countries. Therefore, differentiation of MACLD and PTB is frequently required.

When managing PTB cases, it is necessary to consider airborne infection control; however, this is not necessary in MACLD cases. To first determine the appropriate infection control strategy, careful evaluation of chest computed tomography (CT) findings is very important. However, there are many similarities in chest CT findings between MACLD and PTB, clinicians often face difficulty differentiating the two. Although a few papers have compared the chest CT findings in MACLD and PTB, over two decades have passed since the most recent publication. Working under the hypothesis that new findings might have become available in recent years, we analyzed and compared the differences in chest CT findings and their locations between adult cases of MACLD and PTB.

MATERIALS AND METHODS

This retrospective study included subjects meeting the diagnostic criteria of MACLD or PTB from May 2005 to August 2015 in Shimane University Hospital. We excluded patients who had a history of PTB or MACLD treatment and had a clear association with active lung diseases.

We evaluated the CT images obtained on the date to the diagnosis of MACLD or PTB. Abnormal findings in the lung field were classified as follows: (A) granular shadow, shadow with a major axis of ≤ 1 cm; (B) nodular shadow, oval lesion with a clearly boundary and a major axis of >1 cm; (C) large shadow, shadow with a major axis of >1 cm, including adhesive shadow, invasive shadow, and atelectasis; (D) bronchiectasis; (E) cavitary lesions; (F) tree-in-bud appearance; (G) granular shadow connected to bronchiectasis; and (H) large shadow connected to bronchiectasis. We evaluated these findings locations at each of eight sites: right upper lobe (RUL); left upper division (LUD), Segment (S) 1+2 and S3; right intermediate lobe (RIL); left lingula (LL), S4 and S5; right S6 (RS6); left S6 (LS6); right basal segmental of the lung (RBS), S7 to S10; and left basal segmental of the lung (LBS), S8 to S10.

For comparisons between two groups, a *t*-test was used for the continuous data and the chi-squared test was used for descriptive data. A *p*-value ≤ 0.05 was considered significant. This study protocol was approved by the Research Ethics Committee of Shimane University (approval number is 1507).

RESULTS AND DISCUSSION

The study population consisted of 100 MACLD patients and 42 PTB patients. The subjects with MACLD included 29 males and 71 females, with the mean age of 71.5 years, whereas those with PTB included 30 males and 12 females, with the mean age of 73.9 years. The proportion of males was lower in the MACLD cases and greater in the PTB cases ($p < 0.001$). The immunocompromised patients included 38 with MACLD and 28 with PTB, indicating a significantly higher incidence of PTB in this population ($p = 0.002$).

Granular shadows were observed frequently with both diseases (MACLD 95% vs. PTB 100%, $p = 0.168$), while nodular shadows were relatively infrequent (MACLD 7% vs. PTB 16.7%, $p = 0.076$). The frequency of large shadows and cavitary lesions was similar between the two groups (MACLD 67% vs. PTB 76.2%, $p = 0.277$; MACLD 36% vs. PTB 26.2%, $p = 0.257$; respectively). Bronchiectasis was significantly more frequently observed with MACLD than with PTB (MACLD 93% vs. PTB 42.9%, $p < 0.001$). Among the patients showing bronchiectasis, when the left upper lobe was counted by dividing it into LUD and LL, the average number of pulmonary lobes showing bronchiectasis was significantly larger in patients with MACLD (3.87 ± 1.66) than in those with PTB (2.11 ± 1.53) ($p < 0.001$).

The frequency of granular shadow connected to bronchiectasis was 81% in MACLD cases

vs. 26.2% in PTB cases ($p < 0.001$), while that of a large shadow connected to bronchiectasis was 56% in MACLD cases vs. 7.1% in PTB cases ($p < 0.001$), with both indicating a significantly higher frequency with MACLD than with PTB. The thinnest part of cavitory lesion was significantly thinner in patients with MACLD (2.36 ± 1.40 mm vs. 3.64 ± 2.46 mm; $p = 0.034$).

The frequency at which a granular shadow was observed in the RUL/LUD was significantly higher in patients with PTB (MACLD 78% vs. PTB 92.9%, $p = 0.034$), while that in the RIL/LL was significantly higher in patients with MACLD (MACLD 84% vs. PTB 61.9%, $p = 0.004$). Similarly, the frequency at which a large shadow was observed in the RUL/LUD was significantly higher in patients with PTB (MACLD 30% vs. PTB 64.3%, $p < 0.001$), while that in the RIL/LL tended to be higher in patients with MACLD (MACLD 51% vs. PTB 33.3%, $p = 0.054$). The presence of bronchiectasis in both the RIL and LL was observed with a moderate frequency in MACLD patients, but was only rarely observed in PTB patients (MACLD 58% vs. PTB 2.4%, $p < 0.001$). The frequencies of pleural effusion were significantly higher with PTB than with MACLD (MACLD 12% vs. PTB 42.9%, $p < 0.001$).

Bronchiectasis is considered an important lesion that is frequently observed in NTMLD cases, but it is also commonly observed in PTB cases. Previous comparative studies have shown that bronchiectasis is more frequently observed and tends to exist in multiple pulmonary lobes, and that centrilobular granular shadows around the areas of bronchodilation are more frequently in MACLD cases than PTB cases. These results were similar our study.

In the present study, we evaluated the large shadows connected to bronchiectasis, and it was also more frequently observed in MACLD cases than in PTB cases. This CT findings are commonly observed in MACLD but only rarely found in PTB, so we consider this CT findings is useful to rule out diagnosis of PTB.

Regarding the distribution of lung shadows, the present study showed that the frequency of granular shadows in the RIL/LL was significantly higher with MACLD, while the frequency of granular shadows and large shadows in the RUL/LUD was significantly higher with PTB.

CONCLUSION

Extensive bronchiectasis, cavity lesions with a thin wall, and granular/large shadows connected to bronchiectasis were more frequently observed in cases of MACLD than in PTB. Granular shadows, large shadows, and bronchiectasis were generally distributed to the RUL/LUD in PTB cases, while RIL/LL in MACLD cases. Therefore, these chest CT findings and their distribution would be useful for distinguishing PTB and MACLD.