MINER'S PNEUMOCONIOSIS

(A report of three cases with lung biopsies)

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Lung biopsy is one of the diagnostic procedure of pneumoconiosis,¹⁾ yet it is seldom to perform because conventional measures such as occupational history, chest X-ray and lung function test usually solve the problem^{2,3)} and the biopsy is of complexity. Yet the biopsy sometimes is needed for the diagnostic confirmation with histological examination, chemical qualitative and quantitative tests.

Lung biopsies were done in conventional method⁵⁾ under general endotracheal anaesthesia. The site of incision was preferred right middle lobe and the lingula of left upper lobe. Making an incision of 15-20 cm length, the lung was reached through the fifth or sixth intercostal space. The lung was inspected and palpated to determine suitable segment for biopsy. The desired piece of lung was grasped by a clamp. A haenostat was applied to the root of the piece of lung which was resected. The lung was sutured with atraumatic chromic catgut sutures along the line of resection. A drain was inserted into the pleural cavity and connected to water-seal drainage. It was kept in place until the lung was completely re-expanded.

Three cases of miner's pneumoconiosis received open-lung biopsy to confirm diagnosis, to clarify disease entity with different kind of dusts and existence of complicated tuberculosis at National Medical Center.

Case No. 1

52 year old male, from age of 27 he worked at the

tungsten mine as a driller for 4 years and then as a supervisor in the same mine for 3 years. At that time he had slight productive cough and slight dyspnea.

Chest X-ray was not examined at that time.

4 years ago the dyspnea and productive cough became worse slightly and at that time lung tuberculosis was diagnosed, so anti-tb drugs were taken regularly until coming to NMC in Dec. 1966.

At the time of admission, general condition was fairly well with moderate development and nourishment, and very mild dyspnea. No abnormal signs were noticed on physical examination. Expectoration was 40-90 cc. a day. Hgb - 11.6, WBC - 7600, SR - 32-21, Urine was normal.

Chest X-ray showed wide spread 2-3 mm sized nodular spots on entire both lung fields with sparsing on the anterior lower part of lungs and infiltration on the right upper lung field with overlying pleural reaction and egg shell shape calcifications in both hilar areas. This picture corresponds to complicated or large opacities stage B pneumoconiosis according to International Labor Office classification⁴⁾. (Fig. 1-A)

Lung function test was vital capacity 3764 ml (100% of normal), timed vital capacity was 68% in 1 second, 100% in 3 seconds, maximum breathing capacity was 94 litre (92% of normal), maximum expiratory flow rate by Peak Flow Metre was 370 litre per minute.

Sputum smear and culture for tubercle bacilli was positive. Lung biopsy revealed silicotic change, pneumonic inflammatory change with chronic congestion and considerable anthracotic pigment deposits.

No tuberculous changes were seen.

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Regarding of all above findings, patient could be determined to have silicosis with tuberculosis and non-specific chronic pneumonitis. Biopsy in this case did prove silicosis but not tuberculosis histopathologically mainly due probably to wrong indication of biopsy to the lung involved sparsely. (Fig. 1—B.)

Case No. 2

49 year old male, ex miner, visited to NMC in Feb. 25th, 1965 with complaints of short of breath, chest tightness, large amount of sputum with cough. He worked at Gold mine for 4 years, then at coal mine for another 4 years, and then at tungsten mine for following 4 years until 10 years ago. When he retired from the job no significant X-ray pathology was noticed.

3 years ago respiratory symptoms occurred, and he was diagnosed silicosis and pulmonary tuberculosis, then treated with INH and PAS for 1 year without good improvement. On arriving to this hospital, patient had short of breath, wheezing and large amount of purulent sputum. His general condition was poor with under-nourishment and chronically ill appearance. Tongue was covered with whitish coat. Wheezing sounds were heard all over the both lung fields, and rhonchi were heard on both lung fields. No venous engorgement was seen in his neck.

In his family history he noticed grand-father died of bronchial asthma and his wife has been suffering from similar illness as he had.

Chest X-ray shows 2—3 mm sized small nodular and fibrotic densities on almost entire both lung fields, especially prominent on both upper lung fields, but sparse anterior part of the upper lobe. Emphysematous radiolucent area is seen on left lower lung field and hazy infiltration is seen on right lower lung field. A few egg shell shape calcified lymphnodes are seen on both side hilar regions. According to International Labor Office classification⁹⁾ this case corresponds to complicated or large opercities stage A pneumoconiosis. (Fig. 2—A)

Tuberculin test was positive. Sputum TB culture and smear on a serial examination were negative. SR—95, WBC—4690, Hgb.—11.5 gm.

Vital capacity 1700 ml, timed vital capacity 40% in one second and 80% in three seconds, maximum breathing capacity 32 litre/min.

Arterial blood gas analysis such as O₂ saturation, pH

and standard bicarbonate was within normal limit

Lung biopsy disclosed fibrous whorled structure with fine pigmentation in it. Histological findings were compatible with silicosis. No evidence of caseation necrosis was seen. (Fig. 2—B)

In this case who was suspected silicosis, coal worker's pneumoconiosis (or anthracosis) with emphysema and probable tuberculosis, in spite of poorly localized lesion in the anterior part of the lung where excision was taken, the diagnosis of silicosis was able to be confirmed definitely, while others remained uncertain, as the biopsy showed typical silicosis.

Case No. 3

40 year old male, recent ex-miner, visited to NMC on Dec. 1, 1965 with complaints of productive cough, exertional dyspnea, easy fatigability and night sweating.

This ex-miner worked at gold mine as gold face worker for 10 years and discontinued the job about a half year before coming to NMC.

The above mentioned respiratory symptoms started 3 years ago with gradual onset. He was treated with INH for 2 years and with PAS and SM for sometimes irregularly until admission to NMC under diagnosis of lung tuberculosis and silicosis.

At the time of admission his general condition was fairly good. No dyspnea was noticed. No remarkable abnormal physical finding was seen except barrel shaped chest, diminished breathing sound on both lower parts of lung and rhonchi on upper part of right lung.

Chest X-ray shows multiple about 5—8 mm sized nodular densities scattered on entire both lung fields including anterior part, more on lower lung fields. According to International Labor Office classification⁹⁾ this corresponds to simple or small opercities form, category 3 pneumoconiosis. (Fig. 3—A)

Tuberculin test was positive. Sputum smear and culture for tubercle bacilli was negative a few occasions.

SR—35, WBC—7700, RBC—5.4 mil, Hgb.—13.4, Urine was normal.

Lung biopsy showed fibrocascous tuberculous changes, and granulomatous lesion with marked fibrosis and fine pigmented dusts in it, most probably silicotic tubercles. (Fig. 3—B)

In this case, the disseminated multiple small nodular densities on entire both lungs were thought to be silicosis nodules complicated with tuberculous changes in the

lesions.

Discussion

Operation of lung biopsy needs not involve conventional thoracotomy which approach to anterior lower part of lung to excise edge of lingular segment or middle lobe if the disease is so generalized that any portion of the lung will serve to demonstrate the disease.¹⁾ But as the lesion sparse or absent in anterior lower part of lung in many of silicosis and in cases with complication with tuberculosis the conventional approach of thoracotomy may not give satisfactory answer for disclosing diagnosis or it with complicated disease, even the lung is inspected and palpated before resection on the operation to determine suitable piece for biopsy as the first case of writer's three cases.

Diagnosis of tuberculosis or conformation of its complication in the pneumoconiosis is usually made by detection of tubercle bacillus from sputum, and radiological diagnosis of it is difficult, and it may be distinguished from pneumoconiosis by comparison of films of previous years. Biopsy can be great role in such dubious cases.

As a conclusion conventional lung biopsy in author's cases showed some value in differential diagnosis, although

the method of biopsy has some defect to clue whole diagnostic problem.

Summary:

Lung biopsy was made in three cases of miner's pneumoconiosis, and the biopsy showed some diagnostic value in these cases.

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鑛 夫 塵 肺 症

(肺生檢을 施行한 三例報告)

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(國文要約)

肺生檢은 塵肺症의 診斷方法의 하나이지만 一般으로 그것을 施行되지 않고 있다. 그러나 이것이 組織學的, 化學的定量, 定性檢査에 依한 診斷確定을 爲해서 때때로 必要하다.

鑛夫로서 從事한 바 있고 '塵肺症을 疑心하는 三例의 患者에서 塵肺의 診斷 또는 結核의 合併如否를 確認코지 一般的인 檢査와 함께 外科的인 在來式 肺生檢을 施行하였다.

症例 1은 肺結核과 塵肺症이 細菌學的 및 其他 臨床學的으로 診斷되었던 例였으며 生檢에서 塵肺는 證明되

었으나 結核을 나타내지 않았다. 症例 2는 塵肺症, 炭肺症, 示唆肺結核으로 診斷되었던 例였으며 生檢에서 그 切取의 部位가 贊成된 것이 아니었음에도 不拘하고 定型의인 塵肺像을 보임으로서 塵肺症을 確證할 수 있었다. 症例 3은 塵肺症을 臨床적으로 診斷하였던 例였으며 生檢에서 塵肺像과 함께 結核의 合併을 보여 주었다.

結論적으로 肺生檢이 塵肺症과 그 合併症의 診斷에 있어서의 諸般問題의 解決에는 多少의 次陷이었으나 著者의 三例에서는 그 診斷에 相當한 價値를 보았다.

Fig. 1-A Chest X-ray (P-A & Lateral)

Fig. 1 B:

Fig. 2-A: Chest X-ray (P-A & Lateral)

Fig. 2 -B:

Fig. 3-A: Chest X-ray. (P-A & Lateral)

Fig. 3-B.