consider it to be safe. That holds also for external rotation strains, but it is difficult to determine this in a lateral photograph. The best-placed nail is that which is directly central. Any deviation from this, however, should be towards a posterior or low position. When a nail has broken out I always replace it immediately after the diagnosis has been made, and with the exception mentioned above union has always occurred.

(*b*) ARTHRITIS

My experience of the closed treatment of fracture of the neck of the femur—namely, the Whitman procedure—is not extensive enough for me to compare the incidence of arthritis with that method and the incidence with treatment by the Smith-Petersen nail. In my cases of sixty-six closed nailings there were three cases of arthritis. To these I might add twelve previous cases of open nailings; nine of these patients I have communicated with, and, apart from two pseudarthroses, they have not developed arthritis. I feel that the nail should not be blamed, and that the truth of the matter is that we are now seeing over 80 per cent. of bony unions and a much higher survival rate, and in consequence more arthritis. The arthritis is of a degenerative type, sometimes called aseptic necrosis of the head of the femur. Contributory causes to its occurrence are: (1) delayed union; (2) inaccurate reduction and, in consequence, faulty weight-bearing; (3) excessive impaction; (4) perforation of the cartilage by the guide or nail; (5) pre-existing arthritis.

Eric Lloyd has stated that the abduction fracture should not be nailed. Figs. 4 and 5 (Special Plate) show arthritis following six years after an abduction fracture with slight displacement. Whether this was due to the fracture not being reduced or to degenerative arthritis as a result of inadequate blood supply it is difficult to say, but I hold most emphatically that any fracture, abduction or otherwise, should be reduced and nailed if there is any displacement.

Summary

1. The treatment of fractures of the neck of the femur by the Smith-Petersen nail has been generally adopted.

2. A method of insertion of the Smith-Petersen nail is described.

3. It is suggested that this is the most simple method yet described, necessitating no elaborate instrumentarium, and that by its use the nail can be placed correctly in about half an hour.

4. Complications are due to breaking out of the nail or to arthritis.

In August, 1937, the signing of the National Cancer Institute Act authorized the establishment of such an Institute as part of the U.S. Public Health Service. For the necessary building and equipment 750,000 dollars were allotted and a yearly appropriation of 700,000 dollars is needed to maintain the Institute. The primary object of this Institute is to be research into all phases of cancer—diagnosis, prevention, and treatment. Knowledge gained in the Institute will be available to medical men and agencies all over the world. The appropriation also makes it possible for funds to be utilized as grants-in-aid for research. The Institute is given the power to establish and maintain research fellowships with such allowances as the Surgeon-General may consider necessary. In September, 1937, a National Advisory Cancer Council was formed under the Chairmanship of Surgeon-General Thomas Parran, consisting of Dr. James Ewing, Dr. Francis Carter Wood, Mr. C. C. Little, Sc.D., Mr. Arthur H. Compton, Ph.D., Mr. James B. Conant, LL.D., and Dr. Ludwig Hektoen.

MALIGNANT TUMOUR OF THE THYMUS GLAND

BY

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(WITH SPECIAL PLATE)

Tumours of the thymus gland are comparatively rare, and therefore the following case appears to have a definite interest.

History of the Case

A male child 5 years old was first taken to the family doctor on April 12, 1937, because he had complained of a "tight chest" during the previous two weeks. He had had measles in February, 1937, followed by a normal convalescence. His health had been good and he had always been an active child. Both parents and one brother were alive and well, and there was no history of tuberculosis in the family.

The patient was seen in consultation on April 15, 1937. He was born a "blue baby," and the parents were told at the time that there was "something wrong with his heart." A slight dry cough was present, but no expectoration. The appetite was poor and there had been much recent loss of weight. Shortness of breath and tightness of the chest were the most pronounced features.

On clinical examination the patient was obviously distressed, and there was marked cyanosis of the lips and face. He was able to stand, but could not walk a step owing to the respiratory embarrassment. He was fairly well nourished, although he had obviously lost weight recently. The temperature was 99° F. and the pulse rate 120 per minute. There was no clubbing of the fingers. Nothing definite was noted in the mouth or nasopharynx, but the superficial veins over the upper abdomen and chest were very prominent. On the right side of the neck, in the region of the right lobe of the thyroid gland, was a fluctuating swelling that appeared to transmit an expansile impulse on coughing. The heart apex beat was displaced to the left. The right chest was immobile and showed a decided fullness. There was absolute dullness on percussion and the breath sounds were tubular in character. The heart sounds were accentuated, but no definite valvular lesion was present. No abnormal physical signs were observed in the left lung apart from very harsh breath sounds. The liver dullness appeared to be increased, but nothing definite was palpated in the abdomen. Both testicles were present in the scrotal sacs. *X*-ray examination of the chest showed a dense opacity occupying the inner parts of all zones of the right lung field, and shading off towards the periphery. The diaphragm outline and costo-phrenic sulcus were obliterated. The heart and mediastinum were displaced to the left. The radiographic appearances suggested a large pleural effusion. After consideration of the clinical and radiological aspects of the case a diagnosis of mediastinal neoplasm was made.

The patient was admitted to hospital for further observation. His temperature now varied from 99° to 100.8° F., the pulse rate from 120 to 150, and the respiration rate from 30 to 50 per minute. The following investigations were carried out by Dr. A. F. Sladden, pathologist to the Swansea General Hospital.

April 20: Pleural Fluid.—The fluid was turbid, and of a brownish colour with clot. Microscopical examination revealed a few polymorphs; lymphocytes plus, and a few endothelial cells. No tubercle bacilli or other organisms were seen, and culture was sterile. Euglobulin plus; *p*H 6.9; protein, 3 grammes per cent.; albumin–globulin ratio, 2:1.

April 21: Blood Count.—Red cells 5,464,000, white cells 15,200 per c.mm.; haemoglobin 90 per cent., colour index 1.0. Average diameter of red cells, 7.1 μ.

April 23: Pleural Fluid.—The fluid contained a large amount of blood. Films showed blood cells, polymorphs, and lympho-

cytes. No tubercle bacilli or other organisms present; culture was sterile.

April 28: Blood Count.—Red cells 3,742,000, white cells 41,000 per c.mm.; haemoglobin 64 per cent.; colour index 0.82. Polymorphs, 81.0 per cent.; lymphocytes, 11.5 per cent.; monocytes, 6.5 per cent.; eosinophils, 1.0 per cent.; basophils, 0.07 per cent.; anisocytosis ±.

Further *x*-ray examinations were made on April 17, 22, and 29. These radiographs showed some slight increased translucency in the upper zone of the right lung, with what appeared to be a definite lateral border to a mediastinal mass. The child's condition gradually deteriorated. His weight decreased, the dyspnoea became more severe, and he was obviously gravely distressed. The physical signs remained unchanged. At the request of his parents he was discharged from hospital on May 7. He died a few hours after his arrival home.

Post-mortem Findings

The body was very emaciated. There was no oedema of the legs. No enlarged glands were present in the neck. A cystic swelling was seen in the region of the right lobe of the thyroid gland. On opening the thorax the right pleural cavity was filled with a brownish-coloured fluid—about three pints in all. A large growth was situated in the anterior mediastinum. No glands were palpated in the abdomen. The thoracic contents were removed *en bloc*. I am indebted to Dr. W. H. Tytler, research bacteriologist to the Welsh National Memorial Association, for the following report:

"A large, soft, relatively avascular tumour [see Special Plate] measuring 5 by 5 by 4 inches, lies in the anterior mediastinum in front of the trachea, and extends from just below the thyroid gland downwards for about 5 inches. The tumour is adherent to the upper part of the anterior parietal pericardium, and extends downwards to the apex of the pericardial sac as a broad tongue of growth about half an inch thick.

"It does not infiltrate or enclose the trachea, but the ascending limb and arch of the aorta and great vessels are surrounded and compressed but not infiltrated by it. A thin layer of growth extends downwards, infiltrating part of the posterior wall of the left auricle and ventricle, and isolated plaques of soft yellowish-white tumour tissue lie in the anterior wall of the left ventricle and at the apex of the heart, and are covered by the visceral pericardium. The cut surface of the growth presents a smooth, whitish-yellow, slightly lobulated appearance.

"*Heart:* This appears normal, apart from infiltration of its walls by the tumour as described. Small flattened thrombi lie in the left ventricle and aortic valve. The pericardium itself is nowhere infiltrated by the growth, and the sac contained no fluid.

"*Right Lung:* Normal and air-holding.

"*Left Lung:* This is compressed and practically airless. A few indefinite fibrous-like thickenings are felt over the left margin of the upper lobe, and the cut surface shows a purulent bronchitis.

"MICROSCOPICAL SECTIONS

"The tumour is composed of a diffuse undifferentiated mass of cells resembling small lymphocytes. The stroma is very scanty and there are practically no reticulum cells. The blood vessels, of which there are comparatively few, are small and thin-walled.

"*Metastases—Heart:* The areas involved show a solid mass of tumour cells on the surface and extending into the muscle to about one-half of its depth, forming columns and layers between the muscle cells.

"*Left Lung:* Sections including the thickened areas described show extensive areas of infiltration by tumour cells which involve the pleura and form dense masses round some of the blood vessels and bronchioles. There is evidence of a purulent bronchitis, with desquamation of bronchial epithelium and leucocytic infiltration, and the alveoli are largely collapsed.

"*Right Lung:* Apart from some congestion, sections show nothing noteworthy.

"INTERPRETATION OF FINDINGS

"The tumour is a malignant lymphoma, and on account of its situation possibly arises from the thymus gland. Its origin, however, cannot be stated with any degree of certainty as the thorax contains many other lymphocytic structures from which it may have arisen. The findings indicate that death was due to asphyxia and venous obstruction."

Pathology

Much is still unknown about the normal functions of the thymus gland and the part it plays in conditions of disease. The weight of the gland in relation to that of the body is greatest at birth. The maximum *actual* weight is attained at about the fifteenth year, and thereafter involution occurs—that is, at puberty, and not when the body is fully grown. This suggests an intimate relation between the thymus and the genital glands, and experimental results confirm this view. In tuberculosis the gland is very rarely affected. Small nodules and occasionally small caseous masses may be present in acute miliary tuberculosis, but neighbouring lymphatic glands may be involved by tuberculous infection without lesions occurring in the thymus.

The thymus gland is rarely the seat of either primary or secondary new growths. Voges (1926) notes that tumours of the gland were known to Virchow, who regarded it to be often the starting-point of lympho-sarcoma. The commonest growth appears to be a primary malignant tumour composed of small round cells with scanty stroma. Most writers describe it as a round-celled sarcoma or lymphosarcoma, but some observers maintain that it is of epithelial origin. The carcinomata of the thymus have been the subject of much controversy, as they present many peculiar characteristics. One form of cancer may be ill-defined and resemble sarcoma, while a second variety may take the form of ordinary "medullary" carcinoma. Other observers classify the carcinomata of the thymus as small-celled and large-celled varieties, and also a form of tumour special to this gland, the lympho-epithelioma. In view of the two types of cells present in the thymus—epithelial and lymphoid—this growth may be called a true thymoma, a term which has been rather loosely applied to various forms of growth originating in the gland. Pure epithelial tumours are extremely rare. "Thymic epiblastoma" is a term used by Foot and Harrington (1923) in their description of a case.

Gandy and Piédelièvre (1920) describe a tumour resembling a lymphadenomatous growth which infiltrated neighbouring parts, including the heart and superior vena cava. It is interesting to note here that Symmers and Vance (1921) subdivide lymphosarcomata into two varieties: (1) a growth consisting of masses of lymphoid cells separated by strands of connective tissue (the usual lymphosarcoma); and (2) tumours histologically resembling Hodgkin's disease containing giant cells and eosinophil elements.

Bosanquet and Lloyd (1932) found forty-three instances of adequate records in the literature on tumours of the thymus gland. They state that twenty-nine of these were carcinomata and fourteen sarcomata, ten of the latter being lymphosarcomata. Of the carcinomatous tumours

twelve were apparently lympho-epitheliomata; thirteen were described simply as carcinomata and four as epitheliomata. Davidson (1935) quotes the recent view of Barnard that many of the tumours in the mediastinum called lymphosarcomata are in reality a form of carcinoma. The interpretation as to the character of malignant tumours seems to depend on the view held concerning the peculiar histological structure and nature of the small thymus cells, and in any case the classification of tumours according to histological structure appears to be unsatisfactory. Hassall's corpuscles may or may not be present, but their absence does not negative an origin in the thymus gland.

Metastases occur most frequently in the neighbouring lymphatic glands, in the pleura, and in the lungs. They may also arise in the abdominal glands, liver, kidneys, suprarenal bodies, stomach, ovary, and, very occasionally, in the bones.

Simple tumours such as fibroma and myxoma are said to occur in the thymus, and also cysts of varying kinds, both developmental and dermoid (Ewing, 1916).

Symptomatology

In most cases of tumour of the thymus gland dyspnoea is the predominant symptom, usually of increasing intensity and frequently paroxysmal in character. This is accompanied by cyanosis and often oedema of the neck and face due to pressure on the venous trunks, and even involvement by the growth. The pericardium and heart muscle may be infiltrated by the growth. Haemoptysis may occur owing to involvement of the bronchial vessels. Pleural effusions are a frequent accompaniment, and the fluid is usually haemorrhagic. Pneumothorax has also been met with. The case described shows several of the above features: increasing dyspnoea, inclined to be paroxysmal in character, cyanosis, haemorrhagic effusion, and pneumothorax. The heart muscle was infiltrated by the growth, and deposits were found also in the left lung and pleura. Metastases are often the cause of the most prominent symptoms—for example, abdominal symptoms—and secondary deposits occurring in the spine may give rise to a paraplegic condition before the seat of the primary lesion is recognized.

It is more usual for tumours of the thymus gland to occur in childhood. Among the cases which Bosanquet and Lloyd (1932) collected there were eighteen instances of carcinoma in persons over the age of 40 and ten below that age. The sarcomata were more evenly distributed: three occurred in the first decade of life, two in the second, three between 21 and 30 years of age, and three between 31 and 40, the remaining two being in persons aged 60. Bedford (1930) describes a carcinomatous growth of the thymus in a newborn child. Death was caused by asphyxia, and metastases were present in the lung, liver, bones, and skin.

Several authors discuss the association of thymic tumours with other diseases—namely, lymphosarcoma associated with lymphatic leukaemia, and thymic tumours occurring in patients suffering from myasthenia gravis—most of which are regarded as having been benign in character, although originally reported as otherwise by the authors. Two cases have been described in which thymic tumour was present in patients with tuberculosis. Ewing (1916) reports a case in which repeated attacks of tonsillitis occurred. In view of the close resemblance in histological structure between the tonsil and the thymus the association of these symptoms is worthy of note.

Diagnosis

It is extremely difficult, and often impossible, to make an absolute diagnosis of thymic tumour during life. In most cases dullness on percussion over the upper part of the sternum, dyspnoea, venous engorgement, and the radiographic appearances will help in arriving at a tentative diagnosis of the condition. Unfortunately one or more of these symptoms and signs are frequently absent, and the radiograph may not show the shadow of an enlarged thymus, as instanced in our own case. Screening examination shows that the opacity increases in size when the child cries.

The diagnosis from tuberculous enlargement of the superior mediastinal glands rests upon the characteristics noted above. An intradermal Mantoux test would also prove helpful in the differentiation. In our own case the radiological diagnosis of a thymic tumour was rendered difficult by the appearances of a massive effusion in the right pleural cavity, although later films showed an atypical but defined edge in the upper mediastinal area of the radiograph, suggesting the possibility of a mediastinal tumour. Unfortunately the child was so ill that it was deemed inadvisable to prolong the examination for screening and lateral radiographs to be taken.

Treatment

Apart from symptomatic and palliative measures the treatment of these cases is very unsatisfactory. A case is recorded by Lenz (1928) in which an epithelial tumour of the thymus was successfully removed by operation and the patient recovered. Owing to the involvement of the great vessels in these tumours in the majority of cases it would appear that surgical methods are extremely limited. In our own case surgical removal of the tumour would obviously have been impossible. American workers report success in treating mediastinal lymphoblastomata with deep *x* rays; but although improvement occurs this is probably only transient. The thymus, like lymphoid tissue generally, is very sensitive to the action of *x* rays; degenerative changes are produced in the lymphocytes, which may become destroyed. In early life the thymus has great powers of regeneration, as is seen when a part is removed. Davidson (1935) records a case similar to the one here described, in a child of 5 years. Urgent dyspnoea was the main symptom, and a blood-stained effusion was present. A considerable improvement was brought about for a time following deep *x*-ray therapy, but subsequently the patient died, ten weeks after admission to hospital. The growth in this case was classed as a sarcoma, and sections showed it to be composed of small round cells of the lymphoid type in a fibrous reticulum.

Prognosis

In the case reported by Bosanquet and Lloyd (1932) the disease seems to have been present for several years bfore the patient eventually died. Kneringer and Priesel (1923) describe the case of a man aged 71 in whom the disease had apparently lasted for over eight years; while Miller (1926) records a case in a child of 9 years who died in twenty-six days. In the present case the patient died within thirty-nine days after the onset of symptoms. A duration of two years is not rare, but the majority of patients die within a year of the onset of symptoms.

Summary

1. A case of malignant tumour of the thymus gland has been described. It presented many typical features

from the clinical standpoint, but the radiological appearances were not diagnostic.

2. The tumour infiltrated the heart muscle and the left lung and pleura, but the pericardium was free from involvement. The arch of the aorta and great vessels were surrounded by the tumour, but not infiltrated.

3. The origin of the tumour cannot be stated with any degree of certainty, but it appears to be a primary growth in the thymus gland itself.

4. The microscopical findings show the tumour to be composed of a diffuse undifferentiated mass of cells resembling small lymphocytes. It is not a true "thymoma" in the strictest pathological sense, but more correctly a malignant lymphoma.

5. Post-mortem findings indicate that death was due to asphyxia and venous obstruction.

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SPONTANEOUS HAEMOPNEUMOTHORAX

BY

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(WITH SPECIAL PLATE)

Although a spontaneous pneumothorax is by no means an uncommon event, it is comparatively rarely that the condition proves to be serious. In most cases the collapse of the lung results from the rupture of an innocent cyst or bulla into the pleura, and the air is gradually absorbed from the pleural cavity. Occasionally a valvular opening may occur, with the result that there is a mounting pressure in the pleura and serious interference with respiration; at other times, especially when there is active tuberculosis in the lung, there may be pleural effusion or even pyopneumothorax. Severe haemorrhage in cases of spontaneous pneumothorax is rare enough to justify the publication of the notes of the following case.

Case Record

X. Y., a man aged 24, had always enjoyed good health. On August 28, 1937, he was unscrewing the caps from heavy hydrogen cylinders; this involved considerable strain on the muscles of the chest and arms. He felt no ill effects at the time, but was awakened at 5 o'clock the following morning by a severe pain in the left side of the chest. He got up at his usual time and felt quite well, except that any strain or sudden movement produced a stitch-like feeling in the left side of the chest and some shortness of breath. At that time he "felt as if there was some fluid jumping up and down" on sudden movement. He was reasonably active during the day, but was short of breath on attempting to play tennis. The following day he became still more short of breath, and felt severe and increasing pain in the left side of the chest. He returned home early and went to bed; the dyspnoea and pain were much relieved by rest. On the same night he felt very faint, and his doctor noticed that he appeared to be blanched, exactly as if he had had a severe internal haemorrhage. Physical examination of the chest revealed that there were no breath sounds on the left side, and a radiograph was taken (Fig. 1) which showed a pneumothorax and a considerable quantity of fluid. The patient was seen on September 3, when, in view of his extreme pallor, it was suspected that there had been bleeding into the left pleural cavity. The chest was explored with a needle and blood was found. He was admitted to the St. David's Wing of the Royal Northern Hospital, and on September 9 34 oz. of liquid blood were removed from the left pleura, using a wide-bore needle and a rotanda syringe. No difficulty was experienced and the general condition of the patient was good, but it was decided not to attempt to remove more blood at that time because it was impossible to be sure that further bleeding would not take place. The chest was screened on the following day, and it was then seen that a considerable amount of fluid was still present. On September 12 it was decided to empty the chest as far as practicable, and a further 30 oz. of blood was removed. The breath sounds were found to have returned over the lower lobe and the percussion note became resonant. The patient was kept in bed for a week and given an iron tonic. His general condition rapidly improved and the chest condition remained satisfactory. He was seen again on September 29, when he appeared to have recovered his health, and an *x*-ray film (Fig. 2) showed complete re-expansion of what appeared to be a normal lung.

Discussion

The occurrence of a haemopneumothorax raises several points of importance. In the first place it is almost impossible to imagine it happening in a case of spontaneous pneumothorax unless there had been some previous abnormality in the pleural cavity or some lesion in the underlying lung. In this particular case there was no clinical or radiological evidence of pulmonary tuberculosis, and it seems almost certain that the bleeding must have been caused by the rupture of an adhesion between the two layers of the pleura. It would be possible in this way for a small vein to be opened and for a gradual haemorrhage to result. That the bleeding was gradual is shown by the fact that blanching was not noticed until at least forty-eight hours after the pneumothorax must have occurred.

It is clear that in such cases the blood must be removed as completely as possible from the pleural cavity, but choice of the appropriate time may be difficult. If the intrapleural pressures are interfered with before the bleeding point is sealed off a fresh haemorrhage may be caused, whereas, if left for too long, organization of the blood-clot is likely to commence and permanent damage may result. It would appear that an interval of about a week is desirable before the blood is removed. It is interesting to note that in this case the blood seemed to be entirely liquid and there was no evidence of the presence of a mass of fibrin; it was possible to empty the pleural cavity so completely that the film taken three weeks later did not show any trace of residual blood or of pleural thickening.

A recent French Government decree brings into existence the Order of Public Health, which is to be awarded to persons who have distinguished themselves in the promotion of health and infant welfare. Of the three grades within this Order the highest is that of Commandeur. The next is that of Officier, and the third is that of Chevalier. The decree specifies the conditions under which this honour is to be awarded. It is to replace the honorary medals hitherto conferred on persons distinguished in the field of public health.

T. H. BOON: COMPLICATIONS OF GOLD THERAPY

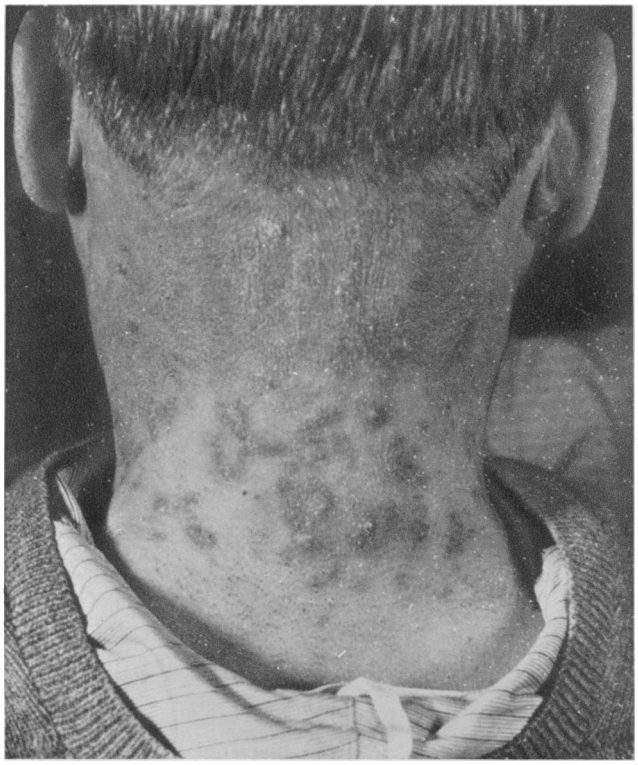

FIG 1.—Condition of back of neck.

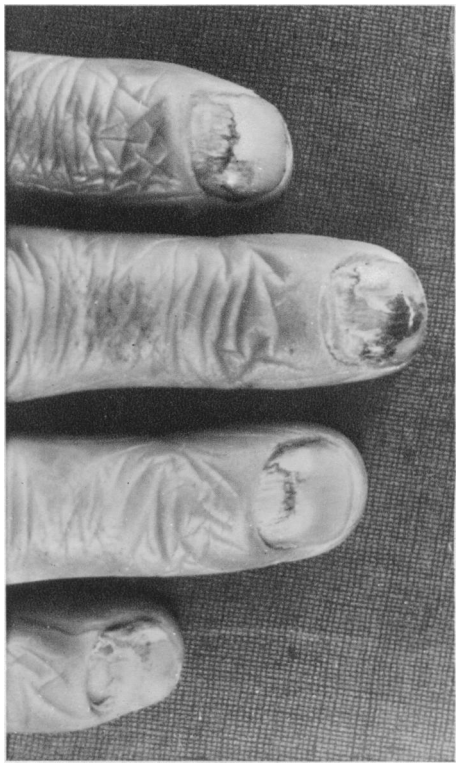

FIG. 2.—Condition of patient's nails.

R. G. PROSSER EVANS: MALIGNANT TUMOUR OF THYMUS

M. CHRISTIE: BILATERAL AXILLARY BREASTS