A guinea-pig was inoculated with C.S.F. on June 24 and suffered no ill effects; necropsy performed on July 28 showed no evidence of disease.

Discussion

Uncomplicated infectious mononucleosis invariably has a benign outcome, and sequelae of any significance are rare. Nephritis is not an uncommon event in the course of the disorder, but the renal function remains unimpaired and rapid recovery ensues. Haemorrhagic phenomena, pulmonary features, and jaundice are other complications, and attention has recently been attracted to involvement of the nervous system. Bernstein (1940) details the neurological manifestations encountered prior to the date of his monograph. Peripheral cranial nerves are rarely affected, but persistent anosmia and facial palsy have been recorded. Paresis of the extra-ocular muscles (Fledelius, 1935) and photophobia and nystagmus associated with poor articulation (Marshall, 1939) have also been reported. An extraordinary example of glandular fever with a strongly positive Paul-Bunnell reaction, in which a paralysis of the serratus magnus muscle developed during the third week of the illness and which cleared up in about four months, is described by Richardson (1942). The meninges appear to be the commonest site of affection, and Bernstein states that in at least 12 cases of glandular fever the clinical picture of serous meningitis has been found. Often the meningeal features antedate other manifestations of the disease. Nuchal rigidity, positive Kernig and Babinski signs, convulsions, and mental changes have been present in certain of such instances. Bilateral optic neuritis (Gsell, 1937) appeared in one case. The cerebrospinal fluid in the meningeal syndromes accompanying infective mononucleosis usually contains an increased protein and cellular content (chiefly lymphocytic in type), but examples have been reported in which the fluid has been normal in spite of unmistakable clinical signs of meningeal irritation (Huber, 1938). Huber also mentions a case in which the pleocytosis attained a level of 1,000 cells per c.mm. The condition of the spinal fluid in uncomplicated glandular fever is of some interest, but is neither constant nor characteristic. Excess of cells and positive Pandey reactions have been mentioned, but the sugar content and colloidal gold curves remain normal, and the Wassermann reaction is negative even in the presence of a false positive in the blood. Culture of the fluid has proved negative except on four occasions when *Listerella* were isolated (Schmidt and Nyfeldt, 1938).

A recent communication (Landes, Reich, and Perlow, 1941) deals with a case of infectious mononucleosis the early symptoms of which simulated those of encephalitis. Of particular importance with regard to our own case is the report by Thelander and Shaw (1941). They described 3 cases of neurological complications. The first was that of a meningitic picture in the course of infective mononucleosis; the peculiarity noted here was the fact that the cerebrospinal fluid, which at the onset contained 630 cells per c.mm., at the end of four months continued to demonstrate a pleocytosis consisting of 82 cells per c.mm. The Paul-Bunnell reaction was strongly positive. The two other cases occurred in sisters, one of whom, aged 3½, was suddenly affected by fever, pain in the back of the neck, and a convulsion. No glandular or splenic enlargement appeared during the illness. The C.S.F. contained 40 lymphocytes per c.mm., and the blood showed a white cell count of 17,000 per c.mm., with the polymorphs accounting for 69% of the total. Encephalitis of unknown aetiology was diagnosed. Four days later the other sister, 2½ years of age, became ill with similar symptoms. The cells in the C.S.F. amounted to 70 per c.mm., and were chiefly lymphocytic in type. The total leucocyte count of the blood was 45,700 per c.mm., and a differential count revealed that 81% of these were lymphocytes. Again no enlarged glands or spleen could be found, and the Paul-Bunnell reaction was negative. The authors consider that the findings in the last two cases point either to a diagnosis of infectious mononucleosis or to a hitherto undescribed pathological syndrome, and refer to their large experience with benign lymphocytic meningitis and encephalitis, in neither of which conditions had they seen cases in which the blood picture or the results of serological tests suggested mononucleosis. The third of Thelander and Shaw's cases and the case reported here present many features in common. The large numbers of cases in our series, referred to above, showing similar signs and symptoms and running a similar course, would appear to support our contention that the group, if not glandular fever (as manifested by the demonstration of heterophile antibodies), has a common aetiology and

forms a clinical syndrome, of which the present case is unique in the manifestation of a meningeal reaction.

We wish to express our indebtedness to Dr. J. A. Wilson, medical superintendent, who kindly carried out the laboratory investigations, and to Dr. A. M. Scott for his interest and advice.

REFERENCES

- Bernstein, A. (1940). *Medicine*, **19**, 85.
 Erf, L. A. (1936-7). *J. Mt. Sinai Hosp.*, N.Y., **3**, 113 (quoted by Paul).
 Fledelius, M. (1935). *Acta ophthalm.*, **13**, 150.
 Gsell, O. (1937). *Dtsch. med. Wschr.*, **53**, 1759.
 Himsworth, H. P. (1940). *Lancet*, **1**, 1082.
 Huber, W. (1938). *Schweiz. med. Wschr.*, **68**, 892.
 Landes, R., Reich, J. P., and Perlow, S. (1941). *J. Amer. med. Ass.*, **116**, 2482.
 Marshall, E. A. (1939). *Amer. J. clin. Path.*, **9**, 298.
 Paul, J. R. (1941). *Lancet*, **1**, 584.
 Richardson, J. S. (1942). *Ibid.*, **1**, 618.
 Schmidt, V., and Nyfeldt, A. (1938). *Acta oto-laryng.*, **26**, 680.
 Thelander, H. E., and Shaw, E. B. (1941). *Amer. J. Dis. Child.*, **61**, 1131.

THE RADIOGRAPHIC POSTERO-MEDIAL BORDER OF THE LUNG

OR THE LINEAR THORACIC PARASPINAL SHADOW

BY

JAMES F. BRAILSFORD, M.D., Ph.D., F.R.C.P.

Radiological Demonstrator in Living Anatomy, University of Birmingham

Under the latter title an editorial in *Radiology*, Aug., 1942, p. 229, draws attention to "a slender line of demarcation which is often seen in antero-posterior or sagittal roentgenograms of the bony thorax and upper abdomen. This line lies on the left side of the lower two-thirds of the thoracic spine and sometimes continues as far down as the plane of the first two lumbar segments. The shadow is frequently an enigma to radiologists and other clinicians viewing such roentgenograms. It is not visible on all films or projections of this portion of the body, but is observed with such frequency that it must be the result of variation in the course and position of a normal structure situated therein." Then follows a discussion in which it is inferred that it is not bony, not due to unilateral spinal ligaments, descending aorta, or inferior vena cava, "but it might be an enlarged and elongated hemiazygos vein." "This editorial is written with the suggestion that this finding be referred to as the left thoracic paraspinal shadow and that its frequency be noted by various radiological observers. In this manner its true incidence may be ascertained and its apparent nature confirmed."

An Important Diagnostic Sign

This radiographic line of demarcation is of great importance in the diagnosis of lesions involving the lower dorsal and upper lumbar spine. It is often seen on the antero-posterior radiographs of the dorso-lumbar area on the left side, but it is seen, though less often, on the right side as well. It extends upwards sometimes to the level of the 4th dorsal vertebra, but only as far as the reflection of the pleura on to the diaphragm, for it marks the postero-medial border of the lung. As will be seen from the accompanying sketch of a cross-section of the body at the 9th dorsal level, the postero-medial border of the left lung, which has been more thickly outlined for emphasis, lies in a direct sagittal line for two or more inches. For the whole of this distance it is separated from the vertebral body by the pleura, fascia, and some areolar tissue. On a plane with the anterior surface of the body it is displaced laterally by the descending aorta and more anteriorly by the heart. On the right side the medial border of the lung extends partly over the anterior surface of the vertebral body and is displaced laterally by the oesophagus and the heart. Antero-posterior radiographs of this area will therefore show the postero-medial boundary of the lung as a straight line lateral to the outline of the vertebra, because on the lung side of the boundary the tissue is relatively radiotransparent, whereas on the vertebral side the tissue is much more radio-opaque. The descending aorta, being more opaque than the lung, will also be seen as a linear shadow lateral to the postero-medial border of the lung where it is superimposed over the postero-medial aspect of that organ. On the right side, because of the shelving margin of the postero-medial aspect of the

right lung, there is usually no sharp line of demarcation between it and the denser medial structures; consequently the border cannot be seen. It is for the same reason that the more anterior of the medial borders of the lung are not shown.

A glance at the sketch will reveal at once why this line has great diagnostic significance, for it shows the close relation of the medial border of the lung to the lateral surface of the vertebral body. If the latter is crushed its transverse

Transverse section of body at 9th dorsal level. The thickened lines are of the postero-medial border of the pleura.

diameter will be increased and the medial border of the lung will be displaced to that extent laterally. If the fracture is associated with a paravertebral haematoma this will show as an added expansion and further lateral displacement of the medial border of the lung. The antero-posterior radiographs show this as a fusiform expansion of the medial opacity, for the postero-medial border of the right lung will be similarly displaced. In a case which came to court the existence of a crush fracture of the vertebral body was disputed until the presence of a paravertebral haematoma was demonstrated to the judge on the radiograph taken immediately after the accident and its absence from radiographs taken a fortnight later. But the commonest demonstration of lateral displacement of the postero-medial border of the lung is due to the paravertebral tuberculous abscess. It is important because it may be detected before any change in the bone has become apparent. The abscess may extend the whole length of the dorsal spine, is usually fusiform in shape, and is sometimes of the width of the heart shadow; indeed, it has occasionally been missed because it was mistaken for the latter. It may show progressive expansion from the time it is first detected. Because from the level of the reflection of the pleura on to the diaphragm there is below no contrast in the densities of the adjacent tissues, the outline of the abscess cannot be traced in the abdomen—i.e., we are dependent upon the lateral displacement of the postero-medial border of the radiotransparent lung for visualization of the abscess. Consequently, though the abscess may have arisen from caries of one of the lumbar vertebrae, if no bone changes are yet recognizable its origin may not be apparent.

Incidentally, it may be stated that in the abdomen a lateral deviation of the line of the psoas muscle may help us to detect the site of an acute abscess, or a chronic abscess before calcium has been deposited within it. For anatomical reasons this line of the psoas may appear to be continuous with that of the postero-medial border of the lung.

Points in Differential Diagnosis

Because of this common appearance of the dorsal tuberculous paravertebral abscess there is a tendency to diagnose all fusiform deviations of the postero-medial border of the lung as tuberculous in origin, but appreciation of the anatomical features I have described which give rise to these shadows induces further discrimination. Thus neoplasm, both primary and secondary, may cause collapse and an increase in the transverse diameter of the diseased vertebral body: this will cause a lateral deviation of the postero-medial border of the lung, which will be increased, if there is proliferation of neoplastic cells or if associated with haemorrhage, to such an

extent that it may resemble a paravertebral abscess. It should be remembered, however, as a feature in differential diagnosis, that neoplasm appears to spare the disks even though all the vertebral body is destroyed.

Fusiform paravertebral expansions have been seen at the site of pneumococcal, typhoid, and paratyphoid abscesses. In these the destructive changes are more frequently present in the disk, which appears to collapse, and within a few weeks the postero-medial border of the lung is straightened out again. The vertebral bodies ultimately fuse. In the acute phase of vertebra plana the involved body is surrounded by fusiform expansion, which within a few weeks gradually disappears, leaving the disk apparently intact but the elements of the vertebral body compressed to a quarter or a third of the normal depth. In Paget's disease that is localized to one or more dorsal vertebral bodies the postero-medial border of the lung is deviated laterally by the expansion of the bodies. In osteochondritis of the spine in infants and adolescents some degree of thickening of the tissues adjacent to the vertebral bodies occurs, and the medial border of both lungs may become apparent just lateral to the border of those bodies; but in this there is no localized fusiform expansion.

In one case rupture of the posterior wall of the aorta was associated with haemorrhage into the areolar tissue surrounding the vertebral bodies: an appearance simulating a paravertebral abscess was produced. Any inflammatory or neoplastic proliferation within the vertebral body or the areolar tissue surrounding it may produce changes such as have been described, and it may be necessary to seek elsewhere for a clue to the identity of the organisms and cells producing the displacement of the lung. Empyema localized to this site would also push the lung laterally.

Summary

The line of demarcation formed at the flattened postero-medial border of the lung by the sharp contrast between the relative radiotransparency of the lung and the radio-opacity of the vertebral tissues is of valuable diagnostic significance in cases of backache.

The anatomical investigations which contributed to the discovery of the cause of this radiographic sign were carried out in the anatomy department of the University of Birmingham with the kind permission and assistance of Prof. C. V. Smout.

Medical Memoranda

A Case of Bilateral Bell's Palsy

Double Bell's palsy has always been looked upon as an uncommon phenomenon. Jelliffe and White (1935) consider it rare, as do Osler and McCrae (1935), Price (1941), Savill (1939), and Walshe (1941). Numerous cases of facial diplegia have been quoted, but the majority of them have been due to some condition such as epidemic encephalitis, trauma, or a lesion at the base of the brain. Bashford and Wilson (1918), Holmes (1917), and Viets (1927) have recorded numerous cases of facial diplegia due to other causes. Currier (1928) discusses facial diplegia and records two cases, but these are not of the type commonly called bilateral Bell's palsy. Most authorities now agree with Patrick (1916) that Bell's palsy is due to an infection elsewhere plus exposure to cold, although the infection is not always apparent.

CASE HISTORY

An electrician aged 17 was seen at the out-patient department of the Royal Infirmary, Sunderland, on Dec. 9, 1940. About a fortnight previously he was unable to whistle; food had a tendency to drop out of his mouth; and when he washed himself the soap got into his eyes. He stated that he had suffered from a catarrhal "cold" about a week previously. There was no history of ear trouble, whether deafness, pain, or discharge.

On examination both sides of the mouth were drooped, furrows of the brow were indefinite, naso-labial folds on both sides tended to be obliterated, and there was a general loss of expression in the face. Both eyes could be opened against the patient's efforts to keep them closed, the left side perhaps more so than the right. He was unable to close both eyes completely, and wrinkling of his brow was poor. He was unable to whistle or blow out either cheek. Attempts to show his teeth were poor, and the mouth tended to be drawn to the right side to a slight degree. No loss of sensation was detected over the face. Taste on the anterior two-thirds of the tongue was normal. There was no marked sensitivity to loud noises. The other cranial nerves were normal, as were the fundi. The central nervous system showed no other abnormality, and the circulatory, respiratory, alimentary, and urinary systems were normal. Radiographs of the skull revealed nothing unusual.