diarrhoea; the diarrhoea could be shown to have expiatory value. As well as satisfying an unrecognized need for restitution, the diarrhoea was observed to be used as an expression of hate. Alexander reports his findings with a reserve as to the general validity of his observations. Whether this same deep pattern applies to ulcerative colitis is unknown at the present stage; if so, a comparative study of spastic and ulcerative colitis should reveal an even more intense conflict situation and strong masochistic components in the latter.

The riddle of the aetiology of ulcerative colitis is still far from being solved. The psychological background described is not necessarily the cause of the obscure disorder, but is certainly an important aetiological factor in this severe organic disease. Many problems in relation to the physical and psychological aspects of the disorder await discovery.

Summary

1. A series of forty unselected patients suffering from ulcerative colitis was submitted to psychological examination. In thirty-seven of the forty patients studied the colitis was antedated by psychological abnormalities or definite psychological disorders well beyond the range of the normal.

2. No uniform personality type could be established. Among the various psychopathological structures observed, obsessionals and hysterics were prominent.

3. The emotional factor as precipitating onset, relapses, and individual attacks of ulcerative colitis was examined in relation to the personality affected.

4. These findings appear to justify an attempt at psychotherapy for selected early cases of ulcerative colitis.

This investigation has been conducted during the tenure of a Fellowship endowed by the Sir Halley Stewart Trust, to whom I am grateful for the opportunity. The access to cases has been arranged through Dr. E. R. Cullinan, to whom I am deeply indebted for the co-operation which has made this investigation possible.

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G. Olin (*Bull. Off. internat. d'Hyg. publ.*, 1938, **30**, 2230) records an epidemic of 115 cases of tularaemia which broke out in Sweden in July, 1937, and continued until the following October, the peak being reached at the end of August and beginning of September. Apart from the fact that there were only five cases under 10, all ages up to 70 were almost equally represented. Fifty were in males and sixty-five in females. The following types of the disease were noted: ulcero-glandular, 101; glandular, nine; oculo-glandular, one; and typhoid, four. The primary lesion was situated on the lower extremities in fifty-seven, on the upper extremities in fifteen, and on the face and neck in twenty-five cases. With a few exceptions the diagnosis was established by serological examination. In 107 cases there was a positive agglutination reaction for *B. tularensis*, in three this organism was grown from the primary or the glandular abscess, and in the remainder the diagnosis was made by the typical clinical picture. As in the two previous epidemics of tularaemia in Sweden, the outbreak was preceded by an epizootic among hares and other rodents.

APICAL BRONCHOGENIC CARCINOMA

BY

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The early clinical manifestations of primary carcinoma of the lung are notoriously protean, ranging as they do from local signs of bronchiectasis or pleural effusion to cerebral tumour. These variations of behaviour depend to a certain extent upon the precise anatomical site of origin of the carcinoma, and of recent years attention has been drawn to the peculiarities of those arising in the periphery and, in particular, at the apex of the lung. We have seen several cases of this kind lately, and because of the conflicting views expressed in the literature concerning them we feel justified in presenting and discussing our findings.

In 1924 Pancoast reported four cases of tumour in the region between the root of the neck and the apex of the lung in which there was a peculiar clinical syndrome resulting from involvement of the brachial plexus and of the sympathetic cervical chain. This comprised motor and sensory disturbances in the shoulder and arm of the affected side, atrophy of the hand muscles, and Horner's syndrome—unilateral miosis, ptosis of the eyelid, enophthalmos, and anidrosis of the face and neck. In 1932 Pancoast republished these cases, added four others, and propounded the theory that the tumours arose from embryonal rests in the fifth pharyngeal pouch. He gave them the name of "superior pulmonary sulcus tumour," and claimed that they could be recognized radiologically, since they produced sharply defined shadows at the apex of the lung, destruction of one or more of the upper three ribs posteriorly, and some erosion of the transverse processes and bodies of the corresponding vertebrae. Pancoast's theory was based upon no more than two brief histological reports on biopsy specimens, but he did a service in drawing attention to a condition which does not seem to have been mentioned since it was described in detail by Hare in 1838. Unfortunately Hare made no reference in his necropsy report to the condition of the lungs, and he was evidently of the opinion that his tumour arose in the neighbourhood of the brachial plexus.

It is clear that any lesion of the parietal pleura at the root of the neck which involves the brachial plexus and the sympathetic chain may produce the characteristic neurological disturbance—apical tuberculosis involving the pleura (Fried, 1934) has been responsible—and should the lesion be a neoplasm it may well bring about destruction of the adjacent bony structures. It is therefore not surprising to find reports of cases where such tumours as the following have been responsible: carcinoma of thymus (Browder and DeVeer, 1935), intrathoracic sympathoblastoma (Frost and Wolpaw, 1936), and metastasis from gastric carcinoma (Tobias, 1932).

Under the title of "sterno-clavicular branchioma" Fried (1935b) described two cases of men, aged 54 and

46, in whom there were tumours in the root of the neck on the left side and no evidence at necropsy of involvement of any other part of the body. These were both squamous-cell cancers, and did not appear to arise in the lung, the dome of the lung being adherent in one case and the pleura separating the tumour from the lung in the other. Graef and Steinberg (1936) subscribe to Pancoast's theory of the origin of such tumours from a branchial cleft, and describe the case of a man of 47 who had a tumour on the right side attached to a yellowish plaque on the pleura which did not extend into the parenchyma of the lung, although on histological examination the carcinoma cells, of mixed squamous and alveolar types, were seen invading the lung septa. Kelman and Schlezinger (1937), in describing another case of an obscure squamous-cell tumour, discard the hypothesis of its branchiogenic origin, since fifth and sixth branchial clefts have never been definitely proved to exist in the mammalian embryo; they do not describe the appearance of the lung at necropsy, but remark that it was definitely excluded as a possible site of origin.

A Survey of the Literature

In the literature we found reports of nineteen cases coming to necropsy (Browder and De Veer, 1935; Clarke, 1934; Connolly, 1935; Davidsohn and Feldman, 1937; Fried, 1934, 1935a; Jacox, 1934; Jacox and Baker, 1937; Ryce, 1938; Stein, 1937; Steiner and Francis, 1934; Tobias, 1932) in which the tumours were demonstrably bronchogenic carcinomata arising at the apex of the lung, extending direct into the ribs and vertebrae, and involving the brachial plexus and sympathetic chain. A further eight cases have been diagnosed clinically, with or without a histological examination of a biopsy specimen (Jacox, 1934; Stein, 1937; Steiner and Francis, 1934; Tobias, 1932). It is interesting to note that of the cases where the relevant data were recorded all were males, ten were on the left side and thirteen on the right, and the histological types were as follows: squamous twelve; adenocarcinoma five; undifferentiated or oat-cell two; unrecorded in the remainder.

We have found references to five further cases of bronchogenic carcinoma of the apex of the lung in which adjacent ribs were involved, but the tumour did not happen to involve the nerves in such a manner as to produce the full syndrome of motor, sensory, and sympathetic disturbances (Fried, 1935a; Marcil and Crawford, 1936; Pancoast, 1932; Stein, 1937). All five of these were males—three of them on the left side and two on the right. Histologically one was an anaplastic round-cell type of carcinoma, two were squamous, and one an adenocarcinoma; in the fifth there was no histological report. It is just possible that one of the cases in this group described by Fried, and one of those in the last paragraph reported by the same author, may be an oat-cell type, since Fried (1935a) states that he considers this type of tumour to be squamous and apparently does not differentiate between them.

We wish now to report four cases of apical bronchogenic carcinoma in which there was the full clinical syndrome described by Pancoast and three in which it was absent.

Case I

This patient was a man aged 46, by occupation a railway checker. In March, 1936, he had pain in the right shoulder and down the inner side of the arm, at first only at night, but later becoming a constant dull ache. Acute exacerbations radiated down the arm, chiefly on the inner aspect to the little and ring fingers. In October, 1936, he noticed weakness and wasting of

the right hand; this rapidly progressed and involved the fore and upper arm. Three weeks later he developed weakness of the legs, and was admitted to Bootle General Hospital on November 4. No cough, expectoration, or haemoptysis.

Examination.—Pupils unequal, right being myopic. Both reacted to light and accommodation. Slight right-sided ptosis and enophthalmos. The left pupil was large and the left half of the face was sweating profusely. Fundi and cranial nerves normal. Right arm flaccid, and wasting very marked in all muscles of arm and small muscles of hand. Typical right "claw-hand." Analgesia of inner aspect of right forearm, otherwise sensation in the arms was normal. The abdominal reflexes and knee- and ankle-jerks were absent. Both plantar responses were extensor. Sensation in the lower limbs and trunk was normal. Retention of urine. Chest: impaired percussion note over right apex posteriorly, otherwise no abnormal physical signs. Heart and abdomen: nothing abnormal. Urine: trace of albumin. Wassermann negative. Cerebrospinal fluid: pressure 80 mm.; fluid clear and colourless; the pressure did not rise on compression of jugular veins, but a rapid rise was seen with abdominal pressure. The specimen tube was broken in transit to the laboratory.

X-ray Report.—There is loss of translucency in the extreme right apex due to a small shadow with a rounded base which appears to be eroding the lateral surfaces of the first and second dorsal vertebrae and is causing erosion of the posterior aspect of the second and third ribs.

The patient died on November 16.

Necropsy.—A hard circular tumour about 5 cm. in diameter and 1.5 cm. thick is present at the thoracic inlet on the right side, overlying and eroding the first, second, and third ribs near their spinal articulations. The apex of the lung is adherent to the mass. At its superior aspect the tumour extends into the neck, invading the brachial plexus and eroding the bodies of the sixth and seventh cervical and first and second dorsal vertebrae. It enters the spinal canal through the intervertebral foramina, and is found in this situation to be a soft mass surrounding the eighth cervical and first dorsal segments of the spinal cord, but it is not adherent to the dura, and the spinal cord is removed with its coverings intact to the naked eye. On section of the right lung it is seen that the tumour is within the lung parenchyma at the apex, and the line of the pleura cannot be recognized; it is therefore impossible to say just how far beneath the pleura the tumour extends. The region of attachment of the lung apex to the chest wall is well defined, and the tumour has extended in nodular masses over the parietal pleura beyond this attachment for a distance of 5 or 6 cm. The tumour has also spread medially alongside the trachea. No metastases or other pathological changes are present in the lungs or elsewhere.

Histological Report.—Carcinoma simplex with a considerable fibrous tissue reaction; parts of the tumour are of a scirrhous type.

Case II

A tram driver aged 48 was admitted to Liverpool Royal Infirmary on April 21, 1938, complaining of severe pain along the ulnar border of the right forearm and weakness of the right hand of six months' duration. He had noticed a swelling above the right clavicle for two months.

Examination.—Evident gross generalized wasting and marked pallor of skin and mucous membranes. Hard fixed tumour, size of orange, in right side of neck extending behind clavicle. Nothing abnormal found in lungs, heart, or abdomen. No enlargement of thyroid or lymphatic glands. Right pupil myopic; ptosis of right eyelid. Wasting of all muscles of right forearm and "claw-hand." Anaesthesia of ulnar nerve distribution. Wassermann negative.

X-ray Report.—There is a rounded opacity of the extreme right apex, the lower border of which is extending down to the fourth rib posteriorly. There is almost complete destruction of the first rib, and early destruction of the second rib, with a pathological fracture about an inch from the angle. The appearances are those of an apical lung tumour.

Operation April 22: chordotomy for relief of pain. Patient died on April 26.

Necropsy (twenty hours after death).—Emaciated, with a large fixed mass above the right clavicle. Wasting of right thenar and hypothernar eminences. The nasal sinuses, mouth, and pharynx are healthy. Both pleural cavities contain a little turbid fluid. There is a muco-purulent bronchitis and a bilateral basal pneumonia. A large mass of growth, involving and apparently arising from the extreme apex of the upper lobe of the right lung, has eroded the first and second ribs posteriorly and laterally. The greater part of the mass, which is 9 cm. in diameter, is situated above the clavicle, covered by the sterno-mastoid muscle and the cervical fascia. The brachial plexus is seen entering the mass from above, and reappears superficial to it at the level of the clavicle. It is not possible to find the sympathetic chain in the tumour. The right transverse processes of the lower two cervical vertebrae are eroded by the growth. The clavicle and scapula are not invaded. There is no glandular enlargement on either side of

FIG. 1.—Case II. The large apical tumour is firmly attached to the ribs and soft tissues at the root of the neck. A metastasis is present in the opposite lung.

the neck or in the axilla. The tumour mass, on section, presents a yellowish-white appearance with some pinkish areas (Fig. 1). There are a few small cavities in the portion of the lung involved by the tumour, and these appear to be emphysematous bullae. There is a spherical blood-borne metastasis, 2.5 cm. in diameter, in the middle of the left lung. The paratracheal lymph nodes alongside the tumour contain tumour, but no metastases are present in any other organs.

Histologically the main tumour mass, which is very necrotic, is a carcinoma simplex. The pulmonary metastasis is better preserved and is in parts a definitely squamous-cell carcinoma.

Case III

A man aged 59, a forwarding clerk, was admitted to Liverpool Royal Infirmary on February 25, 1935. For six weeks he had had pain in the right shoulder, extending down into the hand, with "pins and needles" in the fingers. He had noticed drooping of the right eyelid for the last three months at least.

Examination.—There is a hard fixed mass in the right supraclavicular fossa, and the subclavian artery is more superficial than on the left side. No enlargement of thyroid or lymphatic glands. Definite ptosis of the right eyelid and a contracted right pupil. Complete loss of power of the triceps and

extensors of the right wrist and fingers. Complete loss of power of the flexors of the wrist and all small muscles of the right hand and some loss of power in flexion of the fingers. The brachioradialis is unaffected, and the biceps and brachialis anticus are relatively strong. Deltoid and scapular muscles are normal, but there is winging of the right scapula. Impaired percussion note and deficient air entry right apex. Heart normal. Liver, spleen, and kidneys not palpable. Wassermann negative. No tubercle bacilli found in sputum.

X-ray Report.—There is an opacity in the extreme right apex which has a rounded lower margin extending towards the hilum of the lung. The shadow of the soft swelling extends up into the supraclavicular triangle, and there is early erosion of the third rib posteriorly. The appearances are those of apical bronchial carcinoma (Fig. 2).

Operation (March 16, 1935).—Portion of first, second, and third ribs excised posteriorly. The tumour was found to be attached to and arising from the apex of the lung. The whole of the tumour, together with a portion of the apex of the lung, was removed.

Pathological Report.—The tumour is a bronchial carcinoma showing the not unusual admixture of oat-cell structure, im-

FIG. 2.—Case III. Opacity in the right apex due to apical bronchial carcinoma.

perfect papillary process formations, and incomplete alveolar arrangement.

The patient died on March 19, 1935. No post-mortem examination.

Case IV

A butcher aged 49 was admitted to Liverpool Royal Infirmary on July 25, 1932. Two months previously, after lifting a quarter of beef, he noticed stiffness of the right shoulder and found he had a lump above the right clavicle. During the following week he suffered from pain in right shoulder, right upper arm, and region of right breast. There was no history of cough, expectoration, or dyspnoea. He had lost about 1½ stone in weight in two months.

Examination.—Pallor of skin and mucous membranes and evident generalized wasting. Right palpebral fissure narrowed and right pupil contracted. Ptosis of right eyelid and right enophthalmos. No localized wasting. Tumour under right sterno-mastoid, about size of a walnut, extending behind clavicle. Dullness to percussion over right apex and diminished movement of apex with increased vocal fremitus and resonance and bronchial breathing. Two small glands in right axilla. Nothing abnormal found in heart or abdomen. Wassermann negative. No tubercle bacilli found in sputum.

August 4, 1932: Radium needles inserted into supraclavicular tumour—1,680 mg.-hours.

X-ray Report.—There is a rounded opacity in the apex of the right lung which is causing destruction of the second and third ribs posteriorly, and is eroding the lateral margin of the body of the second and third dorsal vertebrae. The appearances are those of an apical bronchial carcinoma.

The patient died in May, 1933. No post-mortem examination.

Case V

A car park attendant aged 55 was admitted to Liverpool Royal Infirmary on December 23, 1937. He was in good health until ten weeks previously, when he suffered from dull and gnawing pain in the lower dorsal region with slight radiation to left hypochondrium. Cough began at the same time and accentuated the pain. Expectoration daily—often copious; no haemoptysis. No loss of weight. Dyspnoea on exertion. Hoarseness for past month.

Examination.—Plethoric type. No clubbing of fingers. No dyspnoea at rest. Hoarse voice. No enlargement of thyroid or lymphatic glands. Emphysematous chest. Left base not moving as well as right. Diminished air entry and rales left lower lobe. Heart sounds distant. Blood pressure 145/90. Fundi: veins tortuous and dilated; nasal margins of disks hazy; no measurable papilloedema. Pupils equal, and react to light and accommodation. No ptosis. Nystagmus to right and left. Paresis of left face and arm. Right flexor plantar response. Left leg amputated in 1917 for gunshot wounds. No sensory loss. Sphincters normal. Edge of liver palpable 1½ inches below costal margin; smooth and not tender. Spleen and kidneys not palpable. Urine normal. No tubercle bacilli found in sputum. Wassermann negative.

X-ray Report.—There is a rounded opacity extending out of the root of the left lung along the posterior chest wall in the apex of the left lower lobe. The shadow appears to be lying in the periphery of the lung field, and is causing destruction of the seventh rib.

Deep x-ray therapy was started on January 11. Patient died on April 6.

Necropsy (twelve hours after death).—Emaciated. A branny desquamation of the skin of front and back of chest is due to the x-ray therapy. The left pleural cavity contains a fibrino-purulent effusion. The posterior aspect of the upper lobe is densely adherent to the chest wall. There are no other adhesions. The right pleural cavity contains about 100 c.cm. of clear fluid. At the apex of the lower lobe of the left lung, on its posterior aspect, is a small tumour mass some 4 cm. in diameter. This tumour is confined to the periphery of the lung, extending no more than 1 or 2 cm. into the parenchyma, but it has directly invaded the chest wall immediately adjacent to it. It has destroyed the neck of the seventh rib on the left side and invaded the body and transverse process of the corresponding thoracic vertebra. The tumour here is necrotic; it cannot be detected externally. There are some small bronchiectatic cavities in the base of the left lung. The lower lobes of both lungs are the site of organized pneumonia. The bronchi are all patent and not involved in tumour; they contain a purulent exudate. The hoarseness was evidently due to involvement of the left recurrent laryngeal nerve in the tumour. The lung tumour is adherent to the adventitia of the aorta, but does not invade the wall. There is only one tumour metastasis in the liver; it lies on the surface of the left lobe. In the right cerebral hemisphere, beneath the Rolandic area, is a spherical tumour, largely necrotic, 4 cm. in diameter. In the left hemisphere of the cerebellum on its superior aspect is another smaller tumour, about 4 by 10 mm. No metastases elsewhere. *Histologically* a squamous type of bronchogenic carcinoma. One of the sections of three hilar lymph glands from the lung shows a few isolated cancer cells.

Case VI

A spinster aged 56 was admitted to Liverpool Royal Infirmary on March 19, 1938. Nine weeks previously she fell down, and has since complained of inability to use the right upper limb and of severe pain in the arm and right scapular

region. Dysphagia for past eight weeks; food appears to stick at level of upper end of sternum, and she now has great difficulty in swallowing even fluids. Vomiting after almost every meal. Loss of weight considerable. No cough or expectoration and no haemoptysis.

Examination.—General nutrition poor. Very ill and drowsy. Pallor of skin and mucous membranes. No enlargement of thyroid or lymphatic glands. No finger-clubbing. Gross diminution of all movements of right shoulder and severe pain with slightest movement thereof. Chest movements very restricted but symmetrical. Percussion note and breath sounds normal. No adventitious sounds. Liver enlarged and nodular. Spleen and kidneys not palpable. No ascites. Heart and nervous system normal. Urine: deposit contains large numbers of red cells. Wassermann negative.

X-ray Report.—There is opacity of the extreme left apex which has all the appearance of thickened apical pleura, but is associated with destruction of the third rib posteriorly, suggesting the presence of an apical bronchial carcinoma. There is extensive destruction of the glenoid of the left scapula, due to secondary malignant deposit.

The patient died on March 29.

Necropsy (thirty-eight hours after death).—Frail but not emaciated. Some soft nodules palpable beneath scalp. Breasts healthy. Nasopharynx, sinuses, and mouth healthy. A few old pleural adhesions at left base only. On anterior aspect of left upper lobe, about 3 cm. from the apex, is a firm area slightly depressed below the general surface. The pleura covering it is perfectly smooth. It is roughly circular, measuring about 2.5 cm. in diameter and 1.5 cm. in thickness. On section it presents a greyish appearance. There are no other tumours in either lung, and no nodules on either the visceral or parietal pleura. There is no sign, in the gross, of infiltration of the primary tumour towards the hilum. The lymph nodes at hilum of upper lobe of left lung are full of tumour. The liver weighs 1,850 grammes, and is filled with masses of tumour. Massive tumour metastases are present in the vault of the skull, bodies of all the vertebrae, right scapula, sternum, ribs, and right humerus. *Histologically* an oat-cell carcinoma.

Case VII

A spinster aged 78 came to Liverpool Royal Infirmary on March 30, 1937, complaining of pain in the left shoulder of six months' duration. Two months after the onset pain developed below the right costal margin and in the right thigh posteriorly. For the past few weeks there had been severe frontal headache and recurrent epistaxis.

Examination.—Emaciated and anaemic. No enlargement of thyroid or lymphatic glands. Small non-tender nodules palpable beneath the scalp and a tender swelling on the left scapula. The left eye is proptosed, and both eyelids are oedematous. The left upper lid is ptosed. Pupils, fundi, and cranial nerves normal. No localized wasting and no sensory loss. Superficial, deep, and organic reflexes all normal. Signs of small effusion at left base, and oedema of both bases. Liver, spleen, and kidneys not palpable. Blood count shows severe hypochromic anaemia. Wassermann negative. Cerebrospinal fluid normal.

The patient died on April 11, 1937.

Necropsy (eighteen hours after death).—Externally there is proptosis of the left eye. Several small tumours are palpable beneath the scalp and there is a swelling of the left scapular region. A very careful examination of nasal sinuses, entire alimentary and genito-urinary systems, and both breasts fails to reveal any possible primary tumour. The right pleural cavity is entirely obliterated by old adhesions. In the upper lobe of the right lung, on its antero-lateral aspect 5 cm. below the apex, is a small wedge-shaped tumour whose base has infiltrated the pleural adhesions and the parietal layer without grossly invading the adjacent ribs. The regional tracheo-bronchial lymph nodes are full of tumour. The left pleural cavity contains some blood-stained fluid and is studded all over with small nodules of tumour derived by seeding from metastases in the ribs. There are no tumour metastases in the parenchyma of either lung. Metastases are present in

the liver, suprarenals, and nearly all the bones. The proptosis is due to a tumour in the orbital plate and zygoma. *Histologically* it is a well-differentiated columnar-cell carcinoma with large alveoli full of mucinous secretion.

Discussion

Apart from the interest these tumours have aroused among pathologists and radiologists, they are of great importance clinically, because in most cases no symptoms of pulmonary disease are present. Of the seven cases recorded above only one (Case V) complained of cough and expectoration, and in this the tumour was situated in the apex of the left lower lobe, and, moreover, there were complications—pleural effusion, emphysema, bronchiectasis, and terminal pneumonia. Again, there is a striking paucity of physical signs in the chest in most instances, and this is no doubt explicable by the position of the tumour and the absence of bronchial obstruction and complications commonly found in lung tumours that are not situated peripherally.

When there are symptoms and signs of involvement of the brachial plexus and cervical sympathetic chain one should consider the possibility of an apical lung tumour. In Cases I to IV the patients consulted their doctors because of pain in one or other upper limb, and they all had signs of brachial plexus and cervical sympathetic paralysis. The sequence of events in Case I is of particular interest, starting with neuritis of the right arm, followed some months later by wasting of the limb and claw-hand, and terminating with a compression paraplegia due to invasion of the spinal canal by the tumour mass via the intervertebral foramina.

The most remarkable feature of the radiological findings in these cases of peripheral bronchial carcinoma is the comparative smallness of the lesion compared with the severity of the symptoms. They are recognizable as rounded opacities at the periphery of the lung fields, with a convexity towards the hilum. In lateral and oblique views they are in direct contact with the chest wall, and in most cases, to a greater or lesser degree, they involve and cause destruction of the adjacent overlying ribs; this destruction is most marked when they are situated at the apex of the lung, and may so far progress as actually to involve and erode the lateral surface of the spine, a condition present in the late stages of Cases I and IV. These are the only points which characterize such lesions radiologically. They do not interfere with the chest and lung expansion except secondarily, nor do they show any characteristic defect with lipiodol beyond failure of that substance to enter the opaque area, and some associated compression of the surrounding lung field.

The observation that our four cases of carcinoma of the apex of the upper lobe and all the twenty-six recorded in the literature occurred in males is of no significance, since carcinoma arising in any part of the lung is very much more common in males than in females. Only two of the last twenty-eight cases of bronchogenic carcinoma encountered at necropsy at the Liverpool Royal Infirmary have been those of females.

The average age of the previously reported cases with the full Pancoast syndrome is 47, with extremes of 31 and 62. Our four cases were aged 46, 48, 49, and 59. The average age of the last twenty-eight cases of hilar bronchogenic carcinoma we have seen at necropsy was 50, with extremes of 31 and 75. There is thus no difference in the age incidence of apical and hilar cancer.

Little indication has been observed that one lung is more often affected with apical carcinoma than the other.

It is true that our first four cases, in which the upper lobe was affected, were right-sided, but of twenty-eight in the literature fifteen were right and thirteen left: the difference is not statistically significant.

There are no histological features of the apical carcinomata to differentiate them from those arising in bronchi near the hilum of the lung. Geschickter and Denison (1934) make a surprisingly definite statement in this connexion. They analysed sixty cases of bronchogenic carcinoma and divided them rigidly into two classes: those arising at the hilum, which are squamous, basal-cell, or oat-cell in type; and those arising in the periphery of the lung, which are "adeno-columnar, adeno-mucoid, or adeno-cubical." Our experience has been very different. In the last twenty cases of hilar carcinoma coming to necropsy nine were oat-cell, six squamous, four mixed oat-cell and squamous, and one columnar-cell; and of six of the peripheral carcinomata that we now report one was oat-cell, two squamous, one spheroidal-cell, one a columnar-cell adenocarcinoma, and one a mixed oat-cell and columnar-cell type. Samson (1935) reported ten cases of bronchogenic adenocarcinoma, of which only one was peripheral, the remainder arising at the hilum; and Tuttle and Womack (1934) remark that most of the well-differentiated tumours in their series were at the hilum. There is therefore a striking lack of agreement.

We have included Cases V, VI, and VII in this series because they were examples of peripheral tumours which did not happen to be at the exact apex of the upper lobe. In Case V the tumour was at the apex of the left lower lobe and had directly invaded the seventh rib and the corresponding thoracic vertebra. Old adhesions were present in the pleural cavity. The tumour behaved in exactly the same manner as the apical tumours, but failed to produce the same symptoms because of anatomical differences. In Case VI the tumour was subapical, there were no pleural adhesions in that region, and the growth had not invaded the chest wall; the presence of tumour in the ribs was a result of blood-borne metastasis. In Case VII also the tumour was subapical, there were dense pleural adhesions, and the growth had infiltrated the parietal pleura without, however, grossly invading the adjacent ribs. We should like to suggest that the presence of old organized pleural adhesions in the region where a peripheral carcinoma happens to develop may well favour direct invasion of the chest wall by the tumour; and since adhesions at the apex are more common than elsewhere it is not surprising that apical carcinomata so constantly behave in this manner.

In conclusion, we claim to have shown that the peculiar clinical syndrome associated with tumours at the apex of the lung can be fully explained on anatomical grounds, and there is no reason for considering such tumours to be different in other respects from bronchogenic carcinomata arising elsewhere in the lung. It is well to bear in mind, however, the possibility of other types of tumour, primary or secondary, at the root of the neck producing a similar syndrome.

Summary

The previously reported cases of tumours at the apex of the lung are discussed.

Seven new cases of apical or subapical bronchogenic carcinomata are presented.

The clinical, radiological, and pathological features are discussed.

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AN OUTBREAK OF SONNE DYSENTERY

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On January 31, 1938, the bailiff of a farm in the Preston rural district gave information that some of the consumers of the milk produced there had been troubled with diarrhoea. The farm was visited forthwith and the following facts were elicited:

Particulars Concerning the Outbreak

1. The outbreak had started on January 26, and was characterized by diarrhoea and slight abdominal pains. The stools were slimy, but no blood was visible.
2. The cases were few, were limited to the consumers of the milk produced at the farm, and not all the consumers were affected. Among those affected were the four farm employees concerned with the production and delivery of the milk.
3. The quantity of milk produced was eight gallons daily. Four gallons of this were distributed. The remaining four gallons were mixed with milk from other farms and made into cheese.
4. No person at the farm had previously suffered from a similar illness.
5. The water supply to the farm was from two sources: (a) A shallow well: this water was used for washing the milk utensils. (b) A spring: this water was used for drinking purposes.
6. There had been no addition to the cattle for more than a year.

It was clear that the outbreak was milk-borne, and after consideration of the main features it was thought to be probably due to the Sonne dysentery organism. The following steps were accordingly taken:

(a) Distribution of the milk was prohibited for a period of two weeks in order that investigations could be made. Use of the milk on the farm was not prohibited providing it was boiled before use. No action was taken with regard to the cheese which had been made. The proportion of contaminated milk used in its manufacture was very small, and, further, it was known that conditions during "ripening" are so unfavourable that pathogenic organisms of the type under consideration do not survive.

(b) A list of consumers was obtained from the bailiff. (The list was subsequently shown to be incomplete, and this fact accounts for the delay in taking specimens in some cases.) Four of the households supplied with milk lived in the adjoining Garstang rural district. By arrangement with the medical officer of health of that district they were investigated by officers of the Preston rural district.

(c) Each household taking the milk was visited. Inquiries were made, specimens of faeces were taken where it was considered necessary, and instructions were given as to the disinfection of the hands, soiled clothing, and faeces of affected members.

(d) Samples of water from the well and spring were taken for bacteriological and chemical examination.

(e) All doctors practising within the area were notified of the occurrence of the outbreak.

The milk was supplied to twenty-four households, but only twelve were affected by the outbreak. Eighty-six persons were at risk, but only twenty-one became ill. The graph shows the daily distribution of the cases, five occurring on the first day.

It is interesting to speculate as to the number of cases that were "primary" and the number "secondary"—that is, the number which resulted from the consumption of milk that was in a contaminated state when received, and the number which were infected by members of their own households. It must be accepted that the cases occurring on January 26 and 27 were "primary" cases, and it is clear that those occurring on February 4 and 6 were "secondary," because the milk supply had been stopped on February 1. The position with regard to the cases which occurred from January 28 to February 1 inclusive is not clear: it is possible that all these were primary, and due to a common continuing source of infection. On the other hand, in all cases except one there was in the household an infected member of at least forty-eight hours' standing, and in the exceptional case there was abundant opportunity for it to be infected secondarily. The possibility of "secondary" infection cannot therefore be dismissed. The advent of secondary cases indicates that the instructions given to members of affected households were not efficiently carried out.

Graph of the outbreak, showing the daily distribution of cases.

The Water Supply

Samples of water were taken from both the shallow well and the spring, and were submitted to bacteriological and chemical examination. The bacteriological examination gave the following results:

	Shallow Well (Washing Water)	Spring (Drinking Water)
Bacterial colonies per c.cm.:		
Agar 37° C., 48 hours	450	60
Presumptive <i>B. coli</i> :		
Calculated number of organisms of <i>coli-aerogenes</i> group per 100 c.cm.	1,600	70
<i>B. dysenteriae</i> Sonne could not be isolated.		