proportion of 91 males to 7 females is due to the fact that the man more often seeks advice than does the woman because of the interference with wage-earning. The average age of the patients who came on account of intermittent claudication was 50 years, while of those suffering from gangrene the average was 56. The complications of arteriosclerosis are to be found at ages much younger than is generally supposed. Our youngest patient was a man aged 32 who came to amputation owing to gangrene of the foot due to thrombosis of an ulcerated, calcified popliteal artery. The immediate post-operative mortality was small in view of the bad surgical risks of this type of patient. There were four deaths—one from alcoholic delirium, one from a profuse haematemesis due to a duodenal ulcer, and two from pulmonary embolism.

The follow-up has been very thorough; only three of the cases are untraced. Twelve of the patients are known to have died and, as might be expected, the cause of death in ten of these has been certified as either "angina" or "coronary thrombosis." No case of diabetes is included in the list.

Of the 91 cases left for analysis, 88 were in the lower extremity and 3 in the arm. The sympathectomy was bilateral in 46 cases and unilateral in 45, thus providing for review the not inconsiderable number of 137 limbs. The 88 cases in the lower limbs may be further subdivided into 47 in which the operation was done for intermittent claudication and 41 in which the reason for operation was incipient or frank gangrene.

Results in Intermittent Claudication*

The post-operative history of these 47 cases is on the whole disappointing. They were all severe examples with claudication of the order of 25 to 50 yards (23–46 m.), and although not one has failed to show some improvement the majority have gained no more than 50 to 100 yards (45–90 m.). Nearly all say that the period of rest before they can go on again has been shortened and that the pain is not quite so acute. While this kind of result would hardly justify a major operation, it is gratifying to find that not one of these patients who have been followed for from 5 to 15 years has developed rest-pain or gangrene.

Though the average result has not been encouraging we find that six of these 47 cases were so far relieved as to become almost normal. One man returned to a heavy insurance round and walked many miles each day until he died suddenly from a coronary thrombosis. Another returned to his work and could walk any reasonable distance, but not uphill. This man was found at operation to have a complete obstruction of the aortic bifurcation. In the other successful cases the thrombosis was highly placed. These results are in agreement with an old observation that sympathectomy has given its best results in high obstructions. It may be possible by further study and experience to select with greater certainty the type of case that is likely to do well after operation.

Should operation be decided upon it should in all cases be bilateral, although complaint is usually made of one leg only; this is because the worse leg pulls the patient up before claudication can develop in its fellow. If these patients are tested by a claudicometer the second leg will usually be found to be little better than the one of which complaint is made.

Results in Cases with Gangrene

Since in arteriosclerosis there can be no question of a cure, the results in this group have been classified as "good" and "failed." By good is meant the abolition of rest-pain, the change from chronic invalidism to a life of reasonable activity, and the separation and healing of minor gangrenes. Judged on these lines the results in 21 cases were good, while in the remaining 20 the operation did not succeed and some form of amputation had to be done. We would point out, however, that in a sympathectomized limb it is often possible to perform a much less radical amputation than the customary one through the lower third of the thigh. A more detailed examination brings out the fact that without exception all the cases which gave good results were the earlier ones with rest-pain, persistent cyanosis, onychia, or minor gangrene of one or two toes.

A successful result depends upon the patency of a sufficient number of digital vessels. If the extent and degree of digital thrombosis are severe a good result is unlikely, and in doubtful

cases preliminary spinal analgesia or a paravertebral sympathetic chain block should be done to estimate how far the circulation can be restored. The cutting out of the constant wearing rest-pain after operation is often dramatic, but is seen only in those cases in which the operation has caused a definite improvement in the circulation. All the 20 cases which failed to show any improvement were instances of frank gangrene of two or more toes, or of the heel or dorsum of the foot.

It seems clear from these results that there is one stage in the downward progress of these patients at which sympathectomy may be usefully done. The time for it is the stage of rest-pain with deep rubor blanching rapidly on elevation or with persistent cyanosis. No more than trivial and superficial black patches should be present, but onychia can usually be got to heal.

If gangrene is more than trivial in extent, and especially if it be complicated by infection, the operation should not be done. In fact, two of the patients in our series showed a distinct and disquieting extension of the trouble after sympathectomy.

The Upper Extremity

The patients treated by sympathectomy for the complications of arteriosclerosis in the upper limb are too few to warrant any conclusions. They were, one case of thrombosis of the brachial artery and two cases of severe and crippling Raynaud's syndrome such as is sometimes seen in the hands of older and, more often, women patients. All three gave very good results. This is what one would expect from the better blood supply and more free anastomosis of the upper limb; it has no area comparable to the popliteal for danger.

Summary and Conclusions

Sympathectomy is not likely to lead to any worth-while improvement in the majority of patients suffering from intermittent claudication. There are, however, occasional excellent results. These appear to be found in patients with more proximal thrombosis, and it may be that further observation and experience will make for greater confidence in the selection of cases for operation.

Sympathectomy has no place in the treatment of extensive gangrene, but has been found to be of much value in the earlier pregangrenous states—e.g., rest-pain, persistent cyanosis, and small local lesions.

PRIMARY LUNG CANCER IN CHILDHOOD REPORT OF AN UNUSUAL CASE

BY

ARCHIBALD DICK, M.D., B.Sc.

Assistant Pathologist

AND

HUGH MILLER, F.R.C.S.Ed.

Honorary Surgeon

Royal Northern Infirmary, Inverness

The trend of opinion is that primary malignant disease of the lung is increasing; whether the increase is apparent or real is a question on which there has been no little controversy. The great majority of patients suffering from this disease are between the ages of 40 and 60. Thus Davidson (1930) recorded 107 cases of primary lung cancer with only two patients under 21 years, while Duguid (1927) described 173 cases with five under 21 years. Fried (1931) described 47 cases with only one patient between 20 and 29 years. References to primary lung cancer in childhood are still rare, and they are often unsatisfactory in that the origin of the primary growth is not always established. The diagnosis in childhood is often difficult; the following recorded cases each present some interesting but unusual feature. Wasch *et al.* (1940) described a case of bronchogenic carcinoma of seven years' duration in a boy aged 11. Sommer (1934) suggested the possibility of carcinomatous degeneration in a congenital cyst in a child 7 years old. Jones *et al.* (1943) described asthma as a presenting symptom in a boy of 10 years having a papillary growth extending into the lumen of the right main bronchus. Beardsley (1933) described an adenocarcinoma in a child of 23 months in whom secondary deposits had been evident 13 months previously. Hauser (1942)

recorded the case of a child of 17 months who had been ill for five months before the exact nature of the condition was realized.

The case to be described, in which the primary growth was not evident until eight months after a secondary deposit had become manifest, illustrates clearly the difficulties in the diagnosis of primary lung cancer in childhood, and would appear to be worth recording.

Case Record

The patient, a girl aged 9, was first seen at the out-patient department on March 9, 1944, complaining of pain in her left thigh of two weeks' duration, worse when walking and varying in amount each day. There had been no systemic upset or other sign of infection, but her doctor suggested the diagnosis of osteomyelitis and had started treatment with sulphadiazine. On examination there was tenderness over the upper end of the left femur, but no swelling of the thigh and no limitation of movement at the hip or knee-joint. X-ray examination showed no lesion of either femur; the leucocyte count was 10,650. There did not seem to be enough evidence to support the diagnosis of osteomyelitis, and she was allowed home, to be under observation.

On April 11 she was admitted to the Infirmary for further investigation; the pain in her left leg persisted, and was even troublesome when she lay in bed. Her general condition was satisfactory and she was afebrile; the leucocyte count was 8,250. A skiagram of the left leg now revealed a circumscribed area of atrophy just below the epiphyseal line of the greater trochanter; nine days later this atrophy was more pronounced, but at the end of two weeks no further change had occurred. The condition was regarded as an inflammatory process affecting the upper end of the femur, and the possibility of a tuberculous focus was kept in view. No member of the family had suffered from tuberculosis. Her symptoms improved somewhat, and she was allowed home on May 16, with the instruction to rest in bed.

The patient was readmitted six weeks later (June 26) complaining of fairly severe and continued pain in the left leg. Her general condition had deteriorated somewhat and locally there was swelling of the left thigh. X-ray examination revealed further destruction of the upper end of the femur extending towards the shaft; there was no periosteal reaction and the cortex of the bone remained unchanged. The radiological appearances suggested an acute medullary infection, yet this was not consistent with the relatively slight clinical upset. Haematological and biochemical investigations on June 30 showed: Hb, 80%; R.B.C., 4.34 millions; C.I., 0.92; W.B.C., 5,510 (neutrophils 57%, eosinophils 5.5%, lymphocytes 30.5%, monocytes 7%). Further differential counts on July 14 and 19 revealed an almost identical distribution of the blood cells. The urine contained no Bence-Jones protein. Serum: albumin 5.8 g. %, globulin 2.2 g. %, and calcium 10 mg. per 100 ml.

A reasonable diagnosis appeared to be that of subacute osteomyelitis of the femur, and operation was considered advisable. At operation on July 5 several drill-holes were made into the bone and necrotic material was removed. Histological examination of this material revealed the presence of spicules and trabeculae of bony tissue separated by loose vascular connective tissue with masses of very cellular necrotic tissue, the cells of which could not be identified with certainty, but the lesion appeared to be neoplastic. There was no evidence of myeloma; and Ewing's tumour, another possibility, did not seem likely owing to the situation away from the mid-shaft and the absence of the typical radiological appearances of this tumour. A skiagram of the chest at this time (July 12) showed: "Enlarged partially calcified hilar and peribronchial glands, with peribronchial thickening in upper lung fields."

From July 14 to Aug. 25 the patient received deep x-ray therapy to the left femur; kilovoltage, 200; dose in *r* units, 2,000. By July 27 the disease process seemed arrested and showed commencing sclerosis with a periosteal reaction on x-ray examination. By Sept. 19 the process appeared to have "healed" and there was much sclerosis in the affected area; there was also slight atrophy of the head of the femur and a tendency to coxa vara. The child had no pain and was able to walk freely. We felt gratified at the response to x-ray therapy and the patient was dismissed on Sept. 23; the diagnosis was still uncertain and the prognosis doubtful.

On Nov. 10, eight months after she was first seen, the patient was readmitted complaining of cough, headache, and vomiting. She was emaciated and very breathless; there was found to be marked dullness of the right side of the chest, the clinical findings suggesting a right-sided pleural effusion. Aspiration of the chest revealed only a small quantity of blood-stained fluid which contained a few lymphocytes and some endothelial cells; there was no evidence of neoplastic cells. Further aspiration was attempted, but very little fluid was obtained, and the appearances were those of a needle entering solid lung or tumour tissue. The diagnosis was that of a malignant condition of the right lung, probably secondary to the obscure condition of the femur. X-ray therapy to the chest was

carried out from Dec. 12 to 22, by which time the general condition did not permit of further treatment. The patient died on Jan. 4, 1945.

Necropsy Findings.—The body was that of a very thin emaciated girl. The mediastinum was enlarged and was displaced to the left. The right lung was almost entirely replaced by a large mass of necrotic malignant tissue arising from the upper main bronchus. The tumour had invaded the chest wall and the mediastinum. The left lung and the heart, apart from displacement, presented a fairly normal appearance. The abdominal viscera were all free from the neoplastic process. The upper end of the left femur was replaced by yellowish necrotic tissue, which on the lateral surface extended to the periosteum, and the cortex of this part of the bone was considerably thinned. Histological examination of the lung revealed the presence of a primary bronchial carcinoma of the anaplastic type which had involved the whole of the right lung. The lesion in the femur was of similar histological structure.

Discussion

This case of primary lung cancer in childhood, in which the correct diagnosis was not established until necropsy, presents several interesting features. Histological examination of the necrotic material from the bone first suggested the possibility of a neoplastic process; the local response to x-ray therapy was satisfactory, and substantiated this diagnosis. When the patient returned to hospital presenting pulmonary symptoms the first impression was that she had secondary deposits in her right lung causing a massive effusion. (It should be noted that a skiagram of the chest four months previously had revealed no evidence of a bronchial neoplasm.) The radiological appearances of the chest were now consistent with those of a massive pleural effusion, and it was not until a second aspiration was attempted that the nature of the lesion was recognized. Hauser (1942) had previously observed that a sufficiently large tumour causing displacement of the mediastinum may resemble an effusion. Having established the presence of a large lung tumour, it still seemed likely that the pulmonary lesion was secondary to that in the bone. As was stated by Florman (1943), metastatic tumours in the lung in childhood are less rare than primary tumours, since many neoplasms occurring in early life invade the blood stream and become seeded in the lungs. The primary lesion, which had remained unrecognized for eight months, was, however, found to be a bronchial carcinoma, and the lesion of the right femur was secondary. Allen and Smith (1932) have pointed out that metastatic tumours may give rise to symptoms before the original site is suspected of disease, but it is most unusual to find a primary bronchial carcinoma giving rise to a single secondary deposit in bone. We doubt if the correct diagnosis could have been established at an earlier stage; there was nothing to suggest a pulmonary lesion until one month before death. This case therefore stresses the likelihood of early metastases, but unfortunately offers no clue to the cause of the growth.

Summary

A case of primary lung cancer in a girl aged 9 is described. A single metastasis in the left femur caused symptoms eight months before the pulmonary lesion was recognized. The difficulties in the clinical and radiological diagnosis of the condition are discussed.

We wish to thank Dr. Gottlieb of the radiological department for his help with this case.

REFERENCES

- Allen, C. I., and Smith, F. J. (1932). *Surg. Gynec. Obstet.*, **55**, 151.
Beardsley, J. M. (1933). *Canad. med. Ass. J.*, **29**, 257.
Davidson, M. (1930). *Cancer of the Lung and Other Intrathoracic Tumours*. J. Wright and Sons, Bristol.
Duguid, J. B. (1927). *Lancet*, **2**, 111.
Florman, A. L. (1943). *J. Mt. Sinai Hosp.*, N.Y., **10**, 429.
Fried, B. M. (1931). *Medicine*, **10**, 375.
Hauser, H. (1942). *Radiology*, **39**, 33.
Jones, R., Mackenzie, K. W., and Biddle, E. (1943). *Brit. J. Tuberc.*, **37**, 113.
Sommer, A. W. (1934). *Minnesota Med.*, **17**, 415.
Wasch, M. G., Lederer, M., and Epstein, B. S. (1940). *J. Pediat.*, **17**, 521.

Reviews of current literature bearing on various aspects of child welfare, by specialists in their own subjects, are a feature of the March issue of *The World's Children* (20, Gordon Square, London, W.C.; 6d.): Dr. H. Mannheim, of the London School of Economics, writes on juvenile delinquency and the law; Mr. F. Le Gros Clark on science and nutrition; and Dr. R. G. Gordon on problems of adolescence. Mr. John Morgan considers the National Insurance Bill from the point of view of its relation to children and family welfare; Dr. Harold A. Moody discusses the problem of illegitimate children of English mothers and American negro troops; and Dr. R. P. Stewart, writing from Greece, deals with the question of nutrition in that country.