

and before resorting to surgery in the future the effects of this drug should be tried.

Summary

A case record is presented of tuberculosis of the breast and underlying costo-chondral junction. The patient gave a history of old tuberculous peritonitis and tuberculous cervical adenitis. Tubercle bacilli were isolated from the discharging sinus. The general features of the disease, the symptomatology, and the differential diagnosis are described, and special emphasis is laid on the importance of differentiating carcinoma. Attention is called to the association of tuberculosis and carcinoma in the same breast. The treatment is described for various types of case.

I wish to thank Dr. J. H. O. Earle for studying the pathology of the specimen, and Dr. Peter Hansell for the photograph.

REFERENCES

- Cooper, Sir Astley (1829). *Illustration of Disease of the Breast*. London.
- Grausman, R. I., and Goldman, M. L. (1945). *Amer. J. Surg.*, **67**, 48.
- McGehee, J. L., and Schmeisser, H. C. (1935). *Ibid.*, **28**, 461.
- Morgen, M. (1931). *Surg. Gynec. Obstet.*, **53**, 593.
- Nagashima, Y. (1925). *Arch. Path. Anat.*, **254**, 184.
- Nicolson, W. P., and Gillespie, C. E. (1941). *Sth. Surg.*, **10**, 825.

SOLITARY CEREBRAL METASTASES FROM BRONCHIAL CARCINOMATA

THEIR INCIDENCE AND A CASE OF SUCCESSFUL REMOVAL

BY

GEOFFREY FLAVELL, F.R.C.S., M.R.C.P.

(From the Department of Thoracic Surgery, London Hospital)

The extirpation of metastases is not generally regarded as a rewarding surgical practice, and although many an abdominal surgeon must have been tempted to resect an apparently single deposit in the liver, and many a thoracic one must at some time or other have mistaken a secondary tumour in the lung for a primary lesion, few records of their experiences exist, and fewer still of the planned removal of both primary and secondary growths.

One is apt to assume that the appearance of a metastasis inevitably implies the existence of others and the certainty of death, and examples in the literature to support a contrary hope are rare. In 1946 Alexander and Haight were, however, able to collect the histories of 24 patients who had undergone pulmonary resections for solitary metastases in the lung after previous excisions of the primary growths, 15 of which were carcinomata and eight sarcomata. Of the 24, one died, 11 had recurrences, but 12 remained free; and among the latter eight survived their resections by more than a year. One patient (who lived 12 years) had originally been operated upon by Barney (1944a, 1944b) for a renal adenocarcinoma, the lung metastasis having been seen a year before his nephrectomy and removed a year later, so that its malignancy must have been low. Six other of the primary lesions were also renal-cell carcinomata, and it is of interest that both Bumpus (1928) and Beer (1937) have reported spontaneous regression of such metastases.

Albright in 1944, Friedman in 1943, and Turner and German in 1941 have described in all four instances of successful extirpation of characteristically slow-growing skull metastases from thyroid carcinomata; and Cattell (1940) reports a patient well one year after the removal of a solitary secondary in the liver at the abdominal stage of an abdomino-perineal resection of a rectal carcinoma. He argues, "The patient is better off with a large focus of malignancy removed, and there is at least some clinical

evidence that there may be retardation of the malignant process."

The only successful removal on record (apart from the one reported below) of both primary and cerebral secondary growths was carried out by Thurel in 1942, when he excised a deposit from the right frontal lobe of a patient who had had a Halsted operation for carcinoma of the breast exactly a year previously. She remained symptomless two years later (Alajouanine, Thurel, and Longuet, 1944).

The incidence of cerebral metastasis in carcinoma of the lung was estimated by Ochsner and de Bakey, reviewing 3,047 patients, to be 16.5%. Other authorities put the figure even higher—Graham and Wagner at 24% and Olsen at 36%. In 448 proved pulmonary cancers Tinney and Moersch (1944) found that 19 (4%) presented with central nervous symptoms, and in these people the average duration of life from the onset of their symptoms was six months.

In the necropsy records of the London Hospital from 1909 to 1949 I have been able to find 85 examples of cerebral metastases accompanying a primary bronchial carcinoma. Of these, 26 were single in the brain or cerebellum—a percentage of 31 in a group of whom many died in the extremity of their disease, with numerous secondary deposits elsewhere in their bodies. Furthermore, eight (9.4%) were completely solitary in the body (if removable hilar glands alone be ignored); the cerebral lesion was a lonely satellite of the pulmonary primary growth—one, indeed, occurred two years after a successful pneumonectomy.

Case Report

In June, 1947, a man aged 34, in a responsible clerical position, was found on mass radiography to have a circumscribed shadow at the hilum of his left lung. He had had no symptoms of any sort, but one day in October he developed a headache, accompanied by noises and followed an hour later by an epileptiform fit in which he lost consciousness for 10 minutes and was incontinent of urine. This was not repeated, but frontal and vertical headaches persisted and were later associated with occasional diplopia, flashes of light, and other visual disturbances. He was admitted to the London Hospital on November 22, 1947, and except for early papilloedema, very slight left lower facial weakness, and equally slight bilateral hypotonia (a little more pronounced upon the left side), he had no abnormal physical signs either of his chest or of his nervous system. Lumbar puncture revealed a pressure of 210 mm., and the protein content of the cerebrospinal fluid was raised to 120 mg. per 100 ml. Although bronchoscopy was negative, there seemed to be little doubt that a primary carcinoma of the left lung was accompanied by a cerebral metastasis. Since the necropsy findings on similar patients, as already mentioned, gave some encouragement, a deliberate plan was then made to attack the secondary deposit, and, if it proved operable and was single, subsequently to remove the lung with its primary growth.

Because the symptoms and signs of raised intracranial pressure became severe, a palliative right subtemporal decompression was performed on December 18. This proved effective, and on January 8, 1948, ventriculography showed displacement of the system to the left, with no filling of the right ventricle, indicating a large right-sided lesion. Consequently a right fronto-lateral exploratory craniotomy was carried out by Mr. D. W. C. Northfield; this revealed a highly vascular lobulated mass about 7 by 4 cm., occupying a superficial position in the right temporal lobe, but not transgressing the Sylvian fissure. It was secondarily adherent to the dura mater over some 2 cm.² The whole tumour, with a narrow margin of apparently healthy brain tissue, was removed with the overlying adherent dura. Histological section proved it to be a secondary carcinoma, but gave little indication of its origin.

The patient made a good recovery, and eight weeks later was readmitted, this time to the thoracic surgery department.

Radiographs showed that the chest opacity had very considerably increased in the past three months, but bronchoscopy remained negative. On March 11 a left pneumonectomy was carried out by Mr. Vernon Thompson. The growth, which was in the hilar region, was massive, but no enlarged mediastinal glands were found, and there was no growth in several hilar glands later sectioned. The tumour was a squamous-celled carcinoma. Convalescence was again uneventful, but in view of the dural adhesions the patient was referred to Dr. Frank Ellis for deep x-irradiation of the region of the cranial defect. No radiation was given to the chest.

At the time of writing, 18 months after the removal of his lung, the patient is well, works a full day in his exacting employment, and has no sign of recurrence or of any further metastasis.

I am indebted to Mr. D. W. C. Northfield and to Mr. Vernon Thompson for permission to publish this case history; and to Professor Dorothy Russell and Dr. W. W. Woods for their kind assistance.

REFERENCES

Alajouanine, Th., Thurel, R., and Longuet, Y.-J. (1944). *Rev. Neurol.*, 76, 267.
 Albright, Hollis L. (1944). *New Engl. J. Med.*, 230, 573.
 Alexander, J., and Haight, Cameron (1946). *Univ. Hosp. Bull., Ann Arbor*, 12, 117.
 Barney, J. J. Dellinger (1944a). *J. Urol.*, 52, 406.
 — (1944b). *Trans. Amer. Ass. gen.-urin. Surg.*, 37, 189.
 Beer, E. (1937). *Surg. Gynec. Obstet.*, 65, 433.
 Bumpus, H. C. (1928). *J. Urol.*, 20, 185.
 Cattell, R. B. (1940). *Lahey Clin. Bull.*, 2, 7.
 Friedman, H. H. (1943). *Arch. Surg.*, 46, 377.
 Tinney, W. S., and Moersch, H. J. (1944). *Arch. Otolaryng.*, 39, 243.
 Turner, O., and German, W. J. (1941). *Surgery*, 9, 403.

faeces was intimately mixed with saturated sodium chloride solution in a test-tube, filled to the brim, and a slide placed in contact with the upper surface of the fluid. After 30 minutes the slide was removed and a cover-slip placed on the adherent fluid.

Altogether 1,000 specimens were examined. During the examination it became evident that two distinct eggs were being diagnosed as those of hookworm. In the accompanying Table these are quoted together as "hookworm."

| Parasite | In Direct Film | In Flotation | In Direct Film Only | Total Reported |
|--------------------------------|----------------|--------------|---------------------|----------------|
| "Hookworm" .. | 278 | 675 | 20 | 695 |
| <i>Ascaris lumbricoides</i> .. | 162 | 211 | 55 | 266 |
| <i>Trichuris trichiura</i> .. | 25 | 74 | 13 | 87 |
| <i>Hymenolepis nana</i> .. | 8 | 17 | 3 | 20 |
| Double infestation .. | — | — | — | 229 |
| Treble infestation .. | — | — | — | 171 |
| No infestation .. | — | — | — | 173 |

Enterobius vermicularis was not seen in this series, and is distinctly rare. The ova were reported only 10 times in 19,000 routine specimens in the year 1948, but no special methods such as anal scraping were employed. Similarly *Taenia saginata* was not encountered, but it is fairly frequent, ova or segments having been found 144 times in the same series of 19,000. *Taenia solium* is unknown, but is not to be expected among a people whose religion forbids the eating of pork.

The differences noted between these two "hookworm" ova before the identity of both was established were as follows: One was the characteristic *Ancylostoma* egg with rounded ends, one, two, or four blastomeres, and an opalescent appearance. The other was somewhat larger, always showed advanced segmentation, and had one end rounded and the other slightly pointed. It lacked the opalescent appearance of true hookworm and was much more clearly visible under the low-power objective of the microscope.

Once the distinction was established, the number of each appearing in the second 500 specimens was recorded and found to be 16 of the true hookworm and 324 of the false. This agrees fairly well with the figures recorded for the year 1948, when all the technicians were familiar with the two types: 67 cases of true hookworm were reported and 1,671 of its imitator.

Craig and Faust (1945) describe *Trichostrongylus* as a very frequent parasite of sheep and goats. Thirty samples of faeces were therefore collected from sheep intestines obtained from the local slaughterhouse and ova identical with those found in human faeces were observed in all of them. In addition adult worms were discovered in five of the sheep.

The adult worms have not been found in man. The population is overwhelmingly Moslem and the strongest objection is made to necropsies. Consequently only an occasional medico-legal necropsy is done, and, although a search is made for *Trichostrongylus* on each occasion, this has so far yielded no results and the species remains unidentified. Five patients were admitted to hospital and treated with a succession of anthelmintic drugs, but no worms were found in the stools and the men all continued to pass ova. This is in accordance with Maplestone's (1941) statement that no effective means of eradicating the worms is known.

Although final and complete proof that this second parasite was *Trichostrongylus* had not been obtained, as the adult worms had not been isolated, the parasite was assumed to be of this genus for the following reasons: (1) The climate is not one in which the life cycle of *Ancylostoma* could favourably be completed; (2) the wearing of shoes

HUMAN INFESTATION WITH TRICHO-STRONGYLUS IN SOUTH PERSIA

BY

IAN S. STEWART, M.B., Ch.B.

Pathologist, Anglo-Iranian Oil Co., Ltd.

An investigation of the worm infestation of the labourers employed by the Anglo-Iranian Oil Company at their refinery at Abadan was undertaken in January, 1947. These men numbered 30,000, and from the routine investigations made in the company's pathological laboratories it was believed that about one-quarter of them harboured hookworm and about one-sixth of them *Ascaris*. *Trichuris*, *Enterobius*, and *Hymenolepis* were known to be much less frequent.

Abadan Island is mainly arid desert, except for a belt of date palms at its margin and in the residential areas close to the refinery, where abundant irrigation by pumped river water is available. For most of the year the climate is extremely hot and dry, the rainfall occurring only in the cool winter months. The refinery area is furnished with metalled roads, and the labourers wear shoes except when in their own homes. The conditions therefore are the very reverse of those in which ankylostomiasis would be frequent.

"Ground itch" around the ankles is not seen, grave anaemia is infrequent, and attempts to dislodge the worms by means of such drugs as carbon tetrachloride and tetrachlorethylene had been consistently unsuccessful. One notable case was that of a British medical officer who had passed ova for five years in spite of the use of all known treatments and who had remained in excellent health except when enduring the discomforts of purgation.

Present Investigation

Technique of Laboratory Investigation.—(1) A fragment of freshly passed faeces was emulsified in saline on a slide, and a cover-slip applied. (2) A considerable quantity of