Solitary Intramedullary Carcinomatous Metastasis in the Spinal Cord
Case Report

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Although neoplastic metastases are frequently found in the brain and are not uncommon in the spinal epidural and subarachnoid spaces, Benson found only 24 examples of intramedullary spinal cord metastases in the literature. The 23 primary sites actually specified were lung (10 cases), breast (3 cases), kidney (3 cases), melanoma (3 cases), adrenal (1 case), chorionepithelioma (1 case), colon (1 case), and sarcoma of testicle (1 case). Other cases were mentioned by Hughes. Intramedullary metastases have almost always been associated with deposits in the brain or other organs, the vertebrae, or the spinal meninges. The case we report is exceptional in that a carcinoma of the bronchus was associated with a solitary, circumscribed, intramedullary spinal deposit confined to the upper five cervical segments.

Clinical History

A 66-year-old man had experienced pain across both shoulders 2 months prior to admission in October, 1967. The pain gradually lessened and passed away, but returned a few days later and continued from that time on. The pain crossed the top of the shoulders and passed down the outer side of each arm as far as the elbows. At the same time he experienced pain in both buttocks and both legs, which he likened to “sciatica” that had occurred in the right leg 5 years previously. For 2 weeks he had noticed weakness in both arms especially in the hands, and he had lost sleep and tended to walk about during the night because the pain was so severe when he lay down. Recently, the pain had extended up the back of the neck as far as the base of skull. Involuntary extension movements of the legs had occurred in the last few days, mainly on the right side, and he had been aware of variable numbness in the left side of the body and the right leg.

Examination. The patient had a spastic quadriplegia with wasting of the small muscles of the hands and the muscles of the forearms. Tendon jerks in the legs were increased, with ankle clonus and extensor plantar responses. There was impairment to pinprick perception on the right side up to about umbilical level, the upper level being vague, and also in the tips of the fingers. Occasionally there were involuntary extension movements of the legs, especially the right. X-ray of the chest showed a paramediastinal soft tissue mass above the left hilum, probably from collapse of the apical posterior segment of the left upper lobe. A bronchogenic carcinoma was thought to be the likeliest cause of this. The cerebrospinal fluid showed a protein of 140 mg/100 ml, a negative Lange test, and less than 1 white blood cell per cu mm. A cervical myelogram showed complete block at C6–7; from the shape of the termination of the myodil column this was thought to be due to an intramedullary tumor.

Operation. Cervical laminectomy was performed, but no clear evidence of tumor was found. A spondylotic ridge with protrusion of the intervertebral disc was found at C6–7, and this was decompressed. The cord was swollen over this area, but was not markedly displaced dorsally.

Postoperative Course. The patient became increasingly incapacitated from quadraparesis, and his respiration became very distressed. He was treated in a respirator for a time, but continued to deteriorate. He died 23 days after admission.

Postmortem Examination. A tumor mass arising from the left upper lobe bronchus measured 4.5 × 2.5 cm on its cut surface. The whole left lung and the right lower lobe showed bronchopneumonia, patchy collapse, and many small abscesses. There was also a
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chronic, benign, duodenal ulcer (3 × 2 cm) 2.5 cm beyond the pylorus. Oesophagus, peritoneum, stomach, rest of intestines, pancreas, liver (1390 gm), spleen (100 gm), kidneys (245 gm), ureters, bladder, prostate, adrenals, thyroid, abdominal aorta, inferior vena cava, and intra-abdominal lymph nodes were all normal.

The skull and brain (1600 gm) were macroscopically normal. The spine showed a healed laminectomy C-5 through C-7. There were no osseous metastases. The spinal dura looked normal, but when opened the spinal cord showed fusiform swelling of the upper six segments, most marked over the 3rd and 4th segments where the maximal transverse diameter was 1.8 cm. The pia-arachnoid was normal. After fixation, transverse sections of the cervical cord showed a well-defined central, firm, gray lesion, measuring 1.2 cm (horizontally) × 0.8 cm (vertically) in segments 3 and 4 (Fig. 1). In segments 1, 2, and 5 the lesion was much smaller, and from the 6th cervical to the 1st thoracic segments became replaced by a central hemorrhage about 0.1 cm across. From T-2 caudally the spinal cord and cauda equina were normal.

Histological Examination

The lung tumor was a primary carcinoma, mainly undifferentiated but in places showing squamous or adeniform differentiation (Fig. 2 left). Suppurative bronchopneumonia was confirmed in the rest of the lung but there were no pulmonary metastases. All other non-neural viscera and the cerebral hemispheres, brain stem, and cerebellum were free from microscopic metastases.

The central lesion in the spinal cord was a metastatic deposit of carcinoma similar to the lung primary (Fig. 2 right). It lay wholly in the posterior columns, being demarcated laterally by the posterior horns and anteriorly by the posterior gray commissure and central canal. Around the deposit, the myelin of the posterior and lateral columns stained palely, was swollen, and showed sudanophilic degeneration. The intensity of myelin staining showed patchy, "geographical" variation, suggesting microinfarction in places. Numerous swollen eosinophilic, axial spheroids were seen within ellipsoids of fragmented myelin.

Toward the periphery of the cord, at the level of the metastasis, small blood vessels of capillary size contained tumor cells (Fig. 3). Below the deposit the hemorrhage was more widespread than macroscopic inspection had suggested; the blood was wholly within the central gray commissure, tracking posterolaterally along the posterior horns, suggesting that these preformed pathways offered less resistance than the surrounding columns of white matter. Within and around the metastasis there were foci of pigmented siderophages due to previous hemorrhage. The rest of the cord, pia-arachnoid, and dura were quite normal and free from metastases.

Discussion

The site of the intramedullary metastasis, situated wholly within the posterior columns and delimited by the posterior horns and central gray commissure, was noteworthy. The degeneration of neural tissue around the tumor can be attributed to the combined effects of "edematous swelling" and patchy infarction resulting from occlusion of small vascular channels by carcinoma cells. It was not possible to decide whether these intravascular clumps of tumor cells were arterial emboli derived from the primary neoplasm, or venous emboli that had reached the cord parenchyma via the vertebral veins, in accordance with the studies of Batson\(^3\) and Anderson;\(^4\) a further possibility was that the intravascular clumps were not derived from the primary lung carcinoma but represented centrifugal vascular permeation from the intramedullary metastasis. The fact that the