BENIGN EXTRAVERTEBRAL TUMOURS PRODUCING SYMPTOMS OF THE SPINAL CORD: REPORT OF THREE CASES.*

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BENIGN extravertebral tumours, producing symptoms of pressure on the spinal cord, seem to be rare. Up to 1889 de Quervain had reported twenty-five cases of fibroma of the neck which produced such compression. In 1902, Boerner added four cases to the series. In an analysis of 330 cases of spinal cord tumours, collected by Frazier and reported by Steinke in 1918, no such tumours were described. Flateau, discussing extravertebral growths, mentions them as belonging mostly to the various types of sarcoma, others being neurofibromas, myelomas, fibromas, enchondromas, echinococcus cysts, and angioliipomas; they are usually located in the posterior division of the mediastinum, and may penetrate the intervertebral discs and produce pressure on the spinal cord. Others originate in the muscles of the neck and trunk, and in the abdominal cavity.

Beriel and Viret, in 1923, reported two cases of polyneuromas, showing that the tumour spreads exclusively by nerve tissue, and lingers for years in the spinal roots before entering the spine. Neuromatous bunches in the neck had been noted for thirteen years in one of these cases. In the other case the right arm had been weak since childhood.

Two of the three cases observed in the Mayo Clinic were neurofibromas, and the other was a cellular fibroma. In one of the cases of neurofibroma, a small tumour could be seen and palpated to the right of the twelfth thoracic spine; in the other, the tumour produced a firm and prominent enlargement in the left posterior cervical region. In the third case the tumour could not be palpated, but was revealed by *x*-ray as a mass lying to the left of the sixth dorsal vertebra.

REPORT OF CASES.

CASE 1 (A142990).—A woman, aged twenty years, came to the Clinic on October 8, 1915, complaining of paralysis of both legs, partial loss of bladder and rectal control, and deformity of the dorsolumbar spine. Prior to the onset of this trouble the patient had been a healthy, athletic school girl. The

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trouble began four and a half years before by a sudden falling, without pain or premonitory symptoms. She was able to get up immediately and walk quite normally. She would fall, for instance, when playing basket ball, without apparent reason. Three months later she began to note weakness in the right leg in going upstairs. Six months after the onset, this weakness was definite and she dragged the leg in walking. Impairment of bladder and rectal control followed. The patient gradually grew worse for the next three years, requiring a cane, then crutches and lastly a wheel chair. In the spring of 1913 a small tumour was noted just to the right of the twelfth thoracic vertebra. This had gradually increased in size, but was not painful on pressure.

Examination revealed that the patient was well developed, and fairly well nourished. The cranial nerves, upper extremities, and upper portion of the trunk were normal. The patient was paralysed from the waist down and had incontinence of urine and faeces. Both legs were œdematous, the right more so than the left. They were very spastic, almost immobile, and would not support the patient. The patellar reflex was not obtained on the right, and was weak on the left; ankle jerks were present and equal, and a bilateral ankle clonus was easily obtained; bilateral positive Rossolimo, but no positive Babinski reflexes were elicited. There was complete loss of cutaneous and deep sensibility below the eleventh dorsal segment.

A roentgenogram of the lateral view of the spine revealed a destruction of the arches of the twelfth thoracic and first lumbar vertebræ (*Fig. 1*). Spinal puncture was not performed.

A diagnosis was made of compression myelitis, possibly from tuberculosis or sarcoma, the upper level of the compression being at the eleventh dorsal segment. A laminectomy was performed on October 18. A subcutaneous tumour, 10 cm. in diameter, was encountered just to the right of the twelfth dorsal vertebra. Grossly, this tumour suggested sarcoma, but a microscopic section revealed it to be a fibroma. The arches of the ninth dorsal to the first lumbar vertebræ were removed. An extensive, irregular, but completely encapsulated tumour was entirely removed. It had extended into the deep

FIG. 1.—Case 1. Lateral view of spine showing destruction of the arches of the twelfth thoracic and first lumbar vertebræ.

muscles of the back, more on the right than on the left, had worked its way upward and under the twelfth rib on the right, where it was adherent to the pleura, had eroded the arches of the ninth, tenth, eleventh and twelfth dorsal and first lumbar vertebrae, and had compressed the cord extensively, but without penetrating the dura; this was left intact (*Fig. 3*).

FIG. 2.—Case 1. Cellular fibroma. ($\times 120$.)

The pathologist's diagnosis was cellular fibroma (*Fig. 2*).

This patient has been heard from within a year. She gets about very comfortably in a wheel chair, has normal control of bladder and rectal sphincters and slight return of sensation.

CASE 2 (A394867).—A man, aged twenty-seven years, came to the Clinic on June 14, 1922, with paralysis of the arms and legs. For fifteen years he had had a 'knot' on the left side of the neck just below the mastoid prominence. This had grown more rapidly in the last two years. Five years before examina-

FIG. 3.—Case 1. Gross specimen of tumour.

tion his tonsils had been removed with the hope that the lump would disappear. In June, 1921, the left wrist became sore and stiff. This 'neuritis' subsequently involved the entire left arm. The pain was severe and throb-

bing in character, and continued until April, 1922. In September slight weakness and wasting of the muscles around the hand and the left arm were noted. The weakness became more marked and progressed to the shoulder. The patient demonstrated a wrist clonus, which he could produce with ease. The entire arm was tender to touch, and hypersensitive to cold and heat. Within the next week or two the weakness and stiffness progressed and the left leg could not be used. Ankle clonus was also noted by the patient. Vertical headaches, dull in character, were relieved by massage. The patient's neck was stiff. A collar felt like a tight band around the neck, the sensation persisting for some time after the collar was removed. In November weakness and pain of the right arm began, first in the fingers, and later extending towards the shoulder. This was accompanied by atrophy of the muscles and a tendency toward flexion deformity. In January, 1923, the right leg became weak and stiff. The patient thought that both legs became smaller for a time and then returned to normal size.

General examination revealed a smooth, tough, slightly movable tumour raised about 2 cm. above the surrounding surface, and about 6 cm. in diameter, extending from the cervical spine on the left side to the angle of the jaw antero-posteriorly and from the base of the skull from above downward. There was almost complete paralysis of all voluntary muscles below the neck, and the patient lay on the bed with both arms flexed on the chest. The accessory respiratory muscles and possibly the upper two intercostal muscles were actively engaged in carrying on the respiratory movements. The diaphragm seemed to be completely paralysed. Power of the left leg was considerably reduced; the other extremities were practically immobile. There was a good deal of atrophy of the smaller muscles of the hands, of the triceps muscles, and of supinator muscles on both sides. Many fibrillary tremors were noted in both triceps and in the right supinator longus muscles. The tendon reflexes of the upper and lower extremities were all moderately increased. The abdominal reflexes were absent. The plantar responses were positive on both sides by the Babinski, Oppenheim and Chaddock methods; the Rossolimo and Mendel-Bechterew reflexes were positive on the right side. Touch, pain, and temperature sensibilities were impaired over the entire body below the distribution of the fifth cranial nerve, tactile sensibility being slightly less impaired than either pain or temperature. The impairment was moderate above the cutaneous representation of the fourth cervical segment, complete between the fourth cervical and tenth dorsal segments, below which there was a progressive improvement, the impairment being moderate in degree over both feet and over the sacral area. In the course of sensory examinations a stinging and tingling sensation appeared over the upper portion of the chest and over the lower extremities, which interfered greatly with the patient's ability to differentiate and recognize the stimuli produced. Vibration and joint sensibility were almost completely lost below the shoulders. Muscle tenderness was greatly reduced throughout. There was almost complete vesical and rectal incontinence. X-rays of the cervical spine revealed a rudimentary cervical rib on the right. X-rays of the chest and dorsal spine were negative. The routine laboratory tests, including Wassermann tests of the blood and the spinal fluid examination, were negative throughout.

A diagnosis was made of spinal cord tumour, possibly fibrolipoma probably communicating with the mass in the posterior cervical region, and producing maximal compression of the cord at the level of the sixth cervical segment, but with some involvement above this point.

FIG. 4.—Case 2. Gross specimen of tumour.

A laminectomy, under local anaesthesia, was performed. A dumbbell shaped tumour was found. It extended into the muscles of the neck on the left side, reaching a maximal diameter of 6 cm.; a small portion of it eroded the left transverse process of the second cervical vertebra and extended into the canal between the axis and atlas, producing marked pressure on the dura. The tumour was enucleated completely, and without difficulty (*Fig. 4*). The dura was not opened.

The patient's convalescence was uneventful, and he began to move arms and legs ten days after the operation. Microscopic examination revealed neuro-

fibroma (*Fig. 5*). In June, 1923, the patient seemed to be perfectly well, and in December returned to his work as a telephone lineman.

CASE 3 (A446205).—A woman, aged thirty-seven years, came to the Clinic on October 31, 1923, because she was unable to walk. About fifteen months before she began to feel exhausted, usually in the morning after getting up, but as the day wore on this disappeared. About one month after the onset she suddenly dropped to the floor, an incident she attributed to 'turning her ankle.' She got up immediately and walked quite normally. In the next three months these sudden, momentary attacks of sinking to the ground occurred at irregular intervals. She was obliged to give up her work as a private telephone exchange operator, and remained confined to her bed for various periods, on the advice of her family physician. In December she had one of her usual attacks, but this time was unable to get up by her own efforts, and since then had been paralyzed in both lower extremities. The condition remained practically stationary until one month before, when she noted an occa-

FIG. 5.—Case 2. Neurofibroma. ($\times 120$.)

sional numbness and a band-like sensation around the ankles. The knee-joints were sometimes tender to pressure. No sensory disturbances had been noted. She had one or two involuntary evacuations of the bladder, and when using the bedpan was not conscious of the passage of urine. There was no rectal incontinence.

On examination no noteworthy abnormality was found above the waist. There was, however, complete loss of power of the lower extremities, without atrophy, but with some increase in tonicities. The patellar and Achilles reflexes were greatly increased, the abdominal reflexes were absent, and the plantar responses were extensor by the Babinski, Chaddock, Rossolimo and Mendel-Bechterew tests. All forms of superficial and deep sensibility were lost below the distribution corresponding to the ninth dorsal segment. The loss was complete over the saddle area. There was slight urinary incontinence. Lateral *x*-ray of the spine was negative. An antero-posterior view disclosed a dense shadow lying to the left of the sixth, seventh, and eighth dorsal vertebrae (*Fig. 6*). The urinalysis and Wassermann (Kolmer technic) reaction were negative. The hæmoglobin was 57 per cent.; the erythrocytes numbered 4,000,000 and the leucocytes 4,600. The examination of the spinal fluid, of which only 4 c.c. could be obtained, showed normal physical properties, a negative Wassermann (Kolmer) reaction, a positive Nonne, one small lymphocyte to the cubic millimetre, and a colloidal benzoin reaction of 000 000 130 033 333.

FIG. 6.—Case 3. Anteroposterior view of the dorsal spine, showing dense shadow to the left of sixth, seventh, and eighth dorsal vertebrae.

A diagnosis was made of a transverse cord lesion at the level of the ninth dorsal segment, probably the result of pressure and related to the tumour shown by *x*-ray.

A diagnostic puncture was made into the mass on November 22, 1923; the needle encountered definite resistance, but no fluid. The patient was operated on on November 29. The intrathoracic portion of the tumour was exposed in order to resect the posterior portions of the sixth, seventh and eighth ribs, after which was exposed a greyish-red, moderately firm, and somewhat nodular, but well-encapsulated tumour, 8 by 6 cm., and extending forward as far as the anterior portion of the vertebral bodies. The pleura had

to be reflected from the tumour in a number of places. There was slight erosion of the adjacent vertebræ, and indications that the tumour had originated from the seventh dorsal nerve root on the left side. A laminectomy, which involved the fifth, sixth and seventh dorsal vertebræ, was performed. It was found that the tumour had extended into the vertebral canal between the laminæ of the sixth and seventh dorsal vertebræ, and had extended upward and downward within the canal, but extradurally, for a short distance. After removal of the tumour radium was applied. The microscopic diagnosis was neurofibroma (*Fig. 7*). The patient died thirteen hours after the operation. The necropsy was essentially negative.

SUMMARY.

In the study of the course, symptoms, and signs of three benign extravertebral tumours, with involvement of the spinal cord, several features stand out rather prominently:

FIG. 7.—Case 3. Neurofibroma. ($\times 120$.)

1. The lesion existed for a comparatively long time before definite spinal cord symptoms occurred.

2. In two of the three cases the first abnormal manifestation was sudden collapse to the ground without any other sign of discomfort, and only one of the patients (Case 2) experienced pain, which is a common symptom of most other varieties of spinal cord tumours.

3. Extravertebral masses could be demonstrated in the three cases. In two they were visible externally, and could be palpated easily; in the third, a shadow was plainly seen in the roentgenogram.

4. The growths were benign; two were diagnosed pathologically as neurofibromas, the other as cellular fibroma.

5. Two of the tumours were pear-shaped, the thin end extending intervertebrally. This observation was also made by Boerner in his series of cases.

6. The growths occurred in the second and third decades of life.

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