Meningiomas of the Foramen Magnum

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Meningiomas arising at the foramen magnum produce a clinical syndrome which may be difficult to distinguish from other lesions of this region which are less amenable to therapy. The radiologic diagnosis of these tumors, by which a definitive diagnosis can be made, has received heretofore only brief attention in the literature.15

What might be called the syndrome of compression of the cord at the foramen magnum was emphasized first by Elsberg and Strauss,10 Abrahamson and Grossman,2 and later elaborated by Symonds and Meadows.34 A clinical pattern was evident, characterized by cervico-occipital pain, weakness of the ipsilateral arm, atrophy of the small muscles of the hand, spastic paraparesis, disturbance of sense of position (especially in the upper extremities) and a paucity of cranial-nerve findings. Further general discussion on the matter of compressive spinal-cord lesions of this region was given by Cushing6 (pp. 87–99; 171–180), Elsberg8 (pp. 297–301), Love et al.13 and more specifically regarding meningiomas and neurofibromas arising in this region, the works of Dodge et al.7 and Martin and Kleyntjens16 are pertinent.

A number of authors1,10,16 have chosen to follow Cushing’s6 (p. 88) example of dividing these tumors into a variety arising above the foramen magnum—“craniospinal”—and those arising below the foramen magnum—“spinocranial.” In our opinion the former group, of which we studied a number of examples, presents as a posterior-fossa syndrome, the peculiarities of which have been so well documented by Castellano and Ruggiero.5

Material

The meningiomas that we have evaluated were located about the upper-cervical and foramen-magnum region with generally small extensions into the posterior fossa. The attachment, determined at the time of operation or postmortem examination, in most cases was at the rim of the foramen magnum, adjacent to the entrance point of the vertebral artery.

From a total of 1000 meningiomas originating from all areas of the neuraxis, we obtained 25 fulfilling these criteria. The ratio of female to male was 2:1. The patients’ ages ranged from 27–88 years; the great majority of them were 35–60 years of age. All of the tumors were confirmed histologically; 24 at operation and 1 as an incidental finding at autopsy. The majority of the tumors were of the psammomatous type. Myelograms were available for review in 13 cases, while adequate follow-up was obtained in 23 patients. Postmortem examination was performed on 4 patients.

Diagnosis

Symptomatology. Cervical pain invariably is a prominent early manifestation of the growth of a tumor. In 20 of the cases it was the first symptom. The pain when unilateral (18 patients) always was more pronounced on the side of the tumor. The pain was nagging, uncommonly paroxysmal, aggravated by coughing and straining, and associated with restricted motion of the neck, which often was referred to as “rheumatism” by the patient. The pain was confined to the upper-cervical region except for 2 individuals who

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experienced radiation into the ipsilateral arm. Temporary symptomatic relief in the initial stage occasionally resulted from traction, cervical collars or radiotherapy. Sensory or motor symptoms in the form of paresthesias, weakness of grip and clumsiness of the upper extremity, either ipsilateral or contralateral, comprised the remainder of the heralding symptomatology.

The duration of initial symptoms in 9 of the patients was less than 1 year prior to admission and in the great majority of the patients was less than 5 years. The relevant factor in the history is the interval of time from onset of symptoms to symptoms indicative of involvement of the spinal cord, viz., sensory manifestation below the cervical region, girdle sensations over the body, weakness of the legs and disturbance of function of bowel and bladder. This period fortunately was short, being under 1 year in 14 of the patients and only over 3 years in 4 of the patients.

Cervical pain, the most salient initial manifestation of tumor, was followed by paresthesia of the ipsilateral upper extremity in 13 of the 21 cases with ventrolaterally located tumors. With dorsally placed tumors, paresthesia or zones of hypalgesia occurred in both upper extremities and were coupled with vertigo on motion of the head. Subsequently the symptom-complex remained confined to the upper extremities with hypalgesia or hypesthesia involving either limb. Weakness of the upper limbs at this stage was ipsilateral in 3 individuals and bilateral in 3 others. The clinical picture then progressed to include symptoms of progressive spinal-cord involvement manifested by bilateral weakness of the lower extremities, more pronounced on the ipsilateral side. Nineteen of the patients complained of weakness of the lower extremity at this stage.

**Physical Findings.** All of the 24* symptomatic patients when admitted to the hospital demonstrated evidence of corticospinal-tract involvement which was bilateral in 20 and in 13 patients affected predominantly the arm in preference to the leg. The over-all impression is one of an asymmetrical pyramidal quadriparesis, predominantly ipsilateral to the tumor, with greatest involvement of the arms. Weakness usually is not advanced to the stage of invalidism at the time of the examination. Atrophy of the small muscles of the hands was seen in 13 cases. In 6 of these cases the finding was bilateral. Three patients exhibited marked unilateral atrophy of cervical muscles.

Elsberg8 (pp. 292–293) has taken the liberty of modifying the Brown-Séquard syndrome to comprise a composite picture of predominant ipsilateral pyramidal-tract involvement and predominant contralateral spinothalamic-tract involvement. He points out that a pure Brown-Séquard syndrome rarely is seen in compression of the cord. This clinical picture suggests a laterally placed lesion. Of the 22 patients with laterally placed lesions, hypalgesia was bilateral in 7 (in 3 of which it was more apparent contralateral to the tumor), ipsilateral in 2 and in 7 strictly contralateral to the tumor. Five patients had bilateral hypesthesia, 4 ipsilateral and 2 contralateral to the tumor, a total of 11 patients so affected. Fifteen patients demonstrated some affliction of the sense of position which was most pronounced in the ipsilateral upper extremity (11 patients). The upper extremities were involved more frequently than the lower as was noted previously by Symonds and Meadows24 and others.7

Nuchal rigidity and/or tenderness of the cervical spine occurred in 16 of the patients. Cerebellar signs were conspicuous by their paucity, being observed and then mildly in only 5 patients.

Cranial-nerve involvement was uncommon except for involvement of the spinal accessory nerve which was affected ipsilateral to the tumor in 5 cases and bilaterally in 6 others. Nystagmus, seen in 7 patients, was mild. Horner's syndrome has been mentioned or alluded to as an accompaniment of high cervical-cord lesions2,10,13,24 however, we did not find 1 complete syndrome. Five of the patients had suggestive evidences, viz., either

*In 1 patient the tumor was an incidental finding at autopsy.