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Laminectomy for Spinal Cord Compression from Metastatic Tumor

by

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In reviewing the literatures of the spinal cord tumors, intramedullary metastases are rare, whereas extramedullary metastases are not uncommon.

The spinal cord may be damaged by direct infiltation or by vascular occlusion produced by the metastatic lesions. Sometimes the primary tumors are not clearly identified in the early stage of these lesions. In these cases decompression laminectomy may play a double role in diagnosis and in treatment.

The author is to investigate merits and demerits of surgical intervention by reviewing this small series.

Clinical Materials and Methods

The series consisted of nine patirnts who had been operated on at the Department of Orthopedic Surgery, Akita University School of Medicine from 1972 to 1974.

The diagnosis was established by careful work-up in case history, neurological examinations, roentgenograms of spines and myelographies. The signs and symptoms of neurological involvement were divided into three groups ; sensory, motor and sphincter involvement. Sensory symptoms consisted of numbness and radicular pain. Motor symptoms were those of muscular weakness or paralysis of the extremities. All of the patients in this series were paraglegic. The sphincteric symptoms consisted of bowel and bladder disturbances as manifested by constipation progressing to obstipation, and urinary hesitancy or frequency progressing to urinary retention or incontinence.

The operation performed was a complete decompression laminectomy at the suspected level of involvement as determined by clinical and radiographic evidence, with partial or complete removal of the tumor.

Results

The preoperative findings are summarized in Table 1.

Level of spinal cord lesion : The metastatic involvement was most commonly encountered in the thoracic region. Only in one patient the metastasis was observed at the level of the

Table 1.

No.	Case	Sex	Age	Site of primary tumor	Operative findings	Survival	Special features
1	J. I.	M	51	Stomach	Laminectomy (T_1-T_4) Dural pulsation (+) after op.	Died 3 months after op.	Primary lesion not identified before op.
2	S. H.	F	62	Breast	Laminectomy (T_4-T_7) Dural pulsation (−) after op.	Died 2 years after op.	20 years ago mastectomy was perfomed
3	R. S.	F	42	Breast	Laminectomy (T_5-T_8) Bleeding (++) Dural pulsation (+) after op.	Still alive 1 year after op.	3 years ago mastectomy was performed
4	S. T.	M	66	Thyroid gland	Laminectomy (T_5-T_9) Bleeding (++) Dural pulsation (−) after op.	Died 9 months after op.	Primary lesion not identified before op.
5	A. S.	M	1	Lung (neuroblastoma)	Laminectomy (T_1-T_3) Dural pulsation (+) after op.	Still alive 2 years after op.	Primary lesion not identified before op. later lobectomy & radiation treatment were performed
6	K. S.	M	56	Kidney (hypernephroma)	Laminectomy (T_4-T_9) Bleeding (++) Dural pulsation (+) after op.	Died 15 months after op.	4 months ago nephrectomy was performed
7	C.W.	F	49	Ovarium	Laminectomy (T_6-T_8) Bleeding (+++) Dural pulsation (+) after op.	Died 16 months after op.	Primary lesion not identified before op. later gynecological treatment were performed
8	K.N.	M	67	Lung	Laminectomy (T_1-T_4) Dural pulsation (+) after op.	Died 16 months after op.	Lobectomy was performed 4 months ago
9	M.O.	F	32	Lung	Laminectomy (L_1-L_3) Dural pulsation (+) after op.	Died 6 months after op.	Primary lesion not identified before op.

cauda equina segments.

Initial sign and duration of symptoms : In careful review of the history, the most common complaints leading to medical care was the muscle weakness of the lower extremities, although all of the patients revealed at first sensory involvements among the various neurological deficits. Sphincter symptoms was the last to appear in all of the cases, delayed

appearance of this symptoms indicating that this function was the most resistant against cord compression as compared with other two. Table 2 gives the preoperative duration of each symptom as related to the degree of postoperative recovery. In all cases, except one, the duration of sensory symptoms was within three months, and the duration of motor dysfunction was shorter.

Table 2 Relationship between duration of preoperativ symptoms and its postoperative return.

No.	Case	Sensory	Post op. return	Motor	Post op. return	Sphincter	Post op. return
1	J. I.	30 (days)	moderte	12 (days)	moderate	12 (days)	moderate
2	S. H.	60	none	40	none	7	none
3	R. S.	400	moderate	10	moderate	3	good
4	S. T.	60	none	14	none	13	none
5	A. S.	?	moderate	30	good	20	good
6	K. S.	30	none	20	moderate	7	none
7	C. W.	60	good	60	good	1	good
8	K. N.	90	good	90	good	8	good
9	M. O.	120	good	40	good	20	good

Duration of post-operative return of Motor and Sensory function
moderate : more than 2 weeks
good : more than 3 months
In Sphincteric function
moderate : more than 2 weeks without urinary retention
good : more than 3 months without urinary retention

Severity of paralysis : All patients manifested paraplegia and only two of nine showed flaccid paraplegia. A patient changed from spastic to flaccid paraplegia within a week (Case 4). In this case, the rate of progression of the neurological deficit was very rapid and the postoperative return of the function was not observed. Sphincteric dysfunction was found in all cases.

Operative findings : The operation performed was a complete decompression laminectomy. At surgery the abnormal bony structure of the lamina was observed in two of nine patients (Cases 1 and 7). Pulsation was not observed in the dura at the operative site in all the paraplegic cases. Removal of the tumor was followed in general by restoration of dural pulsation. In Cases 2 and 4, the dura did not pulsate and a "cuff" of epidural tumor was observed compressing the cord. These patients showed no postoperative improvement.

The postoperative findings were summalized in Table 2.

Postoperative course : In seven of nine cases, motor function was recovered within 60

days. In six of nine cases, sensory function and sphincteric function were gradually recovered.

Discussion

The management of the patients with extradural metastatic tumor causing spinal cord dysfunction is difficult, whatever treatments they may be given. All large series of cases previously published have been concerned with an evaluation of surgical procedures. Medical treatments including radiation therapy and chemotherapy are usually dealed with as auxiliary ones to surgery. 50 to 300 cases treated with laminectomy have been reported by MULLAN et al. (1957)[7], ARSENI et al. (1958)[1], BARRON et al. (1959)[2], WRIGHT (1963)[15], SMITH (1965)[10], BOTTERELL et al. (1969)[3] and WHITE et al. (1971)[13] with good results. In the meantime, MONES et al. (1966)[6], MILLBURN et al. (1968)[5] and RUBIN et al. (1969)[8][9] suggested that metastatic carcinoma might also be treated by radiation therapy without initial surgery. They thought that in metastatic carcinoma, spreading of cancer cells from the metastasized vertebrae could not be definitively prevented by surgical resection of the foci. In addition, they were anxious about that laminectomy might further weaken the already damaged vertebral column, and its long-term structural soundness could not gain much from this procedure.

In the present study, however, it was found that in six of nine patients satisfactory results were obtained (Table 2). The factors that might affect the results favorably were considered as follows :

1) Duration of Symptoms. In assessing the prognosis of each individual case, the short duration of preoperative symptoms did not always see to affect postoperative recovery favorably. Case 4 showing a complete flaccid paraplegia of 2 weeks duration did not reveal recovery. On the other hand, the cases with long duration of preoperative symptoms with slight neurological deficits showed improvement (Cases 3, 7, 8 and 9). These results coincide with the reports of many workers (TARLOV 1954[11][12], BARRON et al. 1959[2], KENNADY et al. 1962[4], WILD et al. 1963[14], SMITH 1965)[10]. In general, the more rapid the rate of progression was and the longer the duration of severe neurological deficits was, the less favorable was the postoperative prognisis (Table 2).

2) Degree of Paresis. MULLAN et al. (1957)[7] and SMITH (1965)[10] emphasized that a complete paraplegia or flaccid weakness did not present an insuperable barrier to recovery and should not be reason for refusing operation. On the other hand, BARRON et al. (1959)[2] suggested that the operation was unlikely to be valuable when the patient manifested a flaccid areflexic paraplegia or paralysis. From the present observations it was assumed that the patients with spastic paraplegia had a better prognosis after surgery than the patients with flaccid paraplegia. In a case with cauda equina compression due to metastatic carcinoma, however, the patient showing flaccid paraplegia obtained some return of function (Case 9).

Survival : The effect of operation on survival could not be estimated in a small series without controls.

Summary

The results of decompression laminectomy were assessed in a series of nine patients with spinal cord compression due to metastatic tumors.

Seven patients lived more than six months after operations. In six patients, relative successful results were obtained. In general, the more rapid the rate of progression was and the longer the duration of severe neurological deficits was, the less favovable was the postoperative prognosis.

Decompression with laminectomy and with attempted removal of the metastatic tumor is recommended in most of the cases with spinal cord compression due to metastatic tumor, except those with a rapid progression of symptoms.

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和文抄録

悪性腫瘍脊髄転移に対する椎弓切除術

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服　部　　彰

悪性腫瘍が比較的早期に脊髄転移を起す例は少なくないが，こうした9例に対して除圧椎弓切除術を試み6例にほぼ満足し得る成績を得たので報告した．診断的な意義も兼ね備えている点本手術のメリットは少なくない．