

The treatment of malignant spinal cord tumours

Jadvyga Subačiūtė

*Neurosurgical Department of
Kaunas Medical
University Hospital,
Eivenių 2, LT-3007 Kaunas,
Lithuania
E-mail: ZitaSta@takas.lt*

Carcinoma metastases and primary sarcoma of the spinal cord are rare diseases. The treatment of both malignancies is only an attempt to improve the quality of life of these patients. Surgery and adjuvant therapy give a limited extent of benefit to them. The aim of our work was to compare those malignancies by clinical manifestation, the value of surgical treatment and predictive factors for outcome.

Between 1980 and 1994, 237 patients with spinal cord tumours were treated at our clinic. Among these, 22 patients with carcinoma metastases and 22 patients with primary sarcoma of the spinal cord are reviewed.

Conclusions: 1. Results were better in subtotally removed carcinoma metastases. The value of irradiation was not essential.

2. General results in 22 patients with sarcoma surgery were poor – improved only 6 (27.27%), unimproved 6 (36.36%), worsened 2 (9.09%) and died 6 (27.27%) pts.

3. Surgical radicality was a negative predictive factor for functional outcome because of functional deterioration.

Key words: spinal cord, cancer metastases, sarcoma of spinal cord diagnosis, surgery, outcome

INTRODUCTION

Cancers that have metastases intradurally to spinal cord are uncommon, accounting to 6% of all spinal metastases (1). Primary sarcomas of spinal cord are also extremely rare. Most patients with spinal cord sarcoma and carcinoma metastases present a rapid progression and require immediate evaluation. The aim of surgery is to relieve pain, preserve or restore the neurological function and reveal histology if uncertain (2). When the patient's state is good, surgery can correct neurological deficit (3). Patients with spinal cord carcinoma metastases and sarcoma of spinal cord have a limited profit from aggressive treatment. An early diagnosis of compression syndrome is very essential because the neurological condition of the patient predetermines the outcome of treatment. There is a controversial opinion whether decompressive laminectomy, radiotherapy or combination is a choice method of treatment. Paraplegia and tetraplegia lasting more than 6–12 hours is a contraindication for surgery; 5–12% of patients become neurologically worse after surgery (4, 5).

MATERIALS AND METHODS

During 15 years, 22 patients with carcinoma metastases and 22 patients with primary sarcoma of spinal cord were treated at the Neurosurgical Department of Kaunas University Hospital.

Data were collected from case reports and included demographics, clinical symptoms, neurological status and extent of disease.

Diagnosis was specified by plain X-ray, contrast enhanced myelography with In^{111} , Tc^{99m} , majodyl, myelography with omnipaque and CT. MRI was not available at that time. Surgical treatment consisted in decompressive laminectomy and tumour removal at the level of the block determined by myelography or CT.

Decompressive laminectomy was performed immediately after myelography. Additional radiotherapy was started within 8–10 days after operation in cases of subtotal tumour removal. Irradiation doses were 45 Gy during 21–30 days, single fraction 2–5 Gy. Even paraplegic patients were operated on and few received radiotherapy. Corticosteroids were not used consistently.

Data analysis was performed using Epiinfo and Statistica programmes.

RESULTS

From the 237 patients with spinal cord tumours we reviewed 22 (9.2%) patients with carcinoma metastases (13 males and 9 females) and 22 (9.2%) with spinal cord sarcoma (16 males and 6 females). Males prevailed ($p = 0.08$). The mean age of patients with carcinoma metastases was 56.1 ± 12.2 years and with sarcoma 46.2 ± 18.8 years ($PF = 0.034$). The incidence of carcinoma metastases was highest in the 5th–7th decades.

The mean duration of symptoms till hospitalisation in patients with carcinoma metastases was 0.5 ± 0.5 and with sarcoma 2.1 ± 3.5 years ($p = 0.03$).

Table 1 shows the primary location and histology of malignancies causing spinal cord compression.

Table 1. Primary location and histology of malignancies

Histology and location of malignancies	Carcinoma metastases, number of cases	Histology and location of malignancies	Sarcoma of spinal cord, number of cases
Prostate carcinoma	2 (9.1%)	Chondrosarcoma	1 (4.55%)
Kidney carcinoma	2 (9.1%)	Fibrosarcoma	3 (13.64%)
Lung carcinoma	2 (9.1%)	Angiosarcoma	1 (4.55%)
Melanoblastoma of skin	1 (4.55%)	Lymphosarcoma	3 (13.64%)
Osteoblastoma of vertebral column	1 (4.55%)	Malignant neurofibroma transformation to sarcoma	2 (9.09%)
Parotid gland carcinoma	1 (4.55%)	Sarcoma of unknown origin	12 (54.55%)
Adenocarcinoma of breast and unknown origin	7 (31.8%)		

The main primary site of carcinoma in males was prostate and lungs, and in females breast carcinoma metastases. The most frequent symptoms at the onset of spinal cord compression are presented in Table 2.

Table 2. Clinical symptoms of malignancies

Symptoms	Carcinoma metastases, number of patients	Sarcoma of spinal cord, number of patients
Radicular pain	20 (91%)	17 (77%)
Sensory disorders	18 (82%)	18 (82%)
Sphincter disorders	13 (59%)	6 (27%)
Gait disturbance	20 (91%)	14 (64%)

The duration of illness more than 6 months prevailed among sarcoma patients ($P_F = 0.06$).

Patients with malignancies attended our Neurosurgical Department with various types of motor disturbances.

Table 3 presents the character of motor deficit in malignancies.

Table 3. The character of motor deficit

Motor deficit	Carcinoma metastases, number of patients	Sarcoma of spinal cord, number of patients
Radiculopathy	6 (27.3%)	5 (22.73%)
Paraparesis	3 (13.61%)	3 (13.64%)
Paraplegia	12 (54.6%)	12 (54.55%)
Tetraparesis	–	1 (4.55%)
Tetraplegia	–	1 (4.55%)
Hemiparesis	1 (4.6%)	–

There was no significant difference in the character of motor deficit among patients with carcinoma metastases and spinal cord sarcoma. However, men prevailed among the patients with paraplegia in carcinoma ($p = 0.005$) and in sarcoma ($p = 0.05$) patients.

Paraplegia was found in 10 (76.9%) cases among patients aged 60 and over with carcinoma metastases and in 2 (33.3%) sarcoma patients. Paraplegia in patients younger than 60 years

was found in 2 (33.3%) cases of carcinoma metastases and in 7 (31.72%) sarcoma patients. Preoperative neurological motor deficit confidently correlated with age ($p = 0.03$).

Table 4 presents the localization of malignancies.

Table 4. Localization of malignancies

Localization	Carcinoma metastases, number of patients	Sarcoma of spinal cord, number of patients
Cervical	2 (9.1%)	1 (4.55%)
Thoracic	12 (54.6%)	12 (63.64%)
Lumbar	8 (36.4%)	7 (31.72%)

Malignancies of both types prevailed in the thoracic region ($p = 0.001$). All tumours with carcinoma metastases and in sarcoma were epidural, but in one case of carcinoma the metastases were of intramedullary localization.

Plan X-ray was performed to all patients. In 9 cases with carcinoma, vertebral body and arch destruction and in 1 case sacrum destruction were found. In patients with spinal cord sarcoma, vertebral body and arch destruction were found in 7 cases. Before treatment, 45.5% of patients with carcinoma were ambulant. Of the 22 treated patients with carcinoma metastases, 18 were operated on and 4 received only radiotherapy; 21 patients with sarcoma were operated on and one patient received only radiotherapy.

Among the patients with carcinoma metastases, total removal of tumour was performed in 5 cases and subtotal in 7 cases, subtotal removal and radiotherapy in 6, only radiotherapy in 4 cases.

In sarcoma patients, total removal of tumour was performed in 7 and subtotal in 15 cases, and radiotherapy was given to 6 of 21 surgical procedures.

Table 5 presents the results of treatment.

Table 5. Results of treatment

Results	Carcinoma metastases	Spinal cord sarcoma
Improved	7 (31.82%)	6 (27.27%)
Unimproved	14 (63.64%)	8 (36.36%)
Worsened	1 (4.55%)	2 (9.09%)
Died	0	6 (27.27%)

Improved and unimproved 21 patients with carcinoma metastases and 14 with sarcoma, worsened and died 1 (4.55%) patient with carcinoma and 8 (36.36%) patients with sarcoma. The results of treatment were better in carcinoma patients. There were 3 recurrences in patients with carcinoma metastases and 3 recurrences in spinal cord sarcoma.

Better results were received from subtotal tumour removal, because radicality worsened the functional outcome and 6 patients with spinal cord sarcoma died in the early postoperative period.

Table 6 shows the causes of deaths.

Table 6. Causes of deaths

Causes of deaths	Number of patients	Percent
Emboli of pulmonary artery	2	9.09
Pneumonia and pulmonary oedema	1	4.55
Cardiovascular insufficiency	1	4.55
Exhaustion	2	9.09

The early postoperative mortality rate in sarcoma patients was rather high – 6 men (27.7%) died. Four patients died during 4–12 days after operation, and after 1 month 2 patients died from exhaustion.

DISCUSSION

Spinal cord compression from carcinoma metastases and spinal cord sarcoma is a great problem in neurooncology. The symptomatic metastatic disease affecting the spinal cord is observed in 2% of patients with systematic cancer (1) and in 1% of sarcoma patients. The incidence of carcinoma metastases and primary sarcoma was 9.2%.

Clinical factors suggesting metastases include a personal or family history of malignancy or conditions predisposing to it, presence of multiple tumours in the spinal cord or elsewhere, non-specific constitutional symptoms, such as weight loss or decreased appetite (4).

Carcinoma metastases and spinal cord sarcoma prevailed in the thoracic region probably because of a greater number of thoracic segments (7–9).

The main primary sites in males were prostate and lungs and in females breast. Cannolly et al. (10) have reported that the most common non-CNS malignancies as sources of spinal metastases are lung (54%) and breast (13%) carcinomas.

Spinal cord metastases showed to be considered as a differential diagnosis in patients with numbness, pain or weakness in extremities (5).

The fast development of symptoms can be explained by the restricted capacity of the spinal canal and a relative increase of tumour size.

An early symptom in spinal cord compression is pain in patients with carcinoma metastases and sarcoma, and both epidural malignancies were detected by myelography and CT. The treatment is often discussed because there is no evidence of the best treatment modality.

Several factors must be considered before selection of surgical option. The clinical condition and age of the patient, primary tumour pathology and presence of other secondary lesions are among the main factors (11).

The treatment of spinal cord compression with carcinoma metastases and spinal cord sarcoma includes laminectomy with or without postoperative radiotherapy (12–15). Our patients underwent standard laminectomy via posterior approach. Total removal of tumour was performed in 5 patients with carcinoma metastases and in 6 patients with sarcoma, and subtotal removal was applied to 13 patients with carcinoma metastases and to 15 patients with sarcoma. Radiotherapy was given after subtotal removal of carcinoma metastases in 6 cases and only radiotherapy in 4 cases, but the effect of radiotherapy was not essential. Other authors report that radiotherapy alone is effective (13, 16). Sutter et al. (17) suggest that early surgery is the treatment of choice in the second phase when paraparesis and bladder dysfunction are the first symptoms. The extent of surgical resection has an influence on recurrence (18, 19). Among subtotally removed carcinoma metastases there were 3 recurrences and in sarcoma of spinal cord also 3 recurrences.

Walking ability depends on the pre-treatment status. In our group, one paralytic patient with carcinoma metastases was operated on and regained ability to walk with support. Gasser et al. (18) have reported that surgical radicality is a negative predictive factor for functional outcome as it leads to functional deterioration. There were also poor outcomes in more radically treated 3 patients with sarcoma and in 2 cases of carcinoma metastases.

All malignancies treated by us were difficult lesions, but early diagnosis and careful surgical management may improve the functional outcome and prolong the survival. Surgery should be performed when the patients' neurological functions are good.

CONCLUSIONS

1. The results were better in subtotally removed carcinoma metastases. The role of irradiation was not essential.
2. General results in spinal cord sarcoma surgery were poor as only 6 of 22 patients improved.
3. Surgical radicality predicts functional deterioration.

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Jadvyga Subačiūtė

NUGAROS SMEGENŲ VĖŽIO METASTAZIŲ GYDYMAS

Santrauka

Šiame darbe išnagrinėti ir palyginti 22 ligonių (13 vyrų ir 9 moterų), gydytų dėl vėžio metastazių, ir 22 ligonių (16 vyrų ir 6 moterų), gydytų dėl pirminės nugaros smegenų sarkomos, klinikiniai požymiai, gydymas ir baigtis. Vėžio metastazėmis sirgusiųjų vidutinis amžius – 56,1 ± 12,2 metų, o sarkoma sirgusieji buvo jaunesni – vidutinis amžius 46,2 metų. Pastebėta palyginti trumpa sirgusiųjų sarkoma ligos trukmė iki hospitalizacijos: 17 ligonių – nuo 1 mėnesio iki 1 metų ir 6 ligonių ligos trukmė 2–12 metų. Tai patvirtina ligos piktybiškumą ir greitą progresavimą. Svarbiausias atvykusio į stacionarą paciento požymis yra motorikos defektai. Prieš operaciją galėjo vaikščioti 45,5% vėžio metastazėmis sirgusiųjų, 27,3% atvyko radikulopatijos būklės, 13,6% – paraparezės, 4,6% – hemiparezės, 54,6% ligonių – paraplegijos būklės. Sarkomos atveju 27,73% atvyko radikulopatijos būklės, 13,64% – paraparezės, 54,55% – paraplegijos, 9,09% – tetraparezės ir tetraplegijos būklės. 18 vėžiu sergančių ligonių atlikta laminektomija ir iš dalies ar radikaliai pašalintas navikas, vėliau 6 skirtas spindulinis gydymas ir kortikosteroidai, 4 neoperuotiesiems skirtas tik spindulinis gydymas. 21 sarkoma sirgęs ligonis buvo operuotas, vienam paskirtas tik spindulinis gydymas, 7 sarkoma pašalinta totaliai, o 14 – subtotaliai, 6 ligoniams po operacijos skirtas spindulinis gydymas. Ir vėžio metastazių, ir sarkomos atveju stebėti 3 naviko recidyvai. Ankstyvuojų pooperaciniu periodu pašalinus sarkomą mirė 6 (27,27%) ligoniai ir tik 6 iš 22 pagerėjo. Po operacijos galėjo vaikščioti 50% vėžio metastazėmis sirgusių pacientų, pagerėjo 40,8%, nepakito 63,6%. Radikali chirurginė intervencija neurologinę būklę pablogino 3 vėžiu ir 2 sarkoma sirgusiems ligoniams.

Išvados: 1. Geresni rezultatai gaunami iš dalies pašalinus vėžio metastazes. Spindulinio gydymo vertė neesminė. 2. Blogi nugaros smegenų sarkoma sirgusių ligonių gydymo rezultatai: iš 22 atvejų pagerėjo tik 6, 6 mirė. 3. Chirurginės intervencijos radikalumas pablogina funkcinę baigtį.