Paraplegia 19 (1981) 100–106 0031-1758/81/00110100$02.00

II. Session on Non-Traumatic acquired Paraplegia

PARAPLEGIA DUE TO SPINAL EPIDURAL NEOPLASIA

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Abstract. The literature of the last decade concerning the management and outlook of paraplegia has been focused on traumatic or other 'benign' causes. This paper describes a series of 74 patients with paraplegia due to malignant disease, one of the other most common causes of paraplegia.

Key words: Epidural neoplasm; Laminectomy; Paraplegia; Prognosis; Radiotherapy; Spinal tumour.

Material and Methods

BETWEEN January 1977 and January 1980, 74 patients with malignant disease in the spine or spinal canal and compression of the cord were admitted to the departments of Neurosurgery of the University Hospital in Rotterdam and/or the Rotterdam Radio Therapeutic Institute. Forty-five patients were male and 29 female. The ages varied between 15 and 79 years; 61 per cent were between 50 and 70 year of age.

The various primary tumours responsible for the spinal metastasis are listed in Table I. Lung carcinoma is the most common cause (19/74), as in other series (Khan *et al.*, 1967; Hall & Mackay, 1973; Chade, 1976; Dunn *et al.*, 1980).

The tumour in the spine was the first expression of metastatic disease in 22 patients, in 52 patients the primary malignant tumour had already been diagnosed. The primary tumour was subsequently diagnosed during life in 18 patients and at autopsy in four patients.

TABLE I

Distribution of primary tumour in 74 patients with spinal metastasis and cord compression

Primary tumour	Number	%
Lung	19	27
Breast	14	19
Kidney	7	10
Haematological*	6	8
Myeloma	6	8
Prostate	6	8
Melanoma	4	5
G.I. tract	4	5
Sarcoma	4	5
Others	4	5
Total	74	100

* Haematological tumours include malignant lymphoma and leukemia.

TABLE II

Motor function in legs at the onset of treatment

	Number	%
Ambulatory	14	19
Paraparetic	19	26
Paraplegic	41	55

Table II shows the degree of motor deficit in the legs before treatment. Ambulant patients were able to walk without support, the paraparetic group included patients who could walk with support or were bedridden but could move their legs against gravity. The legs in the paraplegic patients were either fully paralysed or showed some, but useless, motor power. In six cases the site of the spinal cord compression was in the cervical region; in 61 in the thoracic spine (T1–T6, 29; T7–T12, 32) and in seven in the lumbo-sacral region. In various patients the cord compression was at one site but there were multiple lesions in the bony spine.

Treatment

All patients except four were subjected to radiotherapy, laminectomy or combinations of these treatment modalities (Table III). Treatment was not standardised and the choice between the various possible therapeutic approaches was made by the specialist in charge. When the patient was primarily admitted to the neurosurgical department laminectomy was often performed, particularly in case of paraparesis with rapid progression of cord signs. These patients were subsequently irradiated unless they were too severely ill or had developed a complete paraplegia without pain. On the other hand, patients admitted to the radiotherapy department commonly underwent irradiation, particularly in case of a known primary tumour with estimated good response to radiotherapy. The extent of laminectomy, which was performed by various qualified neurosurgeons, was determined by the size of the tumour. Usually it included a lamina below the lower pole and a lamina above the upper pole of the tumour. On the posterior and lateral side of the dura as much tumour was removed as possible, particularly around the nerve roots. No attempts were made to remove tumour on the anterior aspect of the cord. We did not carry out primary lateral or anterior

TABLE III

Treatment modalities

	Number	%
Radiotherapy	36	49
Laminectomy + radiotherapy	19	25
Laminectomy	7	9
Radiotherapy followed by laminectomy	8	11
Dexamethasone only	2	3
No treatment	2	3

approaches to the spinal canal. The radiation schedule for radiotherapy varied from 30·0 gy/over 2 weeks to 45·0 gy/over 3–3½ weeks depending on the nature of the tumour and the eventual response of the primary tumour to radiotherapy. Radiotherapy following laminectomy was started at the day of the suture removal (in some cases even earlier). Radiotherapy was followed by laminectomy in two cases where the signs of cord compression recurred and in six cases who showed progressive paraparesis within 3 days despite radiotherapy. Histological examination revealed metastatic disease of the known primary tumour in all eight patients.

Dexamethasone was administered to the 70 patients who were operated or irradiated in a dose between 16 and 40 mg daily for at least two to three weeks. Two patients got Dexamethasone only.

Results

The results of surgery and radiotherapy were assessed by the effect on the two most prominent symptoms: power in the legs and relief from pain. Of the ambulatory group (14 patients) two became paraparetic and five paraplegic. Of the 18 paraparetic patients eight improved markedly and could walk again without support (four after surgery and four after radiotherapy), but ten became paraplegic. Of the 38 paraplegic patients three could walk again and 35 remained paraplegic (Table IV).

The exact cause of deterioration is often difficult to establish. It may be due to the natural course of the disease. In some of our patients, however, the motor function of the legs was worse immediately following the operation, indicating an adverse effect of the operative procedure itself. In particular patients with lung carcinoma (five) or kidney carcinoma (four) were prone to deterioration.

Seventy of the 74 patients complained of pain at the site of the metastasis before treatment. After treatment 52 per cent showed pain relief, 36 per cent remained unchanged and 12 per cent showed a progressive increase of pain. At the completion of this study 59 patients had died and 15 are still alive. Table V gives the causes of death in the 59 patients. Thirty-six died in the hospital, 15 at home and eight in a nursing home.

Table VI shows the survival rate. Of the 15 living patients six survived more than 3 months, six more than 6 months and three more than 12 months. A survival period of more than 3 months was seen in patients with radiosensitive tumours like carcinoma of the breast (six), Hodgkin's disease (two), myeloma (two), carcinoma of the prostate (one), but occurred also in lung carcinoma (one), kidney

TABLE IV

Comparison of motor power in the legs before treatment and after treatment

	One month after treatment*		
Before treatment	Ambulatory	Paraparetic	Paraplegic
Ambulatory	7	2	5
Paraparetic	8	—	10
Paraplegic	3	—	35

* If the patient had died within 1 month after onset of treatment, the last state before death was scored.

TABLE V

Causes of death		
(Broncho)pneumonia	17	
Pulmonary embolism	15	
Sepsis	9	(urosepsis 7)
Myocardial infarction	2	
Gastro-intestinal bleeding	2	
Miscellaneous and unknown	14	

TABLE VI

Cumulative survival rate	
≧ 1 month	68%
≧ 3 months	36%
≧ 6 months	25%
≧ 12 months	18%

carcinoma (one) and others (two). Eleven of these surviving patients are at home, four live in a nursing home.

Discussion

For an extensive review of the diagnosis, differential diagnosis, prognosis and management of spinal cord compression due to metastasis the reader is referred to Chade (1976). There was and there still is disagreement whether radiotherapy alone is as (in-)effective as decompressive laminectomy followed by irradiation. The view of some authors is that the effect of radiotherapy is too slow, they prefer decompressive laminectomy in most cases (Livingston & Perrin, 1978). Khan *et al.* (1967), Brady *et al.* (1975) and Gilbert *et al.* (1978) consider surgical therapy unnecessary in most cases, in particular when Dexamethasone is also administered. The optimal management for patients with spinal epidural neoplasms remains to be established, particularly because only few studies review sufficient numbers of patients to allow statistical evaluation (Dunn *et al.*, 1980). There is yet no controlled prospective study comparing surgery and radiotherapy. This is not surprising, as many variables are involved like speed and onset of spinal cord signs, severity of neurological deficit at the onset of treatment, site and radiosensitivity of primary tumour, type of treatment, presence or absence of metastatic disease elsewhere in the body, etc. (White *et al.*, 1971; Hall & Mackay, 1973; Chade, 1976; Cobb *et al.*, 1977; Meyer, 1977).

We were, however, so impressed by the deterioration of motor function after surgery in some of our patients, that our present policy is to subject most patients to irradiation under cover of 4×10 mg Dexamethasone per day.

We should of course, before starting radiotherapy, require to be convinced of a reasonable extent that the signs of cord compression are due to a malignant tumour and not to a benign cause (*e.g.* meningioma). Malignancy seems highly probable if local, often irradiating, pain is followed by usually rapid progressive signs of involvement of the spinal cord or cauda equina, if X-ray films reveal osteoplastic or osteolytic lesions of the pedicle or vertebral body, bone scanning

shows a 'hot spot' and myelography is positive (Hall & Mackay, 1973; Livingston & Perrin, 1978). Evidence of a primary tumour or of multiplicity of lesions provides further support (Cobb *et al.*, 1977). Explorative surgery is performed if doubt about the malignant character of the tumour prevails, particularly if there is no primary tumour. Laminectomy is also indicated if there is a relapse after a full course of radiotherapy or in case of progressive cord deficit 48–72 hours after the onset of radiotherapy. These therapies, which are essentially palliative, are not given if treatment seems to be of no avail to the natural course, for example if the patient has only a limited amount of pain, has already a complete paraplegia or a severe incomplete paraplegia which developed within 48 hours. In these cases recovery is extremely rare (Hall & Mackay, 1973; Livingston & Perrin, 1978). Haematological disorders form an important exception to this rule.

Spinal epidural malignant disease is a common cause of paraplegia. The incidence has not been adequately recorded, but is most likely equal to that of traumatic paraplegia (which accounts for 15–30 cases per million persons per year). The outlook for patients with paraplegia due to malignant disease is often grim, despite early and intensive therapeutic approach. In most series only a small number of patients improve and in at least 25 per cent the motor function in the legs deteriorates rapidly, despite early surgical treatment or radiotherapy. The majority of these patients rapidly deteriorate to a pitiful condition because of widespread metastatic disease. Patients with spinal metastasis from lung carcinoma in particular have a short survival time (Gilbert *et al.*, 1978; Dunn *et al.*, 1980). Patients with carcinoma of the breast and prostate, with myeloma and Hodgkin disease may survive for longer periods, even if they are paraplegic (Chade, 1976; Dunn *et al.*, 1980).

In our series 64 per cent of the patients died within 3 months, usually as a result of (broncho)pneumonia, pulmonary embolism and (uro)sepsis. The presence of more severe cord involvement had a negative influence on the length of survival. These findings correspond with those of others (Brice & McKissock, 1965; Hall & Mackay, 1973; Chade, 1976; Meyer, 1977; Gilbert *et al.*, 1978; Dunn *et al.*, 1980). Some patients died early as a result of complications which might have been prevented or at least delayed. We wonder whether we should strive for such a delay in those patients in which the survival period is estimated to be short.

It has been stated that in paraplegia life expectancy is not markedly reduced and that the life of paraplegic patients is still quite valuable despite their major handicap, even when compared with matching non-paraplegic individuals (Guttmann, 1973; Michaelis, 1976). These statements are based on mostly young traumatic patients. Regrettably they do not apply to our patients. Many authors advocate management of paraplegia directly from the onset in a spinal unit and object to initial management in neurological, neurosurgical and medical departments.

However, patients with malignant disease, who are even more subject to pressure sores, urinary infections and other complications than, *e.g.* traumatic patients, depend, at least in our country, for their further treatment often on doctors and nurses in a general hospital, who may have less experience in the management of paraplegia than their colleagues in spinal units. Such an approach does not seem to be unreasonable for those patients who are so debilitated by their disease and have so much pain that they are unable to pursue a rehabilitation programme and for those whose life expectancy is only a few months.

Preferably these patients, who await the approach of inevitable death, should be allowed to die in familiar friendly surroundings, such as their own home or, when this is not possible, in a comfortable nursing home. However, if the survival period is expected to be longer than, *e.g.* 6 months, particularly in patients with carcinoma of the prostate and breast, myeloma or Hodgkin's disease, admission to a spinal unit or rehabilitation department is justified. In spinal units the percentage of patients with paraplegia due to malignant disease is usually low. The high incidence of this 'forgotten cause', the grim outlook in most patients despite intensive therapeutic efforts and the consequences regarding physical management and psychological guidance should be a cause of concern to all persons involved in the management of paraplegia. These aspects should also be reflected by those who wish to concentrate 'all' paraplegic patients from the onset onwards in spinal units.

Summary

The results are presented of the management of a series of 74 patients with spinal epidural neoplasia of which 60 showed cord involvement. Radiotherapy and laminectomy caused an improvement in neurological signs in some patients, but 25 per cent deteriorated. In the majority of patients substantial pain relief occurred. At present we prefer radiotherapy in combination with corticosteroids in cases with established metastatic disease. Laminectomy is indicated only when the diagnosis remains uncertain or if neurological deficit increases despite radiotherapy. Two of every three patients died within 3 months. Longer survival was particularly observed in malignant lymphoma, myeloma and carcinoma of the breast. Spinal epidural neoplasia is one of the most common causes of paraplegia. Physical management and psychological guidance is quite different from traumatic paraplegia due to the usually short survival period.

Résumé

Les résultats du thérapie sont présentés d'une série de 74 malades avec une affection maligne dans le canal spinal. Soixante d'eux présentent une paraparèse ou paraplégie. Quelques malades améliorent temporairement quant au déficit neurologique, mais 25% développent une paraplégie malgré radiothérapie ou laminectomie d'urgence. L'effet sur la douleur est plus favourable. Au présent nous préférons la radiothérapie en combinaison avec des corticostéroïdes dans les cas avec des métastases bien établies. La laminectomie est réservée pour les cas dans lesquels on n'est pas sûr que l'affection est maligne, et aussi quand le déficit neurologique avance malgré la radiothérapie. 64% des malades ont mourus en moins de 3 mois. Une survie plus longue est particulièrement observée dans les lymphomes malignes, les myelomes et les métastases du carcinome du sein. Une tumeur maligne est une des causes les plus fréquentes du paraplégie. Ces malades avec leur mortalité souvent vite et inévitable ont besoin d'une toute autre accompagnement que les paraplégiques traumatiques.

Zusammenfassung

Die Ergebnisse der Behandlung einer Serie von 74 Patienten mit einer malignen Erkrankung im Wirbelkanal sind enttaüschend. Einige Patienten zeigen eine vorübergehende Besserung der Lähmung, aber in 25% nehmen die Rückenmarkssymptome zu, trotz schnell ausgeführter Laminektomie und/oder Bestrahlung. Dagegen werden Schmerzen oft bedeutend gelindert. 64% der Patienten sind innerhalb drei Monaten gestorben. Im allgemeinen ziehen wir heute vor eine Kombination von Dexamethason und Bestrahlung. Laminektomie ist nur indiziert, wenn die Diagnose maligner Krankheit nicht sicher ist und wenn trotz der Bestrahlung die Paraplegie zunimmt. Die malignen

Krankheiten machen zusammen mit Trauma die meist vorkommenden Ursachen für Paraplegie aus. Der meistens unvermeidliche Tod fordert eine andere Begleitung als bei traumatischen Paraplegiker.

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