

EXTRADURAL SPINAL COMPRESSION ★

By

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An analysis of 214 cases of spinal compression showed that 100 were due to extradural causes comprising 47%. These cases included patients with clinical symptoms of compression of the spinal cord or the cauda equina, whether the cause was neoplastic or other compressing agents. Cervical and lumbar discs, fracture vertebrae and sacral chordomas were excluded. Affections of the vertebrae not producing pressure symptoms were not included. The clinical data in the 100 cases were recorded and analysed. Plain radiography was studied. All were subjected to operations, and the pathological nature was proved by biopsy in 80 cases. Results of lumbar puncture were of statistical value in 59 cases. Myelography was of diagnostic help in 91 cases.

Table I
Causes of Extradural Compression

Vertebral Causes	No. & percentage
	50
Pott's disease	20
Vertebral haemangioma	12
Osteoma	1
Chondroma	5
Chondrosarcoma	2
Secondries	6
Plasmocytoma	1
Paget's disease	1
Dorsal disc prolapse	2

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Extravertebral Causes	50
Pyogenic abscess	2
Hydatid cyst	2
Granuloma	2
Angioma	4
Angio-endothelioma	10
Neurofibroma (benign)	13
Neurofibroma (malignant)	3
Reticulum cell sarcoma	12
Teratoma	1
Melanoma	1

Aetiological Factors

Age Incidence: 76% of the cases occurred between the ages of 20 and 50. The peak incidence was between 30 and 40. The youngest was a child of 8 years who had a hydatid cyst in the cervical region, the oldest was a woman of 62 with Paget's disease of the spine.

Cases of Pott's disease occurred mostly between 20 and 40 (14 out of 20). Vertebral haemangiomas occurred mainly between the ages of 10 and 20 (8 out of 12). 4 out of 6 secondaries were between 30 and 50; 10 out of 13 neurofibromas between 20 and 30; 8 out of 10 angioendotheliomas between 30 and 50; and 11 out of 12 reticulum cell sarcoma between 20 and 50.

Sex Incidence: Males were 61 and females were 39. Pott's and secondaries were encountered more in females.

Site of the lesions:	Cervical	13%
	Upper dorsal	44%
	Lower dorsal	30%
	Lumbo sacral	13%

There is remarkable frequency of 74% in the dorsal region which is out of proportion to the number of the dorsal vertebrae compared to those of other regions. This was the case in most of the lesions described with the exception of the 2 cases of pyogenic abscesses, both of which were in the lumbar region being secondary to lumbar puncture.

Clinical picture:

1) Initial Symptoms

Root pains	49%
Local pain	13%
Long tract symptoms	38%

Root pain as an initial symptom occurred in 60% in extravertebral lesions compared to 40% in vertebral lesions. On the other hand local pain was present in 23% of vertebral lesions compared to 2% of extravertebral lesions.

Long tract symptoms: Whether sensory in the form of parasthesia or motor in the form of heaviness in the limbs occurred, in 38%. Sphincteric trouble was not recorded as an initial symptom.

Table 2
Symptoms and signs

Root pains	79%
Local tenderness	41%
Pyramida signs	100%
Sensory signs	96%
Sphincteric disturbances	74%

II) Symptoms and Signs:

Root pains	79%
Local tenderness	41%
Motor signs	100%
Sensory signs	96%
Sphincteric disturbances	74%

Root pains: Occurred in 79% of the cases. It showed no particular predilection as regards the site or pathological nature.

Local tenderness: Was elicited in 41%, 30 of which had vertebral lesions, mainly, Pott's, haemangioma, or secondaries.

Motor signs: Motor paresis of varying degree was demonstrated in all the cases. Reflexes were exaggerated in 65%, diminished in 23%, and normal in 12%. The reflexes were found normal or diminished when the compressing agent was in the lumbar region and in some of Pott's paraplegia.

Sensory Signs: Sensory hypalgesia with a level was obtained in 80%. In 16% there was evidence of radicular sensory loss. There was no sensory changes in 4 cases.

Sphincteric disturbances: Occurred in 74% either in the form of bladder irritability or atony depending on the level of compression.

Lumbar Puncture:

The results of cerebrospinal fluid analysis were sufficiently reliable in 59 cases. The protein content was found raised to 60 mgm. % or more in 54 cases. The rise in proteins was found proportionate to the site of the lesion. Thus in cervical lesions the average was 62 mgm., in the upper dorsal 110, at the lower dorsal 180, and 250 at the lumbar level. The highest figures obtained were in cases of neurofibroma (198 mgm. %) then haemangioma (166 mgm. %).

Radiological Findings:

Plain x-rays showed bony changes in 57 cases, 40 of the vertebral lesions and 17 of extravertebral lesions. Thus over 80% of vertebral lesions were demonstrated by plain x-rays. The 20% of cases which did not show detectable x-ray changes were as follows: 2 cases of Pott's, 2 cases of haemangioma, 1 case of osteoma located on the under surface of the lamina, and 2 cases of dorsal disc prolapse. 34 of extravertebral lesions produced detectable bony changes such as widening of the interpedicular space in 4 cases, enlargement of the intervertebral foramina in 3 cases, and paravertebral soft tissue shadow in 3 cases. 6 more case showed abnormal spinal curvature, mainly scoliosis which did not correspond to the underlying lesion.

Myelographic Findings:

Satisfactory myelographic studies were achieved in 91 cases. It demonstrated either temporary or complete block in these 91 cases. It was possible to diagnose it as extradural compression in 73 cases (fig 1.) The myelographic block was corresponding to the suspected clinical level in 73 cases and was found at a higher level in 19. Myelographic diagnosis was more accurate in the higher regions of the spine being 85% in the cervical region and only 28% in the lumbar region.

Operative Treatment:

96 patients were subjected to laminectomy. 4 of these had a second laminectomy and a fifth had 3 laminectomies. The remaining 4 patients were subjected to costotransversectomy or anterolateral decompression.

Discussion:

The incidence of extradural tumours in previously published papers varied between 17% (Lombardi, 1961) and 37% (Love & River, 1962). The present paper is dealing with extradural compressing agents and not only with tumours, hence the higher figure of 47%. Recording the relative incidence of spinal tumours alone is of great pathological significance but has less important clinical and surgical bearings. Clinically a case of "Compression myelopathy" need not be due to a true spinal tumour. It is thus likely that the other compressing agents are forgotten or underestimated unless all compressing agents are grouped together and their relative incidence analysed. This is the aim of this paper.

Vertebral causes of extradural spinal compression

I. Pott's disease:

There were 20 cases of Pott's paraplegia in this series (20%). Females were more commonly affected with the ratio of 3:2. Most of the cases were in the 3rd and 4th decades. The commonest site was the dorsal region (15 cases, i.e., 75%), 5 cases in the upper dorsal, 6 cases in the mid dorsal, and 4 cases in the low dorsal regions.

Although Pott's disease is more common at the dorso lumbar region, yet the frequency of cases developing paraplegia is more in the upper and mid-dorsal regions. This is probably because the spinal canal is narrower and hence the cord is more vulnerable to compression.

In all the cases, more than one vertebra was affected. 7 of them had paravertebral shadows.

Operation was indicated in these cases because they showed no improvement despite immobilisation and antituberculous treatment. In addition, there were evidence of myelographic block. Only few cases (4 in num-

ber) were found suitable for cost-transversectomy or anterolateral decompression. These showed big paravertebral abscesses in addition to a kyphos deformity. The rest of the cases were subjected to a limited formal laminectomy having the cord and duramater under vision. This was thought to give a better opportunity for scraping the tuberculous granulation tissue all round the cord with effective decompression. The granulation tissue was often found firm, so that it would have been difficult to evacuate by a costotransversectomy or an anterolateral decompression.

2 patients died within 3 months, 6 showed no signs of improvement, and 12 showed variable grades of improvement.

11. Vertebral Hemangioma:

This condition was encountered in 12 patients (fig 2), commonly in the dorsal region. The dorsal region was affected in two-thirds of the cases. 3 patients had more than one vertebral affected. In one case two successive vertebrae were affected and in 2 cases there was a distance between the affected vertebrae. Males were more commonly affected with the ratio of 2:1.

Operative decompression was recommended for these patients on account of the following causes: 1) It ensures rapid effective decompression compared to irradiation. 2) Surgical decompression is a safe-guard in case of a flare up taking place during the post operative irradiation. 3) It is an appropriate exploration for the extent of the lesion. Thus in many instances, radiological studies failed to disclose the extension of the haemangioma into the pedicles, the laminae or spinous processes. At exploration, some or all of these appendages were found affected and removed thus, leaving the body of the vertebra alone to be attacked by post operative irradiation. Laminectomy was always followed by irradiation. One patient died 2 months after the operation. Three were unchanged and 8 patients showed variable degrees of improvement. 3 of these had recurrence of symptoms after 1½ to 2 years. A 2nd course of irradiation therapy was given with improvement in 2 cases and further deterioration in the 3rd.

III. Osteoma, Chondroma & Chondrosarcoma:

(A) **Osteoma:** There was one case of a small osteoma on the inner surface of the lamina of D6 in a 20 years old female who gave a history of a slowly progressive (2 years) paraplegia with a level at D8 dermatome.

The tumour was missed in the plain films due to its small size and the fact that the lamina was covering it completely.

(B) **Chondroma:** Five cases of chondroma were included in the series. Four of them in males and one in a female. Most of the cases (4 out of 5) occurred in the dorsal region. The origin of the tumour was a rib in one case which showed an external swelling (fig 3), the rest were vertebral in origin. The duration of symptoms ranged from two months to two years. Four cases improved after decompression. Although the biopsy in these cases failed to demonstrate any malignant transformation, yet it was thought advisable to subject them to post operative irradiation.

The case of chondroma of the rib had recurrence of symptoms after 2 years which improved on further irradiation to recur again after 2 months. This time further irradiation to the tumour site caused deterioration in the condition of the patient with a picture of anterior spinal artery behind.

We believe that recurrence of a chondroma does not mean malignancy. It might be due to continual growth of islets of tumour tissue left behind. On such grounds, repeating the decompression is advisable in preference to irradiation.

(C) **Chondrosarcoma:** There were 2 cases of chondrosarcoma in the series. One occurred in a female, 32 years old who gave a history of rapidly (2 months) progressive paraplegia. Operation did not benefit the patient. The other was not unlike those of chondromas previously described. It occurred in a patient suffering from multiple exostoses (Diaphyseal achlasia). Decompression and irradiation failed to benefit the patient. Biopsy revealed its malignant nature.

IV. Secondary deposits:

6 cases of secondary deposits causing paraplegia were encountered in the series. It should be mentioned that secondary deposits are commoner than the number herein included. Since the latter were those cases where no primary was found. Hence an exploratory decompression was performed. The pathological nature of the compressing agent was only discovered after the operation. The symptoms were the same as those of any benign tumour of the spinal cord except that the progress was usually rapid. Plain films showed erosion of pedicles in 3 cases, (fig 4.) and failed to show destruction of the vertebral body. One case died 2 months after operation, 2 other showed no sign of improvement, and 3 showed variable evidence of improvement. Irradiation therapy was given to the latter.

The nature of the secondary deposits was as follows: 3 thyroid, 1 breast, 1 columnar cell carcinoma Iry. unknown, and 1 epithelial tumour Iry. unknown.

V. Plasmocytoma:

The recorded case was a male patient, 40 years old complaining from root pain and rapidly developing paraplegia that became complete in 2 weeks. Plain radiography showed destruction and collapse of D4 vertebral. Laminectomy and partial removal of the tumour followed by irradiation caused improvement in the motor power and relief of pain. Pathologically the tumour was a friable greyish vascular non encapsulated tumour which proved to be a plasma cell tumour on histological examination.

VI. Paget's disease:

Hyperplasia of bones surrounding the spinal canal is known to produce compression of the spinal cord and nerves. Examples of such a lesion, are referred to in the literature as hypertrophic osteitis. In the present series there was a case similar to this. We believed it to be a localised form of Paget's disease. It occurred in a female, 62 years old, who gave a history of 10 years intermittent root pains and gradually developing paraplegia with a vague sensory level. Plain radiography showed scoliosis and diffuse sclerosis of vertebrae accompanied by kyphosis more marked in the lower dorsal region. Decompression was performed and showed marked sclerosis of the removed spinous processes and laminae. The underlying cord was diffusely compressed. Following the operation the patient showed a slow but definite degree of improvement.

VII. Dorsal disc prolapse:

There were 2 examples of dorsal disc prolapse in the series. They occurred in male patients, both in the 4th decade. One was at the upper dorsal level (D1 — D2 space), the other in the lower dorsal region (D10 — D11 space). Straight films were negative and myelography demonstrated a block opposite a disc space in both cases (fig. 5). Laminectomy was performed for both cases. In the 1st case (high disc), the operation was confined to a simple decompression. In the other (low disc), the prolapsed disc was removed. It was noticeable that improvement took place where simple decompression was performed, where as the patient who had his disc removed did not improve.

Extravertebral causes of extradural spinal compression

I. Inflammatory lesion:

Inflammatory lesions of the epidural space are rare causes of compression. A well circumscribed abscess that has extended from an external infective process or has developed as a metastatic lesion can produce the clinical features of a neoplasm. The 2 cases in the present series occurred in the lumbar region secondary to lumbar puncture, 2 and 3 weeks before the onset of symptoms. The onset was febrile and acute and both quickly developed a picture of cauda equina lesion. Pain in the back and marked tenderness during movements of the spine or on direct pressure were outstanding. Evacuation and drainage of the abscess through a laminectomy in both cases led to improvement.

II. Intraspinal granuloma:

Intraspinal granulomas are occasionally produced by coccidioides, cryptococcus, schistosoma, blastomycosis, as well as tuberculosis. In this series, there were 2 cases of non-specific granuloma besides those of Pott's disease. Both occurred in males in the 4th decade in the dorsal region. Plain radiography was normal. Laminectomy was performed with partial removal of the mass. One showed improvement while the other remained unchanged.

III. Hydatid Cyst:

There were 2 examples of hydatid cyst. The age was 8 and 50 years respectively. In one case the disease affected the cervicodoral region (C3 — D2), in the other, the low dorsal region (D8 & D9). Both had a picture of gradually progressive paraplegia with a sensory level.

Plain radiography demonstrated widening of the spinal canal and erosion of the vertebrae in one case. The condition was not suspected as the disease is rare in the country. Operation led to marked improvement in one case, while the other did not benefit.

IV. Angioma and Angioendothelioma:

Vascular tumours of the spinal canal may be classified as malformations (Angiomas) and neoplasms (angioendothelioma). Angiomas are benign, but angioendotheliomas may be malignant depending on the type of cell most prevalent.

There were 14 such cases in this series. 4 angiomas and 10 angio-endotheliomas.

A) Angioma (4 cases)

These were 3 females and 1 male. One, 17 years old, the other three were in the 4th decade. The course was intermittent and pain was the presenting symptom in the four cases. 3 cases, upper dorsal, and one was lumbar.

Laminectomy with an attempt at removal of the tumour was done in 3 cases and coagulation of the vessels in the 4th case. One patient showed no improvement, the other 3 showed variable degrees of improvement.

B) Angioendothelioma:

There were 10 patients in that group; half were males. The age ranged between 10 and 60 years. The cases were about equally distributed among the different age groups. In 7, the disease affected the dorsal region. Pain was common as an initial symptom. A gradually progressive paraplegia with no intermission was present in all the cases.

Plain radiography gave evidence of vertebral affection in the form of erosion of a pedicle or increased bone vascularity in 4 cases. Laminectomy with partial or complete removal of tumour was done, followed by post operative irradiation. 7 patients showed evidence of improvement.

V. Neurofibroma:

This group includes 16 cases, 3 of which had recurrences after operation and were operated upon more than one time. Evidence of malignant activity was present in 2 of them. They were mostly males with the ratio of 3:1. More than half of the cases occurred in the dorsal region (9 cases) 5 in the cervical and 2 in the lumbar region.

Nine cases had an extraspinal extension through the intervertebral foramen (i.e., dumbbell tumours). Root pain was a frequent symptom being present in 12 cases. Plain radiograms showed evidence of the lesion in 10 cases. The most common findings were widening of the interpedicular distance. Myelographic appearance suggested the extradural nature of the lesion in most cases (14 out of 16). At operation 4 cases had an intradural extension as well as the main mass laying extradurally. One case died 1 month after operation from ascending urinary tract infection and terminal pneumonia, 3 showed no evidence of improvement, and 12

showed signs of improvement. Three patients developed recurrence which necessitated a second decompression. Two of these showed malignant transformation and the 3rd had recurrence due to incomplete removal of the tumour. Malignant transformation was evident on microscopical studies in 3 patients in this group. Two of them had more than one operation.

VI. Reticulum cell sarcoma:

This group included 12 cases, 9 males and 3 females. The age varied between 25 and 60 years. 10 cases were in the thoracic region and 2 in the cervical region. The average duration of symptoms before admission was 3½ months. Plain radiography showed erosion of the pedicles in 2 out of the 12 cases. Decompression laminectomy with partial removal of the tumour followed by irradiation was done in all cases. One case died shortly after operation. 3 more died within few months. 4 cases showed no signs, of improvement while the other 4 showed variable degrees of improvement.

VII. Teratoma:

This was recorded in a 30 years old female. It was located opposite the 3rd dorsal vertebra. At operation, an extradural cyst was found filled with sebaceous material and few hairs. Microscopical examination revealed it to be teratomatous in nature.

VIII. Malignant Melanoma

A cervical extradural mass was found in a male patient, 55 years old. The mass was non encapsulated dark and vascular. On histological examination it proved to be a malignant melanoma. Post operative irradiation was given with some improvement.

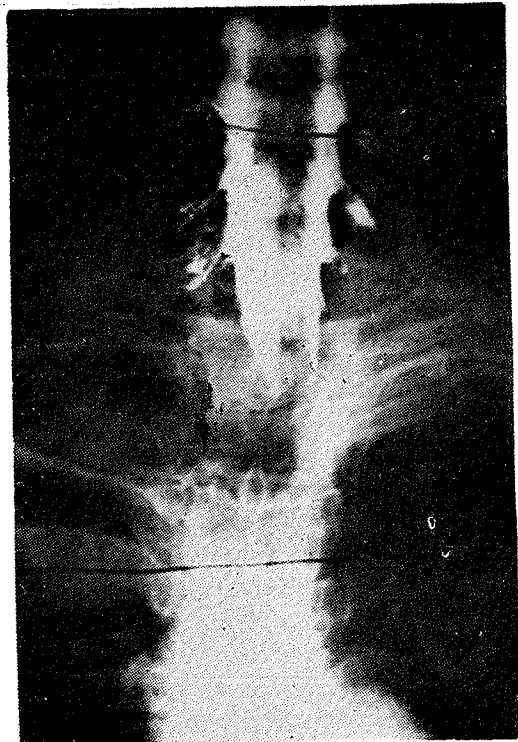


Fig. 1
Myelographic block typical of
extradural compression. (an-
gioendothelioma)

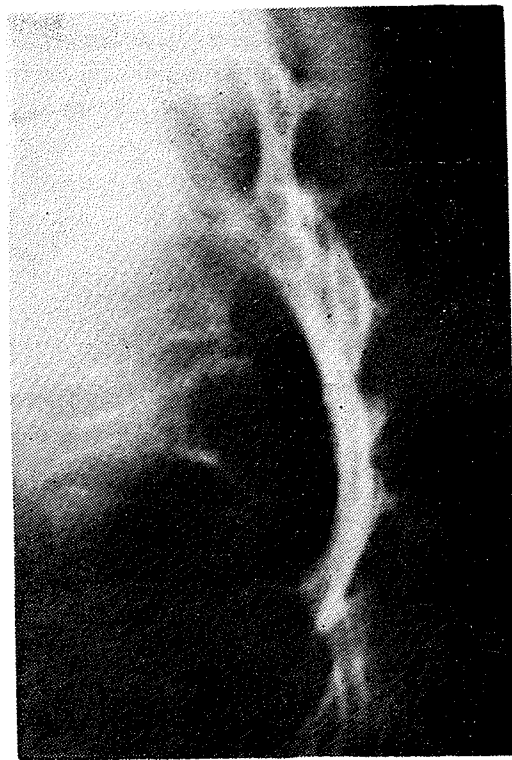


Fig. 2
Vertebral hemangioma with
collapse.



2Fig. 3 . Chondroma arising in a rib, encroaching on the spine.

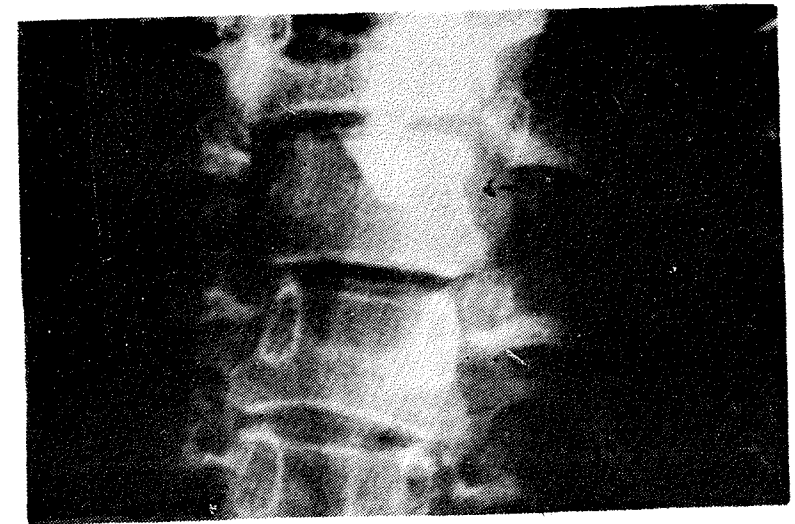


Fig. 4 — Plain radiogram showing absent pedicles
(secondary deposit)

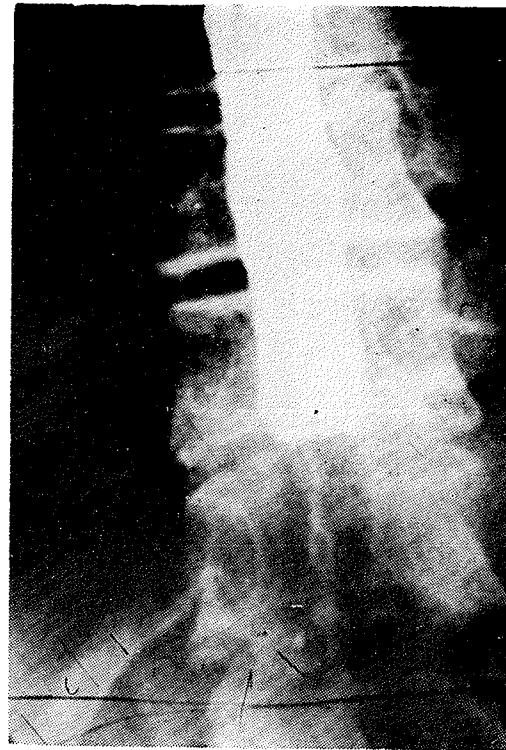


Fig. 5 — Myelographic black due to low dorsal disc

Summary and Conclusion

100 cases of extradural spinal compression comprising 74% of all cases of spinal compression were included. Vertebral and extravertebral compression occurred with equal frequency.

1. Most of the cases occurred between 20-50 years of age, with no significant differences between various causes, except in vertebral hemangioma which tend to affect the younger age groups (10-20). Males were commonly affected.

2. The dorsal region was the commonest site encountered.

3. All patients showed the picture of progressive paraplegia with a sensory level. The initial symptom was pain, root or local pain, in almost two-thirds of the patients. Tenderness over the spine favoured the diagnosis of a vertebral lesion or an inflammatory condition.

4. Vertebral lesions were usually evident on plain radiography.

5. Myelographic diagnosis was found to be more accurate in the cervical and dorsal regions (85%) than in the lumbar region.

6. Pott's paraplegia formed 20% of the cases. Laminectomy in these cases mostly mid-dorsal was thought to give a better access for decompression in the cord, rather than costotransversectomy or antero lateral decompression.

7. Operation followed by irradiation was thought to be a better treatment than irradiation alone.

8. Chondromas were found to have a tendency to recur. It is thought that this was due to incomplete removal rather than due to malignant transformation.

9. Vertebral lesions, suspected to be secondary deposits, with no apparent primary focus, were explored for decompression and verification.

10. Decompression of the cord in cases of dorsal disc prolapse was found to be a safer procedure.

11. Two cases of localised extradural abscess secondary to lumbar puncture were encountered.

12. Extradural angioma and angio-endothelioma comprised 14%. Partial or complete excision followed by irradiation gave satisfactory result.

13. More than half the cases of extradural neurofibromas had extra spinal extensions (dumb-bell).

Résumé et conclusion.

100 cas de compression extradurale de la moelle, comprenant 47% de toutes les compressions de la moelle sont présentés.

Les compressions d'origine vertebrales et non vertebrales, sont à l'égalité.

1 — L'âge; Les pluparts des cas sont situés entre 20 et 50 ans, sans difference notable d'étiologie, exception faite pour l'hémangiome vertebrale qui se situe dans le jeun âge. (10-20)

2 — Le niveau; La région dorsale est le niveau de prédilection.

3 — Symptomes; Tous les malades présentent le tableau d'une paraplegie progressive avec un niveau sensitif. Le premier symptome est la douleur locale ou radicaire, dans presque deux tiers des cas. Le point douloureux vertebrale est en faveur d'une lesion osseuse, ou un état inflammatoire,

- 4 — Les radiographie simples, montrent en générale les lésions osseuse.
- 5 — La Myelographie, a une valeur de diagnostic plus importante dans les régions cervicales et dorsales (85%) que lombaire.
- 6 — La paraplegie Pottique constitue 80% des cas. Dans ces cas, les pluparts situé dans la région dorsale, la laminectomie semble être plus efficace que costotransversectomie ou la decompression anterolaterale.
- 7 — L'intervention suivie de la radiotherapie semble être plus efficace que la radiotherapie seule.
- 8 — Les chrdomes, ont tendance de recidiver, ceci semble être plutôt la conséquence d'une exeres incomplete, qu'une transformation maligne.
- 9 — Les lesions osseuses, suspect d'être secondaires, avec l'absence apparente de foyer primitif, sont operées pour la decocpression et diagnostic.
- 10 — La decompression de la moelle dans les cas de l'hernie discale de la région dorsale, semble être la méthode la plus.
- 11 — Deux cas d'abcès extraduraux consecutifs à une fonction lombaire sont rapportés.
- 12 — Angiomes ou angioendotheliomes constituent 14% des cas. Leur exerse complete ou partielle, suivie de radiothérapie est satisfasante.
- 13 — Plus que 50% des neurofibromes extraduraux ont une expansion extray-vertebrale (Bisac).

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ON THE CLINICAL PICTURE AND PROGNOSIS OF MALIGNANT EXTRADURAL TUMORS OF THE SPINAL CORD

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The malignancy fo spinal tumors is frequently a relative matter and may sometimes be ascertained only through clinical study.

In judging the degree of malignancy of tumors one is inclined to consider only the morphological point of view. The relative characteristics are frequent mitotic figures, infiltrative growth, and a tendency to metastasis.

We know that real spinal cord tumors, i.e., gliomas and ependy-momas, rarely form metastases, not even in the meninges; and furthermore, that in some cases they do not even acquire infiltrative properties. So, with these tumors it depends essentially on how fast they grow.

In cases of rapid growth the clinical picture is characterized by short histories, acute or sub-acute courses, and flaccid paraparesis or paraplegia. So, their relative malignancy may be judged solely from clinical investigation.

This is, however, usually not the case with malignant extradural tumors of the spinal cord, which are mostly sarcomas and carcinomas, nor with malignant tumors of the vertebral column. But among these malignancies of the spinal cord there is one group of sarcomas and certain skeletal tumors occurring in the epidural region which are distinguished from others because of clinical and prognostic characteristics.

In the literature we find rather divergent data concerning the relative frequency of malignant extradural tumors: BALLATINE and DADIN, with 25% of their entire series give the highest rates; TON-

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