PARAPLEGIA IN SPONDYLITIS: RESULTS OF OPERATIVE TREATMENT

By MAC FELLÄNDER, M.D.

Department of Orthopaedic Surgery, St Görans sjukhus, Stockholm

Abstract. Thirty patients with spondylitis were treated by decompression of the cord (31 operations). The spondylitis was tuberculous in 28 and of septic unspecific aetiology in two cases.

The results with respect to the neurological symptoms were complete recovery in 24 cases, incomplete recovery in four cases, and failure in three cases, or in ten per cent.

Transthoracic anterior decompression was found to be the safest and quickest way to obtain restitution. Out of the ten patients treated by this method, nine recovered completely.

One post-operative death from pulmonary embolism occurred. One patient died because of adrenal insufficiency due to adrenal tuberculosis which could not be diagnosed during life. There were no other serious complications attributable to the operative interventions.

MEDULLARY compression is a typical complication of tuberculous spondylitis, occurring at a rate of 10-24 per cent, according to reports from different parts of the world (Butler, 1935; Bosworth *et al.*, 1953; Felländer, 1955; Gauchoux *et al.*, 1961; Hodgson *et al.*, 1964; Guirguis, 1967). Despite the great fall in the incidence of tuberculous spondylitis, cases of paraplegia still occur both in patients with old spondylitis regarded as healed and in patients with newly detected spondylitis.

While the incidence of tuberculous spondylitis in Sweden has decreased markedly in the 1960s, septic spondylitis has become increasingly common, as is evident from a personal series of patients (Ahlbäck *et al.*, 1973). Neurological complications of septic spondylitis have also been reported, the frequency varying between 4.5 per cent and 13 per cent (Alvik, 1951; Weber, 1965); in the aforementioned personal series it was 5 per cent.

As regards the treatment of these neurological complications, various methods have been used in the course of time. In the latter half of the nineteenth century the approach was by operative decompression with laminectomy, which gave poor results, however Ménard (1900) emphasised that the compression always occurs in front of the spinal cord and that in many cases the neural arch, which is removed at laminectomy, is not even in contact with the compressed spinal cord. Instead he advocated anterior decompression, which could be performed by costotransversectomy allowing drainage of tuberculous purulent lesions, in many cases followed by rapid improvement of nerve function. The method was abandoned later on, since some fatal complications occurred, and treatment became mostly conservative. Sorrel (1932), one of the leading clinicians during the first three decades of the twentieth century, advised against surgical treatment. He obtained relief of the paralysis in 80 per cent of 80 patients with paraplegia, and considered that this was attributable to the fact that a circulatory disturbance in the spinal cord was more common than mechanical pressure as a cause of the paralysis; the circulatory disturbances could be relieved by conservative treatment alone, whereas, in his opinion, mechanical compression was inoperable. Seddon (1935) reported

recovery in 70 per cent of 100 patients with paraplegia and stressed the danger of performing laminectomy, as intact arches and processes prevent collapse of destroyed vertebral bodies. Alexander (1946) introduced a technique for decompression of the spinal cord from the front and side. This operation, anterolateral decompression, may be said to be an extension of costotransversectomy. In 13 operative cases some gross mechanical factor was found to account for the spinal-cord compression, namely displaced sequestra of bone and intervertebral discs. Regression of the neurological symptoms occurred very rapidly in many cases. Later Griffiths *et al.* (1956), in an excellent monograph on Pott's paraplegia, have reported favourable results of such anterior decompression, which is based on the pathoanatomical survey carried out earlier by Sorrel (1932) and later by Butler (1935) and Seddon (1935).

It was not until the introduction of chemotherapy around 1950 that operative treatment began to be more widely used. Hodgson *et al.* (1963, 1967) went a step further as regards anterior decompression, namely by using transthoracic exposure and, at decompression of the cord, stabilisation of the spine by anterior fusion. Most patient materials in recent years are reported from countries in which the immunity situation is different to that in the industrial countries.

The present author has experience with operative treatment of spondylitis with paraplegia since 1950, when adequate chemotherapy against tuberculosis could be introduced in Sweden.

MATERIAL AND METHODS

Thirty patients, 22 males and eight females, were operated upon between 1951 and 1970. One patient was operated on twice, the number of operations thus being 31. Two patients had septic and the rest tuberculous spondylitis. The ages of the patients ranged between 9 and 72 years, the mean age being 44 years. Only two were under 22 years of age.

The sites of the disease are presented in Figure 1. The lower dorsal and dorso-lumbar segments were most frequently involved. These are also the commonest sites for tuberculous spondylitis. Only two vertebral bodies were affected in 17 cases, including the two cases of septic spondylitis. Three vertebral bodies were involved in four cases, four in two cases, five in three cases, and six in four cases. Details will be found in the tabular summary for the whole material (Table I).

Operative Technique. In the first six years, bone lesions and any para-vertebral abscesses were evacuated, in the same manner as in other cases of tuberculous spondylitis in the thoracic region without neurological symptoms, by costotransversectomy without any attempt at anterior decompression of the medulla.

As from 1957, I have used anterolateral decompression as described by Alexander (1946) and Griffiths *et al.* (1956), namely by costotransversectomy plus resection of the peduncles. This permits removal of parts of the vertebral bodies that compress the cord from the front, in many cases sequestered discs or bone; abscesses situated in the spinal canal close to the dura can thus also be drained. From 1960 I have used transthoracic exposure and anterior decompression with anterior fusion in suitable cases.

FIG. 1

Neurological Features. The neurological symptoms were classified into four degrees of severity; (a) total paraplegia including sphincter involvement; (b) subtotal paraplegia comprising complete or severe motor and sensory loss but preserved sphincter function; (c) moderate paraplegia, moderately severe paresis with walking difficulties and possibly impaired sensibility; and (d) slight paraplegia comprising slight paresis and spasticity and possibly slight sensory loss.

Total paraplegia occurred in six cases, subtotal in ten, moderate in ten, and slight neurological symptoms in five cases. The duration of these symptoms at the time of the operation varied between six days and ten months. Further data on the severity and duration of the neurological symptoms and type of operation performed will be found in Table II.

RESULTS

A previous report (Felländer, 1955) of the results of operative treatment of tuberculous spondylitis concerned the healing of bone lesions. The present report contains only the results referring to the neurological symptoms assessed after an observation period of more than $1\frac{1}{2}$ years, the average being five years. The whole material comprises 30 patients, one of whom was operated on twice because of recurrent paraplegia six years post-operatively, the number of operations thus

TABLE I

Analysis of 30 cases of spondylitis with paraplegia treated operatively

PARAPLEGIA

Age in years Sex Level of lesion	Duration of: spinal disease paraplegia	Severity of paraplegia at time of operation	Pre-operative complications	Year and technique of operation	Operative complications	Findings at operation	Immediate effects of operation	Ultimate fate	Observation period
12 M Th7-12 Tb	8 years 2 months	Subtotal	Paraplegia 6 years pre- operatively	1951 Costotrans- versectomy	Progress of paraplegia	Extensive destruction Sequestra	Progress of paraplegia	Paralytic	3 years
28 F Th8-L1 Tb	16 years 3 months	Moderate	Paraplegia 9 years pre- operatively	1951 Costotrans- versectomy	None	Extensive destruction and abscess	Complete recovery in 5 months	Well Fit for work	13½ years
9 M Th1-3 Tb	1 year 2 months	Subtotal	None	1951 Costotrans- versectomy	None	Laminar destruction	Complete recovery in 1 month	Well Fit for work	14 years
37 F Th7-8 Tb	4 months 1 month	Moderate	None	1952 Costotrans- versectomy	None	Extensive bone cavity with destroyed bone	Complete recovery in 6 months	Well Fit for work	11½ years
74 F Th7-8 Tb	3 months 2 months subacute	Moderate Bladder paralysis	None	1952 Costotrans- versectomy	None	Extensive destruction Sequestra	Complete recovery in 6 months	Dead Autopsy: Active lesion. Cardio- arterionephro- sclerosis	1½ years
38 M Th4-5 Tb	1 year 4 months	Moderate	None	1953 Costotrans- versectomy	None	Bone cavity with pus and small sequestra	Complete recovery in 6 months	Well Fit for work	6½ years
62 M Th6-7 Tb	6 months 6 months	Spasticity Impaired sensibility	None	1954 Costotrans- versectomy	None	Extensive cavity Sequestra	Complete recovery in 3 weeks-4 months	Well Fit for heavy work	5½ years
49 M Th10-11 Tb	3 months 2 months subacute	Moderate	None	1956 Costotrans- versectomy	None	Bone cavity Pus Big sequestra	Complete recovery in 1 day-6 months	Well Fit for work	6½ years
38 M Th5-6 Tb	6 months 2 months	Total	None	1965 Costotrans- versectomy	None	Pus under pressure Bone cavity Sequestra	Complete recovery in 2 months-1 year	Well Fit for work	3 years
36 F Th11-12 Tb	4 months 4 months	Medullary compression at myelography. No neurological signs. Severe pain	None	1965 Costotrans- versectomy	None	Pus under pressure subliga- mentally and in bone cavity	Completely painfree immediately post- operatively	Well Fit for work	3½ years
72 M Th5-6 Pyogenic	6 weeks 6 days	Subtotal	None	1969 Costotrans- versectomy	None	Pus Sequestra	Complete recovery in 3 weeks-9 months	Well Fit for work	1½ years
62 M Th10-11 Tb	6 months 2 months acute	Total	Laminectomy 2 months earlier	1970 Costotrans- versectomy	None	Big cavity Pus and sequestrum extradurally	No change	Remained paralysed	1½ years

TABLE I—*continued*

Age in years Sex Level of lesion	Duration of: spinal disease paraplegia	Severity of paraplegia at time of operation	Pre-operative complications	Year and technique of operation	Operative complications	Findings at operation	Immediate effects of operation	Ultimate fate	Observation period
26 M Th7-8 Tb	7 years 6 months	Subtotal	Costotransvers- ectomy 5 years earlier. Bleeding ulcer	1957 Anterolateral decompression	None	Paravertebral and intraspinal abscess Sequestrum	Complete recovery in 1 day-3 months	Recurrence 6 years later Reop (see later)	8 years
39 M Th8-9 Tb	3 years 4 months	Moderate	Costotransvers- ectomy earlier. Paravertebral abscess only. No bone lesion explored	1957 Anterolateral decompression	None	Paravertebral abscess Bone cavity with debris of bone and disc	Complete recovery in 9 months	Well Fit for hard work 2½ years postop	5 years 10 months
46 F Th7-9 Tb	13 months 10 months	Moderate	Costotransvers- ectomy 7 months earlier without effect on paraplegia	1958 Anterolateral decompression	None	Sclerotic bone and connective tissue (healing stage)	No change after 6 months Reop: more extensive decompression Regression 4 months later	Incomplete walking with 2 sticks Spasticity	7½ years
22 M Th11-L3 Tb	20 years 3 months	Subtotal	Costotransvers- ectomy 5½ years earlier	1958 Anterolateral decompression	Heart trouble Fistula healed after revision twice	Intraspinal caseous abscess	Complete recovery in 4 months	Well Fit for work	7 years
38 F Th4-7 Tb	18 years 3 months	Moderate	None	1958 Anterolateral decompression	Severe painful spasticity of legs and bladder	Intraspinal caseous abscess Sequestrum	Complete recovery in 3-10 months	Well Fit for work	7 years
67 F Th11-12 Tb	6 months 3 months	Subtotal	None	1959 Anterolateral decompression	Shock 6 weeks postop	Intraspinal bone—and disc sequestrum	Complete recovery in 6 months	Died 7 months postop Autopsy: Tb of pituitary glands	7 months
61 F Th8-9 Pyogenic	4 months 3 months	Total	Perforating cholecystitis subphrenic abscess	1968 Anterolateral decompression	None	Pus Destroyed bone	Partial recovery started 3 months postop	Spasticity Walking with sticks	2 years
50 M Th9-10 Tb	16 years 5 months	Subtotal	Multiple tb manifestations	1968 Anterolateral decompression	None	Granulation tissue Intraspinal detritus	Partial recovery started 2 days postop	Slight spasticity Walking without sticks	3 years
43 M Th8-10 Tb	33 years 7 months	Moderate Loss of deep sensibility Not able to walk	None	1970 Anterolateral decompression	Pulmonary embolism	Hard bone No active tb	Postop progress Regression after 5 days	Dead in pulmonary embolism	24 days
48 M Th7-12 Tb	20 years 2 months	Moderate	None	1960 Transthoracic anterior decompression Bone graft	None	Caseous pus Big sequestra of bone Extradural fibrinous membrane	Complete recovery in 6 months	Well	3 years

TABLE—I *continued*

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PARAPLEGIA

Age in years Sex Level of lesion	Duration of: spinal disease paraplegia	Severity of paraplegia at time of operation	Pre-operative complications	Year and technique of operation	Operative complications	Findings at operation	Immediate effects of operation	Ultimate fate	Observation period
25 M Th9-L1 Tb	12 years 10 months	Slight	None	1960 Transthoracic anterior decompression Bone graft	None	Caseous pus Several small sequestra of bone Extradural fibrinous membrane	Complete recovery	Well Fit for light work	4½ years
47 M Th8-9 Tb	10 years 3 months	Subtotal	Partial paraplegia 10 years earlier	1961 Transthoracic anterior decompression Bone graft	None	Hard sclerotic bone Intraspinal caseous membrane	Complete recovery in 1½-8 months	Well Fit for hard work 1½ years postop	2 years
42 M Th7-8 Tb	17 years 6 months	Subtotal	Anterolateral decompression 6 years earlier	1963 Transthoracic anterior decompression	None	Sclerotic bone Extradural fibrinous membrane	Complete recovery in 3 months	Dead 2 years post- operatively Perforated ulcer Livercoma	2 years
34 M Th12-L1 Tb	13 years 2 months	Slight	None	1963 Transthoracic anterior decompression	None	Necrotic bone Extradural fibrinous membrane	Complete recovery in 1 day-3 weeks	Well Fit for work	8 years
60 M Th7-8 Tb	9 months 6 weeks	Total Subacute	Paraplegia 10 days after costotransvers- ectomy	1964 Transthoracic anterior decompression Bone graft	Pulmonary insufficiency Tracheostomy	Extradural granulation tissue and fibrinous membrane	Recovery in 2 weeks-2 years	Spasticity No paresis Fit for work Walks with one or without stick	7 years
41 M Th10-L2 Tb	11 years? 2 months	Total	Gibbus after trauma during war 11 years pre-operatively	1965 Transthoracic anterior decompression	None	Extradural abscess and fibrinous membrane	Complete recovery in 2 days-4 months	Well Fit for work	6½ years
65 M Th11-L1 Tb	39 years Weakness 2 years 3 weeks acute	Subtotal	None	1967 Transthoracic anterior decompression	None	Caseous destruction Big sequestra Extradural abscess membrane	Complete recovery in 1 year	Chronic urinary infection Retired Social problems	2½ years
45 M Th8-11 Tb	9 years 7 weeks	Slight	Paraplegia 7 years pre- operatively Mental disease	1960 Transthoracic anterior decompression	None	Extradural thick scar tissue	Complete recovery in 2 months	Recurrence of paraplegia 2 years post-operatively Laminectomy— extradural granula- tion tissue circum- ferentially Regress of paraplegia	2 years
57 M Th7-12 Tb	36 years 1½ years	Total	Periods of partial para- plegia for 26 years	1971 Transthoracic anterior decompression	None	Caseous pus Sequestra of bone and disc. Hard sclerotic bone. Scar involving dura	Slight improvement of mobility in 1-4 months	Remained paralysed	2½ years

TABLE II
Duration of the neurological symptoms pre-operatively

	Costotrans- versectomy	Anterolateral decompression	Anterior decompression	Total no. of cases
< 2 months	8 (2)	—	6	14
2-4 months	3	5	1	9
4-6 months	1	2	1	4
> 6 months	—	2 (1*)	2 (1)	4
Total	12	9	10	31

Figures within parentheses refer to failures.

* Patient died after relief of paraplegia.

TABLE III
Effect upon results of duration of neurological symptoms

Duration of neurological symptoms	No. of cases	Complete recovery	Incomplete recovery	Failure
< 2 months	14	12	—	2
2-4 months	9	8	1	—
4-6 months	4	3†	1	—
> 6 months	4	1	2*	1
Total	31	24	4	3

* One patient died from pulmonary embolism after regression of symptoms had started.

† One patient had recurrence later on.

being 31. Complete restitution of neurological symptoms was obtained after 24 operations, incomplete restitution after four, and no or slight improvement after three operations. The duration of the neurological symptoms in tuberculous spondylitis does not seem to be of decisive importance with respect to the results, at least not if the operation is performed within six months of the onset of the symptoms (Table III). Nor does the duration of the skeletal disease seem to influence the results (Table IV).

Although the material is relatively small, the results for each of the three types of operation will be reported separately so as to give an idea of the influence of the operative technique.

Costotransversectomy without Decompression. Twelve operations resulted in ten complete recoveries and two failures.

TABLE IV
Effect upon results of duration of skeletal disease

Duration of skeletal disease	No. of cases	Complete recovery	Incomplete recovery	Failure
< 6 months	10	8	1	1
6-12 months	4	3	1	—
1-15 years	1	1	—	—
5-10 years	4	3	—	1
> 10 years	12	9	2	1
Total	31	24	4	3

Anterolateral Decompression. Nine operations resulted in five complete recoveries, three incomplete recoveries, and one failure.

Transthoracic Anterior Decompression. Ten operations resulted in nine complete recoveries and one failure. The latter result refers to a patient who had had tuberculous spondylitis for 36 years with repeated episodes of paraplegia during this period. At operation I found sclerotic bone and scar tissue that involved the dura; this was, thus, an unfavourable case.

The degree of severity of the neurological symptoms pre-operatively did not seem to be of any significance, except in the mild cases (Table V). Among the 16 cases with total or subtotal paraplegia, complete recovery occurred in 11. For the remaining 15 with less severe neurological symptoms the corresponding figure was 13.

Previous episodes of paraplegia had occurred in five patients, three of whom recovered completely, two of them after transthoracic anterior decompression. Two remained paralytic, one of them after transthoracic anterior decompression (the aforementioned unfavourable case).

The interval between operation and improvement of nerve function and the length of time required for continued restitution varied markedly and seemingly independently of the severity and duration of pre-operative paresis and of findings at operation. Recovery was most rapid in a patient with subtotal paraplegia in whom the nerve function began to improve within one day of anterolateral decompression and was completely restored after three months, and in one patient with slight paresis who began to improve within one day and was fully recovered within three weeks of operation by anterior decompression. In general, restitution was complete after half a year; the longest time required for improvement of nerve function was two years post-operatively.

TABLE V
Results according to severity of neurological symptoms

Severity of paraplegia	No. of cases	Complete recovery			Incomplete recovery			Failure		
		Ctr	Ald	Ad	Ctr	Ald	Ad	Ctr	Ald	Ad
Total	6	1	—	2	—	1	—	1	—	1
Subtotal	10	2	3*	3	—	1	—	1	—	—
Moderate	10	5	2	1	—	1	—	—	1	—
Slight	5	2	—	3	—	—	—	—	—	—
Total	31	10	5	9	—	3	—	2	1	1

Ctr = Costotransversectomy. Ald = Anterolateral decompression. Ad = Anterior decompression.

* Recurrence in one case.

As regards the importance of the operative technique in this connection, the post-operative course was obviously much shorter in the cases treated by anterior decompression.

COMPLICATIONS AND FAILURES

No serious complications occurred immediately after the operation. Three patients were dead at the time of the follow-up examination; a 43-year-old man operated on by anterolateral decompression died on the 24th post-operative day from pulmonary embolism after rapid relief of the paresis, and a 67-year-old woman had transient shock six weeks after anterolateral decompression and died in shock seven months after operation. The latter patient had been completely free from paralysis before she died; autopsy revealed tuberculosis of the adrenal glands. The third death was of a 42-year-old man who died two years post-operatively from another disease after his paresis had been completely relieved.

There were four failures. A 12-year-old boy, who had had paraplegia for six years, remained paralytic after costotransversectomy without attempt at decompression of the cord; he was the first paraplegic patient who was operated upon. A 26-year-old man had a recurrence of paraplegia six years after anterolateral decompression; re-operation with transthoracic anterior decompression was followed by rapid neurological recovery. A 45-year-old man recovered quickly after transthoracic anterior decompression but had a relapse of paraplegia two years later; partial recovery occurred after laminectomy and excision of extradural circumferential granulation tissue. A 62-year-old man did not recover after evacuation of the lesions by costotransversectomy two months after previously performed laminectomy.

DISCUSSION

The opinions on the proper treatment of paraplegia caused by *tuberculous spondylitis* have been and are still controversial. Long before the introduction of chemotherapy, Sorrel (1932) was able to report recovery in 80 per cent of paraplegia cases by conservative treatment, which then predominated. On the other hand, Bosworth *et al.* (1953) report an alarmingly high mortality rate, namely 56.55 per cent in their entire series of 122 patients and 29.3 per cent after exclusion of the hopeless cases, and consider that chemotherapy does not render surgery unnecessary.

Even before the introduction of chemotherapy strong arguments for surgical decompression of the cord were presented, notably by Griffiths *et al.* (1956). The decompression was performed by the anterolateral route, as devised by Alexander (1946), and the authors cautioned against laminectomy which could worsen the situation, since vertebral arches and processes are in most cases intact, and if these are resected there is the risk of increased collapse of the destroyed bodies and increased medullary compression. After the introduction of chemotherapy the number of advocates of surgical decompression has grown. Hodgson and his co-workers (1964) introduced the transthoracic approach and anterior decompression of the cord combined with anterior fusion. In 1967 they could report the results in 100 consecutive cases after an observation period of at least four years. Complete recovery occurred in 74 cases, in 54 of them within six months. They consider that indication for operation is urgent and know of no way of selecting those who will recover on conservative treatment. Their method has now many followers, particularly in the developing countries, where spinal tuberculosis is still a great problem, paraplegia being a common complication. Several reports have appeared from these countries in recent years, telling of successful results of surgical decompression by varying techniques, such as anterolateral decompression and the transthoracic approach with decompression with or without anterior fusion (Alexander, 1946; Tran-Ngoc-Ninh, 1962; Goel, 1967; Guirguis, 1967; Kohli, 1967; Tuli *et al.*, 1967). Some of these authors try chemotherapy first and do not operate unless the neurological symptoms show no regression after a few weeks.

Most reports from the U.S.A. and Europe concern small series of patients. From New York, Cook (1971) presents the results of transthoracic operations on the spine in a material which included, among others, ten cases of osteomyelitis, seven being tuberculous, and in which, rather strikingly and contrary to other reports, the mortality was very high. Jackson (1971), working as a chest surgeon in the London area, used the transthoracic approach to the spinal column and in a series which also included 21 cases of tuberculous spondylitis with paraplegia all were relieved by the operation and remarkably rapidly.

From Ireland, Martin (1971) presents his experiences with various forms of treatment in a material of 120 patients with paraplegia. He concludes that chemotherapy improves the patient's general condition and makes operation safer but does not have any significant effect in preventing paraplegia or in promoting recovery from it. In a comparison between different surgical methods he found that posterolateral decompression gave the best results, namely ten full recoveries, one partial recovery, and one failure among his 12 patients who received chemotherapy

plus operative treatment. By costotransversectomy and anterolateral decompression, only about half the patients recovered completely.

From France, Cauchoux *et al.*, (1961) present 22 cases of paraplegia treated operatively by either anterolateral or transpleural decompression with success in 12 and partial success in five cases.

From Scandinavia, Langenskiöld and Riska (1967) report 19 complete recoveries among 27 patients treated by anterolateral decompression. Their series, however, included a relatively large number of unfavourable cases with paraplegia of many years' standing.

The present writer has obtained very beneficial results by operative treatment in his 28 tuberculosis cases, namely 23 complete recoveries, two partial recoveries, and three failures. The transthoracic approach with anterior decompression gave the best results, in that nine patients out of ten recovered completely after the operation. In accordance with Hodgson, I have not noted any disadvantages of the transthoracic approach. There seems to be no risk of pleural infection, nor does the operation seem to be exceptionally risky—considering the fact that we are concerned with prognostically unfavourable cases of paraplegia.

Yet, there are still those who advocate conservative treatment, *e.g.* Helmig (1971) in Denmark, who reports recovery in 85 per cent of 21 patients treated conservatively by chemotherapy. He emphasised, however, that the treatment period will be longer but that the results numerically compare favourably with those of operative treatment which, in his opinion, is hazardous.

The data that I have compiled from the literature relate to essentially different materials of patients. In the developing countries the younger age-groups predominate and the conditions with respect to immunity, nutrition, etc., are very different from those in the Western world. However, the results of operative treatment of spondylitis with paraplegia are in general favourable, despite these differences. At this operation, large sequestra compressing the cord and extradural abscesses that cannot be established by X-ray are often found, and the surgeon who handles these cases becomes quite convinced that operative treatment is more likely to lead to permanent healing. That nerve function is restored more quickly after operative treatment is a general experience. The paresis may be relieved by conservative treatment, but there is the risk of recurrence. Five of my 28 patients with tuberculous spondylitis had relapse of the paraplegia after conservative treatment.

As regards *septic spondylitis* with paraplegia, it has been stated that paraplegia is always relieved by conservative treatment (Griffiths & Jones, 1971), although no details are presented. The question is, however, whether the increased frequency of this disease which has been observed in recent years (Ahlbäck *et al.*, 1973) could also signify a change in character with the development of more malignant infection and with poorer prognosis unless the lesions are eliminated at an early stage.

One of the two patients with septic spondylitis in the present material had not improved on adequate antibiotic therapy for three months, when anterolateral decompression was performed and led to incomplete recovery. The other patient developed total paralysis with complete paraplegia during the course of penicillin treatment of the septic condition; costotransversectomy with evacuation of abscesses was performed six days after the onset of the paraplegia and resulted in complete recovery. The few cases that I have treated personally do not allow any

definite conclusions as to whether operative treatment is preferable to conservative treatment, but it seems reasonable that in cases with formation of abscesses, usually under heavy pressure in the thoracic region, such infectious lesions should be eliminated as quickly as possible. After compiling this material I have treated a patient with septic spondylitis and complete paraplegia persisting after conservative treatment for four months; it is uncertain whether the neurological symptoms will be relieved after evacuation of the lesions and cord decompression at this late stage.

Another reason for operative treatment is that a confident aetiological diagnosis cannot always be made until the material removed at operation has been examined bacteriologically and histologically, as is also emphasised by Jackson, who has operated on 13 patients with unspecific spondylitis.

According to several authors (Hodgson *et al.*, 1964; Guirguis, 1967; Tuli, 1969; Cook, 1971), *laminectomy* has rarely a place in the treatment of destroyed vertebral bodies; I share this opinion without reservations.

My series contains a patient who had been treated by laminectomy very soon after the onset of complete paraplegia, which persisted after the operation, however. In this case the fairly limited destruction of the vertebral bodies would have been easily accessible to anterior evacuation of the lesions with decompression of the cord, after which the prognosis would probably have been very favourable.

CONCLUSIONS

Neurological symptoms in association with an inflammatory process in the spine are a serious complication, and it is impossible to tell beforehand whether the symptoms will regress by conservative treatment, which moreover takes a very long time and which is not seldom followed by relapses. Under such circumstances, operative treatment at an early stage is recommended, unless the neurological symptoms regress very rapidly during immobilisation and adequate antibiotic therapy. At operation it is essential not only to evacuate destroyed bone and degenerated-sequestered disc tissue and abscesses but also to decompress the spinal cord. Posterior decompression in the form of laminectomy can be indicated only in those exceptional cases in which the bodies are not the site of any noteworthy destruction and are thus stable, or else the laminectomy might give rise to further collapse and increased neurological symptoms. Both anterolateral and anterior transthoracic decompression have been found to give good results. In the present material the latter method produced the best and quickest results.

RÉSUMÉ

Les symptômes neurologiques en association avec un processus inflammatoire de la colonne vertébrale sont une complication sérieuse et il est impossible de dire de prime abord si les symptômes régresseront par traitement conservateur qui de plus durent très longtemps et assez fréquemment suivis de récurrences. Dans ces circonstances une intervention dans la première phase est recommandée, à moins que les symptômes neurologiques ne régressent très rapidement par immobilisation et antibiotérapie. Au cours de l'opération il est essentiel, non seulement d'évacuer la partie osseuse détruite, les séquestres du tissu discal ainsi que les abcès, mais également décompresser la moelle. La décompression postérieure sous forme d'une laminectomie ne peut être indiquée que dans les cas exceptionnels où la destruction n'atteint pas les corps vertébraux et de ce fait risque pas de mettre en danger la stabilité sinon cette laminectomie pourrait être suivie d'un collapsus

vertébral et aggraver les symptômes neurologiques. La décompression par abord antérolatéral ou trans-thoracique antérieure a donné les meilleurs résultats. Dans la série présentée la dernière méthode a donné les meilleurs résultats ainsi que les plus rapides.

ZUSAMMENFASSUNG

Neurologische Symptome als Folge von Entzündungsprozessen der Wirbelsäule sind eine ernste Komplikation. Es ist unmöglich, von vornherein zu sagen, ob die Symptome bei konservativer Behandlung zurückgehen werden, zumal diese Behandlung lange dauert und nicht selten zu Rezidiven führt. Unter diesen Umständen wird operative Therapie empfohlen, wenn die neurologischen Symptome nicht sehr schnell bei Immobilisation und adäquater antibiotik Therapie zurückgehen. Es ist wichtig, bei der Operation nicht nur den zerstörten Knochen, das degenerierte Diskusgewebe und Abszesse zu entfernen sondern auch das Rückenmark zu entlasten. Posteriore Entlastung in der Form von Laminektomie ist nur in den seltenen Fällen angezeigt, in denen die Wirbelkörper nicht der Sitz von ausgesprochener Zerstörung sind und daher stabil sind, anderfalls führt die Laminektomie zum Kollaps und Zunahme der neurologischen Symptome. Anterolaterale oder vordere transthorakale Dekompression haben gute Resultate erzielt. In dem vorliegenden Material hat letztere Methode zu den besten und raschesten Erfolgen geführt.

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