

CERVICAL SPONDYLOSIS

PROGNOSTIC VALUE OF PREOPERATIVE SIGNS AND SYMPTOMS

REYNALDO A. BRANDT *

CHARLES A. FAGER **

Although the clinical picture in cervical radiculopathy and myelopathy due to spondylosis is well known nowadays^{12, 13, 16, 18, 22}, its treatment is still a matter of discussion. Conflicting opinions exist regarding its pathogenesis and consequently different forms of treatment have been proposed. Bony spurs^{1, 3, 31}, compression of the anterior spinal artery¹⁵, vascular compression in the foramina^{2, 29}, atheromasia¹⁰, hypertrophic ligamenta flava^{3, 14}, cord deformity over a spondylotic ridge with flexion of the spine⁴ and its up-and-down movements²⁴, have all been pointed as important factor in pathogenesis, although some of them have been denied as such^{21, 30}.

Lees¹⁴ suggested that surgery does not benefit the patients more than conservative treatment and that "a very conservative approach should be the rule in patients with spondylotic myelopathy". Nurick²⁰ found that results were similar in patients with surgical and conservative treatments. Keegan¹² stated that "operation for relief of neurological symptoms caused by cervical spondylosis should be undertaken early before permanent nerve or cord damage have developed". Some authors^{5, 17, 25} presented their results and preference for the anterior approach, while others prefer laminectomy^{7, 8, 9, 11, 26, 27, 28}, with or without excision of bone spurs and with or without section of the dentate ligaments. Stoops and King^{27, 28} did not find prognostic value in the age, sex, duration of symptoms per se, spinal fluid protein level, history of trauma, congenital abnormalities, number of transverse bars requiring decompression and myelographic findings; profound quadripareses and severe atrophy in the upper limbs showed poor prognosis after surgery. Peserico et al.²³ found that the duration of symptoms prior to surgery was of importance, with their degree. Combalbert and Pellet⁶ described better results in the younger patients. It is possible that different results are seen with the several forms of treatment; however, it is also probable that preoperative factors are important in the outcome of these patients. Thus, we decided to study our patients with cervical spondylosis, looking for a possible prognostic value in preoperative signs and symptoms. One hundred and forty-one patients with cervical spondylosis, surgically treated at the Lahey Clinic in Boston from 1967 to 1972 were studied.

Department of Neurosurgery, Lahey Clinic Foundation, Boston, Massachusetts, U.S.A.: * Fellow; ** Chairman.

RESULTS

Radiculopathy — Pure radicular signs and symptoms were present in 99 patients; in other 23 these were associated to cervical myelopathy. C6 nerve root signs were found in 54.5% and C7 nerve root in 51.4%. Unilateral signs were present in 77.4% and bilateral in 22.6%. The following surgical technique were used in those with pure radiculopathy: *a)* hemilaminectomy, foramenotomy and excision of bone spur, frequently with excision of disc fragments (82 patients); *b)* same, bilaterally (11 patients); *c)* anterior fusion in one level (4 patients); *d)* anterior fusion in two levels (2 patients).

Patients with myeloradiculopathy were treated by laminectomy and foramenotomy. The best surgical results could be seen after the first month, mainly between one and three months after surgery. 22.8% of those treated by hemilaminectomy had complete recovery and 59.6% marked improvement (82.5% of excellent and good results); 12.3% had mild improvement. Two of those treated by anterior fusion in one level had marked improvement, one recovered completely and one had his symptoms arrested. One of those treated by anterior fusion in two levels had complete recovery in the first month after surgery and the other had his symptoms arrested in the first three months of follow-up.

Postoperative results compared to duration of the clinical picture (Table 1) — 9.7% of the patients with radiculopathy came in the first month of symptoms; 55% came between the first and 12th months after the onset and the remaining came between one and five years. Surgical results did not differ significantly in patients with clinical picture lasting from one month to five years until treatment was established.

Postoperative results compared to the degree of the clinical picture (Table 2) — Complete recovery was 2.5 X more frequent in the patients with mild pareses of the upper limb compared to those with severe pareses; excellent and good results were seen in 82.6% of the former and in 75% of the latter. Complete recovery

Duration of cl. picture	Marked improvement	Complete recovery	Total
<i>Radiculopathy</i>			
	%	%	%
One week or less	40.0	20.0	60.0
1 w. — 1 m.	25.0	58.3	83.3
1 m. — 2 m.	50.0	37.5	87.5
2 m. — 6 m.	45.5	42.4	87.9
6 m. — 1 y.	44.4	37.0	81.4
1 y. — 2 y.	66.7	16.7	83.4
2 y. — 5 y.	47.4	26.3	73.7
5 y. or more	66.7	0.0	66.7
<i>Myelopathy</i>			
1 w. — 1 m.	0.0	100.0	100.0
2 m. — 6 m.	42.9	28.6	71.5
6 m. — 1 y.	60.0	10.0	70.0
1 y. — 2 y.	42.9	28.6	71.5
2 y. — 5 y.	60.0	0.0	60.0

Table 1 — Proportion of patients with marked improvement and complete recovery compared to duration of the clinical picture until treatment: w. = week; m. = month; y = year.

was 4.5 X more frequent in the patients without muscle atrophy in the upper limb compared to those with atrophy; excellent and good results were seen in 84.9% of the former and in 62.2% of the latter ($p < 0.05$). Complete recovery was less frequent in patients with hypoactive or absent reflexes in the upper limb. Patients with no sensory loss had complete recovery 4.5 X more frequently than those with hypoesthesia. Complete recovery was 4 X more frequent in patients with myelographic defects in one or two disc levels, compared to those with more levels involved. Surgical results did not differ in patients with normal CSF protein level compared to those with abnormal levels.

	Complete recovery	Marked improvement	Total
	%	%	%
Severe pareses of the upper limb	12.5	62.5	75.0
Mild pareses of the upper limb	31.6	51.2	82.6
With atrophy in the upper limb	8.7	56.5	65.2
Without atrophy in the upper limb	38.9	46.0	84.9
Arreflexia in the upper limb	33.3	53.3	86.6
Hyporreflexia in the upper limb	27.7	55.4	83.1
Normorreflexia in the upper limb	41.2	40.2	81.4
With hypoesthesia in the upper limb	8.3	66.7	75.0
No hypoesthesia in the upper limb	37.1	46.8	84.9
One level involved	38.8	48.2	87.0
Two levels involved	32.4	52.9	85.3
Three levels involved	7.7	46.2	53.9
Four levels involved	0.0	66.7	66.7

Table 2 — Proportion of patients with complete recovery and marked improvement compared to neurological signs and myelographic defects in 122 patients with radiculopathy due to cervical spondylosis.

Postoperative results compared to age (Table 3) — 97.1% of the patients older than 60 years had mild or severe pareses of the upper limb, compared to 73.3% of the patients under 60 years with the same deficit. In the latter, excellent and good results were 2 X more frequent than in the older patients.

Myelopathy — Spinal cord signs were present in 42 patients; 24 were treated by cervical laminectomy and section of the dentate ligaments. Complete recovery was seen in 30.8% and marked improvement in 53.3% (84.1% of excellent and good results). Fourteen patients were treated by extensive cervical laminectomy without opening of the dura; 9.1% had complete recovery and 63.6% marked improvement (72.7% of excellent and good results). These data cannot be compared because there were 20.8% of patients with severe pareses of the lower limbs in the first group and 46.7% of these in the second group. Three patients were treated by anterior fusion and laminectomy; after three months, only one had mild improvement of his symptoms.

Postoperative results compared to duration of the clinical picture (Table 1) — 73.9% of the patients with myelopathy came in the first year of symptoms. Surgical results did not differ statistically in those with clinical picture lasting from two months to five years until treatment was established.

Postoperative results compared to the degree of the clinical picture (Table 4) — No patient with severe pareses of the lower limbs had complete recovery in the first year after surgery; 29.4% of those with mild pareses had complete recovery in the same period of time. Marked improvement was seen in 66.7% of those with mild pareses and in 47.1% of those with severe pareses of the lower limbs ($p < 0.1$). No patient with severe spasticity of the lower limbs had complete recovery in the first postoperative year; excellent and good results were seen in higher proportion of patients with mild compared to those with severe spasticity. Five per cent of the patients with hypoesthesia of the lower limbs had complete recovery and 70% had marked improvement in the first three months after surgery; in the next period of time, until 12 months after surgery, 16.7% had complete

	Younger than 60 years	Older than 60 years
	%	%
Slight pareses of the upper limb	26.7	2.9
Mild pareses of the upper limb	64.7	86.1
Severe pareses of the upper limb	8.6	11.0
Excellent and good results	64.6	32.3

Table 3 — Proportion of patients with slight, mild and severe pareses of the upper limb and results after surgery compared to age in 122 patients with radiculopathy due to cervical spondylosis.

	Complete recovery	Marked improvement	Total
	%	%	%
Mild pareses of the lower limbs	29.4	47.1	76.5
Severe pareses of the lower limbs	0.0	66.7	66.7
Mild spasticity of the lower limbs	16.7	61.1	77.8
Severe spasticity of the lower limbs	0.0	50.0	50.0
Hypoesthesia of the lower limbs	16.7	66.7	83.4
Paresthesia only	25.0	50.0	75.0
Hypoesthesia and paresthesia	5.0	70.0	75.0
One disc level involved	16.7	33.3	50.0
Two discs levels involved	30.0	40.0	70.0
Three discs levels involved	12.5	75.0	87.5
Four discs levels involved	25.0	50.0	75.0

Table 4 — Proportion of patients with complete recovery and marked improvement compared to neurological signs and myelographic defects in 42 patients with myelopathy due to cervical spondylosis.

	Younger than 60 years	Older than 60 years
	%	%
Slight pareses of the lower limbs	9.1	6.01
Mild pareses of the lower limbs	68.92	32.29
Severe pareses of the lower limbs	21.98	54.70
Excellent and good results	68.92	37.64

Table 5 — Proportion of patients with slight, mild and severe pareses of the lower limbs and results after surgery compared to age in 42 patients with myelopathy due to cervical spondylosis.

recovery and 66.7% marked improvement; 25% of the patients with paresthesia only but no objective sensory loss had complete recovery and 50% marked improvement in the first three months; these results did not change until 12 months after surgery. Patients with myelographic defects in three levels had excellent and good results in higher proportion than those with two levels involved and these had better results than those with only one level defect. There was no difference in the surgical results of patients with normal and abnormal CSF protein level.

Postoperative results compared to age (Table 5) — 16.6% of the patients with myelopathy were under 49 years; 66.6% were between 50 and 69 years old. Severe pareses was 2.5 X more frequent in the older than 60 years and complete recovery was 2 X less frequent in this age group ($p < 0.05$).

DISCUSSION

It is our impression that surgery has a definite place in the treatment of radiculopathy and myelopathy due to cervical spondylosis. It is particularly indicated in patients with progressive signs and symptoms. The surgical results can be predicted from the preoperative clinical picture. In our patients with radiculopathy, the degree of motor involvement of the upper limb, muscle atrophy, sensory involvement, number of myelographic defects and age had prognostic value. In those with myelopathy, the degree of lower limbs pareses and spasticity, number of myelographic defects and age had prognostic value. We found no such value in the time of duration of the clinical picture lasting from two months to five years and in abnormal CSF protein level. We think that, at least in part, conflicting results found in the literature are due to the difference in the degree of neurological damage of the patients considered by each author. Definite conclusions regarding the best method of treatment can only be drawn from similar groups of patients. However, it seems very obvious that surgery is a landmark in the recovery of patients with progressive signs and symptoms; the degree of some of these has a prognostic value and its standardization may lead to a better evaluation of the several surgical techniques.

SUMMARY

One hundred and forty-one patients with cervical spondylosis were studied, looking for a possible prognostic value in preoperative signs and symptoms. Duration of symptoms lasting from one month to five years until surgical treatment and spinal fluid protein level had no prognostic value in these patients. In those with radiculopathy, the degree of upper limb pareses, muscle atrophy, absent or diminished reflexes, sensory involvement, number of myelographic defects and age had prognostic value. In those with myelopathy, the degree of lower limbs pareses and spasticity, sensory involvement, number of myelographic defects and age had prognostic value. Surgery is a definite method of treatment for patients with progressive signs and symptoms due to cervical spondylosis; some of the preoperative signs and symptoms are valuable in establishing their prognosis.

RESUMO

Espondilose cervical: valor prognóstico dos sinais e sintomas pré-operatórios

Cento e quarenta e um pacientes com espondilose cervical foram estudados com o objetivo de se determinar um possível valor prognóstico nos sinais e sintomas pré-operatórios; 99 apresentaram radiculopatia, 19 mielopatia e 23 mielorradiculopatia. Nos pacientes com radiculopatia, recuperação completa foi 2,5 vezes mais frequente nos com parestesia moderada dos membros superiores em relação aos com parestesia intensa, 4,5 vezes mais frequente nos que não apresentaram atrofia muscular, 4,5 vezes mais frequente nos que não apresentaram distúrbios objetivos da sensibilidade, 4 vezes mais frequente nos que apresentaram defeitos mielográficos em menos do que dois níveis discais; pacientes com mais de 60 anos apresentaram maior proporção de comprometimento motor grave e também tiveram piores resultados com a cirurgia. Nos pacientes com mielopatia, nenhum com parestesia intensa e nenhum com espasticidade intensa dos membros inferiores teve recuperação completa no primeiro ano após a cirurgia; resultados melhores foram observados nos que apresentaram parestesia moderada nos membros inferiores. Melhores resultados foram vistos em pacientes com número maior de defeitos mielográficos. Comprometimento motor grave dos membros inferiores foi mais frequente nos pacientes com mais de 60 anos e estes apresentaram também piores resultados após a cirurgia em relação aos com menos de 60 anos. A cirurgia foi um marco na recuperação destes pacientes. Conclui-se que a padronização da avaliação destes sinais e sintomas pré-operatórios permite um prognóstico em relação à radiculopatia e à mielopatia conseqüentes à espondilose cervical.

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Reynaldo A. Brandt — Address: Praça Osvaldo Cruz 138, cj. 73 — 04747 São Paulo. SP — Brasil.