Surgery for chronic symptoms after whiplash injury

Follow-up of 20 cases

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20 patients operated on with discectomy and anterior cervical fusion because of chronic symptoms after whiplash injury were examined 4 years after surgery. The commonest indications for surgery were disabling headache and neck pain and radiographically verified disc protrusion.

At follow-up, 11 patients had reduced headache and neck pain, while paresthesia and radicular pain were diminished in 9 patients. Based on Robinsson's criteria for the evaluation of surgical results, 2 patients had good, 9 had fair and 9 had poor results.

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After a whiplash injury of the neck many patients have prolonged symptoms such as neck pain and headache which they attribute to the injury (Hohl 1974, Norris and Watt 1983, Hodgson and Grundy 1989, Hildingsson and Toolanen 1990). There are few studies on the effect of surgical treatment and only a few cases are considered candidates for surgical treatment (Gotten 1956, Macnab 1971, Marshall 1976, Wikström and Larocca 1977, Larocca 1978). Recently Jónsson (1992) reported good results after early surgical intervention.

We have retrospectively studied the clinical results in 20 patients operated on for chronic symptoms after a whiplash injury of the cervical spine.

Patients and methods

20 patients, 7 men and 13 women, with a median age of 36 (23–62) years, were operated on for a whiplash injury sustained in an automobile accident. The impact direction was in 9 cases from the rear-end, in 5 from the front-end, in 4 single and roll-over accidents, and in 2 side collisions.

Patients with previous history of neck injury or surgery of the cervical spine as well as those with head injury or fracture of the cervical spine were excluded. The patients were referred to our hospital for evaluation because of their severe chronic symptoms. All cases had a history of disabling neck pain for a mean of 7 (1–25) years and had been treated with physiotherapy and rehabilitation efforts. 2 patients had a history of alcohol abuse and 4 were treated with tranquillizer for anxiety.

Preoperative radiographic evaluation included cervical MRI in 8 cases, CT in 7, cervical myelography in 14, discography in 5 and lateral radiographs in flexion and extension in 10 cases.

Indications for surgery were severe and prolonged headache, neck and radicular pain in which the symptoms and clinical findings were in agreement with the radiographic findings (Table 1). The operation was performed by one surgeon and the procedure was in 18 cases anterior cervical discectomy with interbody fusion, according to the method described by Cloward (1958) and modified by Kempe (1970). 7 patients underwent a single-level arthrodesis, 9 a two-level and 2 a three-level arthrodesis. In 2 cases a single-level discectomy without fusion was performed.

The follow-up was done by an independent observer on average 4 (1–8) years after the operation. The results of surgery were classified as excellent, good, fair and poor (Robinsson et al. 1962, White et al. 1973).

Results

At follow-up, 11 patients had diminished headache and neck pain, while 9 were unaltered. Paresthesias were improved in 6 patients and radicular pain in 3, while no beneficial effects on vertigo, visual and auditory symptoms were seen (Table 2).

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Table 1. Observations in 20 patients operated due to chronic symptoms after whiplash injury

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	X	Y
1	1	45	8	3	4,5	1	3	6	3	3	1	3	2	3	1	2	3	3	3	3	3	3	1
2	1	61	7	3,4	4	2	3	8	1	2	1	2	3	3	1	2	3	2	3	3	3	2	2
3	1	62	1	1,3,4	3,5	1	4	8	1	3	1	3	3	3	1	3	3	2	3	3	3	3	2
4	2	50	2	2,4	2	2	3	2	1	1	1	1	1	1	1	1	1	2	3	3	2	2	3
5	2	31	6	1,3,5	3,6	1	1.3	1	1	1	1	1	1	3	1	1	1	2	2	2	2	2	3
6	2	33	5	2	1	1	3	6	1	2	1	2	1	1	1	3	1	3	2	3	2	3	2
7	1	57	25	3,4	5	1	3	5	1	3	1	3	3	3	1	1	1	1	1	1	3	3	2
8	2	36	7	1,3,5	3,5	1	1,3	4	1	2	1	2	1	1	1	1	2	1	2	2	2	2	2
9	2	25	6	1,3,4	5	1	1,2	4	1	1	1	1	1	1	1	1	1	2	1	2	1	2	2
10	2	44	5	2,3	2	1	2,3	3	1	2	1	1	1	1	1	1	1	1	1	1	1	1	3
11	2	37	2	1,3	7	1	4	3	1	1	1	1	3	3	2	2	2	1	2	2	2	2	3
12	2	23	4	2,3	6	1	4,5	2	1	1	1	1	3	3	1	1	3	3	2	2	2	2	3
13	1	31	10	1,3,5	6	1	1,2	2	1	2	1	2	2	2	2	2	2	3	3	3	2	3	2
14	2	45	4	2	2	1	2,3,4	2	1	2	1	3	1	1	1	1	1	1	1	2	3	3	3
15	2	26	19	2	2	1	3,4	3	1	1	1	1	1	1	1	1	3	3	3	3	3	3	3
16	2	56	8	3,4	4	1	3	4	2	1	2	1	2	3	3	2	3	1	2	3	3	2	1
17	1	36	4	1,2,4	1	1	3	1	1	2	1	2	1	2	1	2	2	2	2	2	2	1	2
18	1	30	4	3,4,5	3,6	1	1,2	5	1	1	1	1	2	2	2	2	2	2	2	2	2	2	3
19	2	31	7	3,4,5	6	1	1	2,3	5	1	1	1	1	1	1	1	1	1	1	1	1	3	3
20	2	43	1	2,4	2	1	3	1	1	2	1	2	2	2	1	1	2	2	2	3	1	2	2

A Case
B Sex
  1 Male
  2 Female
C Age at time for surgery
D Time from injury to operation (year)
E Preoperative investigation
  1 CT
  2 MRI
  3 Myelography
  4 Flexion-extension radiography
  5 Discography
F Positive findings at preoperative investigation
  1 Disc protrusion on MRI
  2 Disc herniation on MRI
  3 Disc protrusion on myelography
  4 Disc herniation on myelography
  5 Instability on flexion-extension radiography
  6 Positive discography /disc anesthesia
  7 Osteophytes and degenerative changes at one level
G Type of operation
  1 Cloward operation
  2 Discectomy without fusion
H Operated levels
  1 C3/C4
  2 C4/C5
  3 C5/C6
  4 C6/C7
  5 C7/Th1
I Follow-up time (year)
J Headache preop.
K Headache at follow-up
L Neck pain preop.
M Neck pain at follow-up
N Radicular pain preop.
O Radicular pain at follow-up
P Paresthesia preop.
Q Paresthesia at follow-up
R Vertigo preop.
S Vertigo at follow-up
T Visual symptoms preop.
U Visual symptoms at follow-up
V Auditory symptoms preop.
X Auditory symptoms at follow-up
Observations J–X
  1 Daily complaints
  2 Occasional complaints
  3 No complaints
Y Results of surgery according to Robinsson
  1 Good
  2 Fair
  3 Poor

Table 2. Changes in symptoms at follow-up. Number of patients

Symptoms	n	Improved	Unchanged	Worse
Headache	20	11	9	0
Neck pain	20	11	9	0
Radicular pain	14	3	11	0
Paresthesia	20	6	14	0
Vertigo	17	6	7	4
Visual	13	4	9	0
Auditory	14	5	8	1

No patient had an excellent result, while 2 had good results, 9 fair and 9 poor. Instability was shown in 5 cases preoperatively, in 2 of these as the only radiographic findings. At follow-up, 1 had a good and 4 a fair outcome.

Discussion

We consider our results after anterior cervical fusion of whiplash patients with chronic pain unsatisfying. Subjective pain reduction was achieved in about half of the cases but this improvement was difficult to evaluate retrospectively. The surgical treatment for chronic neck pain in general has been of some benefit (DePalma and Subin 1965, Martins 1976, Metzger et al. 1989), but there are no comprehensive reports on the results of surgical treatment of patients with persisting symptoms after whiplash injury. Tamura (1989) reported good results after surgery in 21 cases with Barré-Lieou syndrome; some of his cases were operated on even 1 month after injury. Wickström and Larocca (1977) reported a series of 12 cases out of 488 who had discectomy and anterior fusion. 3 patients

had complete relief of all symptoms, 2 had some improvement and 7 failed to achieve any improvement.

Contrary to the results of surgery in patients with chronic symptoms after whiplash trauma, Jónsson (1992) recently reported good results in a series of 10 cases who underwent early surgical intervention. This may indicate that the time interval between injury and treatment is important for the results.

The disabling symptoms in our patients were most often neck pain and headache, while radicular pain was less frequent. These findings are in agreement with earlier reports (Hohl 1989).

The most frequent preoperative radiographic finding in our cases was disc protrusion. In the study of Wickström and Larocca (1977) the radiographic findings are not described. Tamura (1989) suggested that the cranial symptoms, such as headache, vertigo, tinnitus and visual problems, were a result of irritation of the sympathetic supply at C3/C4 level due to lateral disc protrusion. These protrusions with affection of the nerve root sleeves could be visualized by special oblique views on myelography, though the frontal and lateral views showed a normal image. It has been proposed that the radiating pain and numbness down the arms do not necessarily indicate nerve root pressure, but it might instead be another manifestation of referred pain (Macnab 1971, Hohl 1989) or scalenus spasm (Macnab 1971).

Wickström and Larocca (1977) proposed that the ultimate agent responsible for the pain must in some way be different in patients with good or poor outcome after surgery. However, they could not describe a way to determine preoperatively what this factor is or whether it is present.

Thus, in spite of extensive diagnostic evaluation, it is difficult to identify the painful segment in patients with persisting symptoms after whiplash injury. The diagnostic difficulties might be one explanation of the unsatisfying operative results in our series as well as in others.

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