

costs. In Britain, where obstetricians seem to be conservative in their use of antibiotics for prophylaxis compared with doctors in North America and Australia, there is scope for extending the use of prophylactic antibiotics, even if they are adopted routinely only for women at increased risk of developing infection.<sup>11 17</sup> Possible adverse ecological effects of increasing the total antibiotic load within hospitals should be investigated by randomisation of hospitals rather than individual women to routine antibiotic prophylaxis.

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## Early mobilisation and outcome in acute sprains of the neck

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### Abstract

**Objective**—To assess the long term effect of early mobilisation exercises in patients with acute sprains of the neck after road accidents.

**Design**—Single blind randomised prospective study of patients receiving physiotherapy, advice on mobilisation, or on an initial period of rest followed up after two years by postal questionnaire.

**Setting**—Accident and emergency department in urban hospital.

**Patients**—247 Consecutive patients (mean age at injury 30.6 years) presenting within 48 hours after injury with no pre-existing disease of the neck or serious skeletal injury. Of these, 167 patients responded to the questionnaire; 77 who responded but had not completed their treatment or review course were included in the analysis as a fourth group (non-attenders).

**Main outcome measure**—Presence of symptoms after two years.

**Results**—Of the 167 patients (68%) responding, the percentage of patients still with symptoms was not significantly different in those receiving rest or physiotherapy (46%, 12/26 v 44%, 24/54), but that in those receiving advice on early mobilisation was significantly lower (23%, 11/48,  $p=0.02$ ). Of the 104 patients without symptoms, 94 (90%) recovered within six months and 62 (60%) within three months. Patients without symptoms who received advice or physiotherapy wore a collar for a significantly shorter time than those with persistent symptoms (mean duration 1.4 (SD 0.7) months v 2.8 (1.6) months,  $p=0.005$  and 1.6 (1.1) months v 1.8 (1.3) months,  $p=0.006$  respectively).

**Conclusions**—Advice to mobilise in the early

phase after neck injury reduces the number of patients with symptoms at two years and is superior to manipulative physiotherapy. Prolonged wearing of a collar is associated with persistence of symptoms.

### Introduction

Management of acute sprain of the neck is a common problem in accident and emergency departments and for those concerned with establishing a prognosis for legal and other purposes. Until recently such management has remained passive, relying on the use of analgesia and rest, usually associated with wearing of collars.<sup>1</sup> Reviews of patients with acute neck sprain indicates that two years after injury 45-66% still have symptoms.<sup>1,2</sup> Litigation has been considered to be important in the excessive morbidity for this fairly minor soft tissue injury,<sup>3</sup> but paradoxically in the same report 12% of patients had serious symptoms and 34% minor symptoms when interviewed after settlement of litigation. Hohl found that resolution of symptoms was greater in patients for whom litigation was settled early but also found that an appreciable number still had symptoms after litigation had been settled (62% with symptoms when settlement occurred 18 months or more after injury).<sup>4</sup>

Early mobilisation improved mobility and reduced pain in acute neck sprains in the early phase,<sup>5,6</sup> but its long term effectiveness on outcome has not been reported.

I carried out a prospective longitudinal study of 247 patients who had initially been randomised to receive active physiotherapy, advice on mobilisation, or conservative treatment and analysed the outcome two years after injury. Analysis of early outcome had

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**Looking after your neck**

**Remember POSTURE** when sitting, driving, reading, and standing.

Bad posture will delay your recovery. Avoid slouching forwards with your chin sticking out. Keep your back straight and your shoulders braced. A good exercise is to draw yourself up straight with your chin tucked in, repeatedly, 10 times every hour.

**Getting the movements back is very important**

Here are some more exercises to help you . . .

FIRST straighten up—then try to touch each ear down on to your shoulder.

Straighten up again—now try looking round over each shoulder in turn.

Your exercises will be painful initially but will not harm your neck. You can repeat the exercises as often as you like. The more the better. Try to stretch your neck more each day.

**AVOID** excessive reliance on a collar . . . it will encourage bad posture and delay mobilisation. You will not harm your neck or delay recovery by not wearing your collar. It should be worn for short periods at a time, or reserve it for night time use.

**DISCOMFORT** in your neck will gradually settle but may be improved by local heat application—use a hot water bottle, heated towel, heat lamp, or warming liniment.

The pain killing tablets that you have been given can be used to supplement this.

In **BED** . . . don't use too many pillows. Keep your neck supported, either with the collar or by making a firm roll (use a rolled up hand towel) placed inside the bottom edge of your pillow case. If possible sleep on your side or your back, not on your face.

In the morning start the day with your exercises to relieve any stiffness in your neck.

fitted with a soft foam collar and were given an analgesic (co-dydramol 1000 mg six hourly).

The randomised treatments consisted of rest, physiotherapy, and advice on self mobilisation. Patients receiving rest treatment were given general advice to mobilise after an initial rest period of 10-14 days. Patients receiving physiotherapy were assessed by a physiotherapist, and a tailored programme of outpatient physiotherapy was devised from the resources available in this hospital. Typically, they received a combination of hot and cold applications, pulsed short wave diathermy, hydrotherapy, traction, and active and passive repetitive movements. Each patient received 10 hours of physiotherapy over six weeks. Patients receiving only advice were each assessed by a physiotherapist and given verbal and reinforcing written instruction on correction of posture, use of analgesia and collar, and on the use of heat sources and muscle relaxation (figure). They were encouraged to perform mobilising exercises, which were demonstrated. Emphasis was placed on maintaining a good range of neck movements and on correcting posture even if this initially caused some increased discomfort. The patients were advised to restrict the wearing of the collar to short periods when their neck was vulnerable to sudden jolting. The instruction session typically lasted 30 minutes.

The patients were examined initially and at monthly intervals for three months, during which they became familiar with a visual analogue scale for assessing pain. Two years after injury the patients were contacted by letter and asked to complete a questionnaire, indicating the duration of their pain and stiffness, and those with persistent pain were asked to record its severity on a 10 cm 10 point visual analogue scale similar to that used initially. They were also asked how long they had used their collar. The replies were collated with previously obtained information regarding age, sex, initial severity of pain, and range of movement and about early treatment. Up to three attempts were made to contact the patients. Several patients who had not completed their treatment or review course replied to the questionnaire and were included in the analysis as a fourth group (non-attenders).

Early in the study I felt that simple instruction about effective mobilisation could not reasonably be withheld; because of this ethical objection the treatment regimen for patients allocated to receive rest was discontinued before conclusion of the trial, and thus the number of patients in this group was smaller than in the other groups. No attempt was made to analyse the effect of litigation as its incidence was assumed to be uniform among the treatment groups.

The findings were analysed statistically with independent sample *t* tests for parametric data (comparison of age, duration of wearing collar, initial range of cervical movements, and time to recovery in patients with symptoms and those who had recovered and outcome for the different treatment options). Initial scores for severity of pain were compared in the different groups by the Mann-Whitney U test.

shown that this was not significantly different between the patients who had received 10 hours tailored outpatient physiotherapy over six weeks and those who had been given comprehensive verbal advice and written instructions to allow them to perform postural correction and repetitive mobilisation exercises at home.<sup>6</sup>

**Patients and methods**

Two hundred and forty seven consecutive patients entering this department within 48 hours after sustaining a non-contract flexion-extension sprain of the neck in a shunting road traffic accident were randomised to receive one of three treatments by selecting a sealed envelope. Those with radiological or clinical evidence of cervical fracture or dislocation or pre-existing degenerative diseases were excluded. All patients were

TABLE 1—Range of movement and severity of pain in 247 patients with pain of neck after injury and persistence of symptoms at subsequent two year review in 167

	Initial treatment			Non-attenders
	Rest	Physiotherapy	Advice	
No of patients initially	33	71	66	77
Mean (SD) age (years)	28.7 (8.9)	31.6 (11.3)	30.2 (11.3)	
Range of movement (SD) (degrees)	44.4 (14.7)	45.6 (18.5)	47.3 (20.7)	
Severity of pain (SD) (0-10)	5.6 (1.4)	5.3 (1.9)	5.3 (2.0)	
No (%) of patients reviewed at two years	26 (79)	54 (76)	48 (73)	39 (51)
No (%) of patients with persistent symptoms	12 (46)	24 (44)	11 (23)	16 (41)

$\chi^2=5.43$ , *df*=1, *p*=0.02; advice versus other treatments and  $\chi^2=4.31$ , *df*=1, *p*=0.04 physiotherapy versus advice in patients with persistent symptoms.

**Results**

One hundred and sixty seven replies (68%) were received from the 247 patients who were contacted; these included 128 (75%) of the 170 patients in the study of initial outcome (table I).<sup>2</sup> The severity of injury when assessed by range of cervical movement and severity of pain in the neck within 72 hours after injury were similar for all the treatment groups, which were also similar in age and sex distribution. Table I also shows the number of patients in each group who still had symptoms two years after injury. Recovery was not significantly different between those who had

TABLE II—Recovery of 104 patients with pain of neck

Months of treatment	No of patients recovered	Cumulative %
1	20	19
2	21	39
3	21	60
4	15	74
5	8	82
6	9	90
7	0	90
8	1	91
9	6	97
10	0	97
11	0	97
≥12	3	100

initially received physiotherapy and those who rested (44%, 24/54 v 46%, 12/26 patients with symptoms) but that in patients given advice on mobilisation exercises to do at home (23%, 11/48) was significantly better than in the other patients ( $\chi^2=5.43$ ,  $df=1$ ,  $p=0.02$ ). The difference was still significant even if the patients who were not reviewed were assumed to have the same recovery rate as those in the passive treatment group.

Tables II and III show recovery times for patients who did not have symptoms. Of the 104 patients who recovered within the two year follow up, 101 (97%) had done so within nine months after their injury, 94 (90%) within six months, and 62 (60%) within three months. The mean time to recovery was 3.6 (SD 2.5) months.

TABLE III—Mean (SD) time to recovery (months) in 104 patients with pain of the neck by type of treatment

Treatment				
Rest (n=14)	Physiotherapy (n=30)	Advice (n=37)	Non-attenders (n=23)	Total (n=104)
3.9 (2.2)	4.2 (2.8)	3.4 (2.0)	3.1 (3.0)	3.6 (2.5)

The time to recovery was not different among treatments so the greater percentage of recoveries in the group receiving advice (77%) seems to be distributed similarly.

When patients who recovered were compared with those who had not the original range of cervical movement was not significantly different, but severity of pain of the neck, as assessed on a 10 cm 10 point visual analogue scale, was significantly less ( $p<0.01$ ) (Mann-Whitney U test;  $U=790.5$ ,  $ND=-2.64$ ,  $p=0.008$ ) and applied to each of the original treatment groups except that comprising patients who did not return for follow up. (Advice:  $U=117$ ,  $ND=-2.06$ ,  $p=0.039$ ; physiotherapy:  $U=242.5$ ,  $ND=-2.08$ ,  $p=0.038$ ). Age and sex were not significantly different between patients who did and did not recover  $t=-1.03$ ,  $df=99$ ,  $p=0.31$ ).

Patients in the advice and physiotherapy groups who recovered used a collar for a significantly shorter time than those with persistent symptoms (mean (SD) duration 1.4 (0.7) months and 1.6 (1.1) months v 2.8 (1.6) months and 1.8 (1.3) months respectively, table IV), and this difference was not due to an initial difference in severity of injury shown by diminished range of movement of the neck or increased pain.

### Discussion

Although early mobilisation is effective in relieving symptoms in acute neck sprains,<sup>5,7</sup> the use of physiotherapy has only recently gained recognition.<sup>8</sup> A previous report on the early outcome for the patients in this study showed no significant difference in efficacy between outpatient physiotherapy and a structured verbal and written exercise programme to allow self mobilisation.<sup>6</sup> In addition to the obvious benefits of cost effectiveness, it now seems that an early mobilisa-

tion programme improves long term outcome, reducing the incidence of persistent symptoms at two years from 45% to 23% in this series. The incidence of persistent symptoms with conservative treatment is similar to that previously reported (45-66%).<sup>1,3</sup>

It is not immediately apparent why patients who received advice benefited but not those who were given a course of manipulative physiotherapy. It may be that patients who are given responsibility for their own treatment and encouraged may become self sufficient in managing episodes of minor discomfort, thus preventing the recurrence or persistence of the vicious circle of muscle spasm causing pain, postural changes, and further muscle spasm. There may be psychological advantages in making patients responsible for their treatment rather than victims of their continuing symptoms.

Most of those who recovered within two years did so fairly quickly; only 10% recovered later than six months. This six month watershed may help to clarify the prognosis for individual patients. The greater number of patients who recovered in the group receiving advice seemed to fall into the same time scale for recovery as the other groups. The mean initial pain score in those in the advice group who had persistent symptoms was significantly higher than that in the other groups ( $p<0.05$ ), perhaps indicating that the threshold for recovery is higher for those who are encouraged to mobilise early. The initial pain score from a visual analogue scale seemed to correlate well with recovery ( $p<0.05$ ); there was, however, no significant correlation with initial range of movement. Hohl found no significant correlation between the severity of initial symptoms, including range of cervical movement and outcome.<sup>4</sup> Pain score seems to be a useful indicator of prognosis and probably represents a measure of actual and perceived severity of injury.

Duration of wearing a collar showed a highly significant difference between patients who did and did not recover. Hohl found a similar association between reduced recovery and the development of degenerative changes with prolonged wearing of a collar.<sup>4</sup> This indicates, however, the possibility of the association resulting from these patients having had more serious injury. In this study there was no difference in severity of injury as measured by initial pain score or range of movement between patients who did and did not wear their collar for a prolonged period, and this is considered to be evidence that excessive reliance on a collar may inhibit recovery.

The findings suggest that the outcome for acute neck sprains may be improved by reduced reliance on a collar and by a programme of instruction for early mobilisation at home.

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TABLE IV—Mean (SD) duration of wearing collar (months) in patients who had and had not recovered at two years follow up

	Treatment				
	Rest (n=26)	Physiotherapy (n=54)	Advice (n=48)	Non-attenders (n=39)	All patients (n=167)
Patients recovered	1.8 (0.7)	1.6 (1.1)	1.4 (0.7)	1.2 (0.8)	1.5 (0.9)
Patients with symptoms	1.8 (1.7)	1.8 (1.3)	2.8 (1.6)	2.6 (1.5)	2.5 (1.3)
	<i>Independent sample t tests (recovered patients versus patients with symptoms)</i>				
Observed t	0.16	2.80	3.00	3.68	5.19
df	22	45	41	32	146
p	0.87	0.006	0.005	0.001	0.001