Manipulation of the cervical spine—a pilot study

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SUMMARY. A randomized controlled trial of manipulation of the cervial spine was carried out on 52 patients in general practice, and the results were assessed symptomatically and goniometrically for three weeks. Manipulation produced a significant immediate improvement in symptoms in those with pain or stiffness in the neck, and pain/paraesthesia in the shoulder, and a nearly significant improvement in those with pain/paraesthesia in the arm/hand. Manipulation also produced a significant increase in measured rotation that was maintained for three weeks and an immediate improvement in lateral flexion that was not maintained.

This is to our knowledge the first published formal trial of such manipulation and should increase interest in this form of treatment by the medical profession.

Introduction

MINOR disorders of the neck are common. They may present as pain and/or stiffness in the neck, or pain referred to the head, shoulder, arm or hand. The pathology of such conditions is poorly understood. Various postulated causes are: minor subluxations of the intervertebral facet joints (demonstrated radiologically in some patients with headache), derangements of the intervertebral discs with secondary osteoarthritis of the interarticular joints,[1] or entrapment of the meniscoid structures that exist in the upper cervical apophyseal joints straining the joint capsule[2] (possible pathologies have been reviewed).[3] The majority of such patients improve spontaneously but some do not. Manipulation of the neck as a treatment for such patients remains controversial but it seems to have received little detailed analysis. We therefore devised a trial to try to assess its effectiveness in general practice.

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Methods

Patients were selected for the trial from those routinely attending the surgery of one two-man practice. Those included in the trial were aged between 15 and 65 years, with pain in the neck, arm or hand thought to be due to a lesion of the cervical spine and with evidence of reduced movement at one or more cervical intervertebral joints or palpable asymmetry of the transverse processes of the atlas. Excluded were those cases contraindicated by evidence of cord involvement, rheumatoid arthritis, pregnancy, suspected metastases, psychiatric illness, or other contraindications (usually another cause of pain in the shoulder or arm). For simplicity, patients are referred to in the text as if they were female, and doctors as male.

Each patient initially presented in the course of ordinary surgeries to either D. H. H. or M. T. W., both hereafter referred to as Dr A, who assessed whether she was suitable for inclusion in the trial and asked her consent. If she agreed (only six refused, four of whom wanted to be manipulated), she was examined in another room by the other general practitioner (Dr B), who took the measurements and recorded these and the other necessary particulars.

The patient returned to Dr A, who opened a sealed envelope which contained instructions assigning her to either the control group or the treatment group. Those in the treatment group were treated by manipulation and/or injection and asked to return for further treatment at Dr A's discretion. Both groups of patients were treated with azapropazone. They were all instructed not to tell Dr B whether they had been manipulated or not. All patients then returned to Dr B, who again recorded their symptoms and measured their neck movements.

Patients were asked to attend for two follow-up visits at one and three weeks after the initial consultation. At both visits they were asked whether each symptom was absent, the same, better, or worse, and their neck movements were measured.

Measurement

The goniometer consisted of two parts (Figure 1): a pointer attached to the patient's head by the band of an ENT head mirror and a Perspex sheet attached to the upper end of a rod strapped vertically to her back. Both could be placed horizontally to measure rotation and vertically to measure lateral flexion.

The position of the pointer was marked on the Perspex sheet at the extremes of rotation and lateral flexion in both directions. For each movement, the angle between the two positions of the pointer was measured and divided by 2 to give the average.

Movement before treatment was often limited in only one direction. However, it was not possible to measure changes in movement in each direction accurately because that would have meant placing the headband in exactly the same position each time, which could not be guaranteed.

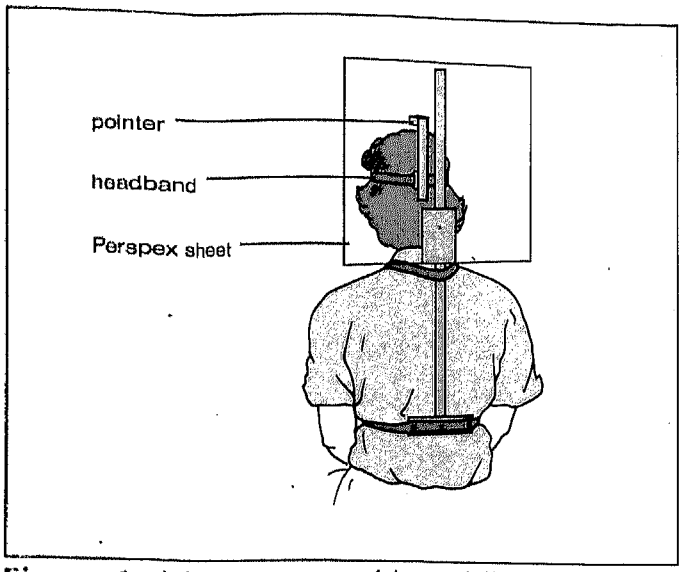

Figure 1. *Measurement of lateral flexion with the goniometer in the vertical position.*

Methods of manipulation

The detailed methods used varied between the two manipulators (D.H.H. and M.T.W.) but the principles are described below. The techniques are similar with only minor differences to those described by Bourdillon.[3] The essence of manipulations is to move the joint or joints as far as comfortably possible and then apply a quick thrust of moderate force but with small amplitude in the same direction. Details of treatment given are shown in Table 1.

Description in detail of how to manipulate is not appropriate to a report of this sort. Neither have we described how to examine the neck and decide which treatment is most appropriate.

The techniques were taught to us by members of the British Association of Manipulative Medicine (BAMM).

One patient in the manipulated group was found to have a lesion of the lumbar spine which was manipulated as well.

Injection

Necks too painful for manipulation, or those patients in whom manipulation failed might be treated by an injection of either methylprednisolone or a mixture of lignocaine and hydrocortisone, to the dorsum of the appropriate apophyseal joint. In the two patients in the trial who received injection treatment, the mixture was given and this allowed manipulation to be carried out.

Statistical methods

Qualitative variables were analysed using the chi-square test. Reproducibility between first and second assessments in controls was expressed as the root mean square difference, viz $\sqrt{(\Sigma \cdot d^2/n)^2}$.

Results

Fifty-two patients were admitted to the trial, 26 by each general practitioner. Exactly half were allocated to the manipulation group and half to the control group.

Table 2 compares patient characteristics, history and presenting symptoms between the random groups. Randomization achieved adequate comparability, except that all six patients whose symptoms had already lasted four weeks or longer were, by chance, allocated to the manipulation group—a significant difference ($P<0.05$). The benefits of treatment of these patients did not differ significantly from those shown in the remainder.

Table 1. Treatment given to patients.

Treatment	Number of patients
One manipulation	17
Two manipulations	4
Three manipulations	2
Manipulation of the neck and lumbar spine	1
Injection and manipulation	2

Table 2. Initial comparability of patient characteristics, history and presenting symptoms between the random groups. (Percentages in parentheses.)

	Control group	Manipulation group
Age under 40 years	11/26 *(42)*	12/26 *(46)*
Male	8/26 *(31)*	13/26 *(50)*
History of previous attacks	19/26 *(73)*	23/26 *(88)*
History of manipulation	19/26 *(73)*	20/26 *(77)*
Present episode lasted four weeks or longer	0/22 *(0)*	6/25 *(24)*
Presenting symptoms		
Pain in neck	17/26 *(65)*	19/26 *(73)*
Stiffness	19/26 *(73)*	15/26 *(58)*
Headache	13/26 *(50)*	14/26 *(54)*
Pain/paraesthesia of shoulder	17/25 *(68)*	22/26 *(85)*
Pain/paraesthesia of arm/hand	9/26 *(35)*	12/26 *(46)*

Table 3 shows that initial average rotation and lateral flexion were similar in the two random groups.

Table 4 shows that, among those patients initially affected with a particular symptom, the proportion showing immediate improvement after manipulation was greater than the corresponding proportion in controls; the difference reached significance for neck pain and neck stiffness and shoulder pain/paraesthesia.

Goniometric assessments of rotation and lateral flexion

Reproducibility was assessed by comparison of measurements of the controls taken at their first two visits; these procedures were done on the same day and were separated only by a visit back to Dr A, when they were told they were to be controls and given a prescription. The results are shown in Table 5. There is a significant reduction in rotation between assessments ($t=2.70$, $df=25$, $P<0.05$) and a non-significant reduction in lateral flexion ($t=1.16$, $df=25$). The root mean square differences between repeated assessments were 5.5° for

Table 3. Initial comparability of goniometric assessment of average rotation and lateral flexion in degrees between the random groups.

	Control group		Manipulation group		
	Mean	SD	Mean	SD	*t*
Rotation (°)	67.8	9.1	68.2	13.1	0.12 NS
Lateral flexion (°)	41.8	7.8	41.3	9.3	0.19 NS

SD = standard deviation. NS = not significant.

Table 4. Regression of symptoms in patients initially affected. Comparison of manipulation and control groups. (Percentages in parentheses.)

	Proportion showing improvement		
	Control group	Manipulation group	χ^2
Pain in neck			
Immediate	1/17 *(6)*	13/19 *(68)*	12.25 $P<0.001$
After 1 week	9/15 *(60)*	14/19 *(74)*	0.23 NS
After 3 weeks	7/12 *(58)*	13/17 *(76)*	0.40 NS
Stiff neck			
Immediate	0/19 *(0)*	13/15 *(87)*	23.12 $P<0.001$
After 1 week	10/16 *(62)*	13/15 *(87)*	1.27 NS
After 3 weeks	9/14 *(64)*	11/15 *(73)*	0.02 NS
Headache			
Immediate	2/13 *(15)*	4/14 *(29)*	0.13 NS
After 1 week	7/12 *(58)*	9/14 *(64)*	0 NS
After 3 weeks	11/11 *(100)*	11/12 *(92)*	0 NS
Pain/paraesthesia of shoulder			
Immediate	1/17 *(6)*	10/22 *(45)*	5.59 $P<0.02$
After 1 week	8/14 *(57)*	16/22 *(73)*	0.37 NS
After 3 weeks	9/13 *(69)*	15/20 *(75)*	0 NS
Pain/paraesthesia of arm/hand			
Immediate	1/9 *(11)*	6/12 *(50)*	1.97 NS
After 1 week	4/7 *(57)*	9/12 *(75)*	0.09 NS
After 3 weeks	4/5 *(80)*	9/11 *(82)*	0 NS

NS = not significant.

rotation and 5.9° for lateral flexion. The reduction in movement is entirely reasonable since all patients had something wrong with their necks, and the first follow-up was the third time in close succession that their necks had been moved passively to the extremes of the range of movement: the first time was when they first consulted Dr A, who examined them to make a diagnosis, the second was at their initial assessment by Dr B. It seems likely that their necks were stiffening up and they were not allowing Dr B to move them as far. Another goniometer (designed by Kadir and colleagues)[4] did not show this effect, but it was assessed on normal volunteers. The root mean square differences indicate reasonable reproducibility within observers.

Table 5. Reproducibility of goniometric assessment in 26 controls. Average of right and left measurements.

	Mean	Standard deviation
Rotation (°)		
First assessment	67.8	9.1
Second assessment	65.2	11.1
Reduction	2.6	4.9
Lateral flexion (°)		
First assessment	41.8	7.8
Second assessment	40.5	8.0
Reduction	1.3	5.8

Table 6. Improvement in rotation and lateral flexion in degrees in manipulated patients after treatment.

	n	Mean increase	SE	*t*
Rotation (°)				
Close of initial visit	25	5.1	1.5	3.43 $P<0.01$
After 1 week	26	6.6	2.1	3.13 $P<0.01$
After 3 weeks	24	5.0	2.2	2.26 $P<0.05$
Lateral flexion (°)				
Close of initial visit	26	2.3	0.8	2.80 $P<0.05$
After 1 week	25	1.9	1.6	1.18 NS
After 3 weeks	24	−0.3	1.4	−0.20 NS

n = number of patients. SE = standard error. NS = not significant. *t* = Student's t test.

Table 6 shows that manipulated patients experienced an improvement in rotation averaging 5° which was maintained at one and three weeks. There was an immediate improvement in lateral flexion but there was no clear evidence that this lasted. Correspondingly, in the controls, no serial changes in rotation or lateral flexion were apparent, apart from the immediate reduction in rotation mentioned earlier.

Discussion

Pain in the neck, pain or paraesthesia in the shoulder and stiffness of the neck were all improved significantly after manipulation. The difference was no longer statistically significant after one and three weeks because of the spontaneous improvement in the control patients. The improvement in pain/paraesthesia of the arm or hand was nearly significant but there was no significant improvement in headache.

Manipulation produced a highly significant immediate improvement in rotation and lateral flexion. This is the first time this has been demonstrated and it confirms the clinical impression of those who practise manipulation. It also disposes of the idea that manipulation only appears to benefit patients by a psychological effect of being an 'active' treatment performed by smooth-talking operators.

Movements in the manipulated group at one and three weeks were significantly better than before manipulation, unlike the controls where there was no significant difference. This did not apply to lateral flexion. However, well over half the patients in the control group experienced improvement in symptoms despite no measured improvement in movement, which again confirms clinical impression. Appearance of any symptoms not originally present was relatively rare and there was no significant difference between the two groups in this respect.

This was a small trial, and one based on a larger number of patients might have produced significant differences in symptoms and movements at one or three weeks.

This is the 'first trial' in this field and it points the way for future research. It is a trial of what was considered at the time to be the 'best' manipulative treatment. It also describes a method of conducting such a trial and an objective method to measure mobility of the neck, allowing quantitative evaluation of physical signs as well as assessment of the improvement in symptoms.

We suggest that the trial be repeated. If our results are confirmed, the next stage should be a detailed retrospective analysis of the results that have been achieved by treating patients with different symptoms and signs by different methods of manipulation or injection. This should point the way towards further trials of specific manipulations for specific conditions. The improvements that were demonstrated in both symptoms and physical signs should increase the interest of the profession in this method of treatment. If our results are confirmed by further work by different authors, manipulation should emerge from the shadows and take a place beside other treatments for disorders of the spine.

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Wide variations of general practice teaching

In this survey the doctors responsible for the teaching of general practice in 32 medical schools in the United Kingdom were identified. Wide variations were found in the title and status of these doctors and the resources available to them.

When questioned about the Declaration of Alma Ata, only half the doctors were able to give information about the content of the declaration. A major gap was identified between the declared policy of the Government as a signatory to the declaration and the doctors responsible for teaching undergraduates about primary health care.

On the evidence of the survey, little prominence is given in undergraduate medical education in the United Kingdom to the concept of health promotion and the prevention of illness.

Source: Walton HJ. The place of primary health care in the United Kingdom: a survey. *Medical Education* 1983; **17**: 141-147.

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