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CLINICAL STUDY

Compensatory head posture and neck problems: is there an association? A cohort study of nystagmus patients

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Abstract

Purpose **The aims of this study were twofold: to investigate if a compensatory head posture due to nystagmus causes long-term neck problems or adversely effects quality of life and to survey ophthalmologists on their opinions and management of these patients.**
Methods **A case-controlled study was carried out to assess the range of neck movements in patients with compensatory head posture due to congenital nystagmus. Exclusion criteria included known neck problems, vertebrobasilar insufficiency, and age less than 16 years. Neck movements were assessed using an inclinometer. Quality of life and disability was assessed using the American Academy of Orthopaedic Surgeons' Cervical Spine Questionnaire. One hundred and fifty consultant ophthalmologists throughout the United Kingdom were surveyed via a postal questionnaire.**
Results **The range of motion in these patients ($n = 20$) was limited when compared to matched controls especially for lateral flexion ($P = 0.001$) and extension ($P = 0.003$). However, despite limited movement, patients did not perceive a disability and there was no adverse effect on quality of life. In all 55% of ophthalmologists believed compensatory head posture due to nystagmus leads to long-term neck problems. About 46% had personal experience of patients with long-term neck problems due to nystagmus. Eighty-four per cent were influenced in their decision to operate by the presence of a head posture.**
Conclusions **Significant restriction in neck movements exists in nystagmus patients with compensatory head posture, although this does not appear to adversely affect quality of life.**

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Keywords: compensatory head posture; congenital nystagmus; neck problems; quality of life

Introduction

Abnormal head posture results from many conditions, ocular and non-ocular. Inner ear disease, bone and joint pathology, and congenital conditions can all lead to an abnormal head posture. Patients with sensory impairment may also assume an abnormal head position to compensate for a visual or auditory deficit. Compensatory head posture (CHP) in ophthalmic conditions is relatively common and may be secondary to nystagmus, strabismus, field defects, photophobia, or incorrectly prescribed glasses. Congenital nystagmus accounts for 20% of ocular CHP and occurs in one in 1000–5000[1] of the population. Up to 60% of patients with congenital nystagmus have a null point on eccentric gaze[2] and 70% adopt a compensatory head posture[3] to maximise acuity and binocularity.

Like congenital nystagmus, cervical dystonia is a condition where patients have abnormal head posture. There is no underlying neck pathology and the aetiology is unknown. In these patients pain is frequent and prominent, occurring in 66–85%.[4,5] Many patients have a limited range of neck motion.[4] Up to a third develop premature spondylosis[6,7] with accompanying radiculopathy and rarely myelopathy. Computerised tomography and magnetic resonance imaging show typical changes of spondylosis with loss of disc height,

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vertebral sclerosis, and osteophyte formation.[6] Disability is common and may have a major effect on quality of life.[8] As patients with both cervical dystonia and congenital nystagmus can have abnormal head posture, we hypothesised that compensatory head posture due to nystagmus can be associated with neck problems. We measured neck function and assessed symptoms of discomfort and quality of life in these patients.

Materials and methods

This is a prospective case-controlled cohort study. Patients with nystagmus and a compensatory head posture were recruited following attendance at a hospital clinic and from the members of a nystagmus self help group. Controls were concurrently recruited from hospital staff and aimed to be matched for age ± 5 years and sex. Exclusion criteria for both groups included other neck disorders, vertebrobasilar insufficiency, age less than 16 years and inability to give consent. Ethical approval was obtained from the local research ethics committee and the study conformed to the tenets of the Declaration of Helsinki.

The patient's awareness of the head posture and quality of life assessment was made with separate questionnaires. The first questionnaire was designed for this study and asked patients to indicate on a scale of 1–10 the percentage of time they perceived they adopted a CHP (Figure 1). The second questionnaire employed was the Cervical Spine Questionnaire^{TM}[9] (Figure 2). This is a validated research and clinical tool developed by the American Academy of Orthopaedic Surgeons. It comprises a number of scoring systems that assess the ease and comfort of patients in performing activities of daily living. All questionnaires were scored using normative tables to generate figures for quality of life.

Measurements were carried out according to a standard protocol. Patients were seated in a hard-backed chair. Feet were placed firmly on the ground, hips, and knees were flexed at 90° to the body, the thorax was fixed with the spine against the chair back and shoulders were horizontal and stabilised. We were unable to find a satisfactory definition of the primary position from the literature. We therefore used the following: the position adopted when the patient is upright with head and body orientated towards and looking at a distant eye level target. An inclinometer was used to measure head posture and range of neck movements. This is a lightweight plastic device that can determine when the head is even and measure head position and movements in three planes. It provides reliable, reproducible measurements[10] and is easy to use in a clinical setting. The inclinometer was fitted with the headpiece over the ridge of the frontal bone anteriorly and below the occipital protuberance posteriorly (Figure 3). Visual acuity was recorded using Log MAR at 6 m and 33 cm.

Compensatory Head Posture Study.
Questionnaire 1

Name .....

Date of birth .....

Male / Female (Please delete)

Study number .....

1. Do you have nystagmus (wobbly eyes) Yes / No

2. What is the cause of the nystagmus?.....

3. Do you adopt an abnormal head posture for visual tasks Yes / No

4. If yes how much of the time do you feel you adopt a head posture?

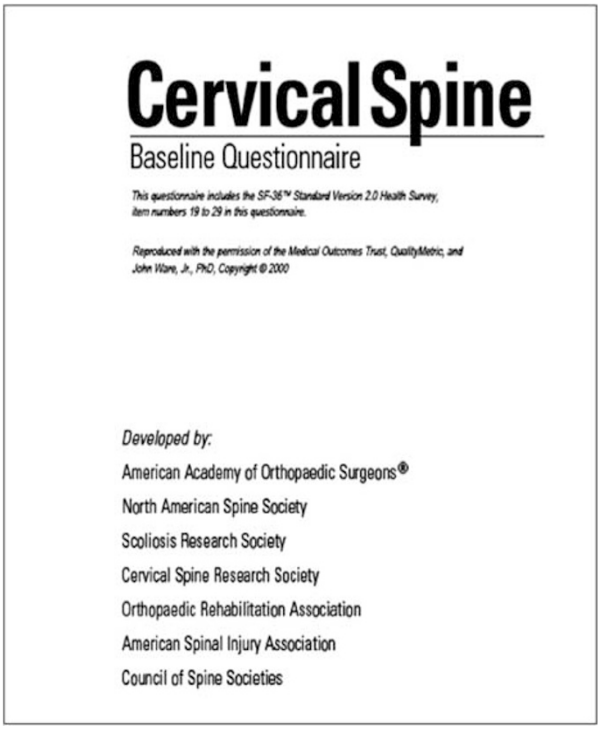
Please mark on the scale.

All the time Half the time None of the time

5. Do you have any other neck problems? Yes / No

6. If yes what? .....

Figure 1 Questionnaire 1.



Cervical Spine

Baseline Questionnaire

This questionnaire includes the SF-36™ Standard Version 2.0 Health Survey, item numbers 19 to 29 in this questionnaire.

Developed by:

American Academy of Orthopaedic Surgeons®
North American Spine Society
Scoliosis Research Society
Cervical Spine Research Society
Orthopaedic Rehabilitation Association
American Spinal Injury Association
Council of Spine Societies

Figure 2 American Academy of Orthopaedic Surgeons' Cervical Spine Questionnaire.

Figure 3 Inclinometer is displayed. This is a lightweight plastic device that fits securely on the patient's head and is simple to use. The head position or amount of motion can be read off the dials as shown.

This was done initially with the patient's head in the primary position and then repeated with the CHP. The head posture was measured with the patient reading the smallest line they could see. When recording the range of motion the primary position was taken as the beginning reference point that is, zero. The maximum deviation from this position was recorded by instructing the patient to actively rotate their head in the desired direction with eyes open. The patient's head was placed in the primary position at the beginning of each measurement. Measurements were repeated three times for each direction and all measurements of the one movement were within 5° or 10% of each other, thus ensuring valid data collection.[11] We certify that all applicable institutional and governmental regulations concerning the use of human volunteers were followed during this research.

While undertaking this study we wished to canvas current opinion regarding CHP and neck problems, with an aim of providing a context for our results. Consultant ophthalmologists throughout the UK were posted simple questionnaires to obtain their views. Three questions were asked. Firstly if they felt CHP could result in neck problems, secondly how many patients they had seen with neck problems due to CHP, and lastly if the possibility of a neck problem would influence their decision to operate for strabismus or nystagmus.

Results

Subjects ($n=20$) had a mean age of 38 years (range 17–74, SD 17.06) while the mean age of controls ($n=26$) was 45 years (range 18–75, SD 19). There were more males in the patient group (60%) as compared to control group (42%). No subject or control declined to enter the study.

Visual acuity was better for near than distance and better for distance with the CHP than in the primary position. Ninety-five per cent of patients had a complex or mixed head posture in which the most common deviation was torticollis in 35% (head rotated in the horizontal plane). This was followed by retrocollis (head extension 20%), laterocollis (head tilt in the coronal plane 15%), torticollis with laterocollis (10%), and predominantly anterocollis (head flexed). Most patients had a mild to moderate CHP; however, for a few patients this was very marked (range 9–73°, mean 33.7).

The active range of neck movement was significantly limited in patients with CHP as compared to controls for right flexion ($P=0.0018$), left flexion ($P=0.0011$), and extension ($P=0.0033$) (Table 1). There was also a trend for reduced motion in left rotation ($P=0.078$) and right rotation, but this was not statistically significant. There was no difference between the two groups for flexion. A two-tailed Fisher's *t*-test was used. No adverse effects on quality of life or disability scores were found.

Table 1 The mean patient and control range of motion for each direction is shown and any differences between the two groups

	Mean patient	*Mean control*	P-*value*
Right rotation	60.7	66.92	0.17
Left rotation	60.05	67.65	0.078
Right flexion	30.9	40.8	0.0018[a]
Left flexion	28.25	37.31	0.0011[a]
Flexion	50.05	57.62	0.1
Extension	49.75	66	0.0033[a]

[a]2-tailed, fisher's *t*-test. Range of motion (patients $n = 20$, controls $n = 26$).

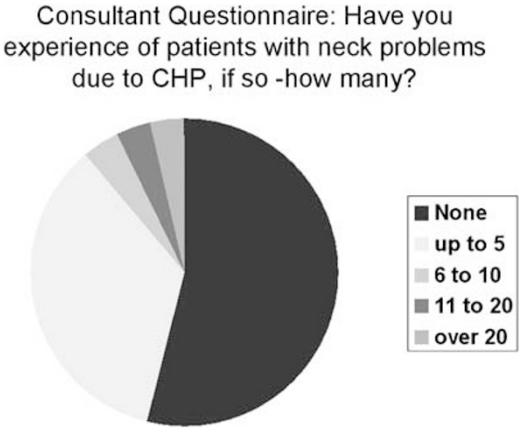


Figure 4 The results of questionnaires filled in by consultant ophthalmologists are shown.

One hundred and fifty ophthalmologists were sent questionnaires. The response rate was 37% (55 respondents). When asked if CHP due to nystagmus could lead to long-term neck problems 55% answered yes, 37% no and 8% possibly. Experience of neck problems in patients with nystagmus was recorded by 46% while 4% had over 20 patients with such problems (Figure 4). Question 3 addressed the role of CHP in influencing the decision to operate for nystagmus. 84% felt that the presence of CHP would affect their decision to operate. Of these 72% would operate to prevent neck problems developing as well as appearance, while only 28% operated for appearance alone.

Discussion

Patients with congenital nystagmus may have better near than distance vision due to convergence and dampening of the nystagmus. The distance vision is better with the compensatory head posture as the eyes are in the null position and the nystagmus minimised. It is difficult to assess abnormal head posture for near as a variable amount of down gaze and head flexion occurs for near visual tasks. Head movement in this study was measured from the primary position, which is a commonly used term but lacking precise definition. The description used for the primary position worked for the purposes of this study partly because it lacks reference to anatomical points or planes, which can vary between individuals. We believe this is the first time the primary position of gaze has been defined in the literature.

Ophthalmology opinion is divided as to the effect of CHP in nystagmus on neck function. Although only 55% felt it would lead to neck problems, 72% would operate to prevent neck problems and appearance. There may have been an inherent bias with those who felt that they had experience of patients with congenital nystagmus and neck problems more likely to respond.

This study has demonstrated a significantly reduced range of neck movement in patients with CHP due to nystagmus. We were unable to identify previous similar studies looking at neck movement and disability in nystagmus to compare our results. The findings were, however, similar to those seen in other non-ocular causes of abnormal head posture.[4] It would be interesting to correlate the direction of reduced movement with the particular head posture of each patient subgroup. However, as the numbers involved so far are small we were unable to comment on this. The observed reduction of cervical range of movement in the nystagmus group may not be entirely due to a disinclination to move their eyes away from the null position. Movement of the head in itself could degrade vision in the presence of nystagmus and may be involuntarily reduced by patients.

Although the patients in this cohort have a reduced range of neck movement, this did not have an adverse effect on their quality of life. We used the Cervical Spine Questionnaire™ to assess quality of life as it considers activities relevant to neck movement as well as general health and well-being and can be used in a control group also. Perhaps patients are fully adapted to their head posture as nystagmus is an early onset condition and thus encounter no functional problems from limited neck movement. Although some patients reported pain and discomfort in their necks this did not affect their overall quality of life scores. It is possible that an older cohort may demonstrate a difference as neck problems increase with age.

This study has several limitations. Nystagmus patients are not routinely followed up in adulthood by medical services so recruitment was via a self-help group possibly leading to selection bias. This was not reflected in the quality of life questionnaire. We were also not able to meet our matching criteria in all cases.

In conclusion, this study supports the hypothesis that patients with compensatory head posture due to an ocular condition have greater limitation of neck movement, but that this does not adversely affect quality of life. Research involving a larger patient sample may address this issue definitely.

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