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The prevalence of visual problems in stroke patients and the effectiveness of the current screening tool used

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Abstract

Aim: **To identify the types and prevalence of visual problems in a small series of acute stroke patients and identify the effectiveness of the existing screening tool used by occupational therapists (OTs) at the Royal London Hospital. Strategies will be suggested for improving this screening process and for aiding rehabilitation.**

Methods**: A prospective study is presented comprising a small series of patients referred to the acute stroke unit at the Royal London Hospital with a confirmed diagnosis of stroke. On admission to the ward, all patients underwent an OT screen for visual problems prior to a full orthoptic assessment that included visual fields to confrontation and assessment of visual inattention/neglect. This was performed without the benefit of the OT screen findings to prevent bias. A comparison was made between orthoptic and OT findings to determine the effectiveness of the existing screening tool.**

Results**: Twenty-eight patients were recruited with a mean age of 67 years (range 39–89 years). Orthoptic assessment revealed reduced visual acuity (<0.300 logMAR) in 43% of patients, with most stroke survivors demonstrating good binocular function (94%) and a full range of ocular motility (57%). No patient had visual inattention and 7% were found to have visual field defects. In 68% of stroke survivors the findings of the OT and the orthoptist were comparable.**

Conclusions**: The OT screening tool was found to be effective in this study. Ways to improve the detection of visual deficits in acute stroke patients are discussed.**

Key words: Rehabilitation, Stroke, Visual assessment, Visual defects

Introduction

Stroke is a major health problem in the UK. It is characterised by a sudden onset of focal neurological signs and symptoms caused by cerebral vascular disturbance. Approximately 80% of strokes are ischaemic in nature, with the remainder caused by haemorrhage. Stroke episodes can last less than 24 hours (transient ischaemic attacks) but symptoms can persist, causing stroke to be the largest cause of adult disability.[1] In England, approximately 110 000 people suffer from stroke each year and 11% of all deaths are caused by stroke.[2]

Visual problems are commonly encountered by approximately 70% of stroke survivors.[3] Ocular symptoms are sometimes vaguely reported and subtle ocular signs of visual complication may not be detected. Visual deficit commonly consists of a number of subgroups.

Reduced visual acuity has been found to be associated with a significant number of falls in the elderly, and also linked with depression and reduced performance of activities of daily living.[4–7] It can be easily resolved in some patients with spectacle correction, leading to improved functional status.[8]

Reading difficulties can be associated with impaired visual perception resulting in the inability to read (alexia). However, it has been reported that ocular causes including low vision, visual field loss and eye movement disorders are responsible for reading difficulties.[9]

Abnormalities of ocular alignment and ocular motility are dependent on whether the stroke is cortical or in the brainstem. Brainstem strokes may include cranial nerve and gaze palsies whereas cortical strokes are associated with fixation/tracking difficulties and impaired smooth pursuits or saccades.

Visual field defects in those affected may manifest as a homonymous hemianopia, commonly affecting the left side, but can also present as superior or inferior quadrantanopia, macular sparing hemianopia, and chequerboard defects. Such defects have been associated with falls and impaired daily functioning in elderly patients.[4,7]

Visual inattention or neglect is a common finding in those with right-hemisphere damage and present with spatial neglect on the side contralateral to the lesion, commonly the left side. The affected patient may not respond to their surroundings, or may neglect their body on the left side.

Diagnosing and treating such visual deficits can vastly aid the rehabilitation of stroke survivors provided that the findings are shared with other members of the multidisciplinary team (MDT). Screening for visual problems is crucial and in most cases is performed by other health professionals, namely occupational therapists (OTs).

The purpose of this study was to identify the types and prevalence of visual deficits in stroke survivors at the Royal London Hospital. The effectiveness of the OT ocular screen was analysed to ensure that visual deficits are being correctly detected in stroke survivors.

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Methods

All stroke survivors at The Royal London Hospital are initially screened by an OT for visual problems amongst other aspects of stroke sequelae, including hemiplegia and cognitive or language impairment. This is performed within 72 hours of patient admission to the acute stroke ward. The OT screening tool consists of functional vision assessment whereby the patient's ability to fix and follow a range of small and large objects is assessed. Formal visual acuity assessment is not performed. Convergence, smooth pursuits and saccades are assessed in a gross manner to identify any obvious defective ocular motility. A case history is taken to determine the presence of diplopia and visual field loss as well as any other general eye problems. The patient's visual field is assessed to confrontation by one assessor and visual inattention is grossly assessed based on the ability of the patient to recognise objects which are introduced to either side of them.

In this study a small series of patients with a confirmed diagnosis of stroke were assessed by a specialist orthoptist on the acute stroke ward at The Royal London Hospital. Recruitment of patients was over a period of 4 months to provide sufficient data for analysis. Assessment was performed within 48 hours of the OT screen and comprised a comprehensive case history, formal assessment of visual acuity, ocular alignment, binocular function, convergence, smooth pursuit and saccadic subsystems of ocular movement, visual field to confrontation using two assessors, and assessment of visual inattention using Albert's test and the line bisection test. To prevent bias, the orthoptic assessment was performed without knowledge of the findings of the OT screen. The orthoptic findings were then compared with those documented from the OT screening assessment, performed at the time of admission to the ward. Data analysis was conducted to identify the types of visual defects found as well as their prevalence.

Results

Twenty-eight patients were recruited with a mean age of 67 years (range 39–89 years). Of these, 71% were male and 29% female. Almost half the patients were of white ethnic origin (46%), with the remainder being black/black British (29%), Asian/Asian British (18%) or Chinese and other (7%). The type and location of the strokes are presented in Table 1. There was no significant correlation between the type of stroke and visual defect in those affected.

Case history identified 57% of patients as spectacle wearers and a further 36% with an additional history of unilateral/bilateral cataract(s). Incidentally, in a majority of these patients the spectacles were either old (dispensed >2 years previously) or were damaged or absent at the time of assessment. Ocular signs consisting of squint, Bell's palsy and ptosis existed in 25% of patients and were pre-stroke in nature. One patient (4%) presented with acquired nystagmus after stroke onset. Of the 43% of patients who were symptomatic, 86% complained of blurred vision. Other symptoms consisted of reading difficulties (4%), diplopia (4%) and oscillopsia (4%).

Table 1. Stroke characteristics

Characteristic	%
Aetiology	
Infarction	50
Haemorrhage	4
Unknown	46
Location	
Occipital	4
Parietal	4
Hemispheric	4
Basal ganglia	7
Cerebellar	4
Intraventricular	39
Multiple	7
Not specified	31

Visual acuity was assessed using a crowded logMAR test at 3 m or the Cardiff acuity test at 1 m in non-verbal patients. Reduced visual acuity proved to be most prevalent, with 43% of all patients being found to have distance visual acuity below the DVLA standard of 0.300 logMAR (6/12 Snellen) in either one or each eye. This finding was not stroke-related in all but 1 patient and was associated with refractive error uncorrected at the time of assessment, a history of amblyopia, or the presence of cataract and glaucoma. Reduced visual acuity accounted for the main visual defect in 86% of patients who complained of blurred vision as well as almost half of those (44%) who claimed to be asymptomatic. Near visual acuity tested with Moorfields Test Type was reduced in 50% of patients who were unable to read prints smaller than N8/N10, which is similar to the size of text used in most newspapers and books. One patient (4%) reported acute reading difficulties consisting of jumbling of print, inability to follow sentences of text and occasional vanishing of print to the left side.

Seventy-nine per cent of patients were found to have exophoria, and full ocular movements by smooth pursuit assessment was found in 57%; age-related limitation of movement existed in 32% of patients. One patient (4%) with a longstanding hyperphoria was found to have reduced fusional amplitudes accounting for their post-stroke diplopic symptoms. Otherwise 94% of patients demonstrated a good range of binocular function.

Visual field defects existed in 7% of patients. One patient (4%) was found to have a right homonymous hemianopia and a left superior quadrantanopia was noted in another patient (4%). No stroke survivors were found to have visual inattention.

The presence or absence of stroke-related visual defects was compared between the OT screen and the orthoptic assessment for each patient (Table 2). The effectiveness of the screening tool was determined by the percentage comparability of the two assessments and was found to be 68%. If the orthoptic diagnoses correlated well with the OT's findings, then this would suggest an effective screening tool for assessing visual problems in stroke survivors. Patients with comparable findings were categorised into two groups: correct positives (4%), where both assessments identified visual problems, or correct negatives (64%), where patients were found not to have a visual defect from both assessments. Of the 'correct negative' patients, 56%

Table 2. Comparison between occupational therapist and orthoptist assessments. Some patients were found to have multiple visual deficits, which have been allocated to each column

Visual deficit	Occupational therapist		Orthoptist	
	n	%	*n*	%
Reduced visual acuity	2	7	12	43
Reading difficulties	0	0	1	4
Abnormal ocular motility	0	0	2	7
Visual field defect	4	14	2	7
Visual inattention	2	7	0	0
None found	20	71	15	54

n, number of patients.

were found to have reduced visual acuity relating to pre-stroke ocular history. The effectiveness of the screening tool was hampered by disparities between the findings of the OT and orthoptist. Patients with conflicting findings between the two assessments were categorised into two groups: false positives (25%), consisting of patients with a diagnosis of no visual defect that were falsely identified by the OT as having a defect, and false negatives (7%), consisting of patients diagnosed with stroke-related visual defects by the orthoptist but misidentified by the OT.

Discussion

Visual problems are experienced by a large number of stroke survivors. Often the ocular signs are subtle and symptoms may not be reported by the patient, but may be detected by family members, carers or health professionals. Rehabilitation strategies are formulated by members of a MDT including OTs, physiotherapists and speech and language therapists and rely on the visual abilities of the patient. This highlights the importance of identifying such visual problems via means of screening all stroke patients. This then allows patients with visual defects to be referred to the orthoptic department for comprehensive assessment with subsequent conservative treatment for alleviation of symptoms, advice and strategies for adapting to the visual deficits. Bedside orthoptic assessment in acute patients can enable crucial information to be relayed to members of the MDT and can effectively lead to the provision of more appropriate rehabilitation strategies. Those who require follow-up assessments with the orthoptist may benefit from sessions in which the orthoptist is able to dedicate ample time for the provision of advice, which may otherwise be difficult in demanding neuro-ophthalmology settings.

The OT screening tool proved to be effective in identifying visual problems in 68% of patients, thus allowing the stroke survivors to benefit from the provision of more effective rehabilitation strategies. However, in 7% of patients rehabilitation may have been hampered as they were falsely identified by the OT as not having a visual defect. Stroke survivors identified as 'false positives' may be affected by prolonged inpatient stay in anticipation of orthoptic referral and the MDT may adopt unnecessary strategies on the basis of visual defects which are in fact absent. Where other health professionals are responsible for visual screening of patients, teaching sessions provided by a specialist orthoptists may enhance the knowledge of visual associations of stroke, promote the orthoptist's role in rehabilitation and lead to the correct identification of visual defects in stroke survivors. Essentially this can account for a more effective screening tool and reduce the number of false positives and false negatives which were found in this study.

The significant prevalence of reduced vision in this study highlights the importance of visual acuity assessment as part of the screening tool. This visual problem holds its limitations in this study as absent or dated spectacle correction accounted for the majority of affected patients (90%) and existed prior to stroke onset. Although unrelated to the stroke, its impact on daily functioning and associations with falls and depression[4–7,10] highlights the importance of its detection and can aid rehabilitation by the simple means of spectacle correction and updated refraction by a local optometrist.

Reading difficulties are seldom detected on the acute ward since patients are often too unwell to read or unable to communicate any difficulties experienced due to cognitive involvement. One patient was diagnosed with reading difficulties on orthoptic assessment but this was misidentified on the OT screen. Impairment of reading can include: the jumbling of print, where patients may use random words to compensate for those that are omitted, and disappearance of print to one side of the page, usually the left side. It is therefore vital that the screening tool consists of specific questioning with regard to the clarity of print, presence of full text and subjective changes in fluency of reading. This can aid the detection of reading difficulties as well as the objective assessment of reading ability. Orthoptic treatment strategies include holding print vertically rather than in the usual horizontal fashion, as well as the use of a typoscope and other low visual aids which can be loaned by the hospital eye service (HES).

Since visual field loss is associated with frequent falls and decreased quality of life[4,7] it is crucial to detect such visual deficits by means of a field to confrontation assessment. To effectively screen for visual field defects, two assessors should be used. In that way, the patient can be kept engaged and their fixation assessed by one assessor while the other introduces a target into the field of view from behind the patient. Conveying such findings efficiently to the MDT can enable the administration of appropriate rehabilitation strategies during inpatient stay. Patients with homonymous hemianopia, for example, can be attended to, at bedside, from their unaffected side and advice can be provided by an orthoptist with regard to scanning techniques and head movements to promote the use of their affected side, as well as coping strategies to adapt to any field loss. Prisms can be placed on spectacles to displace images from the affected side into the seeing side.

Visual inattention can often coincide with visual field loss and is a common perceptual deficit found in stroke survivors. Although absent in this study, other authors have found the incidence of neglect in stroke patients to range from 14%[11] to as high as 82%.[12] The variation can be explained by differences in the time of assessment following stroke onset. Screening tools should utilise

Albert's test, line bisection and a balloons tests which can be used to detect neglect; the use of a combination of tests has been found to result in more sensitive detection. Patients are treated by means of increasing awareness of the neglected side and encouraging attention to the affected side via scanning techniques and compensatory head movement. Recent advancements include the Neurological Vision Training (NVT) system, which uses training programmes to teach stroke patients to compensate for visual inattention and visual field defects.[13]

Conclusion

It is essential for visual screening assessments to be performed in all stroke survivors, since visual problems exist in a significant number of patients and can impede the rehabilitation process. A standardised screening tool which targets assessment of visual acuity, ocular alignment and motility, visual field to confrontation and the presence of visual inattention should be administered. Other health professionals who screen for visual problems can benefit from teaching sessions by a specialist orthoptist in order to maximise the effectiveness of the screening tool currently used. This ensures correct identification of visual problems and promotes the role of the orthoptist in the rehabilitation of stroke survivors.

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