

DRIVER REHABILITATION REFERENCE POINTS FOR THE ORTHOPTIST

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Abstract:

This paper describes the clinical conditions of patients referred for Orthoptic assessment in relation to their ability to drive a motor car. Referrals follow failure of a visual screening test. A description is given of the orthoptic evaluation with reference to official visual requirements laid down by the Roads' and Traffic Authority (RTA) as well as reference points evolved through personal experience and observation of clients in the driving situation.

Key words: *Driving skills, ocular skills, field defects, neglect, monocular function, nystagmus, ocular movement defects, strabismus.*

INTRODUCTION

The 1990 N.S.W. "Guide for Medical Practitioners in determining the fitness to drive a motor vehicle or ride a motor cycle" states that:

"The driver of a motor vehicle operates in a rapidly changing environment where perception, good judgement and rapid response are essential for safe driving. The most important human factors for this task are adequate vision, mental alertness, short reaction time and adequate physical capacity. The impairment of any of these factors requires assessment."

This statement establishes the basis for the assessment of driving skills. The need to have physical skills that can cope in an active situation and the need for a visual standard is clearly identified.

The Guide also raises the importance or objectivity in the assessment and that where a medical practitioner has doubt about the ability of a patient to drive, that they may recommend the patient undertake a practical driving test. Where

there are any doubts about the patient's ability, they can be referred to a driver assessment centre, such as the Driving Rehabilitation Centre at Cumberland College, to determine the capabilities of the patient to operate a vehicle.

At the Driving Rehabilitation Centre at Cumberland College, an assessment is carried out and a report with recommendations regarding the abilities of the patient to drive is sent to the RTA Medical Officer. The Officer makes a decision as to whether the patient can drive or have their licence suspended. At the Centre the initial assessment is carried out by an occupational therapist. The assessment involves an off-road assessment of the physical and cognitive abilities and where the patient has passed the off-road assessment, an on-road assessment will be carried out. When a patient has limitations of general physical function modifications can be made to the car, e.g. a knob can be attached to the steering wheel to help the patient with limb problems handle the car.

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TABLE 1
Australian recommended visual levels for driving

State	Minimum static acuity	Visual field
Qld	2 Eyed 6/12 better eye 6/60 worse Eye 1 Eyed 6/18	130°
SA	6/18 with or without correction 1 or 2 eyes	45° in one or both eyes to each side of the midline
WA	6/12 better eye 6/18 with and without correction 1 or 2 eyes	Normal monocular field one eyed
Vic	6/12 better eye 6/60 worse eye	
NSW	6/12 1 or 2 eyes 6/18 with advanced age	130° monocular and binocular
ACT	6/12 1 or 2 eyes	
TAS	6/12 1 or 2 eyes	
NT	Pass an eye sight test	

VISUAL ASSESSMENT

Part of the assessment includes an eye examination. The initial visual screening tests are carried out by the occupational therapist, and any patients found to have visual defects are referred to the orthoptist for further testing and recorded measurement of any visual defects. The examination carried out by the orthoptist determines the sensory and motor function of the eyes. The results are related to the official requirements of the RTA and unofficial reference points. When the orthoptist is unsure whether any visual defects that are present will affect the patient's driving skills, he/she participates in the on-road test, sitting behind the driver and observing their eyes and head movements through the rear view mirror. The orthoptic information is then presented in a report and included with the occupational therapist's report that is forwarded to the RTA Medical Officer.

OFFICIAL VISUAL REQUIREMENTS

Table 1 shows the recommended visual levels across Australia and demonstrates the considerable variation that exists from State to State.

The official requirements are supported by The Royal Australian College of Ophthalmologists (RACO). In N.S.W. these requirements are stated in the RTA Guidelines with two areas, visual acuity and visual fields, having a numerical standard. A patient failing to reach this

standard may lose their licence.

The remaining areas described in the RTA guidelines, which relate to conditions of monocular vision, sudden loss of binocular vision, diplopia and aphakia, do not prevent a patient from holding a licence but merely suggest a delay until the patient has adapted to their condition.

Problems arise when results are borderline, for example, the visual acuity in the better eye may be 6/12 part. In such a circumstance, where the patient needs to drive in order to maintain his job e.g. as a courier, the decision to remove the licence is difficult. The final decision is made by the RTA Medical Officer or taken to Court.

Flexibility of standards allows for exemptions for patients who barely meet the standards but who are otherwise alert and have normal reaction times and good muscular co-ordination.

UNOFFICIAL REFERENCE POINTS

These points have been developed following observations of drivers with visual difficulties and relate to ocular skills that are required by the driver, rather than a visual standard. The skills are named in Table 2. Failure to demonstrate these skills will not automatically cause the patient to lose their licence, as will failure to achieve the official visual standards. Therefore an extra challenge arises for the orthoptist, that

TABLE 2
Ocular skills required when driving

Visual skills within the car	Visual skills external to the car
<ul style="list-style-type: none"> • Location of the gears • Ability to read dashboard information • Ability to use rear and side view mirrors 	<ul style="list-style-type: none"> • Ability to remain to the left of the middle of the road • Ability to remain within marked lanes • Ability to keep adequate distance from the left of the road (gutter and parked vehicles) • Ability to change lanes • Ability to reverse park • Identification of objects external to the car • Ability to turn the vehicle to the right or left

TABLE 3

Age distribution of the patients in the study			
Years	Patients with CVA	Patients with other conditions	Patients with CVA and other conditions
61-70	0000	X	5
51-60	000		3
41-50	000		3
31-40	0		1
21-30		XXXXX	5
16-20		XXX	3

of developing adaptations that will enable the patient to drive comfortably and safely in the presence of their ocular deficiencies.

REVIEW OF PATIENTS REFERRED FOR ORTHOPTIC ASSESSMENT OF VISUAL SKILLS FOR DRIVING

Twenty patients are presented:

- 9 with cerebro vascular accident (CVA)
- 2 with treatment for a tumour
- 2 with head injuries
- 2 with spina bifida
- 5 with various medical conditions which included multiple sclerosis, spinal cerebellar degeneration, ocular haemorrhage, asthma combined with cardiac arrest and retinopathy of prematurity (ROP) combined with retinal detachment

The ages of the patients ranged between 18 and 70 years. Table 3 shows the distribution, in intervals of 10 years. Those with CVA were older than 40 years with the greater number in the over 60 years. Those with other causes were younger with the largest number of patients being in the age group 21 to 30 years.

There were 4 females and 16 males.

Nineteen of the patients were found to have one or more ocular defects that could be considered to cause problems when driving. One patient who saw halos around lights had an adequate visual standard for driving and was referred to an ophthalmologist for examination. The ocular defects that were found included the following:

Fields Defects — 7 Patients

The defects were quadrantanopia (2 patients),

constricted field (2 patients), central or paracentral loss (2 patients) and half field loss in one eye (1 patient). The fields were assessed using the Goldmann Perimeter with interest being on the extent of peripheral field with a V4e target.

Neglect — 2 Patients

Neglect was present in 2 patients, both of whom had a right CVA. In both patients the condition was subtle, revealing itself in one patient during use of the City University Colour Test and the other following observation during an on-road test of the patient's failure to include information to the left of his midline. In both patients the "bilateral simultaneous presentation" test showed a variable and so questionable response.

Monocular Function — 4 Patients

Each of these patients had recently lost the function of one eye, with the vision in the affected eye being at the level of 6/60 or worse. In each case the good eye had a level of 6/12 or better. Some of the reasons for the loss of vision in the affected eye included: retinal detachment; central retinal artery occlusion associated with a carotid artery block; and ocular haemorrhage which was a consequence of surgery to remove a tumour.

Nystagmus — 11 Patients

This was the most frequently occurring defect and was associated with all categories. Ten of the patients had gaze evoked nystagmus, with three having a rotary component, one of which was associated with an acoustic neuroma and 2 were associated with CVA. The remaining patient had nystagmus present in the primary position which increased on horizontal gaze.

Ocular Movement Defects — 7 Patients

There were 4 constant and 3 intermittent strabismic patients. One patient with intermittent strabismus had an incomitant deviation following a III Nerve Palsy which had been partly corrected by surgery. The remaining patients with intermittent strabismus had concomitant deviations.

Strabismus — 7 patients

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THE EFFECT OF THE VISUAL DEFECTS ON THE OCULAR BASED DRIVING SKILLS

Table 4 shows the area in which visual defects caused problems for patients during the on-road assessment.

Those patients with field defects had quadrantanopias, and demonstrated several areas of difficulty, particularly when during driving they were required to make quick and continuous judgements and adjustments to the position of the car. Location of the gears and of the mirrors were adequate when the car was stationary and the patient could take time and concentrate on that specific skill. When the field defect was on the left side, the car regularly drifted to that side. If neglect was also present, the patient was unaware of the drift and argued that they were in the correct position. Reverse parking was

observed to be a particular problem.

When patients have lost their binocular vision and become monocular, the RTA Guidelines suggest that "driving should cease for three months to enable them to re-learn the judgements of depth and distance. The patients who presented had fulfilled that requirement and had also had installed the recommended rear view mirrors on each side of the vehicle. Changing lanes and reverse parking still continued to be a problem because of the loss of peripheral field on the side of the affected eye. Even turning the head could not compensate fully.

The effect of nystagmus was to cause a reduction in acuity out of the primary position e.g. 6/6 in the primary position could decrease to 6/60 on side gaze. Patients with nystagmus when looking into the periphery were observed to blink or adjust their head. Some patients complained of flicking images and that if given time they would be able to see more clearly.

In the presence of limitation of ocular movements, there were complaints about diplopia or blur. In the presence of over and under shoot of the eyes there were complaints of blurring of vision. In many situations patients were also noted to shut one eye when the images were

TABLE 4
The ocular based driving skills that are affected by visual defects

Visual defect	Ocular based skills within the car			Ocular based skills used external to the car						
	Locate gears	See dashboard	Use mirrors	Stay on left	Avoid left	Stay in lanes	Change lanes	Reverse park	Turn	External object identification
Field defect (7) Quadrant (2)	X		X	X	X	X	X	X	X	X
Neglect (2)	X		X	X	X	X	X	X	X	X
Monocular (4)							X	X		
Nystagmus (11)			X				X	X		
Ocular movement limitation (4) Over (1)/ Undershoot (2)		X	X				X	X		
Strabismus constant (4) intermittent (2)	X	X	X	X		X	X		X	X

X = Problem possible

unsatisfactory e.g. double or blurred vision.

Strabismus has been observed to have variable effects on driving skills. One patient with a constant alternating exotropia described his awareness of a panoramic field of vision and the ability to change fixation with an associated shift of the field. With this shift of the field, the direction sense also changed and the patient drove the car in a different or crooked direction. Three patients with intermittent strabismus complained of insecurity when judging distances, changing lanes, reverse parking as well as difficulty in judging the distance from other cars. Observation of their eyes during the on-road assessment revealed the eyes changed from straight to

exotropic. When the eyes were exotropic the patients described the above difficulties.

COMMENT

Observation of patients who have visual defects when they are driving has demonstrated the many ways in which visual defects can affect the driver's accuracy. Experience in the field of driving rehabilitation has required the use of orthoptic knowledge to translate the significance of patient responses in the driving situation and relate them to actual ocular defects.

References

Medical Guidelines for Drivers and Riders (1990) Roads and Traffic Authority, Rosebery, N.S.W.