

Dementia with Lewy bodies

A 'new' type of dementia with visual symptoms

A previous article in *OT*¹ described the symptoms, diagnosis and changes in the brain in patients with Alzheimer's disease – the most common type of dementia to affect elderly people.

Introduction

Patients with Alzheimer's disease may develop a range of visual problems during the course of the disease. Those include defects in primary vision, eye movement, pupillary function, and in complex visual functions involving the ability to judge distance or to make out the shape of an object². Dementia with Lewy bodies (also known as Lewy body dementia or diffuse Lewy body disease) is now recognised as the second most common type of dementia after Alzheimer's disease³ and may account for up to a quarter of all cases in elderly people.

This disorder is characterised by a progressive, disabling mental impairment and includes fluctuating attention and alertness, visual hallucinations and the symptoms of Parkinson's disease as typical features⁴. Dementia with Lewy bodies is of particular interest because the disorder is common and associated with a range of visual problems that, although they may overlap with those of Alzheimer's disease, may be distinctive enough to help in clinical diagnosis.

The purpose of this article is to describe the general symptoms of dementia with Lewy bodies, the visual symptoms which have been reported in the disorder, and to discuss those visual features which may help in the differential diagnosis of dementia with Lewy bodies and Alzheimer's disease.

General signs and symptoms

The most important general feature of dementia with Lewy bodies is a progressive decline in the mental ability of the patient of sufficient magnitude to interfere with normal social or occupational function (Table 1).

A prominent and persistent memory impairment, one of the characteristic symptoms of the development of Alzheimer's disease⁵, may not necessarily occur in the early stages of dementia with Lewy bodies but is usually evident at some stage of the disease. Problems of attention and in visuospatial ability, however, are usually prominent; the latter including difficulties in clock drawing or in copying figures.

The majority of patients with dementia with Lewy bodies exhibit at least two of the following 'core' features – 1) fluctuating cognitive ability with pronounced variations in attention and alertness, 2) recurrent visual hallucinations which are typically well-formed and detailed, and 3) the spontaneous motor features of Parkinson's disease⁴.

The three most characteristic signs of Parkinson's disease are akinesia, rigidity and tremor. Akinesia describes the very slow pace at which patients can carry out an action, especially the initiation of a movement. Rigidity is increased muscle tone resulting in a stiffness of the limbs and is often manifest as 'cog-wheel rigidity', the arm 'catching' as it moves, rather as if it were controlled by a cog-wheel. Tremor,

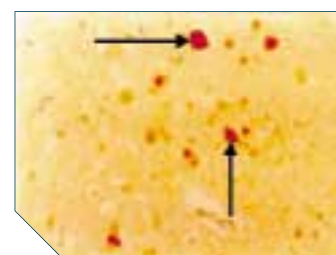


Figure 1
Section through the cerebral cortex of a patient with dementia with Lewy bodies showing the presence of Lewy bodies (arrowed) within the neurons. These probably represent abnormalities of the neuronal cytoskeleton resulting from degeneration (section immunostained against Ubiquitin)

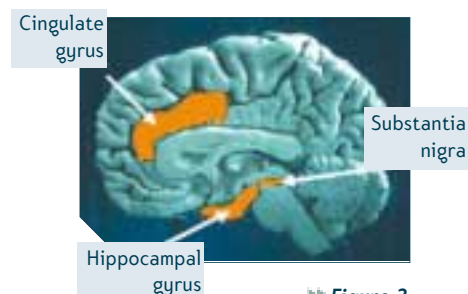


Figure 2
Distribution of Lewy bodies within the brain of a patient with dementia with Lewy bodies as seen in a coronal section. In Parkinson's disease, Lewy bodies are likely to be confined to the substantia nigra in the mid-brain. In dementia with Lewy bodies, Lewy bodies occur in the cerebral cortex, especially the parahippocampal gyrus and the anterior portion of the cingulate gyrus

Table 1

Criteria for the diagnosis of dementia with Lewy bodies (DLB) (after McKeith et al, 1996)

- Progressive cognitive decline which interferes with social or occupational function. Memory deficits are apparent at some stage. Deficits on tests of attention and visuospatial tasks are prominent
- Two of the following features:
 - Fluctuating cognition
 - Recurrent visual hallucinations
 - Motor features of Parkinson's disease
- Additional features which support diagnosis:
 - Repeated falls
 - Syncope
 - Transient loss of consciousness
 - Neuroleptic sensitivity
 - Systematised delusions
 - Non-visual hallucinations
- A diagnosis of DLB is less likely if there is evidence of vascular disease of the brain

which often occurs at a frequency of between 4-8Hz, primarily affects the fingers, hands and head. The problem is most acute while the limb is at rest and improves as the limb is used.

In addition, there are several features, although not in themselves diagnostic of dementia with Lewy bodies, which would support such a diagnosis, viz repeated falls, syncope (fainting due to sudden fall in blood pressure), transient loss of consciousness, sensitivity to neuroleptic drugs, delusions and other types of sensory hallucination. By contrast, features less suggestive of dementia with Lewy bodies include any evidence of vascular disease, such as a stroke, or evidence of the presence of other types of brain disorder which could account for the clinical symptoms. Men may be more susceptible to dementia with Lewy bodies than women and have a worse prognosis⁶.

Pathological changes in the brain

The essential feature necessary for a pathological diagnosis of dementia with Lewy bodies is the presence of characteristic lesions called Lewy bodies (Figure 1), structures which are also observed in patients with Parkinson’s disease⁴. Lewy bodies in dementia with Lewy bodies, however, have a significantly different distribution in the brain, being present within the cerebral cortex whereas in Parkinson’s disease, Lewy bodies are largely confined to the substantia nigra⁴. Within the cerebral cortex, the density of Lewy bodies is greatest in the limbic regions of the brain which include the anterior cingulate gyrus, parahippocampal gyrus and the insular cortex while fewer Lewy bodies have been recorded in the frontal, parietal and occipital areas of the brain⁷ (Figure 2). Lewy bodies are spherical structures found in the cytoplasm of affected cells and can be

stained by a variety of histological methods, including haemotoxylin and eosin (Lewy bodies are eosinophilic structures), alpha-β-Crystallin, ubiquitin and alpha-synuclein. In addition, pathological changes may occur in the brain similar to those of Alzheimer’s disease⁵. These may include the presence of neurofibrillary tangles in cortical neurons and extracellular senile plaques. The density of these changes is so great in some patients, that it has been concluded that they have combined or ‘mixed’ disease, i.e. dementia with Lewy bodies in association with Alzheimer’s disease⁸. The existence of some cases combining the features of both disorders may make the clinical and pathological diagnosis of dementia with Lewy bodies particularly difficult.

Visual symptoms

A summary of the visual symptoms which have been reported in dementia with Lewy bodies to date is given in Table 2. For the purpose of this article, they will be divided into those affecting visual fields, eye movement problems, the blink reflex and pupil reactivity, complex visual functions, and visual hallucinations.

Visual fields

There have been relatively few studies to date on the possible visual field defects in dementia with Lewy body patients. One 66-year old patient, however, developed a left homonymous hemianopia early in the disease process⁹. Large numbers of neurofibrillary tangles were observed in the right striate, peristriate, and inferior temporal cortex in this patient. In addition, studies of regional blood flow have suggested significant hypoperfusion in occipital areas in dementia with Lewy bodies, and this could lead ultimately to the development of significant visual field problems¹⁰.

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Table 2

Visual signs and symptoms of dementia with Lewy bodies (DLB). (AD = Alzheimer’s disease, PD = Parkinson’s disease)

OCULAR ASPECT	CHANGE IN DLB	REFERENCES
Visual fields	Homonymous hemianopia may develop early in disease process	Bashir et al, 1998
Eye movements	Abnormal saccadic and smooth pursuit movements, optokinetic nystagmus, abnormal convergence and vertical and horizontal ophthalmoplegia	Corin et al, 1971, Debruin et al, 1992
Blink reflex and pupil reactivity	Blink frequency and reflex reduced in PD, not so far studied in DLB	Fearnley et al, 1991
Complex functions	Abnormalities in object size discrimination, form discrimination, overlapping figure identification and visual counting tasks	Mori et al, 2000
Visual hallucinations	More frequent in DLB than AD, may be presenting feature in a proportion of patients	Galasko et al, 1996, Hely et al, 1996

Eye movement problems

A variety of eye movement problems have been reported in patients with Parkinson's disease⁴ including abnormal saccadic and smooth pursuit eye movements, abnormal optokinetic nystagmus ('train nystagmus') and convergence¹¹. In dementia with Lewy bodies, difficulty in convergence is often followed by akinesia and rigidity¹². In addition, there have been cases of dementia with Lewy bodies presenting with vertical and horizontal ophthalmoplegia and these could easily be confused with cases of progressive supranuclear palsy¹³.

Blink reflex and pupil reactivity

Patients with Parkinson's disease exhibit a reduced frequency of blinking leading to a staring appearance. To obtain the blink reflex, the glabella is lightly tapped – successive taps in normal individuals producing less and less response as the reflex habituates. However, in Parkinson's disease, the blink reflex may not disappear on repeated tapping. This effect has, to date, not been studied in dementia with Lewy bodies, but it is likely to be present in patients exhibiting a significant degree of Parkinsonian-type symptoms.

Complex visual functions

Deficits in complex visual functions, especially affecting visuospatial tasks¹⁴, are most characteristic of dementia with Lewy bodies¹⁵ and are likely to be attributable to the development of the pathology in the visual cortex. Impairments have been identified in object size discrimination, form discrimination, overlapping figure identification, and on visual counting tasks¹⁵. Patients who develop visual hallucinations are often the worst performers on overlapping figure tasks.

Visual hallucinations

Hallucinations are evident in a significant proportion of cases of dementia with Lewy bodies. In a relatively recent study, hallucinations were present in six of nine patients and were the presenting feature in one patient¹⁶. The visual hallucinations are recurrent, well formed and detailed, and have been described by most groups investigating the disorder. Visual hallucinations may be the only psychotic symptom which reliably discriminates between dementia with Lewy bodies and Alzheimer's disease. Auditory hallucinations may also occur but less frequently.

There is considerable overlap between the visual hallucinations in dementia with Lewy bodies and of other types of disorder such as 'misidentification syndromes' and visual agnosias. They are similar to those described in association with 'delerium' but differ from those produced by hallucinogenic drugs such as LSD.

Patients may see faces emerging out of

the patterns of chair cushions or curtains, or hidden amongst trees or flowers and, at the same time, figures may be seen against a blank background. Most typically, the hallucinations involve people or animals invading the home of the patient, but may also involve inanimate objects and the appearance of writing on walls or ceilings. The hallucinations are seen in great detail and often evoke considerable fear in the patient.

Hypometabolism in area VI and relatively preserved metabolism in the temporal and parietal lobes may be associated with the development of these hallucinations¹⁷. Well-formed visual hallucinations are also particularly evident in patients with extensive development of Lewy bodies in the temporal lobe⁷. Furthermore, there is reduced cholinergic activity in the cerebral cortex of patients with dementia with Lewy bodies. More extensive cholinergic abnormalities are believed to be associated with an increased risk of visual hallucinations. Hence, it is possible that the hallucinations result from a change in the balance of neurotransmitter activity between the cholinergic and monoaminergic systems within the brain.

Dementia with Lewy bodies and Alzheimer's disease

Many of the signs and symptoms of dementia with Lewy bodies can also be seen in patients with Alzheimer's disease. The presenting symptoms of dementia with Lewy bodies may vary considerably, but a clinical diagnosis of the disorder may be suspected when certain features are present. Visual hallucinations are seen in Alzheimer's disease⁵ but are much more pronounced and vivid in dementia with Lewy bodies¹⁸. In addition, positron emission tomography (PET) brain scans reveal hypometabolism in the visual cortex in dementia with Lewy bodies but not so frequently in Alzheimer's disease¹⁹. Other particularly prominent features of dementia with Lewy bodies include fluctuating cognitive impairment, episodes of confusion and Parkinsonism with some of the visual signs and symptoms of Parkinson's disease⁴. Impairment of short-term memory, myoclonus (involuntary limb jerking), disturbances of gait and posture and varying degrees of depression may also be present.

Conclusions

Confused middle-aged to elderly patients, who have not been diagnosed with any disorder, may exhibit a variety of visual signs and symptoms including visual hallucinations.

In addition, the characteristic features of Parkinson's disease may be present and are most likely to involve oculomotor function and pupil reactivity. Hence, a middle aged or elderly patient with

unexplained symptoms or signs of this type, in combination with evidence of confusion and memory impairment, should be referred as dementia with Lewy bodies as a possible diagnosis. The correct diagnosis is particularly important because patients with visual hallucinations may be treated with antipsychotic drugs. This type of treatment may be hazardous in dementia with Lewy bodies, however, because patients can exhibit extreme sensitivity to neuroleptic drugs.

The exact presentation of dementia with Lewy bodies in different patients, may exhibit considerable variation and some patients may be visually asymptomatic. In addition, patients with a possible diagnosis of dementia with Lewy bodies may develop a range of visual problems during the course of the disease including some of the signs and symptoms characteristic of Alzheimer's disease and/or Parkinson's disease. As in Alzheimer's disease⁵, the successful care of such patients may be enhanced if the patient is able to see as clearly as possible and is located in a visually interesting environment. This is particularly important in dementia with Lewy bodies because the visual hallucinations are often exacerbated by other visual impairments and can be temporally relieved by environmental stimulation.

Summary

Dementia with Lewy bodies is the second most common form of dementia to affect elderly people after Alzheimer's disease. In patients with dementia with Lewy bodies, there is often a combination of the symptoms of Alzheimer's disease and Parkinson's disease. The disorder is of particular interest to optometrists, because it is associated with a range of visual problems including possible defects in eye movement, pupillary function, complex visual functions and the presence of specific types of visual hallucination.

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