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Pilot study of treatment of persistent auditory hallucinations by modified auditory input

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Persistent auditory hallucinations occur in several psychiatric conditions. Predictions that hallucinations will decrease with increased external auditory stimulation are supported by several case reports.^{1,2} Green's theory of auditory hallucinations in schizophrenia proposes a defect in interhemispheric transmission of language.⁴ He suggested that wearing an earplug might reduce verbal input to the non-dominant hemisphere. Studies of this have produced conflicting results.⁵

We assessed the therapeutic potential of various techniques for modifying external auditory input in a patient suffering from intractable auditory hallucinations.

Patient, methods, and results

The patient was a 53 year old woman who had been an inpatient continuously for 14 months before this study. She had been admitted with delusions and first complained of hearing voices three months after admission. The voices discussed her in the third person and made critical comments about her. They were present for many hours each day. Treatment with neuroleptics, antidepressants, lithium, and

carbamazepine failed to suppress them. She had been admitted with psychosis on three previous occasions over 12 years.

She was asked to rate the duration of her auditory hallucinations over a baseline period of seven days. Ratings were made hourly from 9 am to 6 pm with eight point scales and referred to the preceding 30 minutes. Eight experimental conditions were then assessed in random order on alternate days. Each condition was applied for two hours, between midday and 2 pm; ratings were made half hourly during the test and hourly afterwards for a further three hours. The test conditions were tapes of pure music (classical), music and speech (BBC Radio 1), boring speech (British Telecom speaking clock), and interesting speech (BBC Radio 4); a blank tape (control); and a hearing aid (right ear); earplug (left ear), and earplug (right ear). A portable cassette tape player with intra-aural headphones was used, allowing continuous play for two hours. All conditions were investigated while she was an inpatient on the same ward, and no other changes were made to her treatment.

She had normal hearing and was right handed. Ratings were consistent over the seven baseline days. The figure shows the results. The tapes of music, music and speech, and interesting speech reduced the hallucinations whereas the blank tape had little effect. The reduction was not sustained beyond the test with music or music and speech, but the effect of interesting speech persisted. An earplug in the left ear made little difference, but when an earplug was used in the right ear the hallucinations disappeared after the test but not during it. Hallucinations temporarily stopped while and after she wore a hearing aid.

Ratings of hallucinations (0=none, 7=continuous) during and after each of eight conditions applied between 12 am and 2 pm. ○—○=Mean baseline ratings

Her clinical improvement was such that she bought her own cassette player and was able to leave hospital taking reduced doses of drugs. She continued to listen to tapes when troubled by voices. At nine months' follow up she had a part time job and was using the cassette player on most days.

Comment

Our results provide tentative support for the hypothesis that increased external auditory stimulation reduces the severity of persistent auditory hallucinations. The response to the use of earplugs did not support Green's hypothesis.⁴ Our patient's hallucinations spontaneously disappeared every morning at 10 am. We surmise that this was caused by her concentrating on ward based occupational therapy that started then. The clinical outcome in this patient was impressive, though conclusions can be only tentative.

Using a portable cassette player has the advantages of being cheap, simple, safe, non-invasive, and socially acceptable, and the patient is given a degree of personal control over distressing symptoms.

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Steroid aerosols and cataract formation

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Posterior subcapsular cataract is a well recognised complication of treatment with oral corticosteroids, the incidence increasing with both dose and duration of treatment. Over 10 mg of prednisolone per day for one year may be necessary for cataracts to develop, but this may be a conservative estimate.^{1,2} Inhaled steroids have been available in Britain since the early 1970s and there is little evidence to implicate them in the development of cataracts.³

We have recently seen three patients whose asthma was treated with inhaled beclomethasone dipropionate and small total doses of oral steroids over several years and who developed posterior subcapsular cataract.

Case reports

Details of the patients are summarised in the table. Apart from the inhaled beclomethasone dipropionate, the only steroids the patients received were short reducing courses of oral prednisolone. Clinical examination showed no features associated with chronic use of steroids, and all three had normal fasting blood glucose concentrations. Full ophthalmological assessment showed normal intraocular tensions and no other reasons for the development of cataracts.

Comment

Cataracts have been described in patients with asthma who received substantial doses of oral steroids. In 1966 posterior subcapsular cataracts were identified

in 3% of 265 asthmatic patients and in 32% of 406 patients with rheumatoid arthritis.¹ A recent review confirmed this discrepancy, subcapsular cataracts occurring in 9% of patients with asthma, 18% with rheumatoid arthritis, and over 40% either with systemic lupus erythematosus or after renal transplantation.² The lower incidence in asthmatic patients was thought to be due to a lower total dose of steroids, their younger ages, and the intermittent reducing regimens used. Children and young adults (aged less than 20 years) may be at greater risk of developing posterior subcapsular cataract: 29% of children taking steroids had cataracts, some occurring after only four months' treatment.^{2,4}

As our patients had received fairly small doses of oral prednisolone the cataracts might have occurred by chance. Little information is available on the incidence and prevalence of posterior subcapsular cataract. A report in 1966 suggested a frequency of 0.6% in adults aged between 50 and 60 years.¹ In 1977-81 posterior subcapsular cataracts were found in nine of 760 unselected patients from a general practitioner's list who underwent a full ophthalmological examination. Routine ophthalmological practice indicates that most of these nine patients would have had factors predisposing them to development of cataracts, suggesting that unexplained posterior subcapsular cataract is uncommon (J Cuthbert, personal communication).

Thus the relation between steroid treatment and development of posterior subcapsular cataract is complex, being related to patients' age, total dose of steroids and how often they were given, and probably the underlying medical condition. Some early cataracts regress after steroids are stopped, and susceptibility varies to the ophthalmological effects of steroids, as seen in glaucoma.^{1,4,5}

In our three patients the only explanation for the development of cataracts was the steroid treatment. Oral steroids may have been responsible for the initial

Details of patients receiving inhaled and oral steroids who developed posterior subcapsular cataract

	Case 1	Case 2	Case 3
Age (years)	52	40	47
Sex	Female	Female	Female
Duration of asthma (years)	10	10	2
Dose of inhaled beclomethasone dipropionate	400 µg/day	400 µg/day	400 µg/day for 1 year; 1500 µg/day for 1 year
Estimated total intake of prednisolone	1 g (3 courses)	1.6 g (11 courses)	540 mg (3 courses)
Time since prednisolone last taken	3 years	6 months	2 years
Ophthalmological findings	Bilateral posterior subcapsular cataract, right>left	Dense right cataract, left posterior subcapsular cataract	Bilateral posterior subcapsular cataract
Visual acuities (with spectacles normally worn)	Right eye: hand movements; left eye: 6/9	Right eye: light only; left eye: 6/9	Right eye: 6/12; left eye: 6/12
Action	Extraction of bilateral cataract and implantation of intraocular lens	Extraction of right cataract and implantation of intraocular lens	Observation