Pertussis: should we immunise neurologically disabled and developmentally delayed children?

R N MILES, G P HOSKING

Abstract

A total of 400 children with neurological disorders were studied to ascertain whether they had been immunised against pertussis, the reasons for non-immunisation, and the "validity" of these reasons, as judged by interpretation of the recommendations of the Department of Health and Social Security. The results for this group were compared with those for a group of 400 aged matched controls. The study group had a significantly lower rate of immunisation than controls ($p<0.01$); rates for both groups fell sharply after 1975. A total of 192 study patients and 186 controls were not immunised. Those children with cerebral palsy had the lowest rate of immunisation (19%) and the highest number of valid reasons for non-immunisation (63%). Paediatricians apparently advised against immunisation in 61 (32%) of the index group but in only four (2%) of the controls.

The risk of serious neurological handicap after pertussis immunisation is small and there is little evidence to support the view that underlying neurological disease predisposes a child to increased risk. The advice currently given by paediatricians may need to be reconsidered.

Introduction

Reports of suspected brain damage after pertussis immunisation[1-3] resulted in a significant fall in the number of children immunised against whooping cough. From 1958 to 1974 acceptance rates in England and Wales were about 75%, falling to 30% by 1978.[4] Notifications of the disease increased and a major outbreak occurred between late 1977 and mid-1979; despite a subsequent slight increase in immunisation rates, epidemic numbers were again reached in 1982.

The estimated incidence of serious neurological reactions to the vaccine varies from 1 in 10 000[2] to 1 in 110 000[5] children immunised. The recent seven year survey in the North West Thames Region found no convincing evidence of major neurological damage after more than 400 000 immunisations containing pertussis vaccine.[6] Although there seems to be little or no evidence that an underlying neurological disease predisposes a child to increased risk of reaction,[7] the Department of Health and Social Security (DHSS) recommends that certain children should not be immunised and others warrant special consideration.

Those they recommend should not be immunised are those with: (*a*) a history of any severe local or general reaction to a preceding dose of the vaccine or (*b*) a history of cerebral irritation or damage in the neonatal period, or those who have suffered from fits or convulsions.

Those "requiring special consideration" are: (*a*) children whose parents or siblings have a history of idiopathic epilepsy; (*b*) children with developmental delay thought to be due to a neurological defect; and (*c*) children with neurological disease.

Hull surveyed a varied group of health workers and concluded that one factor responsible for the low immunisation rate in the United Kingdom was the considerable uncertainty as to how the contraindications should be interpreted.[8] He suggested that the enforcement of some of the contraindications is against the interests of the individual.

We were concerned that children with neurological disabilities may have been underimmunised because of the fears of their medical advisers or parents. To ascertain the size of the possible problem we undertook a survey of immunisation in 400 children with handicapping neurological disorders. Our aims were to find out if this group was underimmunised, and if so, why.

Methods

A total of 400 successive children attending the Ryegate Centre, a regional centre for children with handicapping neurological disorders were chosen for study. The parents of the 400 children answered a questionnaire on their child's state of immunisation and, where appropriate, the reasons for non-immunisation. The hospital notes of each child were checked to ascertain the working diagnosis and, in cases of non-immunisation, to make a judgment as to whether, according to the present DHSS recommendations, there was a "valid" reason for not immunising the child against pertussis. For example, if the parent had given convulsions or brain damage as the reason, we checked whether this was apparent before 6 months of age, when immunisations should have at least begun.

An identical questionnaire was answered by the parents of 400 age matched children attending general paediatric clinics in a neighbouring hospital. Rates of pertussis immunisation rates for the city of Sheffield were obtained from the central health clinic, where a major campaign ensures accurate reporting.

Results

Rates of acceptance for the study group, controls, and the whole of Sheffield were examined according to the year of birth. For those born before 1975 the rates were 72% in the study group, 67% for controls, and 75% for the whole of Sheffield. The rates for those born after 1975 were considerably lower in each group: 31% in the study group, 44% for controls and 40% for the whole of Sheffield. The rates of acceptance were significantly lower in the study group compared with the control group (χ^2 test: $p=<0.01$).

The children with neurological disorders were divided into various diagnostic categories: (*a*) cerebral palsy of all types, whether or not they had associated mental retardation or convulsions; (*b*) severe mental retardation with no cerebral palsy, with or without convulsions; (*c*) epilepsy alone; (*d*) neuromuscular disorders; and (*e*) learning difficulties, clumsy children, language disorders, behavioural disorders.

Table I shows the numbers in each category before and after 1975, with the numbers immunised and those with a valid reason for non-immunisation. Those with cerebral palsy had the lowest rate of immunisation after 1975 and the highest rate of valid contraindications.

In analysing the notes we felt that 15 children had been immunised despite recommended contraindications, but 13 of these were before 1975. Only three of the 400 sets of parents blamed the vaccine for their child's handicap and in none of these was there a contraindication to immunisation.

The parents of non-immunised children were given a questionnaire and asked to tick as many factors as they believed were important in

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TABLE I—*Details of immunisation for children in each diagnostic category by date of birth. Figures are numbers (%) of children*

	Cerebral palsy	Mental retardation	Epilepsy	Neuro-muscular disorder	Learning difficulties
Before 1975:					
No of children	105	45	10	17	25
No immunised	72 (69)	31 (69)	6 (60)	16 (94)	21 (83)
No not immunised	33 (31)	14 (31)	4 (40)	1 (6)	4 (17)
Valid reason given	24	7	2	0	0
After 1975:					
No of children	83	63	5	14	33
No immunised	16 (19)	20 (32)	1 (20)	5 (36)	19 (58)
No not immunised	67 (81)	43 (68)	4 (80)	9 (64)	14 (42)
Valid reason given	53	26	3	1	1

their decision against immunisation. Table II shows their responses. In 21 (11%) of the children with neurological disorders who had not been immunised and 63 (34%) of the 186 in the control group, who had not been immunised no explanation was offered. Among other explanations were: Down's syndrome, prematurity, milk allergy, heart disease, and jaundice.

TABLE II—*Response to questionnaire by parents of children who were not immunised**

		Study group (n = 192)	Controls (n = 186)
A	I decided against immunisation because of comments made by:		
1	My doctor	60	48
2	Paediatrician	61	4
3	Obstetrician	1	0
4	Health visitor	23	24
5	Friends	1	12
6	Relatives	1	13
7	Newspaper or television reports	38	63
B	It was felt unwise for my child because of:		
1	History of fits/convulsions	41	24
2	Suspected brain damage	46	0
3	Neurological disease	1	0
4	Childhood eczema	2	15
5	Childhood asthma	2	12
6	Reaction to previous injection	5	9
7	Difficult delivery	20	0
8	Difficulty breathing at birth	19	0
9	Recurrent illnesses	14	7
10	Family history of fits/convulsions	14	51
11	Family history of eczema/asthma	13	8
12	Family history of mental retardation/brain damage or other neurological disease	6	9
13	Other	13	1

*Parents of 21 children in the study group and 63 in control group gave no reason; some parents gave more than one reason.

Discussion

Our results show that over the past few years children with neurological disabilities have been underimmunised compared with the normal population. This is particularly true of those with cerebral palsy, only 19% of whom were immunised after 1975. By our interpretation 63% of this group had a "valid" reason for not being immunised. In only 26% of these cases, however, did they fall into the categories for contraindication rather than for special consideration. As might be expected, only 2% of children with learning difficulties and neuromuscular disorders had a valid reason for not being immunised.

A survey of this kind, with parents trying to recall advice given some years before, does have limitations but some points of interest emerged from the questionnaire. It appeared that paediatricians advised against immunisation in 61 of the 192 children with neurological disabilities who were not immunised, compared with only four of the 186 controls, where many more, (88 *v* 40) seem to have been influenced by friends, relatives, and television reports. None of the parents in the control group thought that suspected brain damage or perinatal difficulties were reasons for not immunising their children, yet 27 believed eczema and asthma were.

The risk of serious neurological handicap after pertussis immunisation is small,[5] and although the efficacy versus risk argument continues[9 10] many authorities have concluded that routine immunisation should be encouraged.[11–18] Despite this, immunisation rates have remained low and in our survey this is especially so in those children with neurological disabilities, presumably because medical staff have been following the DHSS recommendations. Illingworth[7] and Prensky[19] reviewed the existing data and found no firm scientific or statistical evidence to support the view that children with brain damage or epilepsy are at greater risk of suffering further brain damage than the general population. The risk factors are not known. We do know that convulsions are common in cerebral palsy and many types of mental retardation, and we know that in idiopathic epilepsy fever associated convulsions may occur; all these children may therefore be at increased risk of a further convulsion after pertussis vaccination. That is not, however, to say that they are at increased risk of brain damage. Prensky suggests that many thousands of brain damaged children must have been vaccinated without developing serious complications,[19] and in some of the less recent published reports several clinicians suggest that epilepsy is no contraindication to pertussis immunisation.[20 21]

The recommendations of the American Academy of Pediatricians published in the "red book", as it is commonly known,[18] are much clearer than those of the DHSS, which have been shown to lead to confusion even among the experts.[8] The "red book" gives only one absolute contraindication and that is to a subsequent dose of the vaccine when the initial dose lead to a convulsion, encephalitis, focal neurological signs, or collapse. They recommend that infrequent or well controlled convulsions do not contraindicate immunisation and neither does the presence of cerebral palsy or most instances of developmental retardation. It is felt that children with progressive encephalomyelopathies should not be immunised if only because confusion might occur regarding the relation of vaccination to disease progress. A family history of convulsions or other neurological disease is not thought to be a contraindication.

Paediatricians in the United Kingdom have continued to advise against immunisation in children with varying degrees of neurological disability or developmental delay but this is inevitable while they fear they may be blamed for immunising a child who subsequently shows evidence of neurological damage. We believe a change of policy may be necessary.

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Surgical treatment of infective endocarditis with special reference to prosthetic valve endocarditis

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Abstract

Patients with native valve endocarditis treated surgically between 1968 and 1978 (n=15) and all patients presenting with prosthetic valve endocarditis during this period (n=21) were followed up for at least four years. Five of the patients with native valve endocarditis required urgent early surgical intervention, of whom two died. The remaining 10 underwent valve replacement after a course of antibiotic treatment: all survived, though one required further valve replacement. The 21 patients with prosthetic valve endocarditis suffered 25 attacks. Nine were cured by medical treatment alone; two died before surgical intervention was possible; 11 required valve replacement, of whom three died; and two required valve replacement after a course of antibiotic treatment. The incidence of early prosthetic valve endocarditis—that occurring within two months of operation—was 0·67%, but that of late prosthetic valve endocarditis could not be determined.

Medical treatment when started early should cure endocarditis in most patients, but vigilance should be maintained for the appearance of indications for surgery. When such indications exist surgery should not be delayed.

Introduction

The introduction of effective chemotherapy and development of valve replacement surgery have dramatically changed the outlook for patients with infective endocarditis. Since Wallace *et al*[1] first reported successful excision and replacement of the valve in patients with active disease the role of surgery in the treatment of this condition has expanded steadily. Initial reluctance to insert a substitute prosthetic valve into an infected site diminished when emergency valve replacement proved life saving for patients with rapid haemodynamic deterioration, uncontrollable infection, or recurrent embolism, in whom the mortality with continued medical treatment approached 100%.[2-4]

Prosthetic valve endocarditis is a "new" disease that may occur early or late after valve replacement. Late infection develops as part of a continuing long term risk when bacteraemia from any cause occurs. The infecting organisms are similar to those found in patients with native valve endocarditis.[5] When infection appears within two months of operation it is usually attributable to contamination at the time of valve replacement, particularly after sternal wound infection, and an incidence of 10% in the early 1960s has been reduced to 1% or less with the introduction of more effective antistaphylococcal prophylaxis.[6 7]

Perhaps more than any other condition the treatment of both primary and prosthetic valve endocarditis requires close cooperation between cardiologist, bacteriologist, and cardiac surgeon at an early stage of the disease. Surgical intervention, when required, must be carefully timed. Ten years ago Wise *et al* at this hospital advocated prompt replacement of the aortic valve for patients with severe acute aortic regurgitation despite active endocarditis.[8] We describe the patients with infective endocarditis who have needed surgical treatment at this hospital since that time.

Patients and methods

The definition of infective endocarditis for the purpose of this study was an illness producing valvular dysfunction and incorporating characteristic clinical features that include fever, new cardiac murmurs, splenomegaly, or embolic manifestations. Positive blood cultures were obtained in 77% of attacks. Some patients at presentation had already received blind antibiotic treatment, and a few, in whom the diagnosis was initially made serologically, had infections caused by cell dependent organisms (*Coxiella* or *Chlamydia*). Demonstration of typical vegetations by echocardiography, at surgery, or at necropsy was held as confirmation of infective endocarditis.

Twenty seven patients were operated on for endocarditis between 1968 and 1978 and were followed up for at least four years, 15 with native valve (primary) endocarditis and 12 out of 21 patients who presented with prosthetic valve endocarditis. Patients whose native valve endocarditis was successfully treated medically or for whom valve replacement was required at some time remote from the infection were not included. All patients with prosthetic valve endocarditis were included, though not all required surgical treatment.

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