

cephaly and the Dandy-Walker malformation or variant—may develop late in pregnancy and may not be diagnosed from a scan at 18-20 weeks.

Ultrasound scanning in experienced hands is a powerful diagnostic tool. To maximise its role in clinical practice, appropriate training, good equipment, and access to expert referral when necessary are all required. New knowledge and improved equipment lead to new diagnoses—for example, the many “markers” of chromosome abnormality—which need to be appropriately investigated to find their true importance and to reduce the anxiety caused to parents when they are identified.⁷ The publication of leaflets giving honest information to health professionals and pregnant women about screening tests in pregnancy is a step in the right direction. However, if evidence based practice is to achieve its goal health professionals need appropri-

ate, up to date evidence to be collected and collated. Such evidence is not yet available.

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Lesson of the Week

Who spots the spots? Diagnosis and treatment of early meningococcal disease in children

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Information for parents and doctors about meningococcal disease should emphasise the septicaemic rash, not meningitis

Meningococcal disease can begin suddenly and may kill within hours.¹ Delays in diagnosis and treatment can therefore decrease the chances of survival. The commonest delays in those who die are: parents not recognising that their child is seriously ill; and doctors failing to make a correct diagnosis.²

Accurate information about meningococcal disease for both parents and doctors is therefore extremely important. The information widely available, however, may be misleading, because it tends to focus on meningitis rather than on septicaemia.³ More deaths result from septicaemia, and the proportion of children who present with septicaemia is increasing.⁴

We conducted a prospective study of children admitted with meningococcal disease over a period of 18 months, and we highlight the details of one case in which a missed diagnosis led to the child's death.

Subjects and methods

This prospective study included all children admitted with meningococcal disease over 18 months to four hospitals in Merseyside: Alder Hey Children's Hospital, Arrowe Park, Whiston Hospital, and the Countess of Chester Hospital. Parents were interviewed on admission and were asked about specific features they had noticed, their reasons for seeking medical advice, and the outcome of any contact with a doctor during the illness.

Results

One hundred and twenty six children with meningococcal disease were admitted, 13 of whom died. *Neisseria meningitidis* was isolated from 78 cases. The median age (range) was 20 months (3 months to 14 years). On admission 113 children had a rash and 57 had neck stiffness.

Non-specific features were commonly noted by parents (fever in 122 of the 126 cases, lethargy in 112, and vomiting in 96), and they were often the initial symptoms. A rash was seen by parents before admission in 96 cases, but headache (41 cases) and neck stiffness (14 cases) were rarely noted.

Rash was the commonest reason for calling a doctor (66 cases), followed by fever (41), and lethargy (32). Advice was rarely sought for headache (five cases) or neck stiffness (three).

Parents or relatives were the first to spot a petechial rash in 92 cases. Doctors were the first to notice the rash in 13 children.

RECOGNITION BY DOCTORS OF MENINGOCOCCAL DISEASE

Sixty of the children with meningococcal disease were seen but not admitted by a doctor in the 48 hours before admission—50 by a general practitioner and 10 by a doctor in an accident and emergency department. Thirty two of these children had non-specific signs, six had a petechial rash, and 22 had a maculopapular rash. Four children subsequently died, two who had been seen with no rash and two with a maculopapular rash.

Preadmission parenteral penicillin was given to 22 of the 69 (32%) cases admitted by general practitioners, more often to children who were referred as “meningococcal disease” (18/22, or 82%) than to those referred as “meningitis” (3/15, or 20%).

Antibiotic treatment was delayed after admission to hospital in 15 children. Ten of these children presented with a maculopapular rash: one died. Three children developed a petechial rash after admission and one of these children also died. The other two children with meningococcal meningitis never developed a rash. Delays in treatment on admission thus occurred in those with either a maculopapular rash or no rash.

Case report

A 3 year old boy became febrile overnight. The next morning he was lethargic and vomited. He developed a maculopapular rash and was seen at 1400 by his general practitioner, who diagnosed measles. He remained unwell and was taken to the local accident and emergency department at 1520. A petechial rash began about this time but was not noticed. Meningococcal disease was diagnosed at 1730. Antibiotics were started, but by this time he was in shock. He was intubated, ventilated, and

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Fig 1—Purpuric rash of meningococcal septicaemia



Fig 2—"Flea-bitten" maculopapular rash of meningococcal septicaemia. Some papules have petechiae in their centres

resuscitated with colloid and inotropic drugs. He remained hypotensive, however, and died at 2300.

Discussion

This study shows that the feature of meningococcal disease which most parents notice before admission is a rash, and this is the commonest reason for seeking medical advice. Parents rarely notice or seek medical advice about the features of meningitis. General practitioners often prescribe preadmission antibiotics when they diagnose "meningococcal disease" but rarely when they diagnose "meningitis." Delays in treatment occur when doctors do not recognise the rash that is typical of meningococcal septicaemia, particularly the less well recognised maculopapular rash (figs 1 and 2).

If the mortality from meningococcal disease is to be reduced by earlier treatment then parents need to know about the early signs of meningococcal disease. They are currently advised by the Department of Health to watch for the following: headache; fever; vomiting; neck stiffness; coma; photophobia; and lastly, rash.⁵ Headache and neck stiffness were rarely noticed by parents despite being present in 45% of cases. Information advising parents to look primarily for these features is misleading. A rash is a common feature of meningococcal disease³ and was often seen by parents. Information about the importance of a vasculitic rash in an ill child, and the need for urgent treatment, should be given to those most likely to notice the rash first—that is, parents. Anecdotal evidence suggests that this is effective.⁶ However, most child health booklets written for parents do not have a photograph of the meningococcal rash.⁷

Nearly half the children with meningococcal disease had been seen by a doctor but not admitted in the 48 hours before admission. This proportion is similar to that of other studies.⁸ When a doctor was first called the

child often had non-specific signs, making the diagnosis extremely difficult. Twenty two (37%) children had a maculopapular rash. The presence of a maculopapular rash led to delays in diagnosis that may have contributed to two deaths. Similar cases have been reported from our hospitals and elsewhere.^{1 2 9}

When called to a child who is non-specifically unwell with fever, lethargy, or vomiting doctors should ask parents to call them again if the child later develops a rash or deteriorates rapidly. If such a child develops a maculopapular rash meningococcal disease still needs to be considered.

Preadmission parenteral penicillin was given to less than a third of children admitted by general practitioners. This is a similar proportion to that found in previous studies.^{10 11} The most important factor in whether children received preadmission penicillin was if the general practitioner diagnosed meningococcal disease rather than meningitis.

In conclusion, parents of children with meningococcal disease often recognise that their child is ill and seek medical advice during the early stages of the illness. At this stage the diagnosis cannot often be suspected clinically because children have non-specific symptoms. Subsequently most children develop a rash. Parents notice this rash and commonly seek medical advice because of it. They neither notice nor seek advice about the features of meningitis. Information about meningococcal disease for parents should thus focus on the rash of septicaemia and not on the signs of meningitis. Doctors may not recognise the maculopapular rash of meningococcal disease and are less likely to give immediate treatment if they diagnose "meningitis" rather than meningococcal disease.

The first doctor to see a child with meningococcal disease needs "knowledge out of proportion to their previous experience."¹² General practitioners and casualty officers need to be taught to recognise the rashes of meningococcal septicaemia and to give "on the spot" penicillin and not to delay treatment by looking for signs of meningitis.¹³

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