Our case report differs in that the patient was asymptomatic on presentation and developed the breast lesion relatively soon after the diagnosis. In addition no other distant lesion has yet been detected. An accurate diagnosis of the breast mass was difficult to establish as fine needle aspiration biopsy was inconclusive, and radiological investigations suggested a primary breast lesion. ^{131}I -MIBG scanning can be ineffective in localising metastatic MCT.⁵ In one study of 10 patients with biochemical evidence

of recurrence after surgery only one lesion was accurately identified by ^{131}I -MIBG scan.⁵ This not only has implications for diagnosis but also for ^{131}I treatment of metastases.

In conclusion, therefore, although MCT commonly metastasises to local and distant sites, spread to the breast is very rare, and should be considered a diagnostic possibility in patients with a past history of MCT presenting with an apparently primary breast lesion.

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Bacterial meningitis after MMR immunisation

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Summary

Two children developed bacterial meningitis within five days of measles–mumps–rubella (MMR) immunisation. Diagnosis was delayed because symptoms were attributed to the vaccine, although both had a raised C-reactive protein. Fever or rash within five days of MMR vaccination are unlikely to be due to the vaccine and a raised C-reactive protein suggests bacterial infection.

Keywords: bacterial meningitis, measles–mumps–rubella vaccination, C-reactive protein

Children may develop fever and rash 7–12 days after immunisation with measles–mumps–rubella (MMR) vaccine.¹ The development of fever and rash before this may be due to an underlying bacterial infection. We report two children who developed bacterial meningitis shortly after MMR immunisation, but in whom the early symptoms were ascribed to the vaccine.

Case 1

Two days after MMR immunisation a 13-month-old girl developed fever and a generalised 'blotchy red rash'. She was seen by a general practitioner who prescribed an antihistamine for a possible vaccine reaction. The rash faded, but the child was increasingly lethargic. She was taken to the local hospital and admitted. On admission she had a fever of 38.8°C and a red throat, but no other localising signs of infection. The peripheral white cell count was

$9.8 \times 10^9/\text{l}$ (granulocytes 75%) and C-reactive protein was 235.6 mg/l (normal < 8 mg/l).

Six hours after admission neck stiffness and a sparse petechial rash were noted. Lumbar puncture produced turbid cerebrospinal fluid (CSF) which grew *Neisseria meningitidis*. The child was treated with antibiotics and made a full recovery.

Case 2

A one-year-old girl became lethargic and febrile three days after MMR immunisation. She was seen by her general practitioner who diagnosed a 'viral illness', and prescribed paracetamol. The following morning she remained lethargic and developed a 'blotchy red rash' on her legs. She was taken to an Accident and Emergency department where her symptoms were thought to be due to her recent immunisation. She was discharged, but returned six hours later because of increasing lethargy, fever and pallor. By this time she had marked neck stiffness, a bulging anterior fontanelle, and was poorly perfused with a sparse petechial rash on her legs. A full blood count showed a white cell count of $12.5 \times 10^9/\text{l}$ (78% neutrophils) and serum C-reactive protein was 193 mg/l. She required initial resuscitation with plasma expansion and was transferred to the intensive care unit for stabilisation.

Lumbar puncture was deferred until the next day when CSF showed a white blood cell count of $4 \times 10^9/\text{l}$ (85% neutrophils), protein 0.85 g/l and CSF/blood glucose ratio 0.4. Bacterial and viral cultures and antigen studies on blood and CSF were all negative. She received antibiotics for seven days and made a full recovery.

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Side effects of MMR

- 'mini-measles': 17% (fever and/or rash a week after immunisation)
- 'mini-mumps': 1% (parotid swelling three weeks after immunisation)
- self-limiting thrombocytopenia
- mumps meningoencephalitis: 1 in 11 000 (lymphocytic meningitis two to five weeks after immunisation)

Box 1

Discussion

These cases are not unique since bacterial meningitis has previously been described following measles immunisation.² We report them to highlight the danger of attributing fever and rash to MMR vaccine in the five days following immunisation. We also suggest that a raised serum C-reactive protein may be a helpful indicator of bacterial disease in a child with a fever after immunisation.

Both children developed bacterial meningitis within four days of receiving MMR vaccine. Diagnosis was delayed because their symptoms were initially attributed to the vaccine. However, fever or a generalised rash within five days of MMR are unlikely to be due to the vaccine.¹ Fever occurs between seven and 12 days after MMR immunisation, the peak incidence being on the ninth day. Signs of measles (ie, rash or conjunctival injection) are found only in the second week after MMR.¹ The fever and rash in our cases were thus more likely to be due to bacterial infection than MMR vaccine.

The median age of children with meningococcal disease admitted to our hospital is 14 months, the usual age at which MMR immunisation is given (unpublished data). By chance, a small number of children may therefore develop meningococcal disease shortly after MMR immunisation.

Previous studies have found no increased risk of invasive bacterial infection after routine

Learning points

- the diagnosis of bacterial meningitis in young children requires a high index of suspicion
- fever or rash within 5 days of MMR are unlikely to be due to the vaccine
- a raised C-reactive protein in such circumstances suggests bacterial infection

Box 2

childhood immunisations.³ The recent National Measles and Rubella Immunisation campaign could provide an opportunity to confirm this.

As aseptic meningitis can develop after MMR vaccination,⁴ it was postulated that Case 2 could be classified as such, since cultures were negative. The reported cases of aseptic meningitis after MMR have occurred at least 15 days after vaccination and show a predominance of lymphocytes in the CSF.⁴ Case 2 occurred four days after vaccination, had a predominance of neutrophils in the CSF, a low CSF/blood glucose ratio, a markedly raised C-reactive protein and a petechial rash. These features together with the clinical course are more in keeping with a bacterial (probably meningococcal) meningitis. Both cases occurred after the withdrawal of MMR containing Urabe mumps vaccine, the strain possibly associated with an increased risk of aseptic meningitis.⁴

A maculopapular rash is present in up to 38% of cases of meningococcal disease⁵ and both children developed such a rash before admission. Children with meningococcal disease, including those with a maculopapular rash, often have a raised C-reactive protein on admission.⁶ The markedly raised C-reactive protein in these two cases confirms the diagnostic value of this test and suggests that it may be useful in differentiating between immunisation reactions and serious infection in young children.

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