Viral rashes and skin infections

Clinical

There are several kinds of skin infections caused by viruses, and these are best considered in the four categories that group together similar symptoms for the purpose of differential diagnosis:

- maculopapular rashes
- vesicular rashes
- wart-like lesions
- haemorrhagic rashes.

Maculopapular rashes

These skin rashes can be caused by a variety of different viruses. Clinically it is difficult to distinguish between the viral causes of these maculopapular rashes. Studies have shown that only a small percentage of these rashes are clinically diagnosed accurately. Figure 41.1 shows a typical maculopapular rash. Table 41.1 provides information on the laboratory diagnosis of virus infections associated with maculopapular skin rashes.

Rubella

Rubella is caused by rubella virus. It produces a mild illness with a maculopapular skin rash. It causes severe congenital damage in children born to mothers who acquire infection in the first 12 weeks of pregnancy. Because of this, women should receive rubella virus vaccine before becoming pregnant. They should also seek advice from a healthcare professional if they are in contact with a rubella-like illness in the first 20 weeks of pregnancy. Patients are infectious for one week either side of the onset of rash.

Human parvovirus B19

Infection with human parvovirus B19 can present as a rubella-like rash but the most typical presentation is with a ‘slapped cheek’ rash, especially in children. It can cause hydrops fetalis in babies when the mother is infected at up to 20 weeks’ gestation. Pregnant mothers should seek advice from a healthcare professional if they are in contact with a rubella-like illness in the first 20 weeks of pregnancy. Patients are infectious for one week before the onset of rash but they are not infectious once the rash appears.
Measles
Measles presents with coryza, conjunctivitis, fever and a blotchy skin rash. Since most people in the UK have either had natural measles infection or have received vaccine, infection is uncommon. However, small outbreaks do occur, especially in the spring and summer, due to the inadequate levels of vaccine-induced immunity in the community, largely as a result of the disproven risk of autism linked with the MMR vaccine. Measles is difficult to diagnose clinically, with accuracy rates as low as 5%. Measles is not a cause of congenital infection. It can be severe and 1 in 1000 cases may develop encephalitis, which can be fatal. Severe or fatal infection occurs in immunocompromised and severely malnourished people.

Enteroviruses
Enteroviruses can produce a non-specific rash, often with respiratory symptoms. Children are most affected, but adults can have more severe symptoms, including meningism and meningitis.

Adenoviruses
Adenoviruses can produce a non-specific rash, often with respiratory symptoms. Adenovirus infection can mimic measles, especially in immunocompromised persons.

Human herpes viruses types 6 and 7
Human herpes viruses types 6 and 7 can give a non-specific rash and fever. They usually produce symptomatic infection in very young children. Allergic reactions (e.g. to drugs) can give similar symptoms.
Vesicular rashes

Vesicular skin rashes cause vesicles (small fluid filled blisters) on the skin and are usually caused by herpes simplex virus and varicella-zoster virus, although Stevens–Johnson syndrome (erythema multiforme) can give similar symptoms and should be considered in the differential diagnosis. See Table 41.2.

<table>
<thead>
<tr>
<th>Virus</th>
<th>Diagnosis</th>
<th>Treatment and prevention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rubella virus</td>
<td>Clotted blood sample tested for rubella virus-specific IgM</td>
<td>Prevention by giving MMR vaccine. No antiviral treatment available. Always seek medical advice if pregnant.</td>
</tr>
<tr>
<td>Human parvovirus B19</td>
<td>Clotted blood sample tested for parvovirus-specific IgM</td>
<td>No vaccine available. No antiviral treatment available. Always seek medical advice if pregnant.</td>
</tr>
<tr>
<td>Measles virus</td>
<td>Clotted blood sample tested for measles virus-specific IgM</td>
<td>Prevention by giving MMR vaccine. No antiviral treatment available. Always seek medical advice to investigate the source of infection and to protect those in contact with a case of measles.</td>
</tr>
<tr>
<td>Enteroviruses</td>
<td>Throat swab in virus transport medium can be cultured or tested by PCR</td>
<td>No vaccine available. No antiviral treatment available.</td>
</tr>
<tr>
<td>Adenoviruses</td>
<td>Throat swab in virus transport medium can be cultured or tested by PCR</td>
<td>No vaccine available. Consider cidofovir treatment in immunocompromised patients.</td>
</tr>
<tr>
<td>Human herpes viruses 6 and 7</td>
<td>EDTA blood for PCR in severely ill children.</td>
<td>No vaccine available.</td>
</tr>
</tbody>
</table>

Vesicular rashes

Vesicular skin rashes cause vesicles (small fluid filled blisters) on the skin and are usually caused by herpes simplex virus and varicella-zoster virus, although Stevens–Johnson syndrome (erythema multiforme) can give similar symptoms and should be considered in the differential diagnosis. See Table 41.2.

Herpes simplex virus (HSV)

Herpes simplex virus causes a vesicular skin rash. Primary infection in children often presents as mouth and gum infection. Vesicles usually occur in a small group on the skin (Fig. 10.1), mouth or genitals. The virus lies dormant in nerves and can give rise to reactivated infection (e.g. cold sores). Reactivation can lead to encephalitis, but concurrent skin lesions are rare. Herpes simplex virus can cause severe symptoms in immunocompromised patients and those with chronic skin conditions such as eczema. Infection in mothers at the time of childbirth can give rise to severe or fatal...
infection in neonates (Chapter 42). Antiviral treatment (aciclovir, valaciclovir, famciclovir, foscarnet, etc.) is available.

**Varicella-zoster virus (VZV)**

Primary VZV infection gives rise to chickenpox. The virus lies dormant in the nerve cells and can reactivate later in life to produce zoster (shingles), which produces clusters of vesicles on one side of the body in the distribution of a sensory nerve. Lesions in one cluster are usually at different stages of development (cropping), which can help in distinguishing infection from HSV (where all lesions are usually at the same stage of development). Varicella-zoster virus can cause severe symptoms in immunocompromised patients. Chickenpox in the first 20 weeks of pregnancy can cause severe or fatal damage in the fetus (Chapter 42). Infection in the last 7 days of

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</tr>
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<tbody>
<tr>
<td>Herpes simplex viruses (HSV)</td>
<td>Lesion swab in virus transport medium or vesicle fluid for virus culture, PCR or vesicle fluid for electron microscopy.</td>
<td>No vaccine available. Treatment with aciclovir (iv for severe infections in immunosuppressed patients).</td>
</tr>
<tr>
<td>Varicella-zoster virus (VZV)</td>
<td>Swab in virus transport medium or vesicle fluid for virus culture, PCR or vesicle fluid for electron microscopy, culture or PCR. Clotted blood sample tested for VZV-specific IgM may be negative in zoster.</td>
<td>There is a vaccine available. Treatment of chickenpox with aciclovir (iv for severe infections (e.g. pneumonia and encephalitis) and in immunosuppressed patients). Zoster can be treated with valaciclovir, famciclovir (or iv aciclovir in immunocompromised patients).</td>
</tr>
<tr>
<td>Stevens–Johnson syndrome</td>
<td>Investigate infectious cause.</td>
<td></td>
</tr>
<tr>
<td>Enteroviruses</td>
<td>Enteroviruses can be found in vesicles by electron microscopy and PCR. Some infecting types can be cultured, but inoculation into mice is also employed. Throat swabs in virus transport medium or faeces tested by culture or PCR for diagnosis.</td>
<td>No vaccine available. No antiviral treatment available.</td>
</tr>
<tr>
<td>Pox viruses</td>
<td>Lesion swab, vesicle fluid or scab for PCR or electron microscopy.</td>
<td>Smallpox vaccine available. No antiviral treatment available.</td>
</tr>
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</table>

Table 41.2. *Laboratory diagnosis of virus infections associated with vesicular skin rashes.*
pregnancy poses a severe risk of neonatal chickenpox in the baby, which can be fatal. Antiviral treatment (aciclovir, valaciclovir, famciclovir, etc.) is available.

**Stevens–Johnson syndrome**
Stevens–Johnson syndrome can be caused by HSV, *Mycoplasma pneumoniae* and *Chlamydophila psittaci* infection. It produces target-like lesions on the skin, especially on the genitals. It can mimic chickenpox, especially in children (but the presence of a cough in children should suggest a respiratory cause).

**Enteroviruses**
Certain enteroviruses (especially coxsackie A viruses) cause hand, foot and mouth disease. This is common in young children and is usually a mild infection associated with small hard vesicles on the palms of the hand, soles of the feet and in the mouth. Adults (usually parents) can have similar symptoms, sometimes with meningism or meningitis with an intense frontal headache.
Pox viruses

Cowpox should be suspected in patients with single large vesicular lesions, especially if patients have had contact with cats. Cowpox should always be considered in patients who have a single large vesicular lesion that develops a scab.

Orf is a parapox virus (Fig. 41.2 shows an electron micrograph of the orf virus) and usually produces a single vesicular lesion on an erythematous base, which soon develops a scab. Orf (Fig. 41.3) is common in farmers, acquired from sheep, especially when bottle feeding lambs, and also acquired from cows (milker’s node) when milking. The animals also have vesicular skin lesions.

Smallpox (Fig. 41.4 shows an electron micrograph of the smallpox virus) has been eradicated from the world and is therefore an extremely unlikely diagnosis. However, if smallpox infection is suspected, expert medical opinion should be sought.

Other pox virus infection (e.g. monkeypox) is rare and a history of relevant exotic animal contact is important for the diagnosis.

Wart-like rashes

There are many different papilloma viruses which cause wart-like lesions on the skin (skin warts, genital warts, plantar warts (veruccas)) (see Chapter 19). Infection can be diagnosed by testing the excised skin lesions by electron microscopy (EM) or polymerase chain reaction (PCR). Warts can be treated with podophylin and other methods such as excision.

There is an effective papilloma virus vaccine against genital warts (and those viruses responsible for cervical cancer) but not the others.
Molluscum contagiosum is a pox virus infection, which causes clusters of small wart-like lesions on eyelid margins, genitals and lower abdominal skin. It is common in children.

Haemorrhagic rashes
Haemorrhagic rashes are usually associated with exotic virus infections such as Lassa fever, Marburg disease, Ebola, Crimean–Congo haemorrhagic fever or dengue fever (see Chapter 2). Patients are often severely ill and give a relevant history of recent travel to tropical countries. A careful history of the exact location of recent travel and other factors (e.g. contact with rodents or monkeys) is very important for the correct diagnosis to be made. Lassa fever can be effectively treated with ribavirin if prompt treatment is given. There are no effective antiviral treatments for the other haemorrhagic fever virus infections. Patients should be isolated in strict isolation facilities until a diagnosis is made. Diagnosis is made in specialist reference laboratories using EDTA blood or throat swabs in virus transport medium.

Rarely, haemorrhagic chickenpox occurs, almost always in immunosuppressed patients. It is usually a very severe or fatal disease, which requires prompt high dose intravenous aciclovir treatment.

Fig. 41.4. Smallpox virus.