B. Viral infections whose main symptom is verruca

1. Verruca vulgaris

Outline

- It is caused by human papillomavirus (HPV) infection.
- It occurs most frequently on the fingers, toes, soles and
B. Viral infections whose main symptom is verruca

It is largely asymptomatic.

- Liquid nitrogen cryotherapy, topical glutaraldehyde application, carbon dioxide gas laser therapy, and electro-surgery are useful. Some cases heal spontaneously.

Pathogenesis

Verruca vulgaris is caused by human papillomavirus (HPV), a virus in the Papovaviridae family. The most frequent HPV infection is HPV-2, followed by HPV-4, HPV-7, HPV-26, and HPV-27 (Table 23.1). The virus invades the skin from minor external injury and infects the epidermal cells. It replicates simultaneously with differentiation of epidermal cells, leading to maturation of viral particles in the granular cell layer. The viral particles are released concurrently with exfoliation of verruca, causing spreading to other areas.

Clinical features

Verruca vulgaris occurs most commonly on the hands and feet of infants, after a latency of 3 to 6 months. It begins with small papules. They enlarge, elevating in verrucous shape and becoming several millimeters to several centimeters in diameter (Fig. 23.10). Usually multiple but sometimes solitary eruptions of verruca vulgaris aggregate, coalesce, and may form plaques. It is largely asymptomatic and has specific clinical features. There are some types of verruca vulgaris that are given characteristic clinical diagnostic names according to the clinical features, type of virus and the affected site.

1. **Plantar wart**

Verruca vulgaris occurs on the soles. A keratotic lesion forms without distinct elevation. It resembles tylosis and clavus, but can be differentiated from those by scraping. If surface scraping of the keratotic lesion causes petechiae, the diagnosis is plantar wart.

2. **Myrmecia**

A small, dome-shaped nodule forms on the soles. It is caused by HPV-1 infection (Fig. 23.11) and may resemble molluscum contagiosum. It is also called deep palmpoplantar wart. It has a red, cratered appearance. Tenderness is often present. It is a type of plantar wart.

<table>
<thead>
<tr>
<th>Table 23.1 HPV types and clinical symptoms.</th>
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<tbody>
<tr>
<td>Type</td>
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<tr>
<td>1</td>
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<tr>
<td>2,4,7,26-29</td>
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<td>3,10</td>
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<td>5,8,9,12,14,15,17,19-26,36,47,50</td>
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<td>57,60</td>
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<td>6,11</td>
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<td>16,18,31,33-35,39-41,51-60</td>
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<td>13,32</td>
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<td>30,40</td>
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Clinical images are available in hardcopy only.
Pigmented wart
This is caused by infection of HPV-4 or HPV-65, or of HPV-60 in rare cases. It has the clinical features of verruca vulgaris and blackish pigmentation; it is also called a black wart.

Punctate wart
This is caused by HPV-63 infection. Multiple, punctate, white keratotic lesions of 2 mm to 5 mm in diameter occur on the hands and soles.

Filiform wart
A long, small, thin protrusion of several millimeters in diameter occurs on the face, head region or neck (Fig. 23.12).

Pathology
There is hyperkeratosis, incomplete keratinization and thickening of the papillary epidermis, accompanied by thickening of the granular cell layer in the epidermis. Cells with vacuolar degeneration and large keratohyaline granules are found in the granular cell layer. These cellular changes, called koilocytosis, are characteristic of HPV infection (Fig. 23.13).

Treatment
The main treatment for verruca vulgaris is liquid nitrogen cryotherapy. Local injection of bleomycin and cauterization by electrical scalpel or carbon dioxide laser are conducted on sites where cryotherapy is not fully effective, including hands and soles. For multiple lesions, coix seed (Coix lacryma-jobi L.) extract may be administered orally. Topical application of glutaraldehyde is useful. Topical vitamin D and oral retinoids have been reported effective for severe cases.

Flat wart

Synonym: Verruca plana juvenilis

Clinical features
Multiple, slightly elevated, flat papules of 2 mm to 10 mm in diameter occur on the face (forehead and cheeks). These may coalesce or appear in linear pattern from autoinfection (Köbner phenomenon) (Fig. 23.14). The papules are normal skin color or light pink and nearly asymptomatic. They may disappear spontaneously with scaling, which is followed by inflammatory symptoms such as itching and reddening. However, flat wart may persist for several years.

Pathogenesis
Flat wart is a viral wart that is often caused by HPV-3 or HPV-10.

Treatment
Some cases heal spontaneously. Liquid nitrogen cryotherapy is conducted. Coix seed (Coix lacryma-jobi L.) extract may be administered orally.
3. Condyloma acuminatum

**Outline**
- Genital verrucous papules are caused by HPV-6 or HPV-11. This is an STD.
- Latency is 2 to 3 months.
- Cryotherapy and laser surgical removal are the main treatments.

**Clinical features**

The latency of condyloma acuminatum is 2 to 3 months. Multiple verrucous papules of papillary or cauliflower shape occur in the genitalia or perianal region (Fig. 23.15). Keratinization is rarely present. The papules are infiltrative at the surface and may give off foul odor. Condyloma acuminatum may enlarge. Keratinization and ulceration may closely resemble squamous cell carcinoma (Buschke-Lowenstein tumor).

**Pathogenesis**

Condyloma acuminatum is caused by HPV-6 or HPV-11. Most cases occur in the sexually active years, transmitted through sexual activity. The virus invades through minor external injury of the genitalia, perianal region, or vaginal introitus, and infects epidermal basal cells, inducing abnormal cellular proliferation. Proliferation of the epidermis results in formation of papillary tumors (warts).

**Diagnosis, Differential diagnosis**

Condyloma acuminatum can be diagnosed by the clinical features; however, biopsy may be needed for differential diagnosis, such as from Bowenoid papulosis, a tumor that is often caused by HPV-16 and that histologically resembles Bowen’s disease.

**Treatment**

Treatment for condyloma acuminatum is the same as for verruca vulgaris. Liquid nitrogen cryotherapy and surgical removal using electrical scalpel or carbon gas laser are conducted. Local injection of bleomycin is used in intractable cases.

4. Bowenoid papulosis

Multiple black papules of 2 to 20 mm in diameter occur on the genitalia of young people (Fig. 23.16). Small papules may coalesce and form plaques. HPV-16 is detected in the lesion. Bowenoid papulosis is histopathologically indistinguishable from Bowen’s disease. It rarely becomes malignant, and it may heal spontaneously. The prognosis is good. Liquid nitrogen cryotherapy and electrical cauterization are the main treatments. Bowenoid papulosis is thought to be an atypical type of condyloma acuminatum.

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*Clinical images are available in hardcopy only.*

**Fig. 23.15** Condyloma acuminatum.

The verrucous papules resemble cauliflower.

**Fig. 23.16** Bowenoid papulosis.

The papules caused by Bowenoid papulosis are blackish in most cases or close to normal skin color in some cases.
The main causes are HPV-5, HPV-8, HPV-17 and HPV-20 infection. Susceptibility to the virus is inherited, usually autosomal recessively; however, some cases with autosomal dominant and X-linked dominant patterns have been reported. Congenital cellular immunocompromise against HPV is thought to be associated with the occurrence. Relatively large, flat-wart-like, reddish-brown keratotic patches appear on the dorsal surfaces of the hands and trunk of infants, often coalescing to form plaques or reticular arrangements. Pityriasis-versicolor-like leukoderma and erythema may occur (Fig. 23.17). Multiple cells containing bright and enlarged cytoplasm are histopathologically observed in the upper suprabasal cell layer. The eruptions gradually spread on the whole body surface. Malignant skin tumor (e.g., squamous cell carcinoma, basal cell carcinoma, Bowen’s disease) occurs in about half of adolescent and older patients. There is no specific treatment for epidermodysplasia verruciformis. Sunscreen is used for prevention, because lesions on sun-exposed areas tend to worsen. Oral retinoid administration is effective.

### 6. Molluscum contagiosum

**Outline**

- A wart forms as a result of infection by the molluscum contagiosum virus.
- Infants are most frequently affected.
- Small, multiple, dome-shaped nodules of 2 mm to 10 mm in diameter occur. Autoinfection is caused by wart contents adhering to the epidermis.
- Tweezer excision of the wart is the most effective treatment.
- Multiple molluscum contagiosum may appear on the face of patients with AIDS.

**Clinical features**

The latency of molluscum contagiosum is between 14 and 50 days. Small, multiple, flat-surfaced, glossy, centrally concave, dome-shaped nodules of 2 mm to 10 mm in diameter occur (Fig. 23.18). They contain an opaque white gruel-like substance. They are asymptomatic except for mild itching. The trunk and extremities of infants are most frequently affected. When sexually transmitted, the genitalia, lower abdomen, and medial thighs are involved.

**Pathogenesis, Epidemiology**

Warts are produced by molluscum contagiosum, a virus in the Poxviridae family. Cells at the center of the skin lesion are distorted or destroyed, giving the appearance of large hyaline bodies (molluscum bodies) that contain large amounts of cytoplasmic
virus material. Molluscum contagiosum is spread by contact infection. The virus enters through a break in the skin or a hair follicle, and proliferates in the suprabasal cell layer of the epidermis. When a wart is scratched, the contents adhere to the epidermis and cause autoinfection. Children with atopic dermatitis are most commonly affected. In recent years, the numbers of infections in healthy children at swimming schools, in adults from STDs, and in patients with immunodeficiency have been increasing.

**Pathology**

Molluscum contagiosum is characterized by lobulated, endophytic hyperplasia that produces a circumscribed intracutaneous pseudotumor. The keratinocytes contain very large intracytoplasmic inclusions (molluscum bodies).

**Diagnosis**

Molluscum contagiosum is easily diagnosed by the clinical features. In sudden occurrence of multiple molluscum contagiosum in adults, AIDS involvement is highly suspected.

**Treatment**

Tweezer excision of the lesions is most effective. Cryo-coagulation therapy and application of 40% silver nitrate are also useful. Molluscum contagiosum heals spontaneously in some cases.