Abstract

Molluscum contagiosum is a disease caused by a poxvirus of the Molluscipox virus genus that produces a benign self-limited papular eruption of multiple umbilicated cutaneous tumors. This common viral disease is confined to the skin and mucous membranes. Transmission requires direct contact with infected hosts or contaminated fomites. It is generally thought to infect humans exclusively, but there are a few isolated reports of Molluscum contagiosum occurring in chickens, sparrows, pigeons, chimpanzees, kangaroos, a dog, and a horse. The infection is found worldwide and has a higher incidence in children, sexually active adults, and those who are immunodeficient.

Introduction

Molluscum contagiosum, a cutaneous and mucosal eruption caused by a Molluscipox virus, was first described and later assigned its name by Bateman in the beginning of the nineteenth century.[1] In 1841 Henderson and Paterson described the intracytoplasmic inclusion bodies now known as molluscum or Henderson-Paterson bodies.[2] In the early twentieth century, Juliusberg, Wile, and Kingery were able to extract filterable virus from lesions and show transmissibility.[3-4] Goodpasture later described the similarities of molluscum and vaccinia.[5] Though generally thought to infect only humans, case reports of the virus occurring in other animals have been published. [6,7,8,9]

Incidence

Molluscum contagiosum virus (MCV) can be found worldwide with a higher distribution in the tropical areas. The disease is more prevalent in children with the lesions involving the
face, trunk, and extremities. In adults the lesions are most often found near the genital region. The disease is endemic with a higher incidence within institutions and communities where overcrowding, poor hygiene, and poverty potentiate its spread.[10] Over the last 30 years its incidence has been increasing, mainly as a sexually transmitted disease, and it is particularly rampant as a result of concurrent human immunodeficiency virus (HIV) infection.[11] The worldwide incidence is estimated to be between 2% and 8%. [12] Less than 5% of the children in the United States are believed to be infected. Between 5% and 20% of patients with HIV have symptomatic MCV.[13,14] There are four main subtypes of molluscum contagiosum: MCV I, MCV II, MCV III, and MCV IV.[15,16] All subtypes cause similar clinical lesions in genital and non-genital regions. Studies show MCV I to be more prevalent (75%–90%) than MCV II, MCV III, and MCV IV, except in immunocompromised individuals.[17,18] There are, however, regional variations in the predominance of a given subtype and differences between individual subtypes in different countries.[19]

Pathogenesis

This disease is transmitted primarily through direct skin contact with an infected individual. Fomites have been suggested as another source of infection, with molluscum contagiosum reportedly acquired from bath towels, tattoo instruments, and in beauty parlors and Turkish baths.[10] The average incubation time is between 2 and 7 weeks with a range extending out to 6 months. Infection with the virus causes hyperplasia and hypertrophy of the epidermis.[12] Free virus cores have been found in all layers of the epidermis. So-called viral factories are located in the malpighian and granular cell layers.[12] The molluscum bodies contain large numbers of maturing virions. These are contained intracellularly in a collagen-lipid-rich saclike structure that is thought to deter immunological recognition by the host.[20] Rupture and discharge of the infectious virus-packed cells occur in the center of the lesion. MCV induces a benign tumor instead of the usual necrotic pox lesion associated with other poxviruses.[21]

Clinical manifestations

MCV produces a papular eruption of multiple umbilicated lesions. The individual lesions are discrete, smooth, and dome shaped. They are generally skin colored with an opalescent character. The central depression or umbilication contains a white, waxy curdlike core. The size of the papule is variable, depending upon the stage of development, usually averaging 2–6 mm. Papules
may exceed 1 cm in size in immunosuppressed hosts. The papules may become inflamed spontaneously or after trauma and present atypically in size, shape, and color. The lesions are often grouped in small areas but may also become widely disseminated.

Any cutaneous surface may be involved, but favored sites include the axillae, the antecubital and popliteal fossae, and the crural folds. Rarely, MCV lesions occur in the mouth or conjunctivae.\[22,23,24\] Autoinoculation is common. Children usually acquire molluscum nonsexually at both genital and nongenital areas. MCV in adults affects the groin, genital area, thighs, and lower abdomen and is often acquired sexually. Around 10% of cases develop an eczematous dermatitis around the lesions, but this disappears as the infection resolves.\[25\] Patients with atopic dermatitis can have a disseminated eruption. Eruptions in immunocompromised individuals are very resistant to treatment.\[13,26\]

**Dermatopathology**

Histologically, molluscum contagiosum exhibits intraepidermal lobules with central cellular and viral debris. In the basal layer, enlarged basophilic nuclei and mitotic figures are seen. Progressing upward, the cells show cytoplasmic vacuolization and then eosinophilic globules. The nucleus becomes compressed at the level of the granular cell layer, and the molluscum bodies lose their internal structural markings. Undisrupted lesions show an absence of inflammation, but dermal changes can include an infiltrate that is lymphohistiocytic, neutrophilic, or granulomatous. The latter has been seen in solitary lesions. Antibody to MCV by indirect immunofluorescence has been found in 69% of patients with visible lesions.\[27\] Polymerase chain reaction can detect MCV in skin lesions.\[28\] Currently, there is no in-vitro or animal model for MCV. MCV can undergo an abortive infection in some cell lines, which can cause confusion with herpes simplex virus by laboratories.\[29\] Two sets of investigators have infected human skin with molluscum contagiosum and grafted it onto athymic mice, although there was no continued viral replication.\[30,31\]

**Diagnosis**

The clinical appearance of molluscum contagiosum is in most cases diagnostic. Though molluscum cannot be cultured in the laboratory, histological examination of a curetted or biopsied lesion can also aid in the diagnosis in cases that are not clinically obvious. The thick white central core can be expressed and smeared on a
slide and left unstained or stained with Geimsa, Gram, Wright, or Papanicolaou stains to demonstrate the large brick-shaped inclusion bodies. Electron microscopy has also been used to demonstrate the poxivirus structures. Immunohistochemical methods using a polyclonal antibody allows recognition of molluscum contagiosum in fixed tissue.[32] In-situ hybridization for MCV DNA has also been utilized.[33] Molluscum contagiosum lesions must be differentiated from verruca vulgaris, condyloma acuminate, varicella, herpes simplex, papillomas, epitheliomas, pyoderma, cutaneous cryptococcosis, epidermal inclusion cyst, basal cell carcinoma, papular granuloma annulare, keratoacanthoma, lichen planus, and syringoma or other adnexal tumors.

**Treatment**

Molluscum contagiosum is a self-limited disease, which, left untreated, will eventually resolve in immunocompetent hosts but may be protracted in atopic and immunocompromised individuals. Some patients pick and scratch at the lesions, a habit that may lead to scarring. In addition, some schools and daycare centers will not admit children with visible molluscum papules. When patients seek medical attention and desire to rid themselves of the papules, there are several means of therapeutic destruction to help speed resolution. The decision whether treatment is necessary depends on the needs of the patient, the recalcitrance of their disease, and the likelihood of treatments to leave pigmentary alteration or scarring. Most of the common treatments consist of various means to traumatize the lesions. Antiviral and immune-modulating treatments have recently been added to the options. The following is a brief summary of some of the more common treatments.

**Cryosurgery**

One of the most common, quick, efficient methods of treatment is cryotherapy. Liquid nitrogen, dry ice, or Frigiderm are applied to each individual lesion for a few seconds. Repeat treatments in 2–3-week intervals may be required.[34] Hyper- or hypopigmentation and scarring may be caused by this treatment.

**Evisceration**

An easy method to remove the lesions is eviscerating the core with an instrument such as a scalpel, sharp tooth pick, edge of a glass slide, or any other instrument capable of removing the
umbilicated core. Because of its simplicity, patients, parents, and caregivers may be taught this method so new lesions can be treated at home.[35,36] This method is simple but may not be tolerated by small children.

Curettage

Curettage is another method of removal. It can be used with and without light electrodessication. This method is more painful, and it is recommended that a topical anesthetic cream be applied to the lesions before the procedure to decrease the pain. This method has the advantage of providing a reliable tissue sample to confirm the diagnosis.[35-37]

Tape stripping

Another reported treatment involves the use of adhesive tape. The adhesive side of the tape is repeatedly applied to and removed from the lesion for 10–20 cycles. This action effectively removes the superficial epidermis from the top of the lesion.[38] However, repeated use of the same strip has the potential to spread the virus to adjacent, uninvolved skin.

Podophyllin and podofilox

A 25% suspension in a tincture of benzoin or alcohol may be applied once a week. This treatment requires some precautions. It contains two mutagens, quercetin and kaempherol. Some of the listed side effects include severe erosive damage in adjacent normal skin that may cause scarring and systemic effects such as peripheral neuropathy, renal damage, adynamic ileus, leucopenia, and thrombocytopenia, especially if used generously on mucosal surfaces. Podofilox is a safer alternative to podophyllin and may be used by the patient at home. The recommended use usually consists of application of 0.05 ml of 5% podofilox in lactate buffered ethanol twice a day for 3 days.[35,38] The active agent is absolutely contraindicated in pregnancy.

Cantharidin

Cantharidin (0.9% solution of collodian and acetone) has been used with success in the treatment of MCV. This blister-inducing agent is applied carefully and sparingly to the dome of the lesion with or without occlusion and left in place for at least 4 hours.
before being washed off. Cantharidin can cause severe blistering. It should be tested on individual lesions before treating large numbers of lesions. It should not be used on the face. When tolerated, this treatment is repeated every week until the lesions clear. Usually 1–3 treatments are necessary.[39]

**Iodine solution and salicylic acid plaster**

A 10% iodine solution is placed on the molluscum papules and, when dry, the site is covered with small pieces of 50% salicylic acid plaster and tape. The process is repeated daily after bathing. After the lesions have become erythematous in 3–7 days, only the iodine solution is applied. Resolution has been reported in a mean of 26 days.[40] Maceration and erosion can result.

**Tretinoin**

Tretinoin 0.1% cream has been used in the treatment of MCV. It is applied twice daily to the lesions. Resolution was reported by day 11. Trace erythema at the site of prior lesions was a noted side effect.[41] Tretinoin 0.05% cream has also been used with success and decreased irritation.[35]

**Cimetidine**

Oral cimetidine has successfully been used in extensive infections.[42] The histamine 2-receptor antagonist stimulates delayed-type hypersensivity. One uncontrolled study showed resolution in 9 of 13 patients. In this study, the dosage was 40 mg/kg/day in two divided doses for 2 months.[43] The authors recommended further placebo-controlled, double-blind studies be completed to determine the efficacy of cimetidine in treating MCV. Because cimetidine interacts with many systemic medications, a review of the patient’s other medications is recommended.

**Potassium hydroxide**

Another treatment option is the use of potassium hydroxide. In one study, an aqueous solution of 10% KOH was applied topically twice daily to all lesions with a swab. The treatment was discontinued when an inflammatory response or superficial ulcer became evident. Resolution occurred in a mean of 30 days.[44] This treatment had some complications including hypertrophic scar formation and persistent or transitory hyper- and
hypopigmentation. A subsequent study in pediatric patients recommended the use of 5% KOH and found it equally effective with many fewer side effects.[45]

**Pulsed dye laser**

The use of pulsed dye laser for the treatment of MC has also been documented with excellent results. The therapy was well tolerated, without scars or pigment anomalies. The lesions resolved without scarring at 2 weeks. Studies show 96%–99% of the lesions resolved with one treatment.[46,47] The pulsed dye laser is quick and efficient, but its expense makes it less cost effective than other options.

**Imiquimod**

Imiquimod 5% cream has been used topically to treat MCV by inducing high levels of IFN-α and other cytokines locally.[48,49] This potent immunomodulatory agent is well tolerated, although application site irritation is common. It has had no known systemic or toxic effects in children.[50] It is applied to the area nightly for 4 weeks. Clearing can take up to 3 months.

**Cidofovir**

Cidofovir is a nucleoside analog that has potent antiviral properties. Several small studies and case reports describe the successful use of cidofovir applied topically or administered by intralesional injection in several virally induced cutaneous diseases. [51] Cidofovir cream 3% has been used successfully to treat MCV in studies, with clearing in 2–6 weeks.[52] Its high cost, need for extemporaneous preparation, and carcinogenicity in some studies have limited its use.[51]

**Conclusion**

Molluscum Contagiosum is a common, generally benign, viral infection of the skin. It is common in children, sexually active adults, and immunodeficient patients. It is caused by the molluscipox virus, a member of the poxviridae family. This virus differs from other poxviruses in that it causes spontaneously regressing, umbilicated tumors of the skin rather than poxlike vesicular lesions. In immunocompetent, nonatopic patients molluscum contagiosum is usually a self-limited disease for which
treatment is not mandatory. However, when treatment is deemed appropriate, multiple local therapeutic options are available. For patients with impaired immune functions with widespread and potentially disfiguring eruptions, the usual local destructive therapies are ineffective; antiviral and immunomodulatory medications have been more successful.

References


28. Thompson CH. Identification and typing of molluscum


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