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Three Cases of Adolescent Orf Virus Skin and Soft Tissue Infection in Southeast Texas

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Abstract

We report 3 adolescents who presented to tertiary care hospital in Houston, Texas, with cutaneous skin lesions after contact with sheep and/or goats. The cases presented a diagnostic challenge initially but were later suspected or confirmed as orf virus infection after consultation with infectious diseases specialists.

Keywords

orf virus; poxvirus; ecthyma contagiosum; scabby mouth; case series

Orf virus (ORFV) is a dermatotropic parapoxvirus that causes the zoonotic infection contagious ecthyma, “sore mouth disease” or “scabby mouth” in sheep, goats and other domestic and wild animals.^{1–5} Humans who handle infected animals or animal products may develop cutaneous infections resembling herpetic whitlow or paronychia, presenting a diagnostic challenge for physicians practicing outside of rural settings.^{6,7} In this case series, we report 3 adolescents who developed skin lesions after handling lambs or goats in Southeast Texas and were confirmed or suspected to have ORFV infection.

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Case 1

A 16-year-old female with a history of small atrial and ventricular septal defects presented to a tertiary care pediatric emergency center with lesions on her left arm, right hand and tongue. The lesion on her left arm started as a tiny pinpoint red spot 3 weeks before the presentation. The lesion grew over 48 hours and formed a small head. The patient “popped” the lesion and expressed clear yellow fluid followed by blood. The lesion continued to grow over 2 weeks and at presentation was fluid-filled with a dark center, tender and itchy. One week prior, a similar lesion developed on her right hand, and 2 days prior, 2 similar lesions were noted on her tongue. The patient denied systemic symptoms including fever, fatigue and weight loss.

The patient lived in rural East Texas and was actively involved in raising and showing sheep. Two weeks before the onset of the lesion on her left arm, she trimmed the hooves of her lambs, and 1 of the lambs bit her left arm at the site of the lesion. She also had exposure to pigs, goats and cows. There were no sick contacts at home, and she had not traveled outside of Texas.

Physical examination revealed a well-appearing adolescent. Vital signs were normal. The skin examination revealed a 2.5 cm vesiculopustular lesion with an ulcerative center and erythematous base on the left forearm (Fig. 1A). A small (<1 cm) vesiculoulcerative lesion was on the right hand (Fig. 1B) and 2 vesiculopustular lesions were on the tongue.

Infectious diseases (ID) team was consulted, and molecular testing of fluid obtained from the right hand and left forearm lesions was positive for ORFV (US CDC Poxvirus Laboratory).⁸ Samples sent from the oral lesions were inconclusive.

The patient was discharged with supportive care (keeping lesions clean and dry) for the presumptive diagnosis of ORFV. Once the diagnosis was confirmed, the family was offered therapy with topical imiquimod or cidofovir, but they opted to continue supportive care. The lesions resolved approximately 8 weeks after presentation. An investigation of the sheep in the home did find animals suspected of having scabby mouth.

Case 2

A 15-year-old previously healthy male presented to a pediatric tertiary care hospital in Houston, Texas with skin lesions on his left great toe and left index finger. His toe lesion was initially attributed to an ingrown toenail, and he was prescribed clindamycin without improvement. Over several days, the toe redness and pain worsened, and he developed headaches, a low-grade fever, and a new skin lesion at the base of his left index fingernail. An attempt at draining the fluid at home produced scant, clear fluid.

The patient lives in rural Southeast Texas with agricultural animals on the property. He raises and frequently showcases lambs and goats. The animals were healthy, he did not bottle-feed or shear animals and reported no recent bites. He admitted to biting his own nails, walking barefoot and wearing nonenclosed shoes while caring for animals.

Physical examination was unremarkable apart from a skin examination that revealed a 1.5 cm vesicular-ulcerative, erythematous lesion on the left great toenail with surrounding white base and erythema and a 0.5 cm erythematous ulcerative lesion with surrounding erythema at the base of the left index finger (Fig. 1C,D). There was a 2 cm tender lymph node in the left inguinal region without overlying skin changes or fluctuance.

Wound cultures and molecular testing for herpes simplex virus were negative from the skin lesions, but he was started on antibiotics for possible bacterial superinfection. ID was consulted, and additional testing was sent from the skin lesions, including culture and molecular testing for *Bacillus anthracis* and ORFV⁸ to the Texas Department of State Health Services and the US CDC Poxvirus laboratory. Days after discharge, the redness surrounding the lesions resolved, and the skin had crusted (Fig. 1E,F). Testing for *Bacillus anthracis* was negative but testing for ORFV from both the toe and finger lesions resulted positive.⁶ Supportive care of keeping lesions clean and dry was recommended. The patient showed significant improvement over the subsequent 4 weeks (Fig. 1G,H). In a phone interview with the Texas Department of State Health Services, the family reported the animals were examined by a veterinarian, and no cases of scabby mouth were identified.

Case 3

A 15-year-old previously healthy female presented to a tertiary care pediatric hospital with a goat bite over the left second finger. Immediately after the goat bite, the area was red and swollen with some purulent discharge. Incision and drainage was performed, and the patient was discharged home on oral cephalexin. Three weeks after discharge, the patient returned with worsening erythema and swelling of the left index finger along with bilateral hand swelling, worsening erythema and tenderness. Additionally, she had multiple macular and pustulovesicular lesions over bilateral palms and targetoid lesions over her upper arms and feet. She also endorsed arthralgia. The patient denied systemic symptoms including fever, fatigue and weight loss.

The patient worked in a goat farm and reported multiple goats had oral lesions. She also reported the goat that bit her was ill with fever and oral lesions. She had no other animal exposures, did not travel outside of Texas, and denied sick contacts.

The physical examination on re-presentation was unremarkable except for a 2 mm vesiculopapular lesion with an ulcerative base over the left second finger (Fig. 1I). Additionally, she had multiple erythematous pustulovesicular and confluent targetoid lesions over her palms (Fig. 1J,K) (erythema multiforme) over upper arm. She did not have any oral lesions. Laboratory findings were unremarkable, including negative tests for syphilis and HIV. Bacterial cultures from the purulent material were negative. An ORFV molecular test was not able to be obtained due to specimen acceptance criteria.

ID was consulted, and the adolescent was treated presumptively for ORFV and started on topical imiquimod cream due to tenderness over the site. The lesions resolved within 6 weeks of supportive and topical treatment.

DISCUSSION

Our case series underscores the importance of recognizing ORFV infection as a cause of skin infection among children residing in rural areas with animal contact. The adolescents in this series had characteristic skin lesions, but the second and third cases were initially misdiagnosed as having bacterial skin infection. However, after ID consultation, the adolescents' histories of handling livestock, coupled with negative testing for common viral and bacterial infections, raised suspicion for a zoonotic infection.

ORFV, a member of the Parapoxvirus genus, is a zoonotic pathogen primarily affecting sheep and goats.^{1,2} Human infections typically result from direct contact with oral mucosa or hooves of infected animals or contaminated materials, including wool and hides, which can act as a fomite for the virus for up to 30 days.⁵ The virus has a global distribution, with increased prevalence in regions where sheep and goat farming are common.³

The clinical presentation of ORFV infection in children is characterized by solitary or multiple papules, nodules or pustules that evolve into target lesions with a central umbilication.^{2,4,8–10} Lesions commonly occur on the hands, fingers or face, but as seen in the first case, can also manifest on other body parts, including the tongue.¹¹ Necrosis, id reactions and erythema multiforme have also been described.¹² Systemic symptoms may include headache, fatigue, lymphadenopathy and low-grade fever.² The adolescents in this series had cutaneous vesiculopustular lesions with ulcerative centers and erythematous bases, typical of ORFV infection, but the third case was also complicated by erythema multiforme.

The differential diagnosis for similar-appearing skin lesions includes other poxvirus infections (eg, cowpox, mpox or vaccinia), bacterial infections (eg, cutaneous anthrax, impetigo, atypical mycobacteria or tularemia), viral infections (eg, herpes simplex virus or molluscum contagiosum), fungal infections (eg, sporotrichosis), parasitic infections (eg, leishmaniasis) and noninfectious conditions (eg, pyogenic granuloma or contact dermatitis).^{11,13} Diagnosis of ORFV infection is primarily clinical, based on lesion appearance and history of animal contact, but molecular testing of lesion material is the gold standard for confirming diagnosis.^{2,8,14,15}

ORFV infection is usually self-limiting, and most cases resolve spontaneously within 6–8 weeks, as illustrated in the follow-up images for the second case in this series.² Supportive care, including pain management, wound care, and prevention of secondary bacterial infection, is the mainstay of treatment in immunocompetent individuals. Cryotherapy, curettage, topical imiquimod or topical cidofovir may be considered in immunocompromised patients who develop persistent lesions.^{2,16–18}

This case series highlights the importance of identifying ORFV infection as a cause of cutaneous lesions in children with animal exposure, especially among children with livestock contact. The first case highlights a classic presentation of infection following the bite of an animal suspected to have a scabby mouth. The second case, however, highlights that transmission may occur without the typical bite or report of sick animals and showcases the natural progression of the skin lesions over 6 weeks. The third case highlights the

complication of erythema multiforme in cases of ORFV and the use of topical antiviral therapy. ID specialists at this tertiary care institution were key in making the diagnosis in these cases, but ORFV should be considered in the differential diagnosis of any child presenting with characteristic cutaneous lesions and animal or livestock exposure.

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FIGURE 1.

A–K: Orf virus skin lesions in 3 adolescents in southeast Texas. Orf virus skin lesions in case 1: left forearm (A) and right hand (B). Evolution of orf virus skin lesions in case 2 of left index finger (C, E, G) and left great toe (D, F, H) at presentation (C, D), the day after discharge from hospital (E, F), and 4 weeks after admission (G, H). Goat bite lesion from case 3 on left index finger with pustular lesion with surrounding erythema, ulcer crater (I), followed by diffuse erythema and swelling of bilateral hands/fingers (J) and vesiculopustular lesions on palm with erythema multiforme (K) 3 weeks after the goat bite.