Orf virus infection in human ecthyma contagiosum: a report of two cases in the West of Iran

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Abstract Ecthyma contagiosum is caused by the orf virus, a member of the genus *Parapoxvirus* in the family *Poxviridae*. Humans acquire the infection from contact with infected or recently vaccinated animals in conjunction with skin trauma. In this study, we report two cases of orf infection in two women who had contact with animals. Diagnosis was based, apart from the clinical signs, on histological examination, virus isolation using fetal bovine esophagus cells, electron microscopy and PCR.

Keywords Orf virus · Ecthyma contagiosum · PCR · Electron microscopy

Ecthyma contagiosum or contagious pustular dermatitis is a viral zoonotic disease resulting from the direct or indirect contact of damaged skin with animals infected with the orf virus. Orf is an epitheliotropic DNA virus from the parapoxvirus group, which generally infects sheep, goats, and various other domestic and wild ovine animals [3]. Humans acquire the infection from contact with infected or recently vaccinated animals in conjunction with skin trauma [2]. It also may be observed after the feast of sacrifice in Muslim countries. However, human-to-human transmission has not been reported.

In April 2015, a woman aged 36 was admitted at our center on suspicion of orf infection following contact with

small ruminants. She had a history of direct contact with sheep 2 weeks previously. She presented with an erythematous lesion on her left wrist (Fig. 1, panel A) which was itchy. In addition the patient's left forearm and elbow were red and swollen. Bilateral axillary lymphadenopathy was evident on physical examination, with the nodes being hard and painful.

A 53 year old woman was admitted with a 1 week history of an 11–21 mm lesion on a left hand finger, having a necrotic center and erythematous border (Fig. 1, panel B). She had fever and chills at the time of admission. The patient had a history of slaughtering a sheep, 10 days earlier. Cefazolin 1.5 gm, three times per day was administered as treatment. The lesion healed within 2 weeks. The lesion was sparingly debrided and samples of crust were sent for histological examination.

Specimens from both cases received at the laboratory were processed accordingly. Negatively-stained grids examined by electron microscopy (EM) revealed typical poxvirus-like particles in both cases (Fig. 1, panel E and F respectively). Histological examination showed the presence of inflammatory cellular infiltrates and typical eosinophilic intracytoplasmic inclusion bodies in epithelial cells. The lesions in infected sheep are shown in Fig. 1 (Panels C and D). Using fetal bovine esophagus cells, we performed virus isolation. In this study, Orf virus DNA was detected by polymerase chain reaction (PCR) at the Veterinary Network Laboratory (Dehgolan, Sanandaj). A 537 bp product was amplified with appropriate primers from samples from both patients. The products were directly sequenced, and results were subjected to BLAST analysis, which confirmed Orf virus infection. Finally, on histological examination, orf infection was characterised by the appearance of hyperkeratosis and pathognomonic eosinophilic inclusion bodies in the cytoplasm of

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Fig. 1 Orf virus infection in 2 persons, Dehgolan, Iran, 2015. Cutaneous lesions on the wrist of case-patient 1 (**a**) and the hand-finger of case-patient 2 (**b**), and in sheep (**c** and **d**) are shown. Negative staining electron microscopy of samples from case-patient 1 (**e** and **f**) shows ovoid particles (about 250 nm long, 160 nm wide) with a crisscross appearance; the size and appearance of these particles are highly suggestive of parapoxvirus virions. Histopathology examination (**g** and **h**) showing inflammatory cellular infiltrates and typical eosinophilic intracytoplasmatic inclusion bodies in epithelial cells

vacuolated epidermal cells in the upper epidermis of both subjects. Orf infection is endemic in many sheep and goat herds worldwide, where the disease is known as contagious ecthyma contagiosum, pustular dermatitis, 'sore mouth' or 'scabby mouth' disease. The lesions in animals are typically located in the mucosal area of lips, nostrils, eyes and muzzle, and may appear on the udder and teats. The infection is transmitted to humans through direct contact in conjunction with a skin lesion, seldom through contact with contaminated meat or objects. It is most frequently seen in professionally exposed people such as butchers, farmers, veterinarians and sheep shearers. County veterinary services traced the origins of the sheep considered to be responsible for these two human cases of orf virus infection. Case 1 was linked to milking of sheep under poor hygiene conditions, whilst case 2 was linked to an illegal slaughterhouse within the county where sheep had been housed for 15 days. Today, however, people in developed countries mostly buy lambs, which are cheaper and more plentiful but also highly susceptible to orf virus infections. This change in buying practices has created a large market for possibly infected animals and an associated potential health risk for people who prepare and butcher the animals. The cases reported here stress the need for using suitable measures to prevent animal-to-human transmission of pathogens. Public health officials should educate persons with job-related or household exposure to animals about the possibility for disease transmission and ways to prevent

infection. People who handle animals should wear non-permeable gloves, avoid exposure of open wounds, and wash skin wounds with soap and water after handling animals [1]. In addition, slaughterhouses should verify that all animals to be sold or butchered are in good health; animals with orf virus lesions should be disposed of in a safe manner. Physicians, including dermatologists, should be informed of the potential for orf virus infection, a heretofore under-diagnosed disease [4], and suspected infections should be confirmed by microbiology laboratories.

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