8.5.27 Orf and Milker’s nodule 947

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lesions. Painful muzzle lesions prevent lambs or kids from feeding, resulting in failure to grow properly, so the disease can have important economic impact. Pseudocowpox and, less commonly, bovine popular stomatitis cause cutaneous teat and oral infections in cattle, predominantly in dairy herds. However, in most countries bovine parapoxvirus infections are of limited economic significance. Parapoxvirus transmission to humans is by direct contact of broken skin with an animal's lesions and possibly with fomites, hence human disease is an occupational zoonosis. The lesions on the human hand caused by different parapoxviruses are clinically indistinguishable. Therefore, their recognition as 'orf' or 'milker's nodule' will depend only on which animal is thought to have been the source. Since human orf, in particular, is familiar to veterinarians, shepherds, farmers, abat- toir workers, and butchers and is generally self-limiting, it often goes unreported. In the United Kingdom it is known to be preva- lent in sheep farming communities in Wales. Outbreaks of orf are associated with the end of the lambing season and with Islamic religious festivals associated with animal sacrifice. Human to human spread of parapoxvirus has not been recorded. Infection confers only partial immunity, so that repeated milder attacks are possible. Immunopathology Parapoxviruses infect skin keratinocytes and excite a brisk im- mune response locally and in lymphoid tissue, involving CD4+ and CD8+ cells, interferon, and antibody. However, the parapoxvirus genome encodes a variety of virulence and immunomodulatory factors that subvert or suppress the host's immune response, al- lowing viral replication. These include viral IL-10 and viral vas- cular endothelial growth factor (both believed to have been acquired from the mammalian host genome during viral evolu- tion), interferon resistance protein, chemokine-binding protein, a granulocyte-macrophage colony-stimulating factor (GM-CSF)/ interleukin-2 (IL-2) inhibitory factor, and an inhibitor of apop- tosis. In vaccinology, recombinant orf virus is a promising viral vector for delivering pathogen antigens to the immune system, and inactivated virus is immunoenhancing. Clinical features In orf virus-infected lambs and kids, papules and vesicles appear on the muzzle or nostrils (Fig. 8.5.27.1). These become dry and scabby, and then gradually heal without scarring over 4–8 weeks, although more persistent infections may occur. Parapoxvirus infec- tion of calves may present very similarly, or as less severe inflamma- tory ring lesions. Infected cows and ewes develop lesions on their teats. In humans, after an incubation period of 2–6 days, a somewhat painful, small, red, firm papule enlarges to form a flat-topped haem- orrhagic pustule or bulla with prominent margin and an eroded, crusted centre, sometimes surrounded by pustular satellite lesions (Fig. 8.5.27.2). The lesion is typically 1–3 cm in diameter, but may be as large as 5 cm. They are usually solitary or few in number and

 commonly occur on the extensor surface of a finger or hand, but also on the palm, forearm, and occasionally the face or scalp. The surrounding skin might be reddened, sometimes diffusely, and erysipelas-like lesions have been described. Lymphangitis or re- gional lymphadenopathy may occur. Giant, multiple, fungating granulomatous or tumour-like lesions have been reported, usu- ally in immunocompromised patients with haematological ma- lignancies. Patients with atopic eczema may develop widespread eruptions. Slight fever and malaise can occur. Complications in- clude secondary infection, and generalized papulovesicular rashes, usually classified as erythema multiforme, in as many as one-fifth of cases (Fig. 8.5.27.3), typically developing 10–14 days after the ini- tial lesion. Bullous pemphigoid-like eruptions have been reported. Spontaneous recovery without residual scarring is usually complete within 6 weeks. Diagnosis The characteristic lesion in someone exposed to ruminant animals, especially to lambs or kids, allows a clinical diagnosis. The skin le- sions caused by the different parapoxviruses are indistinguishable. The diagnosis can be confirmed in the laboratory by polymerase chain reaction, by electron microscopy of a biopsy of the lesion, and fluorescent antibody staining. Skin biopsy

specimens show distinctive histopathological changes. There is hyperkeratosis with cellular swelling, balloon degeneration and vacuolation in the upper epidermis, and the presence of eosinophilic B type intracytoplasmic inclusion bodies. Differential diagnosis In those at occupational risk of parapoxvirus infection, the differen- tial diagnosis includes cowpox (Chapter 8.5.4), an orthopoxvirus. Whitlows (felons), including herpetic whitlow (Fig. 8.5.27.4), Fig. 8.5.27.1 Contagious pustular dermatitis (‘orf’) in a lamb. (a) (b) Fig. 8.5.27.2 Typical parapoxvirus lesions of ‘milker’s nodule’ on a dairy farmer’s arm. (a) (b) Fig. 8.5.27.3 Generalized vesicular eruption ‘erythema multiforme’ complicating orf of the left middle finger in a veterinary student:
(a) arms, (b) mouth. Copyright Prof D. A. Warrell

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