

Granulomatous Manifestations Associated with Animals and a Novel Potential Zoonotic Infection from Elephant Washing

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Abstract

Zoonotic infections are a group of contagions that are transmitted from animals to humans. These are acquired from domestic and wild animals by different routes. Presentation can vary between systemic and cutaneous manifestation. A granuloma is a skin manifestation, that is named due to its appearance under a microscope. A wide range of skin pathologies exist, where granulomas are a prominent feature of their presentation. We report a case of a patient who presented with a solitary lesion on her hand, reminiscent of granulomata, following a trip to India where she was involved in washing elephants. Interestingly, the lesion exhibited similar features to that of fish tank granuloma, but there was no history of cleaning fish tanks or aquariums.

Keywords: Granuloma annulare, Fish tank Granuloma, Zoonotic

1. Introduction

Zoonoses, as defined by the World Health Organisation, includes “any disease or infection that is naturally transmissible from animals to humans and vice-versa [1].”

There are over 200 zoonoses that range widely across pathogen classes, including bacteria, viruses, fungi, parasites, and prions [2]. When there is limited information about transmissible zoonotic agents in a particular reservoir, it is worth considering biologically similar animals from which zoonoses have been acquired; however, in our peculiar case this could not be applied. Occupational and travel history are important clues in handling such zoonotic infections. Granuloma is a chronic inflammatory pattern characterised by the localised aggregation of histiocytes with or without other inflammatory cells. It can be presented in some zoonotic infection, thus when assessing granulomas, it is important to ask about potential triggers for granulomatous presentations, which may include bodies of water, infection, animal contact and chemicals.

2. Fish Tank Granuloma

Fish tank granuloma is a dermatological condition caused by the organism *Mycobacterium marinum*. This organism is often found in freshwater locations, and essentially causes the formation of granulomas after manifesting in the skin [3]. It has been reported that the rash appears following a four-week period of incubation, typically on the peripheries including the hands and feet [3]. The distribution of these lesions is concurrent with areas of skin in contact with bodies of infected water such as aquariums or fish tanks. An issue encountered with *M. marinum* infection, is the potential for delayed diagnosis due to late presentation, length of incubation period and the range of differential diagnoses [4]. Typically, such granulomas are not infective from person to person, therefore are usually acquired through contact of broken skin with bodies of water where fish reside [3].

A classic presentation of infection with *M. marinum* in humans involves the development of one or more “inflammatory nodules.” Provided there is no disseminated disease, management with monotherapy tends to be effective [3]. This could either be with an antimicrobial or one of the various drugs used in treating tuberculosis.

Histology can demonstrate varied pathology, ranging from small amounts of granuloma formation to dense mixed infiltrates to abscess formation (Figure 1). The use of Wade-Fite special stain,

may also help to make a diagnosis of *Mycobacterium marinum* (Figure 2).

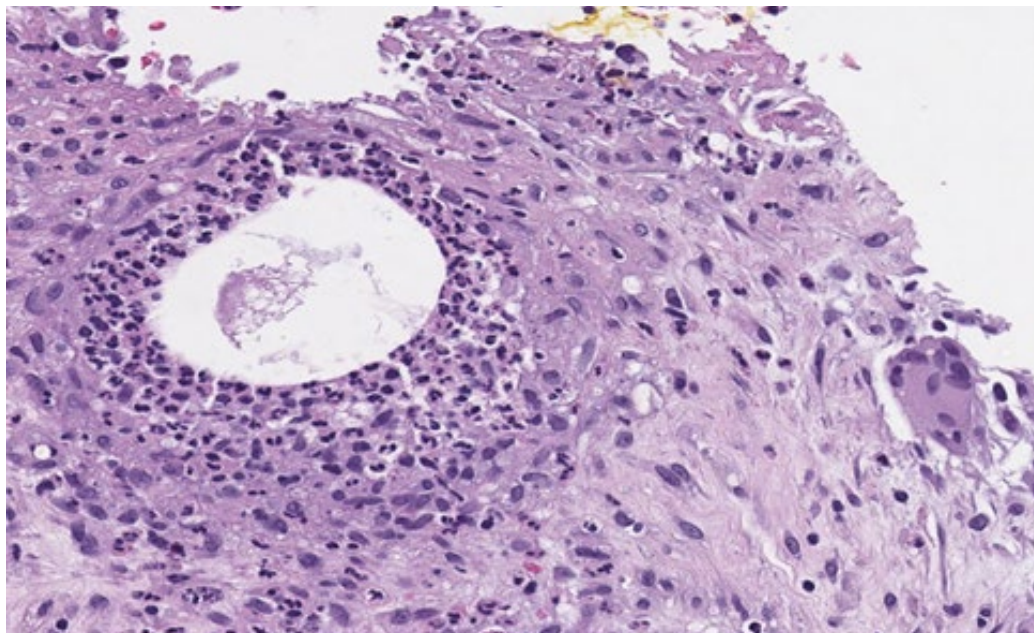


Figure 1: H & E x 200 Fish tank granuloma: Dermal microabscesses with Langhans type histiocytic granulomas comprising a few adjacent multinucleated giant cells. There may be surface ulceration as well.

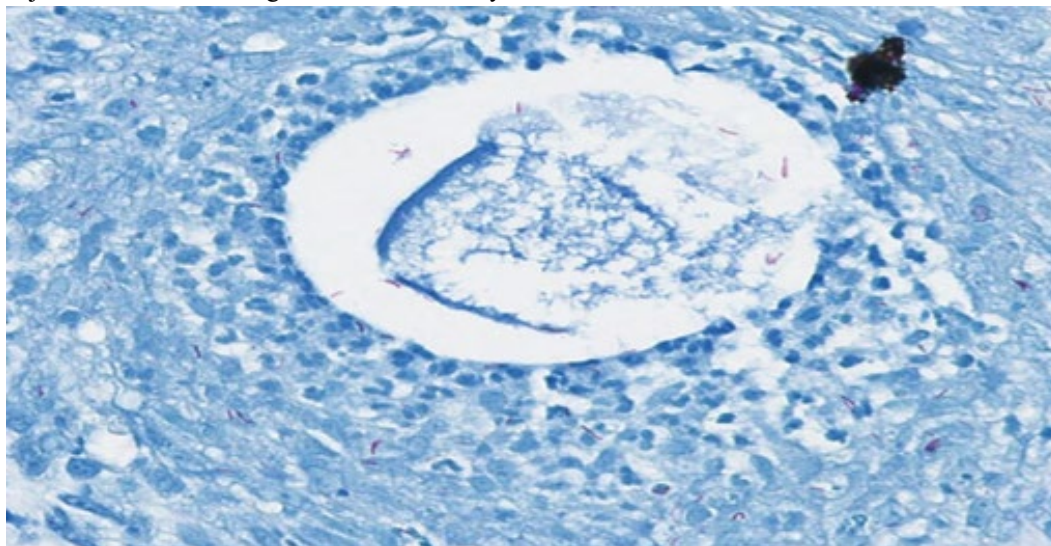


Figure 2: Wade-Fite special stain showing acid fast bacilli in keeping with *Mycobacterium marinum*.

3. Leishmaniasis

This parasitic infection is another example of a disease where there has been an established relationship between animal transmission and granuloma formation in humans. Leishmaniasis has been identified as a parasitic infection, transmitted by sandflies which

have been infected with '*Leishmania*' (a protozoan) [5]. The vectors of this protozoan, live in various reservoirs [6]. Figure 3 demonstrates an example of a histology slide in the case of *Leishmania* amastigotes.

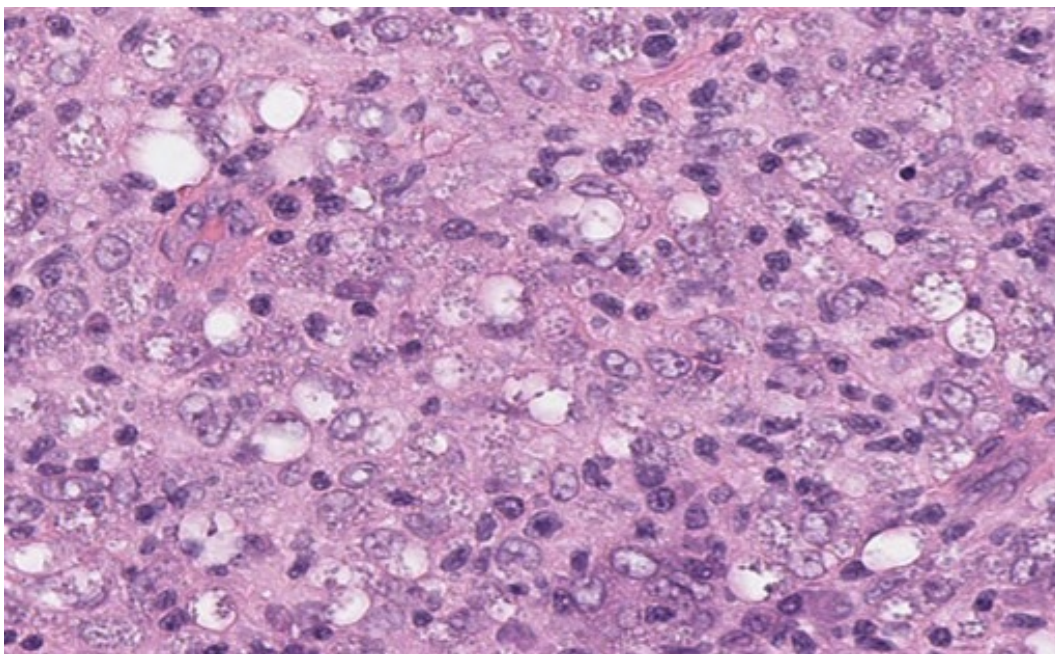


Figure 3: H & E x 400 showing diffuse upper and lower dermal infiltrates composed of histiocytes and lymphocytes with small intracytoplasmic round uniform pink-staining structures in keeping with *Leishmania* amastigotes.

4. A Novel Case of Potential Zoonotic Infection Linked to Elephant Washing

We report an interesting case of a female in her thirties who presented with an unusual granulomatous-like skin lesion on her right hand following a trip to India and Nepal 1 week prior to her presentation (Figure 4). Apart from spending one day bathing elephants in India, the patient reported no other significant history including no involvement with large bodies of freshwater. She described the development of an initial blister which burst, and then developed into a 4x4cm circular lesion.

On examination, there was a well demarcated, deeply erythematous lesion on the dorsum of her right hand (Figure 4). She also had multiple bites on her lower legs, but no similar lesions to the one on her hand. Initially, a provisional diagnosis of granuloma annulare, was made. She underwent a punch biopsy for further diagnostic investigation. The histology report of this biopsy was non-specific due to the small size of the sample and it could not be repeated due to the lesion responding very well to treatment.

5. Discussion

Elephants are exploited for entertainment tourism in Asia and Africa. An extensive search into evidence-based medicine revealed no reports of lesions like that in the case above, being linked with close contact with elephants. The lesion demonstrated below closely resembles a fish tank granuloma, despite there being

no evidence of granuloma in the biopsy histology. However, on further consideration, this might be due to the biopsy not being large enough in size to capture evidence of granulomatous tissue.

The few infections transmitted from elephants to humans include a versatile group of pathogens, some of which can cause skin lesions, however most are responsible for systemic illnesses [7]. Pathogens such as *Mycobacterium* species are most reported with a potential risk of elephant-to-human and human-to-elephant infection with pulmonary tuberculosis [8,9]. Airborne droplets can transmit the infection and factors that increase transmission include expulsion forces, quantity of droplets, air density, and local ventilation conditions [10]. While some infected elephants develop clinical signs of tuberculosis, most are asymptomatic, but importantly, are potentially still able to shed the bacteria [10,11].

Recently, new species of mycoplasma were isolated from the genital tracts of female elephants, specifically Asian and African elephant species, called mycoplasma elephantis, however no human skin pathology has yet been reported in relation to this pathogen [12]. Among those infections that can cause dermal lesions are an orthopoxvirus (possibly cowpox) and bacillus anthrax [13]. Recently, cases of methicillin-resistant staphylococcus aureus (MRSA) skin infections have been reported among the care takers of African elephants in a zoo in the United States of America [14].



Figure 4: Presenting lesion on dorsum of patient's right hand

6. Conclusion

In conclusion, the literature available surrounding the relationship between various skin lesions and the washing of animals or being in contact with bodies of freshwater or fish tanks, is limited, but presents an interesting topic of discussion which necessitates further microbiological investigation.

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