



A case of occupational transmission of mpox

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Abstract

Introduction Between May 2022 and January 2023, a global mpox outbreak affected more than 84,000 patients across all continents. Transmission of mpox occurs through large respiratory droplets and direct contact with skin lesions.

Case presentation We present the case of a 31-year-old previously healthy male with mpox-Infection following occupational exposure to mpox from a needle stick injury with a sterile needle through a contaminated glove. The patient presented with a three-day history of fever, malaise, and an increasing erythema and swelling of one fingertip. The patient works as a medical doctor with regular exposure to patients infected with mpox. Mpox-PCR from a swab of the lesion and an oro-pharyngeal swab were positive. The lesion on his finger evolved into a necrotic skin lesion finally healing, leaving a scar. He did not develop any secondary pox on his skin and recovered fully.

Discussion Only a minority of patients with mpox infection develop illness with pronounced local complications as in this case.

Conclusion Mpox can potentially be transmitted in an occupational context. Medical personnel should be informed about this possible route of transmission.

Keywords Monkeypox · Mpox · Needle-stick injury · Nosocomial · Occupational

Introduction

The global outbreak of mpox infections that started in May 2022 has affected more than 84,000 patients across all continents (by Jan 12th 2023) [1]. The WHO declared the mpox outbreak a “Public Health Emergency of International Concern” on July 23rd 2022 [2].

Mpox is a zoonotic orthopox DNA virus closely related to the variola vera virus. Human infections with mpox were first described in the 1970s in the Democratic Republic of Congo. In countries of central Africa where the virus is endemic, mpox has circulated for decades. Research into mpox infections has, however, been neglected, in part because cases were limited to small outbreaks and travel-associated cases outside of Central Africa with very limited secondary spread [3].

Most cases in the non-endemic context are mild and self-limiting. Between 4 and 13% of affected individuals are admitted to hospitals, mainly for pain management and bacterial superinfection. Antiviral treatment is only rarely needed [4–6]. The fatality rates of 1–10% reported for endemic cases in African countries seem not to hold true in the present outbreak which has thus far produced only sporadic fatal cases [7].

The vast majority of cases during the present outbreak has affected men who have sex with men (MSM). The surge of this forgotten disease is possibly driven by waning smallpox immunity, since vaccinations were stopped in the late 70 s and early 80 s with the last documented naturally transmitted case in 1977 in Somalia [8]. Moreover, resumption of international travel after the lifting of the COVID-19 restrictions and sexual interactions associated with large gatherings have contributed to the spread of mpox. So far it is known that human to human transmission occurs through large respiratory droplets and direct contact with skin lesions.

In the largest worldwide study at the time of writing 41% of the cases were HIV-positive [4].

Occupational animal to human transmission in hunters in West and Central Africa has been reported [9]. During

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an outbreak in the USA in 2003, linked to infected prairie dogs, no occupational human to human transmission was documented among 40 health care workers, who had at least one unprotected contact [10].

Here we describe the unusual case of an occupational transmission of mpox through a needle-stick injury.

Case presentation

We present the case of a 31-year-old previously healthy male with mpox-infection after occupational exposure to mpox through a needle stick injury without the patient being aware of a transmission risk.

The patient presented with a three-day history of fever and malaise. In addition, the tip of his right index finger had simultaneously developed an increasing redness and a white spot (Fig. 1).

This lesion appeared one day after the fever had developed and had been slowly increasing with a swelling and redness of the entire fingertip since the day prior to presentation.

On the first visit at our infectious diseases' day clinic the patient had a low-grade fever of 38.3 °C, normal blood pressure and oxygen saturation. The physical examination showed a swollen and erythematous tip of the right index finger with a white circular lesion, measuring 4 mm in diameter with a black spot the size of 2 mm in the centre resembling an eschar (Fig. 2).

The rest of the physical exam was unremarkable; notably, there was no evidence of epitrochlear or axillary lymphadenopathy.

The blood tests showed the following results: CRP elevated at 46 mg/L (cut off < 5 mg/L), full blood count, creatinine, creatinine kinase, transaminases, bilirubin not elevated.



Fig. 1 Initial lesion

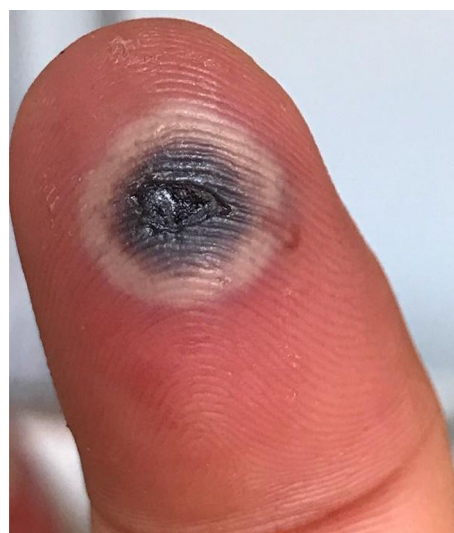


Fig. 2 Lesion with black spot at the centre

Up until two days prior to the onset of the symptoms, the patient had been exposed to nature and wildlife over a period of four days in a forest close to the German Baltic Sea. Together with his father, a hunter, he repaired wooden raised hides and gutted a shot deer. Gloves were worn during the procedure. No injuries, splinters, bites or stings were recalled. No relevant travel history outside Germany in the last 6 months was reported, nor had there been other contact with animals.

The patient identifies himself as heterosexual and did not report any sexual contacts outside of his relationship.

The further course was characterised by persistent malaise, undulating fever, headache, local pain, and continuous growth of the lesion itself with central necrosis, swelling of the entire right middle finger and dorsum of the right hand and increasing lymphangitis up to the right axilla (Figs. 3, 4, 5).

The systemic nature of the illness with fever in combination with the rapid spread of the infection from the finger to the arm prompted us to start antimicrobial treatment with amoxicillin/clavulanic acid and clindamycin. Considering the patient's contact with game and wildlife we added doxycycline to the treatment regimen, suspecting tularaemia or rickettsiosis as a differential diagnosis.

A swab did not show bacterial growth. Serology for *Francisella tularensis*, *Rickettsia typhi* / *R. rickettsii*, *R. conorii* / *R. prowazekii* and HIV were negative.

Lymphadenopathy was still absent. No other skin or mucosal lesions appeared during the course of illness. After 7 days, the general symptoms slowly subsided. An incision of the lesion at the fingertip performed by the patient himself had led to a drainage of pus and improvement of the local symptoms.



Fig. 3 Further development of the lesion



Fig. 5 Further development of the lesion



Fig. 4 Further development of the lesion

The patient works as a medical doctor at the emergency department of our hospital with regular exposure to mpox-positive patients, most recently 9 days prior to initial presentation.

We decided to perform a PCR for mpox on the lesion and the oro-pharynx.

Mpox-DNA was detected by PCR from both swabs. Retrospectively, we discovered that the patient had pricked his finger with an unused lancet during one of his last shifts in the emergency department. On further questioning, he reported having palpated a lesion immediately prior to the incident which turned out to be a mpox lesion. Thus, he had

pricked his finger with an unused lancet through a glove which he had been wearing—immediately prior to the finger-pricking injury—when palpating a skin lesion that was later confirmed to be mpox-positive. As the lancet had not touched the index patient and mpox was not confirmed at the time, he had not considered any further action necessary.

After receiving the positive mpox PCR, we decided to discontinue the antibiotic therapy as this had not produced a clinical response.

The mpox-lesion on the fingertip took 25 days to heal (Fig. 6).

Discussion

Only a minority of patients with mpox infection develop pronounced local complications as in our case. Complications of the hand with or without concomitant bacterial superinfection and marked lymphangitis have already been reported. The severity of such cases differs, occasionally surgical intervention is required. In the cases published so far, however, the lesions have been attributed to transmission during sexual contact [4, 6, 11].

Transmission through intradermal injuries is known from endemic countries, especially in the context of scratch wounds caused by rodents [12].

Occupational transmission of mpox through needle stick injuries has been described in the recent outbreak, however to our knowledge not through the modality discussed in this case [13, 14]. Surface contamination with mpox is a known phenomenon but the role in transmission through intact skin is unclear. Often only a very low viral burden can be found



Fig. 6 Healed lesion after 25 days

on surfaces. In comparison to variola virus, a significantly higher dose is assumed to be required to cause an infection [15]. In our case the transmission resembles an inoculation comparable to the second generation smallpox vaccinations with a lancet touching a contaminated surface, in this case the glove, and then penetrating the skin of the patient [16].

A complicating factor in this case was the exposure to a dead wild animal and the stay in a forested area. This led us to initially suspect tularaemia.

Another differential diagnosis was rickettsiosis. Non-imported rickettsiosis is registered in Germany in only very isolated cases, on average one case per year. Most cases are diagnosed in returning travellers [17].

Conclusion

Mpox is a novel disease for doctors in non-endemic countries. Adequate protective measures for medical staff were unavailable at the time of this case but are now clearly defined and also address the long persistence on surfaces [18]. Our case shows an infection in principle via an accidental inoculation. Surprising in this case is that infection was possible without the lancet having touched the patient and that it therefore, must have happened via the contaminated gloves.

Mpox can potentially be transmitted through needle-stick injury in an occupational context. Medical personnel

in emergency departments in particular should be informed about this possible route of transmission.

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Declarations

Conflict of interest The authors report that they have no conflicts of interest.

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Patient consent statement Written informed consent was given by the participating patient.

Consent to participate Written consent to participate was given by the patient.

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