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Review

Infections associated with religious rituals

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SUMMARY

This review evaluates the medical literature for religious rituals or ceremonies that have been reported to cause infection. These include an ultra-orthodox Jewish circumcision practice known as metzitzah b'peh, the Christian common communion chalice, Islamic ritual ablution, and the Hindu 'side-roll'. Infections associated with participation in the Islamic Hajj have been extensively reviewed and will not be discussed.

1. Introduction

Rituals are part of every religion and are defined as a behavior that is repeated in a precise order and frequently involves performing an action to the body or mind to fulfill a religious obligation.[1] Often, rituals involve breaching the body's innate defenses, such as the skin, sinus, respiratory, gastrointestinal, or genitourinary systems, which can be potentially harmful.

This paper reviews the medical literature for religious practices that have been associated with infection. Several rituals were identified, including an ultra-orthodox Jewish circumcision called metzitzah b'peh, the Christian communion chalice, the Hindu side roll, and Islamic ritual ablution. Infections associated with the Islamic Hajj have been extensively reviewed and will not be discussed.[2–5]

2. Neonatal herpes simplex infection following Jewish ritual circumcisions

Jewish tradition dictates that when a male child is 8 days old they should undergo ritual circumcision, which is performed on 60–90% of the Jewish population in the USA.[6] Evidence suggests that circumcision reduces the incidence of sexually transmitted diseases, urinary tract infections, and inflammation of the prepuce; however, there have been at least 22 reports of infection with herpes simplex virus (HSV) type 1 when a method called metzitzah or metzitzah b'peh is used.[6]

Ritual circumcision has three parts: the 'milah' or excision of the external prepuce, the 'peri'ah' or slitting of the inner foreskin, and finally the 'metzitzah' or sucking of blood from the wound.[6] The metzitzah originated in the 5th century Babylonian Talmud where it states metzitzah should be performed "so as not to bring on risk," although what the risk is, is not explicitly stated. Historically, if the mohel failed to perform the metzitzah he was barred from performing future circumcisions.[6] During metzitzah, the mohel sips wine and applies his lips to the involved portion of the penis and then spits the wine into a receptacle, which may be repeated until hemostasis is achieved. Metzitzah with direct oral–genital suction was commonplace until the 19th century when Rabbi Moses Schreiber ruled that an instrument, such as a glass pipette, could be used as an interface between the mohel and the infant.[6] This led most to abandon direct suction in favor of sterile suction devices; however, some mohelim have resisted this change and continue to perform the ritual with direct oral–genital contact. Metzitzah has been scrutinized by the New York City Department of Health, and in 2012, the city passed a law requiring mohelim to obtain informed consent from parents prior to performing metzitzah. The mohelim have brought a law suit against the city citing violations of religious freedoms. The law was not being enforced until January 2013, when Judge Naomi Buchwald denied

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a request for an injunction against the consent form.[7,8] Failure of mohelim to produce the relevant signed consent forms can result in penalties and fines up to US $2000.[8] There is also concern that certain hospitals have been under-reporting cases of neonatal herpes because of fear of losing Hasidic patients.[9]

When neonatal HSV infection is transmitted it occurs during delivery 85% of the time, congenitally 5% of the time, and from adult care givers including hospital workers in the remaining 10%.[10] The clinical manifestations can be isolated to the mucocutaneous surfaces or disseminated to the visceral organs and the central nervous system.[10]

There have been 22 cases of HSV-1 infection associated with metzitzah described in three case series and one case report. In 2000 Rubin and Lanzkowsky reported two cases of infants delivered via vaginal birth in New York City, who underwent metzitzah by the same mohel 10 years apart.[11] The first case, from 1988, presented 4 days after metzitzah with fevers and vesiculo-pustular lesions on the genital and gluteal areas. In 1998, the second infant presented 3 days after metzitzah, with fevers and vesiculo-bullous lesions on the penis, buttocks, and ankles. In both cases, a Tzanck preparation of the lesions showed inclusion bodies consistent with herpes virus, and viral culture grew HSV type 1 in the second infant. Both were treated with intravenous acyclovir with subsequent resolution of the lesions. After 10 years of follow-up, infant 1 had no recurrence of symptoms; however, at 8 months of age infant 2 had recurrence of cutaneous lesions. The mohel who performed both procedures claimed to have completed over 1000 circumcisions and, personally, never had labial or genital herpes.[11]

In 2003 Distel et al. reported that a boy who had metzitzah was hospitalized 10 days later for pustular lesions, edema, and dorsal deviation of the penis and vesicles on the buttocks and thigh.[12] Cultures from the lesions grew HSV type 1 and *Klebsiella pneumoniae*, and serology showed high IgM titers to HSV-1 and HSV-2. He was treated with intravenous acyclovir and antibiotics for 10 days with improvement over 4 days. Unfortunately, there was recurrence of lesions on the penis and thighs over the subsequent month.

Gesundheit et al. reported eight cases of HSV-1 infection after metzitzah in Israel and Canada from 1994 to 2002.[6] The patients presented 4–11 days after metzitzah, with fevers and/or vesicular lesions on the penis and scrotum. Seven of the eight patients had disease limited to the integument, however one of the eight patients had encephalitis with long-term neurological consequences, including seizures. Four had recurrence of cutaneous lesions and received long-term prophylaxis with acyclovir. Six of the eight patients received intravenous or oral acyclovir, while two received supportive care with resolution of symptoms. There were six mohels involved, because two had performed multiple circumcisions; however, only three were tested for HSV, all of whom had positive HSV serologies. Also notable, the mother of the infant who had encephalitis was the only mother who had positive serology for HSV type 1 at 1:16, although it was not specified which subclass of immunoglobulin was isolated. While the methods of delivery were not reported, none of the mothers had active oral or genital herpes.

The largest case series by the Centers for Disease Control and Prevention (CDC) was published in 2012, wherein they highlighted 11 cases of HSV-1 after confirmed or probable oral–genital suction from 2000 to 2011 in New York City.[13] Ten of 11 cases were hospitalized and unfortunately two cases were fatal. Six patients had mucocutaneous lesions, two had central nervous system involvement, and three had dissemination to visceral organs. In 2004 twin boys born via cesarean to a mother without evidence of HSV infection during childbirth underwent metzitzah on the eighth day of life. Afterwards, both neonates developed fever and vesicles on their abdomen, buttocks, and genitalia that contained HSV. One of these infants later developed disseminated infection and died. These cases prompted an investigation by the New York City Health Department, which discovered that a year prior, a case of neonatal HSV infection after metzitzah by the same mohel had also led to vesicular lesions. After these cases were reported the New York City Health Department set up surveillance, which uncovered eight more cases of HSV-1 after probable or confirmed oral–genital suction. The discovery of these cases was facilitated by a 2006 mandate in the New York City Health Code that infants less than 60 days old with a diagnosis of herpes infection be reported.[13] When laboratory confirmation of HSV-1 or untyped HSV was obtained there was further investigation to determine if ritual oral–genital suction was performed. The authors calculated the estimated relative risk of neonatal herpes to be 3.4 times greater after direct oral–genital suction compared to those who did not.[13]

These 22 cases provide evidence that metzitzah with direct oral–genital contact can transmit HSV-1 infection. The temporal relationship where all infants presented within 2 weeks of the ceremony is consistent with the typical incubation period of HSV; the isolation of HSV-1, a pathogen typically transmitted via oral contact, and negative serologies or clinical manifestations of herpes in most of the mothers all suggest an association.[11] Additionally, the finding that some of the mohels' saliva tested negative for HSV is not surprising since shedding of HSV is sporadic and can be found in asymptomatic individuals, as demonstrated by Hatherley et al.[14] and Douglas and Couch.[15] Finally the location of HSV-1 on genitalia suggests that it was likely transmitted via direct contact.

This review focuses on the transmission of HSV-1 from the mohel to the infant. However, it is also plausible that the reverse could occur and the infant could spread pathogens such as HIV and hepatitis B or C viruses to the mohel if vertical transmission occurred in utero or during delivery.

3. Cutaneous larva migrans associated with ritual side roll

The Lord Murugan Temple of Nallur in Jaffna, Sri Lanka is a place of devotion for Tamil Hindus. A festival occurs there annually between August and September where icons of deities are marched around temple grounds and devotees gather for prayer and penance. The most devout penance that a devotee may perform is known as the 'side roll' or angapradakshinam where the night prior they engage in a ritual fast, soak in the temple water tank, then lie on the ground and side-roll in the same path that the icons previously traversed. For the comfort of the participants the local government ships in sand from coastal areas and waters the sand twice daily to keep dust down.

An increase in the incidence of cutaneous larva migrans (CLM) in 2003 prompted an investigation by Kannathasan and colleagues. The study found that out of 1014 devotees studied, 26.8% had a creeping eruption.[16] These findings prompted a follow-up cross-sectional study by the same authors in 2010 on a random sample of 194 devotees who performed the side-roll. They issued a questionnaire and performed microscopic examination of soil samples on the sand brought in from the shore prior to spreading around the temple grounds and then 10 days after distribution. They also examined five canine fecal samples found on the temple grounds with saline and iodine wet smears. They found that 58.2% of the 194 devotees surveyed had lesions characteristic of CLM, with a positive correlation ($R^2 = 0.446$) between frequency of side-roll and number of lesions. Thirty-two percent of participants had evidence of a secondary bacterial infection, presumably from pruritus and scratching. The soil and fecal examination provided additional evidence that the side roll led to CLM. Of the 20 sand samples tested prior to spreading around the temple ground, none had evidence of hookworm larvae, whereas 10% (2/20) of samples