ABSTRACT. Objective. Genital neonatal herpes simplex virus type 1 (HSV-1) infection was observed in a series of neonates after traditional Jewish ritual circumcision. The objective of this study was to describe neonate genital HSV-1 infection after ritual circumcision and investigate the association between genital HSV-1 after circumcision and the practice of the traditional circumcision.

Methods. Eight neonates with genital HSV-1 infection after ritual circumcision were identified.

Results. The average interval from circumcision to clinical manifestations was 7.25 ± 2.5 days. In all cases, the traditional circumciser (the mohel) had performed the ancient custom of orally suctioning the blood after cutting the foreskin (oral metzitzah), which is currently practiced by only a minority of mohels. Six infants received intravenous acyclovir therapy. Four infants had recurrent episodes of genital HSV infection, and 1 developed HSV encephalitis with neurologic sequelae. All four mohels tested for HSV antibodies were seropositive.

Conclusion. Ritual Jewish circumcision that includes metzitzah with direct oral–genital contact carries a serious risk for transmission of HSV from mohels to neonates, which can be complicated by protracted or severe infection. Oral metzitzah after ritual circumcision may be hazardous to the neonate. Pediatrics 2004;114:259–263.

URL: http://www.pediatrics.org/cgi/content/full/114/2e259; ritual circumcision, herpes simplex infection, infection of the newborn, Jewish tradition.

ABBREVIATIONS. HSV, herpes simplex virus.

Biblical sources dictate routine ritual circumcision at 8 days of age for Jewish boys. This procedure is widely accepted, and 60% to 90% of newborn boys of the Jewish population in the United States undergo this procedure, which also has an important cultural and historical role. The medically beneficial versus harmful consequences have long been debated. Circumcision has been reported to reduce the incidence of urinary tract infections in infants, young boys under the age of 2 years, and preschool boys. Pathologic phimosis and paraphimosis is precluded by the absence of a foreskin, and balanitis and posthitis (inflammation of the prepuce) primarily affect uncircumcised male individuals. Virtually all sexually transmitted diseases, including human immunodeficiency virus infection, are reported to be more common in uncircumcised men.

Both immediate and long-term complications of ritual circumcision are rare, probably because of the specific and meticulous precautions required by Jewish law. Only an experienced and qualified circumciser, the mohel, is allowed to perform circumcision. Historically, Jewish ritual circumcision consists of 3 parts: 1) the excision of the outer part of the prepuce (milah), 2) slitting of the foreskin’s inner lining to facilitate the total uncovering of the glans (peri’ah), and 3) the sucking of the blood from the wound. Formerly, the mohel took some wine in his mouth and applied his lips to the part involved in the operation and exerted suction, after which he expelled the mixture of wine and blood into a receptacle provided for this purpose; this procedure was repeated several times until bleeding stopped (metzitzah). The first 2 parts are the act of circumcision, whereas the removal of the blood was done for medical reasons of wound care. However, the ancient procedure of metzitzah also carries a risk of infection, and currently most mohels use an appropriate suction device, such as a mucus extractor.

The incidence of neonatal herpes simplex virus (HSV) infections ranges from 1 to 6 per 20 000 live births. Most neonatal HSV infections result from exposure to infectious maternal genital secretions at delivery. Postnatal transmission usually results from nongenital infection of a caregiver, including parent or nursery personnel with oral lesions. Nosocomial transmission in nurseries has been documented. We present 8 infants who developed neonatal HSV-1

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Four term neurologic sequelae, including seizures. Only presented with severe encephalitis followed by long-

polymerase chain reaction, consistent with the clinic-
brospinal fluid sample was positive for HSV-1 by
seropositive with a titer of 1:16. In patient 7, a cere-
tive for HSV; only patient 7 and his mother were
pes. Most infants and their mothers were seronega-
mothers had clinical evidence of oral or vaginal her-

copy. HSV was isolated from all patients. None of the
was detected by negative contrast electron micros-
tent with herpesvirus; in 1 case, herpes group virus

patients (Fig 1). In 5 patients, Tzanck preparation
ular rash over the scrotum and penis was noted in all
appetite. Mean temperature was 37.8
admission, all infants were reported to have poor

interval from circumcision especially if the infant is seronegative for

was performed by oral versus instrumental
suction could not be evaluated statistically. The 8 cases were
collected from personal communication and the experience of the
authors from 1997 to 2003. Clinical data from all patients were
collected, and follow-up was conducted during hospitalization
and after the discharge of the infants from the hospital.

Identification of herpesvirus from lesions was performed by
microscopic examination of Tzanck preparations and electron mi-
croscopy of specimens directly from the lesions. The virus was
determined to be HSV-1 by immunofluorescence microscopy, iso-
lation in cell culture, or polymerase chain reaction. HSV serostatus
and seroconversion were determined by complement fixation or
enzyme immunoassays. In all cases, the details of the circumcision
procedures were reviewed. When possible, the mohel was tested
for virus shedding in saliva and for HSV serostatus. Tests were
performed separately in the diagnostic virology laboratory rou-
tinely used by each hospital.

RESULTS

Eight neonates with documented genital HSV-1
infections were identified (Table 1). In all cases, the
mohel had performed the ancient custom of oral metz-
itzah. On 2 occasions, the same mohel performed the
circumcision in 2 different infants: patients 1 and 4
(an interval of 5 years) and patients 7 and 8 (an
interval of 5 weeks).

The mean birth weight was 3220 g (standard de-

= 696). The circumcision of patient 1 was
delayed because he was born prematurely, and the
circumcision of patient 3 was delayed because of
suspected sepsis. All other infants were circumcised
on day 8 of life. The mean interval from circumcision
to HSV clinical infection was 7.25 ± 2.5 days. On
admission, all infants were reported to have poor

G. Vesicular rash over the scrotum and penis was noted in all
patients (Fig 1). In 5 patients, Tzanck preparation
was performed and showed cellular changes consist-
ent with herpesvirus; in 1 case, herpes group virus
was detected by negative contrast electron micros-
copy. HSV was isolated from all patients. None of the
mothers had clinical evidence of oral or vaginal her-

es. Most infants and their mothers were seronegative for
HSV; only patient 7 and his mother were
seropositive with a titer of 1:16. In patient 7, a cere-
brosplinal fluid sample was positive for HSV-1 by
polymerase chain reaction, consistent with the clin-
cal course and radiologic diagnosis of HSV enceph-
halitis.

Six infants were admitted to the hospital and re-

ceived intravenous acyclovir therapy. Four infants
had recurrent episodes of genital herpes, and 1 infant
presented with severe encephalitis followed by long-
term neurologic sequelae, including seizures. Only four mohels could be tested, and they were found to

DISCUSSION

In the 8 infants presented here, the association
between genital HSV-1 infection and the perform-
ance of the ancient procedure of oral metzitzah
during the circumcision is strongly suggested on the
basis of the following criteria: exclusive genital dis-
tribution of the lesions, timing of their appearance
(4–11 days after circumcision), isolation of HSV-1,
absence of HSV exposure in mothers (based on both
clinical observation and negative serology in most of
the mothers), and absence of clinical signs and symp-
toms consistent with HSV infections among family
members. Furthermore, although the oral metzitzah is
performed by only a minority of mohels, all infants
described here underwent this procedure.

On 2 occasions, patients 1 and 4 and patients 7 and
8, the circumcision was performed in different in-

fants by the same mohel. On 1 occasion, the interval
between the 2 cases was 5 weeks; in the other, 5
years. In previous reports, HSV-1 genital infection
occurred in 2 infants who were circumcised by the
same mohel 10 years apart.10,11 Because HSV-1 can be
secreted intermittently in saliva for several days to
weeks, it is likely that other infants were infected. We
suspect, therefore, that this entity is underreported
for cultural reasons and that the studies described
here are only the “tip of the iceberg” of the true
incidence of the disease.

Because in every case the mohel had removed the
blood by mouth after cutting the foreskin, it was
most likely that the infection was transmitted di-
rectly from this oral or salivary contact. All of the
mohels who consented to be tested were seropositive.
The likelihood of other sources for an HSV-1 infec-
tion in the area of the glans penis in the region of the
wound of the circumcision is minimal.12 Because
shedding of HSV-1 in the saliva of both symptomatic
and asymptomatic individuals has been documented
repeatedly, the act of metzitzah represents a potential
source of orogenital transmission to the nonimmune
infant whose skin integrity was disrupted by circum-
cision, especially if the infant is seronegative for
HSV.

The genital infection in 7 patients remained local-
ized, but patient 7 developed HSV encephalitis fol-

lowed by long-term brain damage manifested by
seizures and infantile spasms. Four infants experi-
enced recurrent episodes of genital herpes simplex
and received long-term prophylaxis with oral acyclo-

vir.

In the past, reports of HSV genital infections after
circumcision have been relatively rare, not with-
standing the high frequency of active herpes labialis
among the population, which would include the mohels.10 This may be accounted for in part by the
observation that all but 1 of these cases were sero-
negative for antibody to HSV, which suggests that
seropositive infants might be protected to some de-
gree. Likewise, the practice of oral metzitzah is lim-
ited to only a small subset of ritual circumcisions.
There is, however, the possibility that some previous
TABLE 1.  Clinical and Laboratory Findings of 8 Neonates With Genital HSV-1 Infection After Ritual Circumcision Followed by Oral Metzitzah

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Admitting hospital</td>
<td>Hadassah Mt. Scopus Jerusalem, Israel</td>
<td>Hospital for Sick Children, Toronto, Canada</td>
<td>Hadassah Ein Karem, Jerusalem, Israel</td>
<td>Soroka University Medical Center, Beer Sheva, Israel</td>
<td>Sheba Medical Center, Tel Aviv, Israel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Birth weight (gestational age)</td>
<td>1880 g (35 wk)</td>
<td>3980 g (41 wk)</td>
<td>3170 g (40 wk)</td>
<td>3475 g (40 wk)</td>
<td>3200 g (40 wk)</td>
<td>4100 g (42 wk)</td>
<td>3155 g (40 wk)</td>
<td>2800 g (40 wk)</td>
</tr>
<tr>
<td>Age (d) at circumcision</td>
<td>8</td>
<td>16</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>Days from circumcision at presentation</td>
<td>4</td>
<td>9</td>
<td>4</td>
<td>9</td>
<td>6</td>
<td>11</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Temperature</td>
<td>38.0°C</td>
<td>38.1°C</td>
<td>38.2°C</td>
<td>38.5°C</td>
<td>36.1°C</td>
<td>37.0°C</td>
<td>38.0°C</td>
<td>38.4°C</td>
</tr>
<tr>
<td>Serology of mother (infant)</td>
<td>Negative (negative)</td>
<td>Negative (negative)</td>
<td>Negative (negative)</td>
<td>Negative (negative)</td>
<td>Positive 1:16</td>
<td>Negative (negative)</td>
<td>Negative (negative)</td>
<td>Negative (negative)</td>
</tr>
<tr>
<td>Serology mohel</td>
<td>N/A†</td>
<td>Positive (&gt;1:64)</td>
<td>N/A</td>
<td>N/A</td>
<td>Positive (1:64)*</td>
<td>N/A</td>
<td>Positive (1:64)*</td>
<td>Positive (1:64)*</td>
</tr>
<tr>
<td>Initial treatment (acyclovir in mg/kg/day)</td>
<td>IV acyclovir × 8 d</td>
<td>IV acyclovir × 10 d</td>
<td>IV acyclovir × 8 d</td>
<td>IV acyclovir × 10 d</td>
<td>IV acyclovir × 21 d</td>
<td>IV acyclovir × 10 d</td>
<td>IV acyclovir × 14 d</td>
<td>IV acyclovir × 21 d</td>
</tr>
<tr>
<td>Course and treatment</td>
<td>4 recurrences over 8 mo; treated with PO acyclovir × 4 d</td>
<td>Discharged after 26 d IV acyclovir, no neurologic deficit; treated with local acyclovir ointment</td>
<td>5 episodes over 20 mo, treated with PO acyclovir</td>
<td>3 episodes over 7 mo, treated with local acyclovir ointment</td>
<td>Spontaneous recovery</td>
<td>Spontaneous recovery</td>
<td>4 d in intensive care unit as a result of seizures (same dosage of acyclovir)</td>
<td>5 more episodes over 11 mo with positive HSV cultures from lesions; treated with PO-acyclovir × 7–14 d</td>
</tr>
<tr>
<td>Long-term outcome</td>
<td>Prophylactic treatment with acyclovir for 1 y, normal development</td>
<td>Delayed psychomotor development</td>
<td>N/A</td>
<td>&gt;2 mo N/A</td>
<td>&gt; 3 mo N/A</td>
<td>Infantile spasm, hipsarrythmia</td>
<td>Prophylactic treatment with acyclovir, normal development</td>
<td></td>
</tr>
</tbody>
</table>

IV indicates intravenous; PO, oral; N/A, not available.

* Same mohel for patients 7 and 8 with an interval of ± 5 weeks.

† Same mohel for patients 1 and 4 with an interval of 5 years.
cases were not reported for cultural reasons. To clarify this statement, the cultural background requires elaboration.

According to Biblical law, a male infant should be circumcised at the age of 8 days as a sign of the eternal covenant between God and the Jewish people (Genesis 17:10–14; Leviticus 12:3). According to classical rabbinic interpretation, performance of this religious ritual offers medical advantages, a view upheld by many modern medical authorities, as noted earlier. The Babylonian Talmud (Sabbath 133b), the main rabbinical literature completed in the fifth century of the common era, states that for the sake of the infant, the mohel is obliged to perform the metzitzah so as not to bring on risk. The nature of the risk was not specified. It specifically states that “this procedure is performed for the sake of the infant’s safety and if a mohel does not perform the suction [of the wound], this is deemed dangerous and he is to be dismissed.” To prevent medical complications, the Talmud permits only an experienced and responsible mohel to perform the ritual circumcision. The Talmud (Tossefta Shabbath 15:8) was aware of potential medical problems that could arise from ritual circumcision and in fact provided the first description of hemophilia in the history of medicine, manifested as a familial bleeding disorder that required circumcision to be postponed.14

In the 19th century, Ignaz Philipp Semmelweis (1818–1865) established the principles of hygiene and disease transmission,15 after neonatal tuberculosis was documented after circumcision by an infected mohel.16 Since then, most rabbinical authorities modified their approach in response to these findings. Because the Talmudic injunction to perform metzitzah did not explicitly stipulate oral suction, >160 years ago, Rabbi Moses Schreiber (Pressburg, 1762–1839), a leading rabbinical authority, ruled that metzitzah could be conducted by instrumental suction,16 a ruling quickly adopted by most rabbinical authorities.17 Consequently, the great majority of ritual circumcisions are performed today with a sterile device and not by oral suction by the mohel. However, some orthodox rabbis have felt threatened by criticism of the old religious customs and strongly resist any change in the traditional custom of oral metzitzah. The cultural process of replacing ancient customs by modern wound care has to be encouraged by a heightened awareness of this potentially life-threatening medical complication.16

On the basis of our observations, the medicolegal impact of neonatal infection by the mohel has to be redefined. Our findings provide evidence that ritual Jewish circumcision with oral metzitzah may cause oral–genital transmission of HSV infection, resulting in clinical disease including involvement of the skin, mucous membranes, and HSV encephalitis. Furthermore, oral suction may not only endanger the child but also may expose the mohel to human immunodeficiency virus or hepatitis B from infected infants. The same consideration that led the Talmudic sages once to establish the custom of the metzitzah for the sake of the infant could now be applied to persuade the mohel to use instrumental suction.

Indeed, after our first cases, the Chief Rabbinate of Israel pronounced in 2002 the legitimacy of using instrumental suction in cases in which there is a risk of contagious disease. We support ritual circumcision but without oral metzitzah, which might endanger the newborns and is not part of the religious procedure.

ACKNOWLEDGMENTS
Dina Averbuch, MD, diagnosed and treated patient 4.

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Neonatal Genital Herpes Simplex Virus Type 1 Infection After Jewish Ritual Circumcision: Modern Medicine and Religious Tradition
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