CT of Neonatal Herpes Encephalitis

Seven neonates with proven herpes (HSV type 2) encephalitis exhibited a characteristic sequence of findings on cranial computed tomography (CT). The initial CT abnormalities in all infants were fingerlike areas of cortical increased attenuation noted on unenhanced scans obtained 2–30 days after presentation. These usually were accentuated by increased white-matter lucency. Subsequently (more than 30 days after presentation), extensive cerebral destruction, multicystic encephalomalacia, and calcification were seen on follow-up CT scans obtained in five infants.

Materials and Methods

A retrospective survey was done of infants seen at Massachusetts General Hospital from 1977 to 1982 with a discharge diagnosis of neonatal herpes encephalitis. All seven were term infants (average gestation, 40 weeks) and were discharged from their home nursery in good condition. In none was a maternal history of genital herpes available at the time of admission. All presented with tonic-clonic seizure. The age at onset of this seizure, which was considered the age at presentation, varied from 12 to 23 days. Three of the seven infants developed cutaneous herpetic vesicles. The diagnosis was confirmed in one child by brain biopsy, in three by nasopharyngeal cultures positive for HSV type 2, in two by rising HSV serum titers, and in one by cytopathology of cutaneous vesicles. Each infant had at least two computed tomographic (CT) scans during the initial month after presentation.

Results

Initial CT scans (performed in only two infants) within the first 2 days after presentation were normal. Subsequently, CT scans became abnormal in all infants during an interval of 2–30 days (average, 20 days) after presentation. In all seven infants, the initial CT abnormalities were fingerlike areas of increased density in the cerebral cortex, probably gyral in location (figs. 1–3), and decreased density in the white matter.

CT scans obtained more than 30 days after presentation in five of the seven cases demonstrated extensive cerebral destruction with multiple low-density areas
Fig. 1.—31-day-old infant. Unenhanced CT scan at 14 days after presentation. Linear areas of increased density in cortical region, somewhat more obvious in right hemisphere than on left.

Fig. 2.—27-day-old infant. Unenhanced CT scans at 12 days after presentation. Intense cortical gyral density.

Fig. 3.—35-day-old infant. Unenhanced CT scans at 13 days after presentation. Very intense gyral fingerlike densities, mainly on right.

Fig. 4.—Unenhanced CT scan at 3 months after presentation. Widespread low-density cystic changes in cerebral hemispheres.

and calcifications (figs. 4 and 5). In the other two infants no follow-up examinations were available.

Discussion

Neonatal HSV type 2 infection is most often acquired at delivery as the child passes through an infected birth canal [1]. Four types of presentation of the neonatal infection have been observed [2]: (1) disseminated infection with hepatitis and pneumonitis but without central nervous system (CNS) involvement, (2) disseminated infection with CNS involvement, (3) localized CNS infection without other manifestations, and (4) localized mucocutaneous infection without CNS or other organ involvement. The mortality of untreated patients with CNS involvement is 30%–80% [6]. The morbidity is high, and many survivors have severe CNS damage [6].

Preferential involvement of the temporal lobe and mass effects were not observed in our series of neonatal herpes encephalitis [5]; rather, a more diffuse involvement was seen. Characteristic initial CT abnormalities consisted of fingerlike
areas of cortical density, demonstrated in all the cases; there
was also some decrease in white-matter density diffusely as
compared with normal. The low attenuation values are due in
part to edema and in part to brain tissue destruction, which
occurs rapidly in HSV type 2 encephalitis. The pattern of
cortical gyrual densities has been reported previously in cases
of neonatal HSV encephalitis [4, 7]. Biopsy material in one of
our patients suggested that the areas of increased cortical
density may represent hemorrhage. Follow-up CT scans ob-
tained in five of the seven infants more than 30 days after
presentation demonstrated diffuse low-density cystic areas
throughout the cerebral hemispheres with scattered calcifi-
cations. Similar low-density areas and calcifications were seen
in two previously reported cases of neonatal HSV type 2
infection [7]. This CT pattern appears to correspond to mul-
ticystic encephalomalacia and has been seen in other neonatal
abnormalities, including toxoplasmosis and hypoxic enceph-
alopathy [8, 9].

As treatment becomes available, early diagnosis becomes
more important; CT scanning is not really adequate for early
diagnosis. The two cases scanned at 2 days yielded negative
results. Perhaps magnetic resonance (MR) imaging will dem-
strate changes earlier; it has been suggested that MR
imaging is more sensitive to CNS inflammatory disease [10]
and that the MR imaging appearance of nonneonatal (type 1)
HSV encephalitis demonstrates more extensive changes than
simultaneous CT [11].

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