Calcification of the nucleus pulposus with pathologic confirmation in a premature infant.

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Abbreviated Reports

Calcification of the Nucleus Pulposus with Pathologic Confirmation in a Premature Infant

Although calcification of the nucleus pulposus has been observed in more than 75 children, its clinical significance is debated. The presence of the nuclear calcifications in the premature infant we studied suggests that the calcification in some individuals may be an incidental finding.

Case Report

A woman with severe preeclampsia gave birth to a 425-g baby boy by emergency cesarean delivery. The baby had low Apgar scores at birth and died 8 hr later in respiratory failure. No congenital abnormalities were noted on physical examination. A chest radiograph obtained before death showed grade-III hyaline membrane disease and calcifications in the lower two cervical intervertebral disk spaces (Fig. 1A). A complete blood count was normal except for anemia (RBC = $3.3 \times 10^6/\mu l$). Blood cultures and assays for surface antigen were negative. CT, MR, cryomicrotomy, and histologic studies were performed after death (Figs. 1B–1D). The histopathologic examination revealed ossification centers in C6–C7 and C7–T1 with no evidence of infection, inflammation, trauma, or hemorrhage.

Discussion

We have observed no disk calcification on cryomicrotomic or histopathologic examinations in the cadavers of 10 other neonates. Calcification of the nucleus pulposus is a phenomenon of childhood [1, 2], in contrast to the calcification of the anulus fibrosus, which occurs in adults. The C6–C7 nucleus pulposus calcifies most commonly [1]. The average age of children with disk calcification is 7 years [3], and only four of 75 reported cases were in children less than 1 year old [4]. Our case is the first in a newborn, and the first with pathologic correlation. The calcification in our patient had radiographic, CT, and MR appearances similar to those seen in other cases [4, 5].

Several causes for calcification of the nucleus pulposus have been proposed: trauma, infection, congenital malformation, metabolic disorder, and degenerative change. We found no evidence for any of

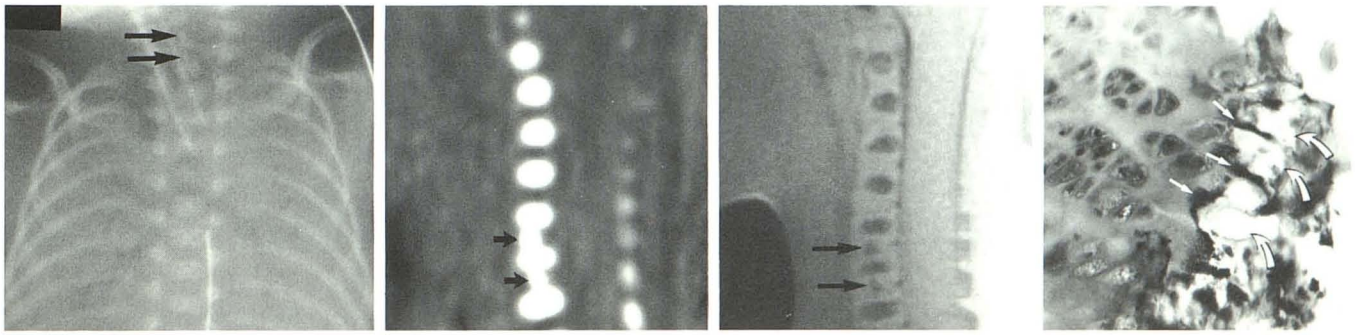

Fig. 1.—Calcification of the nucleus pulposus in a premature infant.
***A*, Chest radiograph shows intervertebral disk densities (*arrows*).**
***B*, Sagittal CT image of cervical spine shows homogeneous, dense calcification at C6–C7 and C7–T1 (*arrows*).**
***C*, Sagittal MR image (800/20) of cervical spine shows calcification (*arrows*) as regions of low signal intensity.**
***D*, Histologic section from C5–C6 intervertebral disk shows palisades of maturing chondrocytes, degenerating cartilage cells (*curved arrows*), and numerous calcium deposits (*straight arrows*) consistent with endochondral calcification.**

these. Ossification of embryonic disk cartilage in the course of its maturation, which has been observed in dogs [6], may explain the radiographically detected mineralization in our case.

Investigators have elicited a history of trauma in some [7], but not all [8], cases. Trauma is not a likely explanation of the congenital calcification in our case. In cases of disk calcification in children, a low-grade fever, leukocytosis, or an elevated sedimentation rate has suggested the presence of an infection [2]. An association has been reported between calcification of the nucleus pulposus and patent ductus arteriosus, spina bifida, congenital cataract, mongolism, ventricular septal defect, pulmonary stenosis, renal hypoplasia, adrenal hyperplasia, and fatty metamorphosis of the liver [4, 8, 9]. We saw no such abnormalities. Calcification in association with a spinal fusion operation for a Klippel-Feil deformity, myositis ossificans progressiva, juvenile arthritis, or ankylosing spondylitis has been attributed to early degeneration [10]. Degeneration is not the explanation for a finding in a neonate. Although trauma, infection, metabolic disorders, and degeneration were excluded in our case, they may be causal factors in other cases.

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REFERENCES

1. Swick HM. Calcification of intervertebral discs in childhood. *J Pediatr* **1975**;86:364–369
2. Weens HS. Calcification of the intervertebral discs in childhood. *J Pediatr* **1945**;26:178–188
3. Newton TH. Cervical intervertebral disc calcification in children. *J Bone Joint Surg [Am]* **1958**;40-A:107–113
4. Melnick JC, Silverman FN. Intervertebral disk calcification in childhood. *Radiology* **1963**;80:399–408
5. McGregor JC, Butler P. Disc calcification in childhood: computed tomographic and magnetic resonance imaging appearances. *Br J Radiol* **1986**;59:180–182
6. Hansen HJ. A pathologic-anatomical interpretation of disc degeneration in dogs. *Acta Orthop Scand* **1951**;20:280–293
7. Schorr S, Adler E. Calcified intervertebral disc in children and adults. *Acta Radiol [Diagn]* (Stockh) **1954**;41:408–504
8. Silverman FN. Calcification of intervertebral disks in childhood. *Radiology* **1954**;62:801–815
9. Asadi A. Calcification of intervertebral disks in children. *Am J Dis Child* **1959**;97:282–286
10. Connell MC. Calcification of the intervertebral discs in children. *Clin Radiol* **1963**;14:87–90