DYSPLASIA EPIPHYSIALIS PUNCTATA

Report of a Case with Discussion

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Dysplasia epiphysialis punctata is a rare congenital disorder of infancy affecting in particular cartilage, muscles and joint capsules, and the eyes. It is associated with obvious growth defects in patients surviving long enough to show them. The severity varies in the different cases reported. In the present case the distribution was widespread, with generalised changes complying with the clinical and pathological picture now considered characteristic of the condition.

This report was in preparation when Frank and Denny (1954) described a similar case. Ours is therefore offered as yet another case, presenting certain additional features, mainly of degree, and a strong parental luetic history, with a radiological and histological study.

Previous literature has been reviewed by Mosekilde (1952) and others. The first case was described by Conradi (1914) as supposedly an abortive form of achondroplasia or chondrodystrophy. The first American report, by Tisdall and Erb (1924), described "calcereous deposits in joints"; the child died early and a patent ductus arteriosus was found. About fifty cases have since been described under many different names. In America the term "chondrodystrophia calcificans congenita" is favoured, whereas dysplasia epiphysialis punctata or stippled epiphysis, suggested by Fairbank (1951) and Weber (1936), is preferred by others.

The etiology is still unknown. Many different suggestions, based mostly upon what seems to be a coincidence, have included: syphilis (Tisdall and Erb 1924), hypothyroidism (Reilly and Smyth 1938) and a developmental anomaly (Maitland 1939). Mosekilde (1952) suggested a disturbance of calcium metabolism in mother and child.

In the case described below there was a strong luetic infection in the family without sign in the patient.

Raap (1943) published four cases in which he investigated the whole family including the father, mother and two grandmothers. All were healthy. There is no evidence of heredity, but the disease seems to be familial, as in Raap’s five patients, all belonging to the same family: twins ten months old, one newborn baby and an older child two and a half years of age. All three youngest children showed typical changes of dysplasia epiphysialis punctata; the other one showed a normal skeleton except for a few densities in the bones of wrists and ankles which suggest that she may have had the characteristic changes previously. Most of the patients described were infants, and most have died in their first year. Fairbank’s (1951) inability to find any later report of a case showing generalised changes may be explained by Raap’s investigation, in which he followed his cases for four years and showed that the abnormal calcifications apparently are marked at birth but disappear by the age of about three years. Haynes and Wangner (1951) also stated that the stippling heals and becomes uniform in time. Selakovich and Warren White (1955) have reported the late effects at the age of twelve years: shortening of the entire extremity with smallness and abnormality of the bones. Serial radiographs showed a progression from the stippling stage into complete calcification, ossification and healing, indicating a definite chondrodysplasia.

The disorder does not affect the epiphyses alone, but even the soft tissues of the locomotor system and in many cases the eyes. Mosekilde (1952) has listed the following five signs which are so often encountered as to constitute a typical picture or diagnosis: 1) micromegalia and
rhizomelia; 2) additional shortening of one to four centimetres in one or possibly two extremities; 3) semiflexion and limitation of extension of larger joints; 4) bilateral congenital cataract; 5) stippled epiphyses.

In addition some of the following deformities will often be found: congenital heart disorder, short neck, enlarged fontanelles, retracted bridge of nose or broad and flat nose, adactyly, hypopactyly, syndactyly, varus or valgus deformities of the hip, knee and ankle, luxations, notably of the hips, and ulnar deviation of the wrists. In some cases skin lesions are found, such as exfoliative dermatitis, follicular atrophodermia, and ichthyosis sebacea.

Complete blood chemistry investigations including estimations of the calcium, phosphorus, cholesterol and phosphatase have yielded normal results with few exceptions.

**CASE REPORT**

A Chinese girl, one month old, was brought to hospital on account of deformities of the arms and legs.

**History**—The father had syphilis in 1942. He was treated for several years, receiving eighty
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intramuscular injections (probably of bismuth or arsenic). At the time of his infection he already had four children. The fourth child died when a few months old. All the other three daughters were healthy and strong. The mother’s fifth and sixth pregnancies ended in abortion at about the twentieth week. The child of the seventh pregnancy had sores on her head at birth. The mother’s blood gave a positive Kahn reaction. She was given a course of sixty intramuscular injections and the child ten. The next child (eighth pregnancy) was born healthy but the mother had another course of ten injections; the child was said not to need treatment. With the pregnancy (ninth) of the present child the mother had a course of twenty injections. There was no remembered injury during pregnancy. A breech presentation was followed by an uneventful delivery.

Examination—The child appeared somewhat dwarfed, with shortening of the neck. There was marked contracture of the left hip and knee, the right elbow, and the left foot, which was kept in the equinovarus position. The left lower leg showed bowing of 10–15 degrees and there was half a centimetre of real shortening of the left leg. The left hip had a flexion contracture of 60 degrees with 45 degrees of abduction, and joint movements were greatly restricted. There was a 45 degrees' flexion contracture of the left knee, which could be forced to 10 degrees short of full extension. The right elbow showed a limited extension of 45 degrees. The eyes showed cataract, worse in the left. A serological test for syphilis was negative.

Radiography revealed a widespread disturbance of ossification. The affected epiphyses were stippled, calcium being deposited in small spots much denser than normal bone. Most of the deposits were discrete, with well defined outlines, rounded or comma-shaped. Some
coalesced and showed marked irregularity in size, shape and density. Stippled deposits were visible at the proximal ends of the humerus, radius, ulna, femur, tibia and fibula on both sides. All the vertebrae, including the sacral segments, were involved, and some deposits were visible in the coccygeal region. In the scapulae deposits were present in the acromion processes and near the inferior angles. In the pelvis (Fig. 1) there were deposits near both iliac crests, in the acetabular regions, in the pubic and ischial rami, and in the ischial tuberosities. Both patellae (Fig. 2) were affected. In the thoracic region scattered stippling was visible, probably in the costal cartilages. Extensive stippling was present in the carpal regions (Fig. 4), and the individual bones were indistinguishable. In the metacarpal regions a few dense spots were present; these may have been due to overlapping shadows, the

![Image](https://example.com/image.png)

**Fig. 4** Both arms, showing stippling in shoulder, elbow and wrist.

metacarpal bones being probably unaffected. The phalanges appeared normal. In the feet the calcaneum and talus were outlined on both sides by aggregations of dense deposits (Fig. 3). The other tarsal bones also were affected but their outlines were ill defined. Apart from a few spots probably caused by overlapping shadows the metatarsal bones and phalanges appeared unaffected. The clavicles and cranial bones appeared normal. The diaphysis of the left tibia had a varus curvature and seemed to be slightly shorter and broader than its fellow. The diaphyses of some of the other long bones might be slightly broader than normal at their ends, but otherwise were well formed and normally ossified.

**Post-mortem examination**—Three days after the child was first seen she died of bronchopneumonia, verified at routine necropsy. The body was buried but exhumed the next day, and parts of the tibia, lumbar vertebrae, calcaneum, femur and ilium were removed for further study.
In radiographs made after death the cartilaginous epiphyses at the shoulder, elbows, hips and knees were faintly outlined in contrast to gas in the soft tissues. With the exception of the right femoral epiphysis they appeared to be normally formed. At the elbows and knees the stippled deposits occurred near the metaphyses and most of the cartilage was uncalcified. At the shoulders and hips deposition was mainly at the lower borders of the capital epiphyses and in the regions of the greater tuberosities and trochanters. The right femoral capital cartilage appeared to be smaller than normal and flattened. It appeared to be dislocated, but this may have been a post-mortem effect.

\[ \text{Fig. 5} \]
Lower end of femur, showing the reasonably normal endochondral ossification occurring in this situation. (× 120.)

\textit{Histological examination}—The material consisted of sections from the lower end of the femur and from other unspecified epiphyseal cartilage. Cortical bone, where present, was thin but did not show any other significant histological abnormality. The region of endochondral ossification at the lower end of the femur (Fig. 5) appeared normal. The important histological abnormality was the presence, throughout the tissue of the epiphyseal cartilages studied, of abnormal circumscribed areas reaching one or two millimetres in size (Figs. 6 to 9). These areas contrasted with the surrounding cartilage in staining darkly and irregularly, and they were presumed to indicate sites of calcification. Some of them showed proliferation of cartilage cells, whereas others showed advanced degeneration of the tissue with complete loss of cells. Occasional areas of vascularisation of the degenerated calcified cartilage and of localised bony replacement of the tissue were seen, but they were not a conspicuous feature.
FIG. 6
Lower end of femur. Part of a focal area of calcification in the cartilaginous epiphysis. The pale-staining uncalcified cartilage of the epiphysis in the lower part of the field has undergone a considerable amount of post-mortem autolysis. Note the separation that has occurred at the margin between the calcified and uncalcified tissues. (× 120.)

FIG. 7
Epiphysial cartilage from unspecified site. Large and small areas of focal calcification in the epiphysial cartilage. The large area on the left of the field shows cellular proliferation of the darkly staining (and hence presumably calcified) cartilage. That on the right, however, while staining darkly shows advanced degeneration. (× 120.)
FIG. 8
Epiphysial cartilage from unspecified site. Areas of focal calcification. Note the area of "cystic" degenerative change in the uncalcified cartilage towards the lower left corner of the field. (× 120.)

FIG. 9
Epiphysial cartilage from unspecified site. Area of focal calcification. Although considerable post-mortem autolysis was present, this focus showed evidence of vascularisation and bony replacement of cartilage in the neighbourhood of the area of degeneration in the lower part of the field. (× 120.)
The uncalcified epiphysial cartilage showed occasional small areas of cystic and fibrous degeneration. Very pronounced post-mortem autolysis appeared to be present, and it was of interest (Fawns and Landells 1953) that this had involved the uncalcified epiphysial cartilage far more than the focal areas of calcified tissue. The autolysis prevented accurate assessment of the extent of histological change in the uncalcified tissues.

**DISCUSSION**

There is still so much to be learned about the etiology of the dysplasias and dystrophies that it is important to obtain as much information as possible from each case that is reported. We already have enough facts about this case to make a diagnosis of dysplasia epiphysialis punctata and to exclude other conditions presenting epiphysial stippling, such as cretinism and dysplasia epiphysialis multiplex.

The widespread generalised distribution of the lesion might suggest an avascular necrosis, with subsequent revascularisation and regeneration (Haynes and Wangner 1951). That both parents in this case suffered from syphilis might have been coincidental; yet it cannot be disproved that the foetal cartilage may have degenerated, fragmented and calcified as a result either of the syphilis or of the treatment by arsenic or bismuth which had interfered with the primitive vascular supply to the epiphyses. On the other hand the presence of associated anomalies, such as flexion contractures of the limbs and early retardation of growth as seen also in achondroplasia, could be explained by the interference of some factor toxic or infective, in the early embryo stage as shown by Duraiswami (1952) using insulin in the chick embryo.

The widespread skeletal involvement suggests a severe lesion and is often accompanied by early death, but the cases of Raap (1943) and of Selakovich and White (1955) show that the punctate areas of calcification do reabsorb and regenerate by the age of twelve, leaving only shortening of the extremity with smallness and abnormality of the bones. The calcified foci are clearly distinct from ossification centres. (Ossification centres appear later and are not involved in the process.) Harris (1933) found, as in achondroplasia, patchy mucoid degeneration and cystic spaces preceding calcification in the cartilaginous epiphyses; this degeneration is also noticeable in the present case.

It seems worth while making a further suggestion as to the etiology of this rare condition in the hope of stimulating further investigation. Is it not likely that the vessels supplying the growing epiphyses and metaphyses, or the cells themselves of these parts, are damaged at different ages by some toxic or infective factor confining the lesion to the epiphyses in dysplasia epiphysialis punctata or to the metaphyses in metaphysial dysostosis (case reported by Cameron, Young and Sisson 1954)?

**SUMMARY**

1. A case of dysplasia epiphysialis punctata is described, with some histological observations.
2. Both parents were syphilitic.
3. The etiology is not yet fully determined. Some suggestions are put forward for further investigation.

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**REFERENCES**

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