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SEASONAL VARIATION OF EPIPHYSIOLYSIS OF THE HIP AND POSSIBILITY OF CAUSAL FACTOR

By

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In the departments of roentgen-diagnosis in the University Hospitals in Malmö and Lund, Sweden, slipping of the upper femoral head appeared to be diagnosed more frequently during the summer months than in the rest of the year. This suggested that it might be worth while investigating whether any seasonal variation was really demonstrable with certainty and, if so, whether it might be related to factors known to be capable of inducing epiphysiolysis in experimental animals.

MATERIAL

The material was collected from orthopaedic departments in the south of Sweden catering for a population of about 1.5 million inhabitants and covers the period 1945–1955. Of 150 slipped epiphyses in 127 patients, data of relevant interest were available only regarding 76 cases in 67 patients. This group consists entirely of patients examined roentgenographically within 2 months of the onset of symptoms.

It was considered that the inclusion of those with a longer history would have reduced the reliability of the results. In table 1 the cases are classified according to the month of the year in which the symptoms initially appeared. The seasonal variation was still clearer when the material was distributed among 4-month periods (Table 2). It is apparent from the tables that in more than half of the cases (54 per cent) the symptoms appeared in the months of June to September. The chances of this seasonal frequency being due to chance were less than 1 to 1,000 (χ^2 14.55). No differences were found between town and country population.

TABLE 1

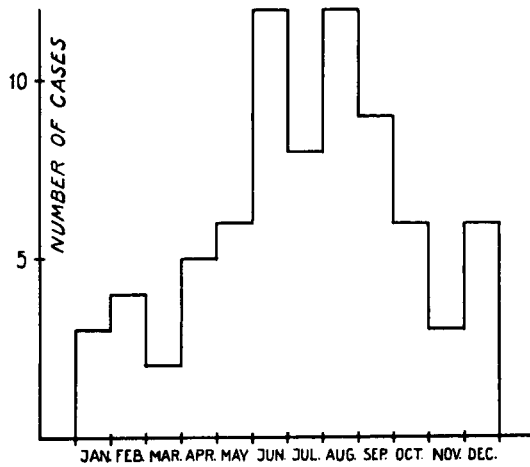
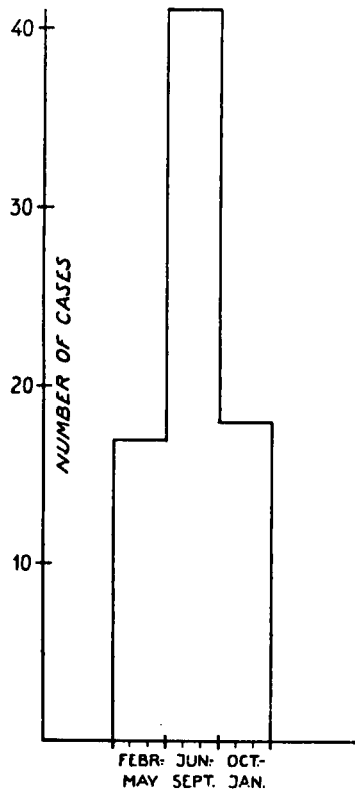


TABLE 2



DISCUSSION

As early as 1931 Ferguson & Howorth found that 66 per cent of their series of 70 cases appeared during a 5 months period of July to November. They pointed out that "this was the period of vacation and football playing. The seasonal incidence was one month earlier for girls, for their period of activities was not prolonged by football. They claimed that this suggested that epiphysiolysis was due to trauma ascribable to the greater physical activity of the children in this ages". But in later articles Howorth did not mention anything about seasonal variation. In Sweden, however, activity in childhood, i.e. ski-ing and ice skating, is often just as great in winter as in summer. In our material the incidence was lowest when winter sport was at its highest. This argues against the relationship found by Ferguson & Howorth between increased activity and epiphysiolysis.

Epiphysiolysis is most common in two groups of endocrine disturbances, namely in patients with the adiposogenital syndrome and in quickly growing slender youths (Key 1926). This was also noted in the present material.

In an experimental investigation Harris (1950) showed that the growth hormone decreases, and the sex hormone increases, the shearing strength of the epiphyseal plate. The changes are due to alterations, produced by these two hormones, in the thickness of the third layer of the epiphyseal plate.

Although no seasonal variation is known in the production of the growth and sex hormones, it is known (Tanner) that the rate of growth in length in adolescence is greater in spring and the rate of increase in bodyweight in autumn. The onset of epiphysiolysis thus falls in the main between these two periods. If the production of the growth hormone were the only factor of importance in epiphysiolysis, it should theoretically be most common in spring.

Epiphysiolysis and several other conditions have been induced experimentally with aminonitriles (Ponseti et coll. 1954). The aminonitrile most commonly used for this purpose is β -aminopropionitrile (BAPN), which occurs in certain sorts of *Lathyrus*, especially sweet pea (*L. odoratus*), and synthetic aminoacetonitrile (AAN). In the literature the poisoning is known under the name of lathyrism—which was originally used to designate quite another type of poisoning from completely different sorts of *Lathyrus*—as well as the name of odoratism suggested by Vivanco & Jiménez Diaz (1951). A good survey is given by Strong (1956).

The histologic picture of epiphysiolysis induced by aminonitrile poisoning is the same as that of spontaneous epiphysiolysis in man (Ponseti 1957).

Selye et al. 1957 showed that the toxicity of AAN is markedly enhanced by simultaneous injection of growth hormone, even in doses too small demonstrably to stimulate growth, and that the poison has a less toxic effect on hypophysectomised animals.

No foodstuffs are known to contain aminonitriles (Strong), but the period of increased frequency of epiphysiolysis coincided with the months the cows are out to pasture in Sweden.

The consumption of herbage containing aminonitriles by the cows might result in the presence of traces of aminonitriles in the milk and thereby contribute to the development of epiphysiolysis in persons with increased production of the growth hormone. Of the few patients questioned, all reported that they were heavy milk drinkers. It might be added that Kocher (1894) described epiphysiolysis as an occupational disease among young dairy workers and ascribed it essentially to the fact that they lived mainly on milk.

As yet no human disease due to consumption of aminonitriles is known. This does not, however, exclude the possibility of such a disease, as might be suggested of the seasonal variation observed in the present material.

Parenthetically it might be mentioned that Kaschin-Beck's disease, osteoarthritis deformans endemica, which is an endemic condition in Transbaicalia and Manchuria with severe skeletal changes, has been tentatively ascribed to contamination of the water and to chronic iron poisoning from drinking water or to complex avitaminosis.

The actual causes of the disease are not known with certainty. Aminonitrile poisoning has hitherto never been considered, although the pathologic changes suggest the possibility of such an origin.

Since, as pointed out above, epiphysiolysis is commonest among patients with Frölich's syndrome and in rapidly growing slender youths, the effect of an alimentary factor upon existing hormonal disturbances might be worth while considering in the investigation of the cause of epiphysiolysis.

SUMMARY

A seasonal variation was found in the onset of epiphysiolysis of the femur in Sweden. It was most common (54 %) during the 4-month period of June to September, a period coinciding with that when the cows are out to pasture.

It is tentatively suggested that the occurrence of slipped femoral head might be favoured by an alimentary factor containing aminonitrile or some related substance.

RESUME

On a observé en Suède une variation saisonnière dans l'apparition des cas d'épiphyseolyse fémorale. Ceux-ci sont plus communs (54 %) dans la période des quatre mois entre juin et septembre, période qui coïncide avec la mise au pâturage des vaches.

Il a été suggéré que les décollements épiphysaires du fémur sont peut-être favorisés par un facteur alimentaire contenant de l'aminonitrile ou une substance apparentée.

ZUSAMMENFASSUNG

Eine jahreszeitlich bedingte Verschiedenheit im Auftreten von Epiphyseolysis des Femurs in Schweden wurde gefunden. Sie erschien am häufigsten während des viermonatlichen Zeitraumes vom Juni zum September, einer Periode, die mit der Zeit in der die Kühe weiden, zusammenfällt.

Das Auftreten der Epiphysenlösung des Schenkelkopfes kann möglicherweise durch einen Ernährungsfaktor, der Aminonitril oder eine verwandte Substanz enthält begünstigt werden.

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