

Incidence of Growth Lines in Psychosocial Dwarfs and Idiopathic Hypopituitarism

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The presence of growth lines in the distal radius was evaluated prior to treatment in 23 psychosocial dwarfs and 25 patients with idiopathic hypopituitarism. The lines were very common in the psychosocial dwarfs and rare in the pituitary dwarfs ($P = .0005$). This finding can be explained by the fluctuating adverse environment to which the psychosocial dwarf is exposed and the constant lack of growth in hypopituitary patients. Therefore, in the absence of systemic disease, when growth lines are present in a patient with short stature or failure to thrive, a thorough review of the patient's psychosocial environment should be made.

In the evaluation of a child with failure to thrive, one difficulty is the differentiation of psychosocial dwarfism from idiopathic hypopituitarism, particularly since the psychosocial dwarf may have acquired hypopituitarism [1]. As described by Barbero and Shaheen [2], psychosocial dwarfism is characterized by: (1) weight below the third percentile, with subsequent weight gain after appropriate nurturing; (2) developmental retardation, with subsequent acceleration of development after appropriate stimulation and nurturing; (3) no evidence of systemic disease or abnormality to account for the initial growth failure; (4) clinical signs of deprivation which improved with nurturing; and (5) significant environmental psychosocial disruption. This paper evaluates the incidence of growth lines (Harris, Park lines) in these children and their possible application in differentiating these two entities.

Subjects and Methods

The radiographs of 23 psychosocial dwarfs (13 females and 10 males) and 25 patients with idiopathic hypopituitarism (19 males and six females) were reviewed by two of us (R. Hernandez, A. K. Poznanski). Four additional patients with panhypopituitarism also had adverse psychosocial factors. The age range for the psychosocial dwarfs was 2–15 years (average, 5.9 years), whereas patients with idiopathic hypopituitarism were 1 month to 21 years (average, 7.75 years).

The breakdown of the different diagnostic categories is shown in table 1. All patients were evaluated thoroughly by the pediatric endocrinology section. The diagnoses of psychosocial dwarfism and idiopathic hypopituitarism were made by established criteria [1–4].

Films selected for the study were posteroanterior views of the hands before treatment, since they were available in all cases. We interpreted transverse lines of bone which exceeded one-half of the radial shaft as presence of growth lines. Poorly defined short transverse trabeculae were interpreted as absence of growth lines.

Results

Of the 22 patients with growth lines, 20 were psychosocial dwarfs; of the 26 patients with no growth lines, only three were psychosocial dwarfs while 23 had idiopathic hypopituitarism ($\chi^2 = 27.25$, $P < .0005$). The distal radius was the area which most often showed the growth lines (fig 1A). The distal radius of a patient with growth hormone deficiency is illustrated in figure 2.

A few of the psychosocial dwarfs had radiographs of the knees which, as expected, showed the growth lines (fig. 1B) to better advantage. The four patients with a combination of hypopituitarism and psychosocial factors all had growth lines, while only two of 25 patients with hypopituitarism alone had these lines.

Discussion

The relation of growth lines to temporary arrest of growth due to disease or trauma has been clearly established [5]. Blanco et al. [6] found that Guatemalan children with growth lines in the distal radius showed a consistent tendency to be shorter than children without such lines. Mackay [7] observed that children with delayed skeletal maturity had increased numbers of growth lines.

Malnutrition has been implicated as a cause of growth lines. Several authors [8–10] have produced growth lines in animals with different deficient diets. Jones and Dean [11] found a higher incidence of growth lines in patients with kwashiorkor than in controls. Dreizen et al. [12], to the contrary, found no difference in the incidence of growth lines between nourished and malnourished children. Some psychosocial dwarfs have a thin habitus suggesting some degree of malnutrition. However, although the actual caloric intake is difficult to evaluate in these children, it seems that malnutrition, when present, is usually not due to inadequate caloric intake.

TABLE 1
Summary of Diagnoses

Diagnosis	No. Cases
Psychosocial dwarfs	23
Idiopathic hypopituitarism:	
Panhypopituitarism	6
Partial isolated growth hormone deficiency	6
Isolated growth hormone deficiency	9
Multiple deficiencies	4
Psychosocial and panhypopituitarism	4

Received March 3, 1978; accepted after revision May 12, 1978.

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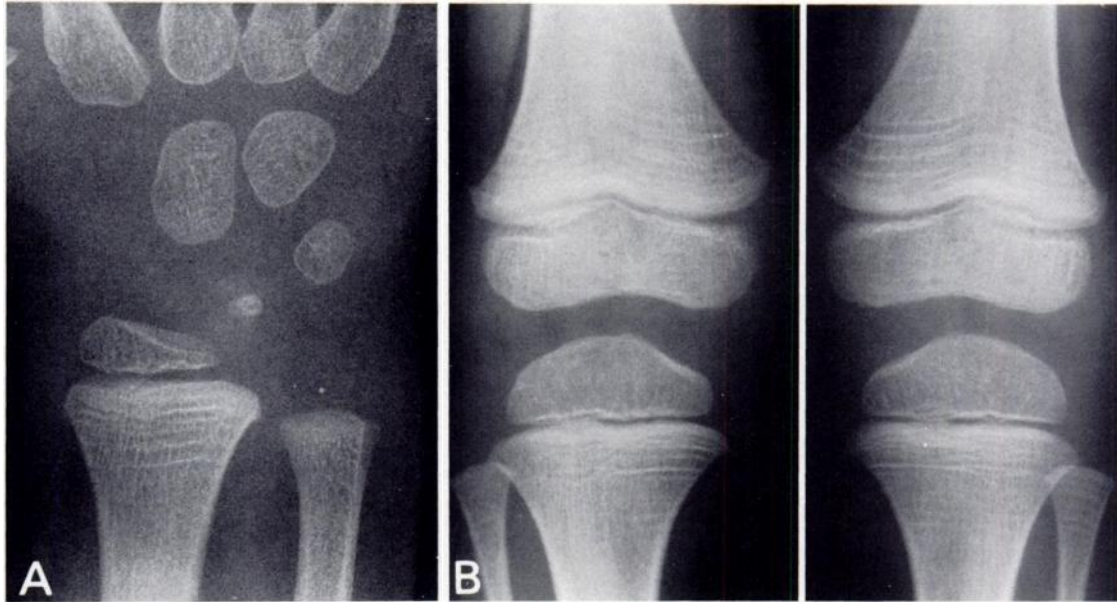


Fig. 1.—A, Distal radius of psychosocial dwarf with several growth lines. Chronologic age, 6 years 10 months; skeletal age, 4 years. B, Anteroposterior view of knees showing multiple growth lines.



Fig. 2.—Distal radius of patient with isolated growth hormone deficiency. Chronologic age, 8 years 9 months; skeletal age, 6 years. Note absence of growth lines.

Growth lines have also been related to emotional factors [13]. Capitanio and Kirkpatrick [14] and Gloebl et al. [15] noticed the presence of growth lines in psychosocial dwarfism. Saenger et al. [16] documented a drop in the growth rate from 3 cm/month to 0.5 cm/month due to emotional trauma, with unchanged caloric intake in an 8-year-old psychosocial dwarf. Others [17, 18] have reported similar observations.

To explain the greater incidence of growth lines in psychosocial dwarfism compared with idiopathic hypopituitarism, the factors that produce a growth line (arrest of growth and recovery [10]) must be examined. As Powell et al. [4] have stated, "The growth observed was unusual in that both acceleration and deceleration occurred rapidly with a change in environment. Possibly environmental changes occur even with the disturbed homes. . . ." Psychosocial dwarfs often have fluctuating growth, including periods when growth far exceeds normal. In idiopathic hypopituitarism, growth remains slow with little or no fluctuation until treatment. When growth lines are associated with delayed skeletal age in a patient who fails to thrive from unknown cause, psychosocial dwarfism should be considered.

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