

Genu Recurvatum Congenitum in the Newborn: *Its Incidence, Course, Treatment, Prognosis*

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A disturbance seen in Negro infants which is easy to correct permanently by simple corrective measures.

THE purpose of this paper is to present the clinical course of 22 cases of congenital genu recurvatum that were encountered initially in the nurseries of the D. C. General Hospital during a five-year period (1958–1962). Congenital genu recurvatum in the newly born is characterized by anterior hyperextension of the knee joint, prominence of the femoral condyles in the popliteal fossa, and increased transverse skin folds over the anterior surface of the knee. Resistance of the knee to flexion is sometimes present. Roentgenograms of the knee show normal bones and bony relationships. The term congenital genu recurvatum is not applied to congenital dislocation of the knee which is usually associated with bony or muscular abnormalities (Fig. 1).

Congenital genu recurvatum is unusual but not uncommon. Shaffer³⁶ in his book "The Diseases of the Newborn" has only a picture and comments that the condition is so rare that discussion is not included in the text. Campbell⁵ mentions that the most common

abnormality of the knee is genu recurvatum. Chapple and Moore,⁷ in Nelson's textbook of pediatrics, state that hyperextension of the knee is not unusual in the neonatal period.

Chatelain⁸ in 1822 was the first to record a newly born infant with a hyperextended left leg; the leg was kept in flexion for 23 days, and it recovered completely. Bard³ in 1834 described an infant whose leg became normal after being fixed in flexion for a few days. Potel,³² in his thesis of 1897, distinguished between congenital genu recurvatum and congenital dislocation of the knee in a review of 300 cases; 80 of these were congenital genu recurvatum. Drehmann,¹³ in 1900 in a study of 127 cases, concluded that this deformity represented only a preliminary stage of anterior luxation and referred to it as subluxation. He believed that the condition was related to the position *in utero*, afflicted females more frequently than males, and had no tendency to involve one leg more than the other. Kirmison²¹ later noted that the left leg was most frequently affected. Middleton,²⁸ reviewing 135 instances, attributed the deformity to contracture of the quadriceps extensor cruris muscle from intra-uterine fibrofatty degeneration of muscle fibers. Leuveuf²⁴ reviewed 200 cases; reported five female cases of his own;

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FIG. 1. The typical appearance of congenital genu recurvatum when the infant's leg is forcibly hyperextended more than 190°. The femoral condyles protrude in the popliteal fossa and the skin is wrinkled in transverse folds over the anterior surface of the knee. The roentgenogram showed no abnormality of the bones about the knee joint.

recommended that arthrograms be performed; concluded that congenital genu recurvatum occurs most frequently in females and usually affects the left leg. Provenzano³³ noted no sex difference in a review of 212 cases. Forgon and Szentpety¹⁵ believed that the condition is usually bilateral. Werthemann and Schindler,⁴⁰ Kopits,²² and Niebauer and King²⁹ reported that congenital genu recurvatum and congenital dislocation of the knee occur most frequently in females; 22 of their 28 patients were females. Numerous other authors^{4, 28, 33, 38} have reported single cases of congenital genu recurvatum, and most of these were females.

As for comparative frequency of congenital knee defects (recurvatum and dislocation) to

congenital hip dislocation, Drehmann¹³ gave a ratio of 1:30; Kopits,²² 1:84; Chapple and Davidson,⁶ 1:90; Werthemann and Schindler,⁴⁰ 1:30 to 1:90; Clayburgh and Henderson,⁹ 1:37; Niebauer and King,²⁹ in 25 years at the Mayo Clinic, noted only 12 cases of congenital dislocation of the knee in contrast to several hundred dislocations of the hip. No true incidence data are available.

Congenital genu recurvatum is not associated usually with other anomalies. However, association with congenital hip dislocation, elbow luxation, spina bifida, club foot, torticollis, scoliosis, angiomas, strabismus and absence of the patella have been reported.^{4, 10, 16, 26, 29, 34, 37, 40}

Theories advanced as to the cause of this condition include intra-uterine traumatic developmental defects, mesenchymal defects, endocrine disorders, genetic selection, and teratogenic agents acting during pregnancy.^{19, 29, 40}

Among the intra-uterine traumatic developmental defects, malposition *in utero* and uterine compression have received prominent consideration.^{14, 17, 18, 23, 24, 29, 33, 35, 37, 39, 40} Chapple and Davidson⁶ believe that the "positions of comfort *in utero*" produce congenital genu recurvatum. Davis¹¹ states the uterine positioning fits the position of comfort. Injury to the fetus while *in utero*, and malposition during delivery have also been listed as causes. An entwined cord has been blamed for the condition by one author.²⁵ Oligohydramnios has been implicated by others. Provenzano³³ and others suggest intra-uterine fetal illness. Intra-uterine mesenchymal defects, including epiphyseal and contractural degenerative changes in the quadriceps femoris muscle, have been regarded as a possible cause.^{4, 10, 12, 28, 29, 32}

A recent report from Scandinavia stated that high maternal estrogen excretion was associated with congenital dislocation of the hip.^{1, 2} It is possible that such an elevation in circulating estrogen may also affect ligaments of the knee.

Examinations from this point of view were made of 32,313 infants born at the D. C. Gen-



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the Pediatric Out-Patient Clinic or during a home visit eight months to four years after birth.

Every one of the 22 infants with congenital genu recurvatum was a Negro. Seventeen or 77 per cent were female. Birth weights ranged from 2,100 to 3,860 Gm. Three were

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brother and sister were without a history of congenital genu recurvatum.

Surgery was not performed on any of the infants. Eight cases were treated by plaster casts or application of a posterior splint for 15 to 31 days, and did well without further treatment. Roentgenographic examination of



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Discussion

The increased frequency of congenital genu recurvatum in breech delivery deserves comment. Of all deliveries at the D. C. General

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this sex difference is not clear. The possibility of relaxation of ligaments by female hormones, which occurs in pregnant women, may be a contributing cause. Arden and Borglin^{1,2} have shown an increase in the urinary excretion of estradiol and estrone in newborns with congenital dislocation of the

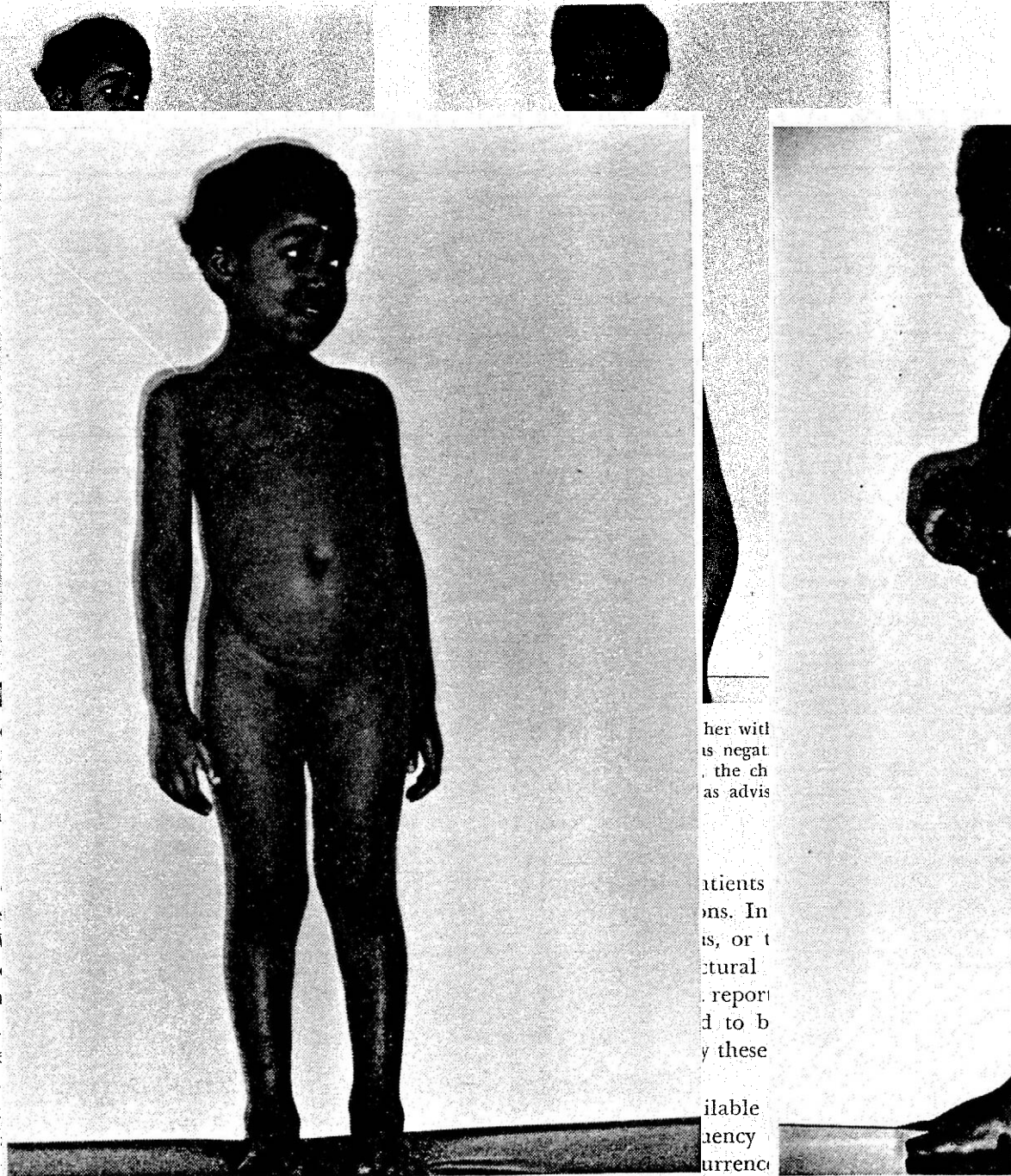


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genital dislocation of the hip is more common on the left than on the right and is six times as frequent in females.³¹

Injury to the fetus *in utero*, an entwined umbilical cord, infection, oligohydramnios, and epiphyseal defect have each been reported as possible causes of congenital genu recur-

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dition 6.8 times in our 10,000 deliveries would make it not exactly uncommon. The low association of congenital genu recurvatum with other congenital anomalies is also apparent.

Congenital genu recurvatum can give rise to undue concern on the part of physician and parents. Parents should be given assur-

TABLE 1. Cases of Congenital Recurvatum

Case No. and Sex	Presentation	Type of Delivery	Birth Wgt. in Gm.	Extremities	Mother Gravida/Parity	Treatment after Birth for Genu Recurvatum	Other Abnormalities at Birth	Last Physical Exam.	
								Age	Findings
1. F.	Vertex L.O.A.	Low forceps	2880	Rt.	1/0			4½ years	Able to produce voluntary dislocation of knees
2. F.	Vertex R.O.P.	Low forceps	3200	Lt.	1/0			4 years	
3. M.	Vertex L.O.A.	Spontaneous	3415	Bilat.	6/5			4 years	
4. F.	Vertex L.O.A.	Spontaneous	3230	Lt.	1/0			4 years	
5. F.	Vertex L.O.A.	Spontaneous	3175	Bilat.	1/0			4 years	
6. F.	Vertex R.O.P.	Spontaneous	3390	Bilat.	5/2	Cast, changed ×1 total 17 days		4 years	
7. M.	Frank breech R.S.P.	Breech extraction	3120	Bilat.	4/0			4 years	
8. M.	Vertex L.O.A.	Low forceps	2890	Rt.	1/0			3½ years	
9. F.	Vertex R.O.A.	Spontaneous	3230	Lt.	4/2			3½ years	
10. F.	Right footling breech R.S.A.	Breech extraction	3050	Lt.	2/1		Hip flexion cast for 2 weeks	3½ years	
11. F.	Vertex	Spontaneous	2100	Lt.	?	Casted for 30 days		Died at 8 months car accident	
12. F.	Frank breech L.S.A.	Breech extraction	3375	Bilat.	2/1			3 years	
13. F.	Vertex R.O.A.	Low forceps	2950	Lt.	1/0	Posterior splint changed ×2 total 15 days		2½ years	
14. F.	Vertex R.O.A.	Spontaneous	2935	Lt.	5/4	Posterior splint changed ×2 total 15 days		2½ years	Slight external rotation of left leg
15. F.	Vertex L.O.A.	Spontaneous	3100	Bilat.	1/0			2½ years	
16. F.	Vertex R.O.A.	Spontaneous	2640	Bilat.	7/6	Cast changed ×2 total 30 days		20 months	
17. F.	Vertex R.O.A.	Spontaneous	3575	Lt.	2/1	Cast changed ×3 total 31 days		16 months	
18. M.	Vertex R.O.P.	Low forceps	2370	Lt.	3/1			15 months	

TABLE 1. *Continued*

Case No. and Sex	Presentation	Type of Delivery	Birth Wgt. in Gm.	Extremities	Mother Gravida/Parity	Treatment after Birth for Genu Recurvatum	Other-Abnormalities at Birth	Last Physical Exam.	
								Age	Findings
19. F.	Frank breech R.S.T.	Breech extraction	3765	Lt.	3/2			9 months	Physiologic bowing of legs
20. M.	Vertex R.O.A.	Spontaneous	3860	Lt.	9/8			4 months	
21. F.	Vertex L.O.A.	Spontaneous	2240	Lt.	4/2	Cast changed $\times 2$ total 20 days		3 months	Still slight genu recurvatum if left knee forced
22. F.	Right footling breech R.S.A.	Breech extraction	2810	Lt.	6/5	Cast changed $\times 4$ total 30 days	Talipes equinus varus, right. Casted	2 months	

ance as to the favorable outcome of this condition. Early diagnosis and conservative treatment usually suffice. Gentle flexion of the knee by manipulation or keeping the flexed knee over a small pillow is a most effective form of therapy. Should more formal treatment be necessary, the knee should be gently maintained in a position of flexion by a bandage, adhesive plaster, posterior splint, or temporary plaster cast for a few days until the joint has stabilized. All children in this study were able to stand or walk without difficulty when treated in this fashion.

Summary

Twenty-two cases of congenital genu recurvatum followed from eight months to four and one-half years are presented. The incidence was 6.8 per 10,000 live births within a population which was 95 per cent Negro. The deformity appeared most frequently in the left knee and in females, and was seen more often in infants delivered from a breech presentation. Two cases occurred in siblings; no other familial incidence was noted.

Conservative management is recommended. In this series no child required surgical correction. Eight infants had casts or splints ap-

plied for 15 to 31 days. All were later able to support their weight or walk without further therapy.

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