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Literature Search Results

Search request date: January 2010
Search completion date: 1st February
Search completed by: Janet Badcock

Enquiry Details

Genu Varum and Genu Valgum

Comment

Information on this was hard to find and were mainly very old or foreign. No clinical guidelines could be found at all for the treatment of these guidelines.
Opening Internet Links

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Research

Bow legs
Radiographic Characteristics of Lower-Extremity Bowing in Children
Link to full text and images
http://radiographics.rsna.org/content/23/4/871.full.pdf+html

Genu Varum in Children: Diagnosis and Treatment
WC Brooks and RH Gross
Department of Orthopaedic Surgery, Medical University of South Carolina, Charleston.
Genu varum is a relatively common finding in children. Physiologic bowing, which is seen most often, has a well-documented favorable natural history. Idiopathic tibia vara is the most common of the pathologic conditions that are associated with bowed legs; treatment strategies vary with the patient's age and the stage of disease and deformity. Genu varum may also accompany systemic conditions, such as achondroplasia, vitamin D-resistant rickets, renal osteodystrophy, and osteogenesis imperfecta—all of which can result in short stature. Indications for intervention are not always well defined. A rare disorder, focal fibrocartilaginous dysplasia, usually requires no treatment. Standing radiographs of the entire lower limbs are necessary for surgical planning, as the deformity can sometimes affect the distal femur rather than the proximal tibia. Restoration of the mechanical axis of the limb is the principal goal of treatment; the particular type of internal fixation is of secondary importance.
Lower Extremity Abnormalities in Children
PAMELA SASS, M.D., and GHINWA HASSAN, M.D., State University of New York–Downstate Medical Center, Brooklyn, New York

Rotational and angular problems are two types of lower extremity abnormalities common in children. Rotational problems include in-toeing and out-toeing. In-toeing is caused by one of three types of deformity: metatarsus adductus, internal tibial torsion, and increased femoral anteversion. Out-toeing is less common than in-toeing, and its causes are similar but opposite to those of in-toeing. These include femoral retroversion and external tibial torsion. Angular problems include bowlegs and knock-knees. An accurate diagnosis can be made with careful history and physical examination, which includes torsional profile (a four-component composite of measurements of the lower extremities). Charts of normal values and values with two standard deviations for each component of the torsional profile are available. In most cases, the abnormality improves with time. A careful physical examination, explanation of the natural history, and serial measurements are usually reassuring to the parents. Treatment is usually conservative. Special shoes, cast, or braces are rarely beneficial and have no proven efficacy. Surgery is reserved for older children with deformity from three to four standard deviations from the normal. Parents often seek medical advice about lower extremity appearance in their children. In most cases, the complaint is a variation of normal growth and development, and the problem resolves without treatment as the child grows. Common variations include rotational problems (in-toeing, out-toeing) and angular problems (genu varum [bowlegs], genu valgum [knock-knees]).

Link to full text: http://www.aafp.org/afp/2003/0801/p461.html#

Genu Varum in Children: Typical Roentgen Picture
Axel Renander. 1
1 Department Of Roentgenology Of Centrallasarettet, Västerås, Sweden
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Abstract

Title: Pathology of Genu Valgum, or Knock-Knee.
Citation: Journal of Anatomy & Physiology, July 1890, vol./is. 24/Pt 4(593-7) (1890 Jul)
Author(s): Humphry
Publication Type: Journal Article
Source: MEDLINE
Title: Notes on the Dissection of a Case of Double Knock-Knee.
Citation: Journal of Anatomy & Physiology, April 1897, vol./is. 31/Pt 3(465-8) (1897 Apr)
Author(s): Symington J
Publication Type: Journal Article

Title: Physiological knock-knee.
Citation: A.M.A. American Journal of Diseases of Children, February 1952, vol./is. 83/2(254-5), 0096-8994;0096-8994 (1952 Feb)
Author(s): GEPPERT TV

Title: The relationship between Blount's disease and bow legs.
Citation: British Journal of Radiology, February 1968, vol./is. 41/482(107-14), 0007-1285;0007-1285 (1968 Feb)
Author(s): Bateson EM
Publication Type: Journal Article

Title: Genu varum and genu valgum. Another look.
Citation: American Journal of Diseases of Children, March 1971, vol./is. 121/3(219-21), 0002-922X;0002-922X (1971 Mar)
Author(s): Greenberg LA, Swartz AA

Title: Complications of tibial osteotomy in children for genu varum or valgum. Evidence that neurological changes are due to ischemia.
Citation: Journal of Bone & Joint Surgery - American Volume, December 1971, vol./is. 53/8(1629-35), 0021-9355;0021-9355 (1971 Dec)
Author(s): Steel HH, Sandrow RE, Sullivan PD

Title: Physiological genu varum.
Citation: Acta Orthopaedica Scandinavica, May 1975, vol./is. 46/2(221-9), 0001-6470;0001-6470 (1975 May)
Author(s): Hansson LI, Zayer M
Abstract: Physiological genu varum is a condition which, during the first years of life, usually does not require any treatment, but it can present differential diagnostic difficulties. The condition can be distinguished from Mb Blount, prenatal genu varum, hypophosphataemia, rachitis, and post-traumatic genu varum in its course, roentgenological picture, and laboratory examination. It is highly probable that physiological genu varum is the reversible initial stage at Mb Blount, because both physiological genu and Mb Blount can occur at the same time in the same patient.
Title: Knock knees and bow legs.
Citation: British Medical Journal, April 1976, vol./is. 1/6013(826-7), 0007-1447;0007-1447 (1976 Apr 3)
Author(s): Sharrard WJ

Title: Lateral widening of epiphyseal plates in knees of children with bowed legs.
Citation: AJR. American Journal of Roentgenology, August 1977, vol./is. 129/2(309-12), 0361-803X;0361-803X (1977 Aug)
Author(s): Currarino G, Kirks DR
Abstract: Five children are described in whom genu varum was associated with widening of the lateral segment of epiphyseal growth plates at the knees. The proximal end of one tibia was involved in three cases and the distal end of one femur in two. This finding is thought to represent an epiphyseal diastasis caused by the low grade chronic stress of the bow leg deformity.
Publication Type: Case Reports, Journal Article

Title: Bow legs and knock knees.
Citation: Pediatric Clinics of North America, November 1977, vol./is. 24/4(825-39), 0031-3955;0031-3955 (1977 Nov)
Author(s): McDade W

Title: Lateral bowing of the legs due to osteochondritis genu varum: empirically, nutritional deficiency seems a contributory factor.
Citation: Clinical Pediatrics, February 1978, vol./is. 17/2(189-95), 0009-9228;0009-9228 (1978 Feb)
Author(s): Barber CG

Title: Epiphyseal stapling for knock knee and bow legs.
Citation: Lancet, August 1979, vol./is. 2/8138(342), 0140-6736;0140-6736 (1979 Aug 18)
Publication Type: Editorial

Title: Corrective shoes for children: a survey of current practice.
Citation: Pediatrics, January 1980, vol./is. 65/1(13-7), 0031-4005;0031-4005
Author(s): Staheli LT, Giffin L
Abstract: A survey of shoe-prescribing practices for children was taken among pediatricians, orthopaedists, pediatric orthopaedists, and podiatrists. Opinions differed significantly regarding the usefulness of shoe modifications for common pediatric lower limb and foot problems. Parents' attitudes toward children's shoes were also surveyed. Pediatricians and pediatric orthopaedists tended to prescribe corrective shoes less often than did orthopaedists and podiatrists. High topped shoes are not necessary to promote normal foot development, in the opinion of 85% of those surveyed; however, high topped shoes were often
recommended for infants because they slip off less easily. Preferences for Thomas heels, scaphoid pads, reverse lasts, straight lasts, wedges, torque heels, and shoe lifts for problems including flexible flat feet, metatarsus adductus, intoeing, bow legs, knock knees, and leg length inequalities were delineated among the four groups treating children's feet. The authors conclude that whereas studies show that shoe modifications are of questionable value in the problems discussed, corrective shoes are often prescribed when regular shoes would be more appropriate and economical.

**Normal limits of knee angle in white children--genu varum and genu valgum.**
Heath CH, Staheli LT.
University of Washington School of Medicine, Seattle.
Knee angle and intermalleolar (IM) or intercondylar (IC) distance were measured in 196 white children aged 6 months to 11 years to establish normal limits of tibiofemoral angle. Children were maximally bowlegged at age 6 months and progressed toward approximately neutral knee angles (0 degree) by age 18 months. Greatest mean knock knee of 8 degrees was observed at age 4 years, followed by a gradual decrease to a mean of < 6 degrees at 11 years. Normal children aged 2-11 years had knock knee up to 12 degrees and intermalleolar distance up to 8 cm; the existence of bowlegs after age 2 years was abnormal. Instr Course Lect. 1994;43:151-9.

**Genu varum and genu valgum in children.**
Genu varum and genu valgum are often normal developmental changes in knee alignment that occur in a young child. Measuring the child's height and understanding normal development is the key to determining which children need further evaluation for a possible skeletal or metabolic bone dysplasia.

**Genu varum and genu valgum in children: differential diagnosis and guidelines for evaluation.**
Greene WB.

**Effects of simulated genu valgum and genu varum on ground reaction forces and subtalar joint function during gait.**
Van Gheluwe B, Kirby KA, Hagman F.
Laboratory of Biomechanics, Vrije Universiteit Brussel, Brussels, Belgium.
The mechanical effects of genu valgum and varum deformities on the subtalar joint were investigated. First, a theoretical model of the forces within the foot and lower extremity during relaxed bipedal stance was developed predicting the rotational effect on the subtalar joint due to genu valgum and varum deformities. Second, a kinetic gait study was performed involving 15 subjects who walked with simulated genu valgum and genu varum over a force plate and a plantar pressure mat to determine the changes in the ground reaction force vector within
the frontal plane and the changes in the center-of-pressure location on the plantar foot. These results predicted that a genu varum deformity would tend to cause a subtalar pronation moment to increase or a supination moment to decrease during the contact and propulsion phases of walking. With genu valgum, it was determined that during the contact phase a subtalar pronation moment would increase, whereas in the early propulsive phase, a subtalar supination moment would increase or a pronation moment would decrease. However, the current inability to track the spatial position of the subtalar joint axis makes it difficult to determine the absolute direction and magnitudes of the subtalar joint moments.

**Genu valgum in children with coxa vara resulting from hip disease.**
Shim JS, Kim HT, Mubarak SJ, Wenger DR.
Children's Hospital, San Diego, California, USA.
Three patients with chronic hip disease and progressive coxa vera deformity also had an unrecognized compensatory ipsilateral genu valgum until the primary hip deformity had been corrected operatively. This unrecognized genu valgum may become subtly worse in a growing child because of lateralization of the mechanical axis of the lower extremity with respect to the knee joint. Operative correction of coxa vara acutely moves the mechanical axis farther laterally, causing the occult genu valgum to become clinically apparent. The genu valgum may subtly worsen over time in a growing child because of lateralization of the lower extremity mechanical axis with respect to the knee joint, with the resulting abnormal Hueter-Volkmann forces across the physis causing progressive genu valgum. Recognition of occult genu valgum before correcting coxa vara in children allows the surgeon the better to advise the family about the need for possible subsequent operations on the knee.

Amilho S, Mora G, Léniz P.
Department of Orthopaedic Surgery and Traumatology, University Clinic of Navarra, Pamplona, Spain.
Effect of foot deformity on conventional mechanical axis deviation and ground mechanical axis deviation during single leg stance and two leg stance in genu varum.
Desai SS, Shetty GM, Song HR, Lee SH, Kim TY, Hur CY.
We assessed the effect of foot deformity on the loading axis of lower limbs in 33 patients with genu varum (25 bilateral and eight unilateral) caused by varying etiologies including achondroplasia, cerebral palsy, prior trauma, rickets, metaphyseal chondrodysplasia and primary osteoarthritis using single leg stance and both leg stance radiographs. Deviation at the knee from the hip ankle line (conventional) and hip foot line (centre of hip to centre of heel) was calculated. A comparison was made between single leg stance and two leg stance for tibiocalcaneal angle, mechanical axis angle, knee and ankle joint line convergence angle, conventional mechanical axis deviation (MADC) and ground mechanical axis deviation (MADG). In addition comparisons were also made among three groups formed depending on the tibiocalcaneal angle and MADC-MADG difference for all the above measurements. Mechanical axis deviation (calculated using the two methods) varied with the talocalcaneal angle and single leg stance. Patients with a fixed subtalar varus and with severe genu varum, where the normal compensatory subtalar eversion could not compensate showed that conventional mechanical axis deviation was significantly higher by 3.4+/-.2.4 mm and ground mechanical axis deviation degrees was significantly higher by 3.8+/-.3.2 mm in single leg stance when compared to two leg stance (p<.0001). Foot deformity should be included during preoperative evaluation and planning for knee deformity correction.

Genu valgum in children who received renal transplant.
Katz K, Eisenstein B, Davidovits M, Yosipovitch Z.
Department of Orthopaedics, Beilinson Medical Center, Petah Tiqva, Israel.
In 19 children who received renal transplants, 6 developed genu valgum one to two years after the transplantation. Except for one patient, biochemical blood and urine parameters were normal and bone radiograph showed no signs of renal osteodystrophy during this period. Two patients had bilateral varus supracondylar osteotomy, and in one patient medial hemi-stapling of the distal femur was performed.

McCarthy JJ, Kim DH, Eilert RE.
Children's Hospital, Denver, Colorado, USA.
The purpose of this study was to compare the results of operative versus nonoperative treatment for posttraumatic genu valgum. It is a retrospective chart and radiograph review of all patients with the diagnosis of posttraumatic genu valgum from our institution and from data obtained in response to 389 letters sent
to the members of the Pediatric Orthopaedic Society of North America (POSNA). The complementary physeal shaft (CPS) angle and the tibial femoral angle (TFA) were measured at the time of injury, at maximal deformity, and at latest follow-up. Fifteen patients were identified, 10 in the nonoperative group and five in the operative group. In both groups, the valgus deformity progressed over a 20-month span. In both groups, the valgus deformity improved at the time of follow-up. There was no significant difference in the CPS angle or TFA, between groups at the time of injury, at maximal deformity, or at follow-up.


**Physeal stapling for idiopathic genu valgum.**

Stevens PM, Maguire M, Dales MD, Robins AJ.

University of Utah School of Medicine, Salt Lake City, USA.

Adolescent idiopathic genu valgum may cause anterior knee pain, patellofemoral instability, circumduction gait, and difficulty running. The purpose of this study was to evaluate and discuss what we consider to be an ideal treatment protocol using hemiphyseal stapling. We reviewed 76 patients (152 knees) who underwent hemiphyseal stapling for idiopathic adolescent genu valgum and were followed up to maturity. Clinical evaluation included assessment of gait, limb length, alignment, and patellofemoral stability. Radiographic evaluation included measurement of the distal femoral angle (DFA), the anatomic femoral tibial angle (FTA), and the mechanical axis (MA) before stapling, at the time of staple removal, and at skeletal maturity. After stapling, we noted improvement in gait, clinical symptoms, and all radiographic parameters. Our conclusion is that adolescent genu valgum may cause significant symptoms including anterior knee pain and gait problems. Hemiphyseal stapling addresses the anatomic malalignment, alleviating symptoms while offering a high degree of patient satisfaction. It is safe and effective, with no premature physeal closures noted in our series. The procedure, which is well tolerated, obviates the need for corrective femoral osteotomies.

**Genu Varum in Children: Diagnosis and Treatment**

WC Brooks and RH Gross

Genu varum is a relatively common finding in children. Physiologic bowing, which is seen most often, has a well-documented favorable natural history. Idiopathic tibia vara is the most common of the pathologic conditions that are associated with bowed legs; treatment strategies vary with the patient's age and the stage of disease and deformity. Genu varum may also accompany systemic conditions, such as achondroplasia, vitamin D-resistant rickets, renal osteodystrophy, and osteogenesis imperfecta—all of which can result in short stature. Indications for intervention are not always well defined. A rare disorder, focal fibrocartilaginous dysplasia, usually requires no treatment. Standing radiographs of the entire lower limbs are necessary for surgical planning, as the deformity can sometimes affect the distal femur rather than the proximal tibia. Restoration of the mechanical axis of the limb is the principal goal of treatment; the particular type of internal fixation is of secondary importance.
Genu Valgum in Children: Diagnostic and Therapeutic Alternatives
GR White and GA Mencio
Department of Orthopaedics and Rehabilitation, Vanderbilt University Medical Center, Nashville, Tenn.
Genu valgum is a common orthopaedic problem in children. The vast majority of cases are physiologic variants, which resolve normally. However, there are pathologic entities due to both focal and systemic processes in which the deformity often progresses and usually requires treatment. Differentiating between the two forms is facilitated by a thorough understanding of the natural history of the development of the tibiofemoral angle in children. In this review, an approach to the evaluation and diagnosis of genu valgum is presented, and therapeutic alternatives are discussed.

Assessment of Angulation and Torsion of Lower Limbs in Children
Stephen J. Stricker, MD; Andrew A. Sama, MD
Pediatricians frequently evaluate children for torsional and angular deformities of the lower extremities, especially for intoeing and bowlegs. The authors review important points and classic literature to assist pediatricians in their evaluation of children with such deformities. Most angular and torsional problems are physiologic with spontaneous correction expected, so observation and reassurance play an integral role in their management. Orthopaedic shoes, braces, and sleeping postures appear to have little impact on the natural course of these conditions. This review article is written to enhance the primary care physician’s ability to recognize pathologic conditions such as Blount’s disease and rickets, and to determine which patients are most suitable for orthopaedic referral. Int Pediatr. 2001;16(3):138-143.

Prevalence of Genu Valgum in Obese and Underweight Girls
F. Rahmani Nia, H. Daneshmandi and K.H. Irandoust
Faculty of Physical Education and Sport Sciences, University of Guilan, Guilan, Abstract: The purpose of this study was to determine the prevalence of genu valgum among obese girls in Rasht (north of Iran). 454 high school students were selected cluster random sampling. Height and weight of
subjects were measured by using standard apparatus. BMI (weight/height²) was considered as the index of adiposity and international BMI cut-off values to categories each subject as obese (values>95th percentile), overweight (85th-95th percentile), desirable weight (15th-85th percentile) and underweight (15th percentile<values).

The degree of valguse was assessed with the distance between the intermalleolar. Prevalence of obesity and overweight was about 18/7%, prevalence of desirable weight and under weight were %67, %13.9 and prevalence of genu valgum was %28 among girls. We found that overweight and obesity are related to genu valgum in high-school girls. It was concluded that elevated BMI increases loading of the knees and lower extremity.

Additional Material – patient leaflets and information

NHS Choices Knock Knees
http://www.nhs.uk/conditions/Knock-knee/Pages/Introduction.aspx