GENU VALGUM ( KNOCK KNEE )

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Genu valgum, commonly called "knock-knee", is a condition in which the knees are deviated towards midline of the body and touch one another when the legs are straightened. Individuals with severe valgus deformities are typically unable to touch their feet together while simultaneously straightening the legs(Figure-1). The term originates from the Latin genu, "knee", and valgus which actually means bent outwards, but in this case, it is used to describe the distal portion of the leg which bends outwards and thus the proximal portion of leg near knee seems to be bent inwards.

Mild genu valgum can be seen in children from ages 2 to 5 where children have genuvalgum angle up to 20 degrees. Genu valgum rarely worsens after age 7 & valgus should not be worse than 12 degrees, intermalleolar distance should be <8 cm. The deformity often get corrected naturally as children grow. However, the condition may continue or worsen with age, particularly when it is the result of a disease, such as rickets or metabolic origin(Figure-2). Idiopathic genu valgum is the commonest form that is either because of congenital or has no known cause. Distal femur is the most common location of primary pathologic genu valgum but can arise from tibia.

Etiologies

- bilateral genu valgum
  - physiologic
  - renal osteodystrophy (renal rickets)
  - skeletal dysplasia
    - Morquio syndrome
    - spondyloepiphyseal dysplasia
    - chondroectodermal dysplasia
- unilateral genu valgum
  - physeal injury from trauma, infection, or vascular insult
- proximal metaphyseal tibia fracture
- benign tumors
  - fibrous dysplasia
  - osteochondromas
  - Ollier's disease

**Diagnosis:**

The degree of genu valgum can be estimated by the Q angle, which is the angle formed by a line drawn from the anterior superior iliac spine through the center of the patella and a line drawn from the center of the patella to the center of the tibial tubercle. In women, the Q angle should be less than 22 degrees with the knee in extension and less than 9 degrees with the knee in 90 degrees of flexion. In men, the Q angle should be less than 18 degrees with the knee in extension and less than 8 degrees with the knee in 90 degrees of flexion. A typical Q angle is 12 degrees for men and 17 degrees for women.

**Treatment:**

For persistent genu valgum, treatment recommendations have included a wide array of options, ranging from lifestyle restriction, bracing, exercise programs, and physical therapy. In recalcitrant cases, if valgus malalignment of the extremity is significant, corrective osteotomy or, in the skeletally immature patient, hemiepiphysiodesis may be indicated.

- **Nonoperative**
  - **observation** of deformity & parent counselling

  Considered as first line of management for physiological genu valgum in children of <6 years age with valgus angle <15 degrees.

  - **bracing**

    Mostly used in progressive physiological genu valgum for parental satisfaction but limited use in pathological genu valgum. common splints used are- mermaid
splint, lateral single bar knee ankle foot orthosis (figure-2), shoe modification with elevating inner border of shoe from 3/16 to ¼ inch

- **Operative**

  **Hemiepiphysiodesis or physeal tethering**

  Hemiepiphysiodesis can be accomplished using the classic Phemister bone block technique, the percutaneous method, hemiphyseal stapling, or, more recently, application of a single 2-hole plate and screws around the physis.

  Percutaneous epiphyseal transcutaneous screws as a means of achieving angular correction (figure-4). While this is performed through a small incision, the physis is violated and the potential exists for the formation of an unwanted physeal bar, with its sequelae.

  Controlled growth modulation, using a nonlocking 2-hole plate(Figure 8 plate) and screws, is a reversible and minimally invasive outpatient procedure, allowing multiple and bilateral simultaneous deformity correction. A single implant (8-plate) is used per physis, which serves as a tension band, allowing gradual correction with growth (figure-4). Because the focal hinge of correction is at or near the level of deformity, compensatory and unnecessary translational deformities are avoided. This is the most recent method of management of genu valgum.

  Percutaneous drilling or curettage of a portion of the physis yields only a small scar and no implant is required. However, this is a permanent, irreversible technique. Therefore, its use is necessarily restricted to adolescent patients and is predicated upon precise timing of intervention, requiring close follow-up to avoid undercorrection or (worse yet) overcorrection.
Osteotomy

Mostly indicated for genu valgum patients around the age of growth plate fusion and patients with severe valgus deformity (figure-5). Osteotomy is done at the apex of the deformity at femur and/or tibia depending on the site of deformity. It can done as medial close wedge osteotomy or lateral open wedge osteotomy.

Gross deformities can be corrected in a single sitting (figure-6). However, this is a very invasive method fraught with potential complications, including malunion, delayed healing, infection, neurovascular compromise, and compartment syndrome.

Figure-1

Figure-2