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Osteotomies around the Knee for the Young Athlete with Osteoarthritis

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Jackson first described proximal tibial osteotomy in 1958 as a successful treatment for moderate to severe unicompartmental, degenerative arthritis of the knee associated with angular deformity [1]. Many studies have analyzed the results of this operation with respect to age, activity, gender, degree of arthritic changes, weight, previous injury treatment, and preoperative and postoperative angulation, in an effort to identify the risk factors for failure [2–5]. Evaluation of distal femoral osteotomy for valgus deformity has yielded similar results [6–10]. Findings indicate that factors predicting favorable outcomes include decreased relative weight, increased angle of correction, and lower overall level of disease. For the younger, active patient with angular deformity beyond the average range of physiologic variation, osteotomy remains the procedure of choice.

Pathophysiology

Osteoarthritis of the knee is generally considered to be a mechanical phenomenon. In the young adult, pathologic phenomenon such as meniscal injury, or meniscectomy, osteochondral injury, and ligamentous insufficiency can predispose an individual to develop osteoarthritis [11]. Changes in water content and decreased cartilage matrix synthesis lead to macroscopic fissuring and cartilage loss. Knee malalignment, whether induced by injury or underlying anatomic variability, has been shown to place abnormal stresses on the articular cartilage of an affected compartment and promote the development of these changes [12–15] (Fig. 1). The normal anatomic load-bearing axis of the knee ranges from

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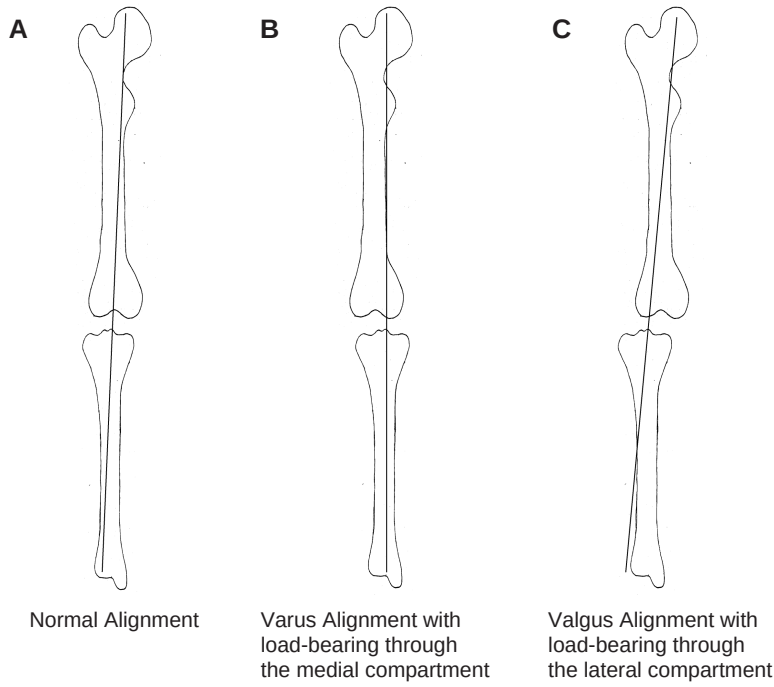

Fig. 1. Demonstration of various biomechanical axes. (*A*) Normal alignment. (*B*) Varus alignment with load bearing through the medial compartment. (*C*) Valgus alignment with load bearing through the lateral compartment.

5 to 7 degrees of valgus. The medial side of the knee bears 60% of the force transmitted through the joint, with 40% born laterally. Walking further increases the load by adding lateral thrust or an adduction moment varying somewhat by gait pattern [16]. Younger patients may be more prone to these changes resulting from injury in an isolated compartment, thus altering the biomechanical axis and accelerating this process. Total joint replacement remains a viable alternative for the older, less active patient, but long-term outcomes in the young adult have been less reliable and more complex. As a result, clinicians have recommended osteotomy as a means of altering malalignment to more evenly distribute these forces over both the medial and lateral compartment and delay or prevent degenerative changes in this population.

History

Age, weight, and activity level should be assessed in all patients as selection of appropriate surgical candidates may be influenced by these factors. Patients with unicompartmental arthritis generally complain of localized knee pain. A history of injury or previous surgery should be sought out. Pain may