SEVERE VALGUS DEFORMITY OF THE KNEE: DESCRIPTION OF NEW SURGICAL TECHNIQUE FOR ITS CORRECTION

Robson Rocha da Silva[1], Marcos Almeida Matos[2], Maurício Pimentel[3], Bruno Jacomeli Martins[4], Rafael Valadares Oliveira[4]

ABSTRACT

Varus supracondylar osteotomy of the femur is the established procedure for treating painful knees that present lateral arthrosis and valgus deformity. In descriptions of the conventional surgical techniques, there are divergences regarding the location, access route, correction level, fixation type and area for synthesis insertion. This is most evident in cases of severe valgus with angles greater than 30º and distal femoral deformation, in association with hypoplasia of the lateral condyle. The authors describe a new surgical technique for distal femoral osteotomy, based on anatomical and geometrical criteria, which was developed in their clinic for treating severe valgus cases, and they present one of the cases treated. In the new technique, the wedge to be surgically resected has an oblique direction and the format of an isosceles triangle. This new proposal thus seeks to resolve problems that have been presented in such cases, through enabling valgus correction without causing any new deformity of the distal femur. Good cortical bone contact is promoted, and application of a stable synthesis system is made easier. However, the age limits for such patients and the degree of knee arthrosis that might contraindicate this procedure remain unknown. Hence, a larger sample and longer follow-up for operated cases are required.

Keywords – Osteotomy; Femur; Knee; Osteoarthritis

INTRODUCTION

Varus rotational supracondylar osteotomy of the femur is the established procedure for treating knees with valgus deformity associated with pain and/or lateral arthrosis[1]. Jackson et al[2] presented the first description of osteotomy to correct a valgus knee. In 1973, Coventry[3] established that only distal osteotomy of the femur would be capable of transferring the load to the medial compartment in cases of angular valgus deformities greater than 12º, associated with obliquity of the joint line greater than 10º.

In 1984, Insall[4] made reference to the scarcity of studies on this type of treatment. In 1992, Navarro and Laredo[5] showed that the literature on this topic diverged with regard to the site, access route, degree of correction, type of fixation and region for placement of the synthesis. These findings have given rise to a series of uncertainties regarding this subject.

Recent studies have not clearly addressed the treatment of severe cases of valgus knee, such as those with angles greater than 30º and distal femoral deformation associated with hypoplasia of the lateral condyle. These cases are difficult to treat using the methods presented in the literature, because of lack of capacity to correct, or because of the disparity of width of the distal and proximal segments after resection of the wedge, or because of lack of cortical bone contact, thus allowing loss of correction or hypercorrection in varus[6].

The aim of this study was to describe a new surgical technique for distal femoral osteotomy, based on anatomical and geometrical criteria, which was developed at our service for severe cases of valgus knee.

DESCRIPTION OF THE TECHNIQUE

This study consists of an experimental presentation of a new surgical technique performed on a single

1 – Orthopedist and Head of the Knee Group, Hospital Santa Izabel, Santa Casa de Misericórdia da Bahia, Salvador, BA, Brazil.
2 – Adjunct Professor; PhD from the Bahia School of Medicine and Public Health, Salvador, BA, Brazil.
3 – Resident Physician at Hospital Santa Izabel, Santa Casa de Misericórdia da Bahia, Salvador, BA, Brazil.
4 – Orthopedist at Hospital Santa Izabel, Santa Casa de Misericórdia da Bahia, Salvador, BA, Brazil.

Work performed in the Knee Group, Hospital Santa Izabel, Santa Casa de Misericórdia da Bahia, Salvador, BA.

Correspondence: Av. Orlando Gomes, Condomínio Veredas Piatã, Quadra B, Lote 07, Piatã, 41650-010 Salvador, BA - E-mail: robroc@superig.com.br

Work received for publication: June 2, 2011; accepted for publication: August 4, 2011

The authors declare that there was no conflict of interest in conducting this work

This article is available online in Portuguese and English at the websites: *www.rbo.org.br and www.scielo.br/rbort*

anatomical model that was based on a real case. The pre and postoperative radiographic data on a patient operated at our service were accessed with the aim of building up an anatomical model based on a real case. The preoperative radiographs and tomographic scans were sent to a laboratory, where a polyurethane model of the distal femur was constructed so as to reproduce the deformity encountered in this patient.

All of the preoperative planning was done using AP and lateral radiographs on the patient. The planning consisted of marking out the wedge to be surgically resected. A polyurethane model was used to make a step-by-step presentation that simulated the surgical procedure.

Both the preoperative planning and the surgical technique were photographed using a digital camera in order to provide comprehensive detailed illustrations of the procedure.

SURGICAL TECHNIQUE

The theoretical basis of our technique was the geometrical principles described below[7]:

1) The sum of all the angles of a triangle is always 180º.
2) An isosceles triangle is composed of at least two sides of the same length and two equal (congruent) angles. The angle formed by the sides of the same length is called the vertex angle and the other two are called the base angles (Figure 1).
3) "If a triangle has two sides of the same length, then the angles opposite these sides are congruent". In other words, in an isosceles triangle, the base angles are equal (isosceles triangle theorem) (Figure 1).

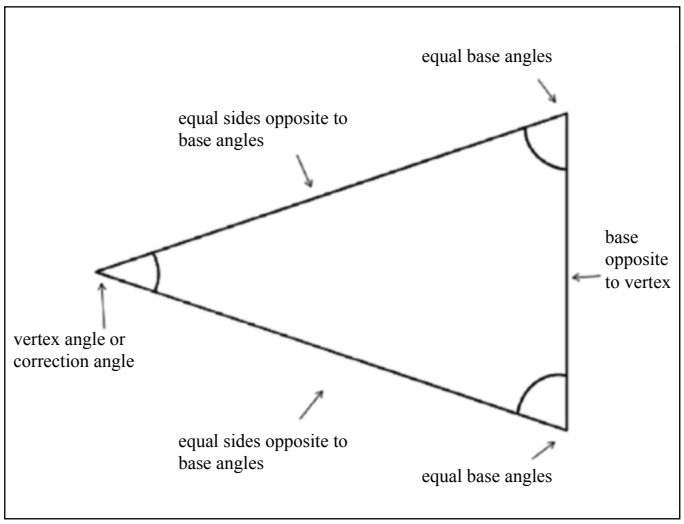

Figure 1 – Isosceles triangle.

The main modifying element of the new technique consists of resection of a wedge that will have the format of an isosceles triangle. The vertex angle is the deformity correction angle, located within the lateral cortical bone of the femur. The base of the wedge, opposite the vertex, is located in the medial cortical bone (Figure 2).

The geometrical foundations described above help in obtaining the measurements of the wedge and determining its location in the femur. Thus, if the magnitude of the vertex angle is known, the other two angles can be obtained, from the following formula:

$$a^o = \frac{180 - \text{correction angle}}{2}$$

a^o = base angles (always equal in an isosceles triangle)

For example, if the correction angle is 30°:

$$a^o = \frac{180^o - 30^o}{2} \qquad a^o = \frac{150^o}{2} \qquad a^o = 75^o$$

In this manner, by locating the lower point of the base on the femur and knowing what the base and vertex angles are, it is possible to trace out the exact location of the triangle on the radiograph, with the aid of a goniometer.

These are the geometrical and anatomical principles of the new technique, which is presented in two phases: preoperative planning and operative phase.

Preoperative planning

In the preoperative phase, the first step is to define the valgus angle that is to be corrected, through measurement of the anatomical axis. The objective of the surgery is to take the anatomical axis to 0º, thus transferring the load to the medial compartment, as recommended in other studies[1,3].

The exact location of the osteotomy is established on the AP radiograph of the knee, by tracing

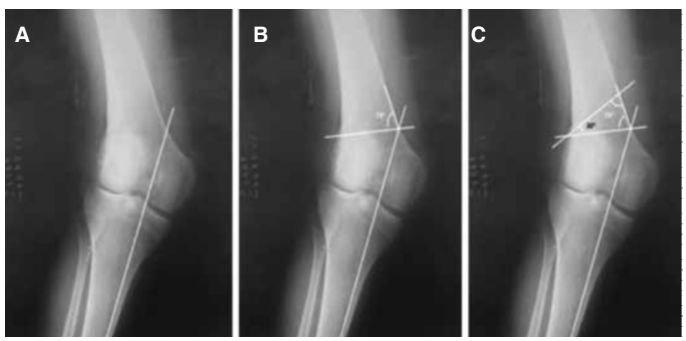

Figure 2 – (A) Lower point, at base of triangle. (B) Point at vertex, in lateral cortical bone. (C) Isosceles triangle.