

Contents lists available at [ScienceDirect](#)

The Knee



Proximal tibial anterior open-wedge oblique osteotomy: A novel technique to correct genu recurvatum

Tae Woo Kim ^a, Sahnghoon Lee ^b, Jung-Ro Yoon ^c, Hyuk-Soo Han ^b, Myung Chul Lee ^{b,*}

^a Department of Orthopaedic Surgery, Hallym University Hospital, Chuncheon 77, Sakju-ro, Chuncheon-si, Gangwon-do 200-704, Republic of Korea

^b Department of Orthopaedic Surgery, Seoul National University Hospital, 101 Daehang-ro, Jongno-gu, Seoul 110-744, Republic of Korea

^c Department of Orthopedic Surgery, Veterans Health Service Medical Center, 6-2 Dunchon Dong, Kangdong Ku, Seoul, Republic of Korea

ARTICLE INFO

Article history:

Received 22 June 2016

Received in revised form 3 September 2016

Accepted 14 October 2016

Available online xxx

Keywords:

Genu recurvatum

Open-wedge osteotomy

Center of rotation of angulation

Transverse bisector line

ABSTRACT

Background: For successful acute correction of genu recurvatum, accurate correction of plateau angle, restoration of anatomical axis, rigid fixation, and preservation of patellar height are essential. However, a surgical treatment that satisfies all these conditions has not yet been established. The purpose of this study was to evaluate the novel technique of proximal tibial anterior open-wedge oblique osteotomy (PT-AOWOO) for the treatment of genu recurvatum.

Methods: Five patients with genu recurvatum underwent PT-AOWOO from 2008 to 2013. The open-wedge center of rotation of angulation (CORA) was determined by the intersection of transverse bisector line and tibial posterior cortex to prevent secondary translational deformity. An osteotomy was performed from the distal margin of the tibial tuberosity to the planned CORA to maintain patellar height and provide sufficient space for fixation. The opening gap was calculated by the picture-archiving and communications system (PACS)–Photoshop method.

Results: The mean angle of recurvatum was 17° (range, 14 to 25°) preoperatively and –0.4° (range, –5° to 5°) postoperatively. The mean angle of the tibial plateau was 79.8° (range, 67 to 85°) preoperatively and 98.4° (range, 95 to 105°) postoperatively. Tibial anatomical axis was restored and the patellar height was maintained in all patients. The overall results were excellent in three patients and good in two patients.

Conclusions: The PT-AOWOO and its unique osteotomy level corrected the tibial plateau angle accurately, restored the sagittal tibial axis without translation, maintained patellar height, and enabled rigid fixation. This technique showed satisfactory radiologic and clinical outcomes without any complications.

© 2016 Elsevier B.V. All rights reserved.

1. Introduction

Genu recurvatum is a sagittal plane deformity of hyperextension of the knee and can be classified as osseous, ligamentous, or combined [1,2]. Proximal tibial recurvatum secondary to premature anterior physeal arrest is a major cause of osseous genu recurvatum [3–7]. If left untreated, it can lead to knee pain, muscle weakness, impairment of the extensor mechanism, instability, and stretching of the posterior capsuloligamentous structures of the knee [1–3].

For successful acute correction of osseous genu recurvatum, accurate correction of the tibial plateau angle, restoration of the tibial anatomical axis, rigid fixation for bone consolidation, and preservation of patellar height are essential [2,8,9]. Although

* Corresponding author.

E-mail address: leemc@snu.ac.kr (M.C. Lee).

various open-wedge and closing-wedge proximal tibial osteotomy techniques have been suggested [1,2,10–12], an osteotomy technique that satisfies all these conditions has not yet been established. An open-wedge osteotomy proximal to the tibial tubercle can result in patella baja [2,12]. Even when combined with tibial tubercle transfer, the problem of rigid fixation and accurate correction of the tibial plateau angle remains [1,2]. An open-wedge osteotomy distal to the tibial tubercle can cause secondary angular and translational deformities that restrict the correction angle, result in unsatisfactory outcomes, and require additional proximal fibular osteotomies [2]. A closing-wedge anterior displacement osteotomy is technically demanding, and the optimal amount of anterior displacement is not clear [11].

The purpose of this study was to evaluate the novel technique of proximal tibial anterior open-wedge oblique osteotomy (AOWOO) for the treatment of genu recurvatum. In this osteotomy technique, the concept of the center of rotation of angulation (CORA) and transverse bisector line (t-BL) was applied to reduce the secondary deformity and improve the deformity correction accuracy. Moreover, an oblique osteotomy was performed from the distal margin of the tibial tubercle toward the open-wedge CORA to preserve the patellar height and provide sufficient space for rigid fixation. To our knowledge, this report is the first to provide a method of calculating the open-wedge CORA and opening gap in the acute correction of osseous genu recurvatum.

2. Materials and methods

2.1. Patients

This retrospective case series study was approved by the Institutional Review Board of the Seoul National University Hospital. Five consecutive patients with genu recurvatum (including four with the osseous type and one with the combined type) were treated with the novel technique of proximal tibial AOWOO in the Seoul National University Hospital between 2008 and 2013. The mean age of the patients was 24.5 years (range, 19 to 52 years). Three male patients (27, 30, and 28 years) with osseous genu recurvatum had experienced sports knee injuries as adolescents, and two of the three had posterior instability caused by chronic posterior cruciate ligament insufficiency. A 19-year-old female patient had idiopathic osseous genu recurvatum, and a 52-year-old female patient with sequelae of poliomyelitis had a combined type genu recurvatum deformity. The preoperative symptoms were pain, instability, weakness, leg length discrepancy (LLD), and cosmetic dissatisfaction, and they were variable among patients (Table 1). The mean duration of follow-up was 47 months (range, 24 to 86 months).

2.2. Preoperative planning

2.2.1. Preoperative evaluation of the genu recurvatum deformity

To determine the amount and type of genu recurvatum before surgery, the angle of recurvatum (RG) and the angle of the tilt of the tibial plateau (RT) were measured on a passively extended lateral radiograph of the knee using Moroni et al.'s method [2] (Figure 1). There was no significant sagittal bowing of tibia in all five cases.

2.2.2. Determination of open-wedge CORA and osteotomy level

On the lateral tibial radiograph, the original CORA was determined by the intersection of the proximal and distal anatomical axes of the deformed proximal tibia [8,13]. The lateral proximal tibial axis was defined as the line that started from the anterior 1/5 point of the tibial plateau [14] and drawn seven or 13° (target angle) off the perpendicular axis. The lateral distal tibial axis was defined as the line that connected the two midpoints at the 1/3 and 2/3 points of the tibial shaft. Then, the open-wedge CORA was determined by the intersection of the t-BL that passed the original CORA, dividing the transverse angle into two equal halves, and the posterior cortex of the tibia. Then, an oblique osteotomy was performed from the distal margin of the tibial tubercle to the planned open-wedge CORA which was located near the fibular head (Figure 2(A)). According to the osteotomy rule of Paley [8], colinear alignment can be achieved when the open-wedge CORA is located on the t-BL. The location of the open-wedge CORA on the t-BL enabled the restoration of the anatomical axis without additional translation (Figure 2(B)).

Table 1

Clinical and radiologic data of five patients of with genu recurvatum before operation.

Case	Age/sex	Etiology	Symptom	RG (degree)	RT (degree)	A:B ratio	ROM (degree)	LLD (mm)	Instability	Clinical scores (anatomical/functional/total)
1	27/M	Adolescent sports injury	Pain	15	67	1.12	−20 to 145	30	Posterior instability	10/40/60
2	30/M	Adolescent sports injury	Pain, instability	14	84	0.76	−15 to 145	11	Gr3; soft end Posterior instability Gr2	40/45/85
3	19/F	Idiopathic	Pain, LLD	14	83	0.97	−15 to 140	18		20/50/70
4	21/M	Adolescent sports injury	Pain, cosmesis	17	80	0.73	−15 to 130	6		30/45/75
5	52/F	Poliomyelitis sequelae	Pain	25	85	0.64	−30 to 125	24		30/30/60

A:B ratio, Blackburne and Peel patellar height ratio; LLD, leg length discrepancy; RG, angle of recurvatum; ROM, range of motion; RT, angle of tilt of the tibial plateau.

Download English Version:

<https://daneshyari.com/en/article/5710662>

Download Persian Version:

<https://daneshyari.com/article/5710662>

[Daneshyari.com](https://daneshyari.com)