بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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جامعة عين شمس

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MONA MAGHRABY

A Systematic Review of Simultaneous Versus Staged Anterior Cruciate Ligament Reconstruction and Opening Wedge High Tibial Osteotomy for Varus Malalignment in Young Patients with Anterior Cruciate Ligament Deficient Knees

Submitted for Partial Fulfillment of Master Degree in Orthopaedic Surgery

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Dedication

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List of Abbreviations

Abb.	Full term
ACL	Anterior Cruciate Ligament
PL	Posterolateral bundle
AM	Anteromedial bundle
FATC	Femur-ACL-tibia complex
CoR	Center of rotation
HAMS	Hamstring muscle force
GAS	Gastrocnemius muscle force
PT	Patellar tendon/quadriceps muscle force
CTO	Contralateral toe off
GRF	Ground reaction force
COM	Center of mass
HTO	High Tibial Osteotomy
ROM	Range of motion
KL	Kellgren Lawrence score
AMP	Accessory medial portal
MRI	Magnetic resonance imaging
EAT	Extra-articular tenodesis
ALL	Anterolateral ligament
OA	Osteoarthritis
JSN	Joint space narrowing
WOMAC	Western Ontario and McMaster Universities Osteoarthritis Index
IKDC	International Knee Documentation Committee
IKDC-SKF	International Knee Documentation Committee subjective knee form
BPTB	Bone-Patellar Tendon-Bone graft

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INTRODUCTION

Chronic anterior cruciate ligament (ACL) injury has been proved to be implicated in the development of tibiofemoral osteoarthritis (OA). [1]

Regardless of surgical intervention, the risk of loss of cartilage increases by 19 times for the medial femoral condyle 7 to 11 years after injury. [2] Furthermore, patients who undergo delayed anterior cruciate ligament reconstruction (ACLR) are more susceptible to an increased incidence of medial meniscal lesion, [3] which is managed by concomitant meniscectomy or repair. [4]

It has been corroborated that meniscectomy is a definite risk factor for the early onset of medial osteoarthritis, with an odds ratio of 3.54. [5]

Medial compartment osteoarthritis is also a very common condition in patients with varus malalignment. In addition, meniscectomy aggravates the varus alignment. In the meantime, the varus alignment was observed to potentially compromise the ACL or the ACL graft by increasing the ligament tension. [6]

Accordingly, the combination of the 2 pathologies of medial compartment osteoarthritis and ACL injury was one of the "most difficult diagnostic and treatment dilemmas that a clinician may be required to manage." [7]

Commonly occurring in young individuals, acute ACL injuries tend to predispose patients to an early onset of osteoarthritis at the age of 30 to 50 years. Although ACLR provides restoration of anterior knee stability, the development of osteoarthritis after ACLR seems to undergo little intervention. (8)

The optimal surgical procedure to address both ACL deficiency and medial compartment OA has been controversial: ACL reconstruction alone, high tibial osteotomy (HTO) alone, staged combined ACL reconstruction and HTO, and a combination of ACL reconstruction and HTO have all been explored. (9)

AIM OF THE WORK

The aim of this study was to review the literatures about simultaneous and staged anterior cruciate ligament reconstruction and opening wedge high tibial osteotomy in patient with ACL deficiency and varus malalignment as regard clinical outcomes and complications.

REVIEW OF LITERATURE

Anatomy of Anterior Cruciate Ligament

The ACL controls anterior movement of the tibia and inhibits extreme ranges of tibial rotation. The ACL consists of 2 major bundles, the posterolateral bundle (PL) and the anteromedial bundle (AM). The component ACL bundles are named based on their tibial insertion. (10)

Both bundles originate on the posteromedial side of the lateral femoral condyle and insert on a region just anterior to the intercondylar tibial eminence (**Figure 1**) (11)

The broad ACL tibial insertion point occurs so that there is no physiological impingement on the intercondylar notch in full extension. (12) Placement of the ACL graft insertion into the tibia during reconstructive surgery must adhere to this principle. Mean length of the AM bundle is 33 mm and is 18 mm for the PL bundle. (13) The width of the ACL in cadavers ranged from 7 to 17 mm, with the average being 11 mm. Average ACL cross-sectional area is 36 and 47 mm2 for women and men, respectively. (14)

The ACL is composed of type I collagen fibers. Dissection by **Giuliani et al.,** (10) found that the primary blood supply to the ligament comes from the middle genicular artery, with additional supply coming from the infero-medial and inferolateral genicular arteries. There are also many types of