

Comparison of Clinical and Radiographic Outcomes between Minimally Invasive Lateral Approach and Mini-Midvastus Approach in Total Knee Arthroplasty

Chaiyaporn Siramanakul MD*,
Pornpavit Sriphirom MD**

* Department of Orthopaedics Surgery, Banphaeo Hospital (Prommitr Branch), Bangkok, Thailand

** Department of Orthopaedics Surgery, Rajavithi Hospital, Bangkok, Thailand

Objective : To compare clinical and radiographic outcome between minimally invasive lateral approach and mini-midvastus approach in total knee arthroplasty.

Material and Method: Patients with 28 knees were underwent total knee arthroplasty. They were divided into two groups. 14 knees were underwent total knee arthroplasty with lateral approach and the other 14 knees were operated with mini-midvastus approach. Clinical evaluation was done with visual analog scale from the second day to the fifth day after surgery. WOMAC score and range of motion was recorded at the third month. Including operative time and incision length was evaluated. Prosthetic component angles was measured with radiographic evaluation at the third month.

Results: The results revealed no significant difference between lateral approach and mini-midvastus approach in terms of visual analog scale, incision length, operative time, range of motion, WOMAC score and prosthetic alignment.

Conclusion: Lateral approach in total knee arthroplasty had no difference clinical and radiographic outcomes compare with mini-midvastus approach.

Keywords: Lateral approach, Mini-midvastus approach, Minimally invasive total knee arthroplasty

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Total knee arthroplasty (TKA) has led to excellent long-term results with survival rates of more than 95%⁽¹⁾. Short-term results are also important. Pain and impaired quadriceps muscle function may lead to prolonged rehabilitation⁽²⁾. Minimally invasive surgery (MIS) in total knee arthroplasty (TKA) has previously been perceived as a challenging operation, the technique has gained popularity over the last decade. The main focus has been on reducing quadriceps damage⁽³⁾. Various studies have shown beneficial results, including reduced postoperative pain, reduced length of hospitalization and earlier return to full function⁽⁴⁾.

Tria and Coon⁽⁵⁾ reported on a minimally invasive technique referred to as quadriaps sparing approach. This approach has not yet been accepted as true quadriceps sparing technique, since the inferior

edge of the vastusmedialisobliquus inserts at the midpole of the patella in most cases^(6,7). Then, this approach often requires detachment of the vastus media lisobliquus muscle. The MIS lateral approach was reported by Seyler et al⁽⁸⁾. The direct lateral approach describes in the present report is a true quadriceps sparing approach that facilitates a very rapid recovery and return to normal function at early follow-up⁽⁹⁾.

The purpose of the present study was to investigate short-term clinical and radiographic result of lateral MIS-TKA to compare the results from medial MIS-TKA.

Material and Method

The authors collected data from 28 osteoarthritis knees of 26 patients. All patients need TKA due to failed conservative treatment. Fixed valgus or varus and deformity more than 15 degrees were excluded. The present study was divided and randomized the patients into 2 groups. The first group of 14 knees were underwent primary TKA using lateral approach. The second group of 14 knees were used mini-midvastus approach. The implant used was

Correspondence to:

Siramanakul C, Department of Orthopaedics Surgery, Banphaeo Hospital (Prommitr Branch), 12 Sukhumvit 39, Bangkok 10110, Thailand.

Phone: 0-2259-0333, Fax: 0-2258-4751

E-mail: chaisira@hotmail.com

posterior-stabilized prosthesis (LPS-FLEX; Zimmer, Warsaw, IN, USA).

Surgical technique of lateral approach

The patient lies on operating table in a supine incision. Lateral parapatellar skin incision of 9-11 cm in length from 2 cm above lateral epicondyle to Gerdy's tubercle. The fascia is incised from 1-2 cm distal to midpoint between Gerdy's tubercle and tibial tubercle, extending proximally along anterior margin of iliotibial band as far as 2-3 cm proximal to superior pole of patella. After incision of fascia the muscle belly of vastus lateralis obliquus is exposed and retracted medially with patella. The iliotibial band and tibialis anterior muscle are detached from Gerdy's tubercle and the ridge of tibia. Through the lateral arthrotomy. Anterior horn of lateral meniscus are excised. Dissection is then continued by placing soft tissue retractors underneath patellar tendon. The surgeon can visualized anteromedial surface of tibia. All TKA was done using measured resection technique with distal femoral cut first.

Postoperative management

All patients were received spinal anesthesia during surgery and same postoperative pain management. The second day after surgery, all patients were performed range of motion exercise by physical therapist. The third day after surgery, the patients were started full weight walking with walker.

Clinical evaluation

Clinical evaluation was performed with use of Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC). Pain assessment with visual analog scale was performed four days after surgery. Range of motion was evaluated before and three months after surgery. Incision length and operative time were collected.

Radiographic evaluation

Weight-bearing, long leg radiography of the limb was performed two weeks after surgery. Measurement included component angles as defined by the Knee Society⁽¹⁰⁾. Coronal femoral component angle (angle between femoral shaft and transcondylar line of the femoral component) and coronal tibial component angle (angle between mechanical axis of tibia and tibial base plate) were evaluated in AP view. Sagittal femoral component angle (angle of femoral component flexion) and sagittal tibial component angle

(posterior slope angle of tibial component) were evaluated in lateral view.

Statistical analysis

The data were subjected to averaging and statistical analysis. Paired sample t-test and Mann-Whitney test were used for statistical analysis. All p-values less than 0.5 were considered significant.

Results

Lateral approach group had 9 varus knees (average 9.11 degree) and 5 valgus knees (average 9.00 degree) with anatomical axis measurement. Mini-midvastus approach had 12 varus knees (average 9.67 degree) and 2 valgus knees (average 11.00 degree). No statistically significant difference in mean deformity between two groups (Table 1).

No statistically significant difference in visual analog scale from the second day to the fifth day after surgery between two groups (Table 2).

No significant difference in range of motion pre-operation, the fifth day and the third month after surgery between two groups (Table 3).

Incision length of lateral approach group was 9.46 cm and mini-midvastus group was 9.46 cm. No difference in incision length between two groups (p-value > 0.05).

Operative time of lateral approach group was 110.17 minutes and mini-midvastus group was 103.57, no statistically significant difference between two groups (p-value > 0.05).

No significant difference between two groups in WOMAC score before and three months after surgery (Table 4).

Radiographic analysis revealed no statistically significant difference between two groups in prosthetic alignment (Table 5).

Discussion

Keblish was the first person that recommended a lateral approach for TKA in the valgus knee and the technique was refined by Buechel^(11,12).

It has become unpopular because it is considered to be technically more demanding and elevation of the tibial tubercle is recommended. In valgus knee, the lateral and patellofemoral compartments are usually disease and it would therefore seem logical that this would be deal with most effectively by lateral approach. The most cases had varus deformity. The difficulties of the lateral approach in varus knee are exposure and doing medial release at

Table 1. Mean deformity between two groups

Deformity	Lateral Approach	Mini-midvastus	p-value
Mean	9.29 ± 9.90	9.34 ± 3.39	> 0.05

Table 2. Visual analog scale after surgery

	Lateral	Mini-midvastus	p-value
2 nd day	3.72 ± 2.06	4.18 ± 2.52	> 0.05
3 rd day	3.25 ± 1.48	3.71 ± 1.95	> 0.05
4 th day	2.82 ± 1.27	2.50 ± 1.47	> 0.05
5 th day	2.68 ± 1.17	2.32 ± 1.64	> 0.05

Table 3. Range of motion

ROM	Lateral	Mini-midvastus	p-value
Pre-operation	116.00 ± 10.61	118.29 ± 11.88	> 0.05
5 th day	94.14 ± 10.72	93.21 ± 8.46	> 0.05
3 rd month	104.50 ± 28.54	116.29 ± 8.54	> 0.05

Table 4. WOMAC score pre-operation and three months after operation

	Lateral	Mini-midvastus	p-value
Pre-operation	39.00 ± 14.21	34.00 ± 13.48	> 0.05
3 months after operation	7.21 ± 7.45	5.64 ± 5.26	> 0.05

Table 5. Prosthetic alignment between lateral approach and mini-midvastus approach

	Lateral	Mini-midvastus	p-value
Coronal femoral component angle	90.00 ± 0.00	91.93 ± 3.34	> 0.05
Coronal tibial component angle	90.57 ± 1.22	91.29 ± 2.16	> 0.05
Sagittal femoral component angle	4.86 ± 5.69	3.86 ± 6.46	> 0.05
Sagittal tibial component angle	85.14 ± 3.82	86.57 ± 3.63	> 0.05

medical side of tibia. Then limitation of lateral knee approach in varus knee is severe varus deformity. Although how much deformity can be accepted for lateral approach remains unclear, at present fixed deformity is considered as a contraindication⁽¹³⁾.

As a result, consequence pain score after TKA had no difference between lateral approach and mini-midvastus approach. YasuoNiki et al reported that lateral MIS TKA patients complained of very little knee pain and displayed lower VAS scores for pain on

postoperative day 7 than patients who underwent medial MIS-TK⁽¹³⁾. The result of the present study is difference according to the authors was determined VAS only five days after surgery and postoperative pain regimen was difference.

From the result there was no significant difference between lateral approach and mini-midvastus approach in clinical assessment using WOMAC score, range of motion 3 months after surgery. Operative time and incision length were similar between groups, either



Fig. 1 Skin incision in lateral approach



Fig. 2 Lateral arthrotomy

way lateral approach is not difficult to do. Radiographic analysis revealed that no significant difference of prosthetic alignment between groups. Lateral approach to precisely position the prosthesis as mini-midvastus approach. Limitation of this study is small sample size and different deformity between groups.

Conclusion

The present study shows lateral approach with clinical result and radiographic result has no statistically significant difference from mini-midvastus approach.

Potential conflicts of interest

None.

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การศึกษาเปรียบเทียบผลการผ่าตัดและภาพรังสีระหว่างการเปิดแผลด้านข้างเข่าและการเปิดแผลด้านในเข่าชนิดบาดเจ็บกล้ามเนื้อน้อยในการผ่าตัดเปลี่ยนข้อเข่าเทียม

ชัยพร ศิระมานะกุล, พรภวิษญ์ ศรีภิรมย์

วัตถุประสงค์: เพื่อศึกษาเปรียบเทียบผลการผ่าตัดและภาพรังสีระหว่างการเปิดแผลด้านข้างเข่าและการเปิดแผลด้านในเข่าชนิดบาดเจ็บกล้ามเนื้อน้อยในการผ่าตัดเปลี่ยนข้อเข่าเทียม

วัสดุและวิธีการ: เป็นการศึกษาผู้ป่วยข้อเข่าเสื่อม โดยการผ่าตัดเปลี่ยนข้อเข่าเทียมจำนวน 28 เข่า โดยแบ่งผู้ป่วยเป็น 2 กลุ่ม กลุ่มแรกจำนวน 14 เข่าผ่าตัดเปลี่ยนข้อเข่าเทียมด้วยการเปิดแผลด้านข้าง กลุ่มที่สองจำนวน 14 เข่าผ่าตัดเปลี่ยนข้อเข่าเทียมด้วยเปิดแผลด้านในชนิดบาดเจ็บกล้ามเนื้อน้อย โดยเปรียบเทียบผลการรักษาโดย วัดความเจ็บปวด วันที่สองถึงวันที่ห้าหลังผ่าตัด วัดองศาการงอเข่าหลังผ่าตัดสามเดือน วัดขนาดแผล วัดเวลาที่ใช้ผ่าตัด WOMAC score หลังผ่าตัดสามเดือนและ วัดเปรียบเทียบการวางตำแหน่งข้อเข่าเทียม

ผลการศึกษา: วิธีผ่าตัดข้อเข่าเทียมโดยเปิดแผลด้านข้างและด้านในเข่าไม่แตกต่างทางสถิติ ในเรื่องความเจ็บปวด วันที่สองถึงห้าหลังผ่าตัด องศาการงอเข่า ขนาดแผลผ่าตัด เวลาที่ใช้ผ่าตัด WOMAC score หลังผ่าตัดสามเดือน และการวางตำแหน่งข้อเข่าเทียม

สรุป: การผ่าตัดเปลี่ยนข้อเข่าเทียมโดยการเปิดแผลด้านข้างได้ผลการรักษาและภาพรังสีของตำแหน่งข้อเข่าเทียมไม่แตกต่างกันทางสถิติเทียบกับการเปิดแผล ด้านในชนิดบาดเจ็บกล้ามเนื้อน้อย
