

Functional Outcome of Varus versus Valgus knee in primary Total Knee Arthroplasty

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ABSTRACT

Introduction: Total knee arthroplasty (TKA) is the surgical treatment of choice for advanced OA change after the failure of other modes of conservative management in appropriately selected patients. There are two designs of implants used for TKA: Unconstrained, including cruciate-retaining, cruciate substituting, and mobile-bearing knees and Constrained, including hinged and non-hinged. However, the unconstrained type is the most common type, used for uncomplicated knee problems, synthetic constituents introduced inside the knee not connected for each other, constancy constructed inside the scheme, and trusts in the patient's ligaments and muscles.

Method: Retrospective study, conducted (from January 2014 to January 2018) as a comparative study between primary Varus PS and valgus PS total knee replacement. Forty patients were collected, twenty-four of them were females, and sixteen were males. These patients were divided into two groups according to deformity (Varus or valgus). A detailed history was taken from all patients, including pre-operative and post-operative history. In addition, data were collected from patient's files.

Results: After the final follow-up, we found significant improvement in the knee and functional scores post-operatively for each group. We found no significant statistical difference between the two groups post-operatively when comparing their results using the knee and functional scores.

Conclusion: There were no significant statistical and clinical differences in the functional outcome after a four-year follow-up period between Varus and valgus groups.

Keywords: Functional outcome, Knee Society Score, Primary TKA, Valgus, Varus.

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INTRODUCTION

Total knee arthroplasty (TKA) is the surgical treatment of choice for advanced osteoarthritis after the failure of other modes of conservative management in appropriately selected patients. There are two designs of implants used for TKA: Unconstrained, including cruciate-retaining, cruciate substituting, and mobile-bearing knees, and constrained, including hinged and non-hinged. However, the unconstrained type is the most common type, used for uncomplicated knee problems, artificial constituents introduced inside the knee are not connected, have no steadiness built into the structure, and trust the patient's ligaments and muscles. The goal of TKA is to get pain-free, near the normal range of motion, restore normal daily activity, and improve life and a more active lifestyle.¹ The alignment methods in TKA include the following: standard technique; whichever the tibial or the femoral osteotomy may

be done primary. Cut off the valgus at femur distally in concept is the variance between the anatomic and mechanical axes, femoral shift use as the anatomic orientation. The patient's build habitus determined the distal femoral valgus, usually decreasing around 5–6 grades of valgus. Valgus knees are usually cut in 4–5 grades of valgus, varus, and usually, united knees are cut at 5–6 grades of valgus.² The anatomical technique is to reproduce normal knee kinematics with a PCL retentive prosthesis; Hungerford and Kenna used an anatomic technique of lower extremity arrangement for TKA. 9–10 grades of Femoral valgus is usual at an anatomic, the tibial cut is finished in 2 to 3 grades of Varus, by making an anatomic 6 to 7 grades of lower extremity valgus.² A knee valgus deformity presents a unique challenge when performing a total knee arthroplasty, typically defined by an anatomic valgus of >10 degrees. The valgus deformity is more commonly found

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in rheumatoid arthritis, post-traumatic arthritis, and metabolic bone disease or after tibial osteotomy. However, most cases are secondary to osteoarthritis.³ Valgus deformities have been classified into three subtypes by Krackow. In a kind I malformation, there is least valgus angulation besides least extending of median soft tissue. A kind II valgus knee, most deformity > 10⁰, significantly weakened the median soft tissue. A kind III malformation is an acute osseous malformation that happens afterward a previous osteotomy; bungling medial soft tissue covers.⁴ Valgus deformities may be managed by one of three general methods. First, the contracted lateral structures can be released until the lateral compartment is balanced with the more lax medial compartment; this often requires placing a more oversized polyethylene insert to compensate for the excessive loose gaps in flexion and extension. Second, the lax medial soft-tissue structures may be tightened until the medial compartment is balanced with the more contracted lateral compartment.⁵⁻⁷ Finally, the surgeon can place a component constrained in the coronal plane to compensate for the soft tissue laxity 8 mechanically. The study aims to evaluate the functional outcome of patients who underwent TKA for Varus and valgus using the knee and functional scores and compare the post-operative results of both groups.

METHOD

Retrospective study, conducted (from January 2014 to January 2018) as a comparative study between primary Varus PS and valgus PS total knee replacement, including a review of their perioperative courses. Inclusion criteria: TKR due to osteoarthritic changes, patients’ agreement to participate in this study, and patients’ deformity (up to 20 degrees). Exclusion criteria: post-traumatic arthritis, total revision knee, morbid obesity, patients that already have known ruptured collateral ligament of the knee joint, and rheumatoid patients. Patients’ data that were admitted in the orthopedic department of the medical city center through the study period were reviewed, looking for patient files that meet inclusion criteria. Data collected included: gender of the patient, age, type of pathology (osteoarthritic changes), time of surgery, anatomical site of surgery (RT. or LT.), type of deformity (Varus knee or valgus knee), the weight of the patients, and post-operative rehabilitation course. The collected data for all groups (Varus and valgus), including the history of pain, stability, flexion and extension, range of motion, and x-ray of patients (pre-operative) and at time of the study (post-operative), were done. Statistical analysis done by SPSS 22, categorical variables presented as frequencies and percentages, continuous variables presented as (mean ± standard deviation). T-test to show the difference between means of continuous data. P-value less than or equal to 0.05 is significant.

RESULTS

Forty patients were collected, 24 of them were females, and sixteen were males. These patients are divided into two groups according to deformity (Varus or valgus). And KNEE SOCIETY SCORE (KSS) is applied as in Table 1.

Regarding the knee score, the data were collected for both groups as follows: the mean and standard deviation of group A (Varus knee) was 77.5 ± 8.65, while the mean and standard deviation of group B (Valgus knee) was 75 ± 8.02 and when comparing the means of both groups it was found that there is no significant difference between both groups. P-value (0.096) as shown in Figure 1 and Table 2:

Regarding the functional score, the data were collected for both groups as follows: the mean and standard deviation of group A was 70 ± 7.59, while the mean and standard deviation of group B was 65 ± 6.85 and when comparing the means of both groups, it was found that there is no significant difference between both groups. p-value (0.163) as shown in Figure 2 and Table 3.

DISCUSSION

Total knee arthroplasty (TKA) is the surgical management of choice for advanced arthritic knee joints after the failure of



Figure 1: Show the post-operative means of the knee score of both groups.

Table 1: Distribution of the patients by socio-demographic factors.

Variables	Numbers
Gender	16 males
	24 females
Deformity	9 Varus
	7 valgus
	11 Varus
	13 valgus
	20 patients Varus
	20 patients valgus

Table 2: Show the comparison of the knee score between both groups.

Group	Post-operative (mean ± SD)
Varus	77.5 ± 8.65
Valgus	75 ± 8.02
p value	0.096

p-value less than 0.05 (not significant).

Table 3: Show the comparison of the functional score between both groups.

Group	Post-operative (mean ± SD)
Varus	70 ± 7.59
Valgus	65 ± 6.85
p value	0.163

p-value less than 0.05 (not significant).



Figure 2: Show the post-operative means of the functional score of both groups.

other modes of management in appropriately selected patients. It is an effective treatment for most patient-facing the painful knee. Varus and valgus deformities are the most common malalignments that need intervention.¹ In Varus, knee group:

Sandesh reddy Yaratapalli et al. studied in 2015 that were designed to evaluate the knee and functional scores for varus knee at follow-up 3.5 years, and the results were good to excellent. The knee and functional scores were 29.45 (range: 15–52) and 26.50 (range: 10–40), respectively. The score improves to 84 (range: 60–92) and 79.5 (range: 70–90), respectively.⁹

A S Sidhu et al. in 2011, their study showed that the TKR delivers an unmatched enhancement in the symptoms of illness, malformation, steadiness, and wellbeing in persons who have OA modifications. Post-follow-up for 1 year showed 57 patients become very well, 12 patients well, and 5 patients fair after assessment according to knee civilization score.¹⁰ *Hatem M.A. Bakr et al.* study in 2016, the knee score (Knee Society Clinical Rating System) increased from a mean of 32 degrees (range: 12–48) to a mean of 92 degrees (range: 59–100 degree). The function score improved from a mean of 32 points (range: 10–68 points) to a mean of 90 points (range: 60–100 points). The radiographic follow-up assessment showed no osteolysis, radiographic loosening, or component subsidence except in one patient, where they had graft resorption with the poor final functional result. They had 15 knees with excellent results at the final follow-up, 12 with good, two with fair, and one with poor functional results.¹¹ In the current study, there is a significant improvement in the varus group, which had well to excellent results in both knee score ($m \pm SD$: 77.5 ± 8.65) and function score ($m \pm SD$: 70 ± 7.59) post-operatively in subsequent follow-up.

In the valgus knee group: the *LÜHS et al.* studied in 2005 (which involve 74 patients, 11 males and 63 females), the patient follows up of up to 33.8 months (5 month–9 years), the average kss improved from 22.7 points (0–48) point preoperatively to 81.7 points (rang 71–93) post-operatively. The function score improved from 26.5-points pre-op to 86.3 points post-operative.¹² *Nakano N et al.* study shows that 26 patients with a total of 27 valgus knees who suffered TKA with the NexGen LPS-Flex insert were medically and X-ray assessment post most minor follow-up of two years. As Knee Society Mark

in addition to Knee Society Function Mark for diagnosis of OA before and after surgery. Mean score of knee society before surgery 43 and after surgery 82, while the mean score of knee functional before surgery was 41 and after surgery 81.¹³ *Mahmoud Jabalameli et al.* study showed that the age of patients was 68 years old (52–83), with follow-up period 48 months (12–100) months. KSS become well after surgery than before, 42 with range (20–69) to become 90 with range (67–99). functional KSS develop better significantly, 52 to become 86 after follow up of patients.¹⁴

In the current study, there is a significant improvement in the valgus group. Which had well to excellent results in both knee score ($m \pm SD$: 75 ± 8.02) and function score ($m \pm SD$: 65 ± 6.85) post-operatively during follow up. *Chou et al.* showed a difference between Varus and valgus malformations before and after operation in factors of TKA consequence. 83 patients have valgus, and 949 have Varus; all these patients followed up for 6 years. Rendering to the KSS assessment, there is no significant difference between Varus and valgus (KSS = 91.6, KSS = 91.4) respectively¹⁵. *Karachalios et al.* also have the same results that after follow-up patients with varus and valgus for 6 years post-TKA, KSS= 81 for patients with varus after surgery and KSS=80.9 for patients with valgus after surgery with no difference statistically.¹⁶

In the current study, when comparing these two groups, there were no clinical and statistical differences at the final follow-up. Regarding the knee score, it was found that there is no significant difference between both groups, P-value (0.096). While the functional score, it was found that there is no significant difference between both groups.

CONCLUSION

In this study, we found significant improvement in the means of knee and functional scores post-operatively of both the Varus and valgus groups. While when we compare the post-operative results of both groups, we found no significant statistical difference between the two groups using knee and functional scores using the Knee Society Score.

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