

Study of Sequential Release for Genu Valgum Correction in Total Knee Replacement

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Received: 01-07-2026 / Revised: 15-08-2026 / Accepted: 21-09-2026

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Conflict of interest: Nil

Abstract

Background: This study introduces a new soft tissue release technique designed to balance valgus knees, aiming to prevent unacceptably high rates of late-onset instability and the necessity for primary constrained implants. This study describes the soft tissue release technique and its long-term results when performed during primary total knee replacement in patients with severe valgus knee deformity.

Method: 66 adult patients aged between 18 and 35 underwent unilateral total knee replacement. 11 (16.6%) patients required screws and alignment, 33 (50%) required release of the post-lat capsule, and 22 (33%) patients underwent both post-lat and pie-crusting of the iliotibial band.

Results: Clinical manifestations were 25 (37.8%) who had rheumatoid arthritis, 19 (28.7%) who had osteoarthritis, and 11 (16.6%) who had childhood metabolic disorders (rickets). The parameters of effects of lateral release pre- and post-surgery, viz., valgus angle, flexion deformity, ROM, pain, walking score, total knee score, and total functional score, had a significant p-value ($p < 0.001$); 33 (50%) had release of the post-lateral capsule; 22 (33%) had both post-lateral and pie-crusting of the iliotibial tract; 11 (66.6%) had screw alignments; 25 (37.8%) had rickets; and 11 (16.6%) had post-traumatic arthritis.

Conclusion: The present study is a standard procedure with excellent results for the treatment of advanced arthritis, which leads to genu valgum.

Keywords: Rhumatoid Arthritis, Knee score, Genu, Flexion, ROM.

DOI: 10.25258/ijcpr.18.10.70

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Introduction

The goals of a total knee replacement for a fixed valgus deformity are similar to those of the varus knee, i.e., the creation of balanced extension and flexion gaps and restoration of the proper mechanical alignment of the lower limb. Nevertheless, the technique is still a matter for discussion regarding whether it requires the medial or lateral approach and which structures should be released to correct a fixed deformity [1].

Some of the surgeons use the medial approach, but this, located on the opposite of the retracted structures, often necessitates the release of the patellar lateral retinaculum with a consequential risk of devascularization [2]. It is proposed that a

lateral approach, which has none of these disadvantages but requires the proper knowledge of a new technique. Moreover, its use is limited by an increased risk of proximal patella migration due to release of the patellar tendon insertion [3]. There are different techniques that have been proposed to relax the tight structures.

The lateral collateral ligament and popliteus tendon tight in flexion can be released subperiosteally at the lateral condyle using a lateral femoral sliding osteotomy or sectioning them at the level of their insertion. The pie crusting technique reduces the posterolateral structures and tightens the iliotibial tract band in extension. Some surgeons use a Z- or

V-Y-shaped incision or transverse cut above the articulation. The lateral approach also allows automatic iliotibial tract division and elevation from the Gerdy's tubercle to be taken in continuity with the anterior compartment fascia and release of the attachment of the lateral part of the femur [4]. Hence, an attempt is made to sequential release for genu valgum correction in total knee replacement.

Material and Method

66 (sixty-six) adult patients aged between 18 and 35 years visiting MNR Medical College and Hospital, Sangareddy-502294, Telangana, India, were studied.

Inclusive Criterion: The patients with valgus ($>10^\circ$) knee deformity of the type I or II with Krakow's willing for total knee replacement were included, and patients who gave their consent in writing were selected.

Exclusion Criterion: The patient having valgus determining $<10^\circ$ (less than 10°), previously operated for high tibial osteotomy, and Krack-Kow type III valgus deformity patients having cardiac and neurological complications. Immune-compromised patients were excluded from the study.

Method: Past history of every patient was noted; routine blood exam, CBC, and RBC were ruled out. Preoperatively each valgus knee was evaluated for degree of alignment, flexion contracture, and ligamentous instability. Preoperative radiography was a scan of lower limbs, standing AP and lateral, and skyline views of the pelvis [5].

The knee society clinical and functional scanning system was used for preoperative and postoperative evaluation. With slight modification of knee alignment scanning [6,7]. With the knee society score, points are deducted when the anatomic alignment of the knee is $<50^\circ$ or $>100^\circ$ of valgus. But the aim of alignment was 30 to 50.

The scanning system was modified so that deductions were made for alignment $<20^\circ$ or $>70^\circ$ of valgus. The clinical and functional scores were more than 85 points, which were classified as excellent; 70 to 84 points were as good; 60 to 69 points were as fair; and <60 points were as poor.

Surgical Procedure: Spinal and epidural anesthesia were given to patients, a standard medial parapatellar approach was taken, and the posterior cruciate ligament was resected. The distal femoral cut was taken in 3° of valgus in relation to the anatomical axis of the femur as compared to the typical 5° to 7° of valgus used for a varus knee. Knee was then flexed and proximal tibial surface was cut at 90° and proximal tibial surface was cut at 90° to its long axis, after the proximal tibial and distal femoral bone cuts were made, the knee was

extended and was distracted with a distracter, bringing the lateral structures under tension. Then electrocautery was used to release tight, soft tissue capsular structures in the lateral compartment intra-articularly. The release was performed transversely, from the lateral portion of the resected posterior cruciate ligament to the posterior margin of the iliotibial tract (band), to create a balanced extension gap. Caution was taken that electrocautery must not injure the peroneal nerve. Both medial and lateral soft tissue sleeves were made with an equal gap and 2 to 3 mm opening when a valgus or varus stress was applied with a spacer block in place.

If the imbalance remains in the extension gap after the intra-articular release, the ilio-tibial tract is lengthened in a controlled manner as necessary from inside with the use of the pie-crusting technique, which consists of multiple stab incisions. 1 cm above the joint line, the extension gap was again checked using a distracter, and a stab incision was made. This process continued incision until a balanced extension gap was achieved. Then balancing in flexion gap was assessed. No soft tissue releases were performed with the knee in flexion; rather, antero-posterior chambers of the femoral bone were made to adjust them to attain the correct soft tissue. The tibial cut was in fact 90° to the long axis of the tibia, and the soft tissues were balanced in extension. None of the patients required release of the lateral collateral ligament, popliteus tendon, or lateral head of gastrocnemius for balancing; four (4) patients required screw augmentation for placement of tibial components because of bony loss, while 12 (twelve) required release of the posterior-lateral capsule, and 8 (eight patients) required release of both the posterior-lateral and the piriformis of the iliotibial tract (ITT).

The duration of the study is March 2025 to June 2026.

Statistical Analysis: The effect of the lateral release technique was compared preoperatively and postoperatively, and a t-test was done at SPSS software. The ratio of male to female was 2:1.

Observation and Results

Table 1: Study of parameters of effects of lateral release of pre- and post-surgery.

- Valgus angel: $13.52^\circ (\pm 2.07)$ was pre-operative, $3.22^\circ (\pm 0.5)$ in post-operative, t-test 39.2, and $p < 0.001$.
- Flexion deformity: $8.22 (\pm 2.60)$ in preoperative, $0.43 (\pm 0.05)$ in postoperative, t-test 24.3, and $p < 0.001$.
- ROM (Range of movements): $94.26 (\pm 10.10)$ in pre-operative, $115.2 (\pm 9.2)$ in post-operative, t-test 12.4 and $p < 0.001$.

- Pain: 17.35 ($\pm$ 3.90) in pre-operative, 44.0 ($\pm$ 2.8) in post-operative, t-test 45.09 and $p < 0.001$.
- Walking score: 22.34 ($\pm$ 2.82) in pre-operative, 49.4 ($\pm$ 3.6) in post-operative, t-test 48.07 and $p < 0.001$.
- Total Knee score: 42.13 ($\pm$ 5.18) pre-operatively, 88.8 ($\pm$ 5.2) post-operatively, t-test 51.6, and $p < 0.001$.
- Total functional score: 39.62 ($\pm$ 6.60) in preoperative, 87.6 ($\pm$ 5.2), t-test 46.3, and $p < 0.001$.

Table 2:

Study of different approaches for release of correction of genu valgum.

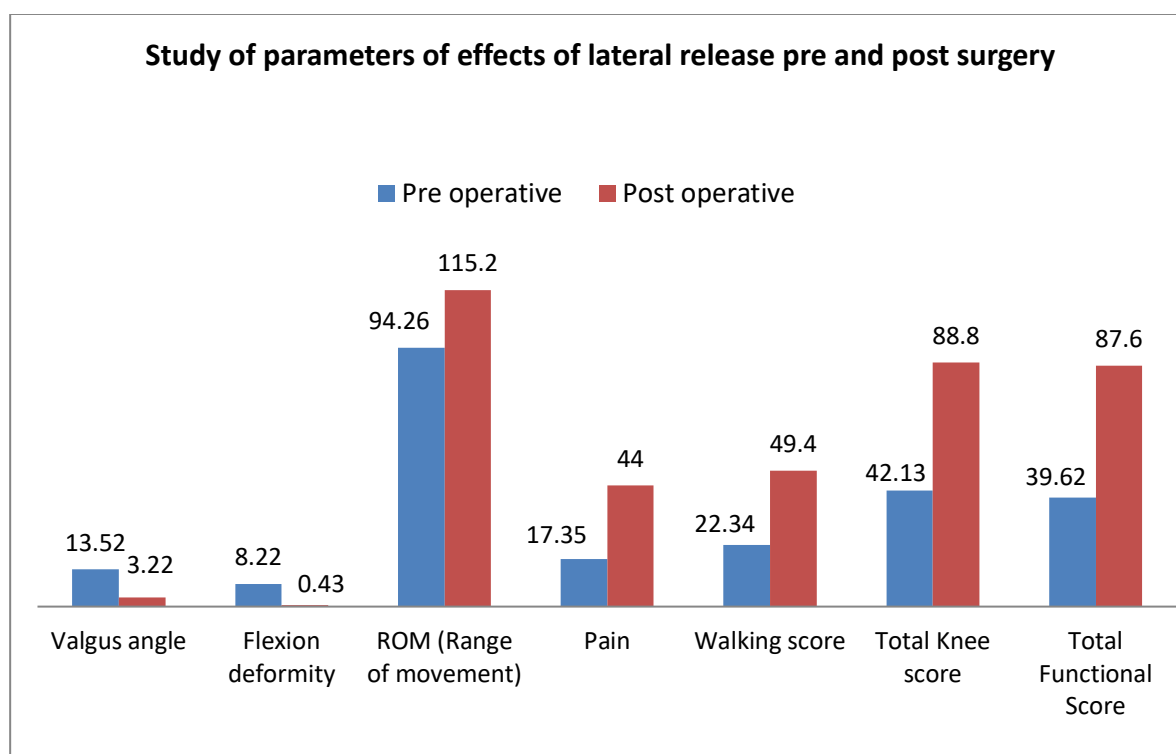
- 33 (50%) patients had release of post-lateral capsule.
- 22 (33%) patients underwent both postero-lateral and pie-crusting of the iliotibial tract.
- 11 (16.6%) patients had screw alignment.

Table 3: Clinical manifestations of genu valgum patients

- ☐ 25 (37.8%) had rheumatoid arthritis.
- ☐ 19 (28.7%) had osteoarthritis.
- ☐ 11 (16.6%) had a childhood metabolic disorder (rickets).
- ☐ 11 (16.6%) had post-traumatic arthritis.

Table 1: Study of parameters of effects of lateral release pre and post-surgery (No of patients: 66)

Parameters	Pre-operative	Post-operative	t test value	P value
Valgus angle	13.52 (SD $\pm$ 2.07)	3.22 (SD $\pm$ 0.5)	39.2	$P < 0.001$
Flexion deformity	8.22 (SD $\pm$ 2.60)	0.43 (SD $\pm$ 0.05)	24.3	$P < 0.001$
ROM (Range of movement)	94.26 (SD $\pm$ 10.10)	115.2 (SD $\pm$ 9.4)	12.4	$P < 0.001$
Pain	17.35 (SD $\pm$ 3.90)	44.0 (SD $\pm$ 2.8)	45.09	$P < 0.001$
Walking score	22.34 (SD $\pm$ 2.82)	49.4 (SD $\pm$ 3.6)	48.07	$P < 0.001$
Total Knee score	42.13 (SD $\pm$ 5.18)	88.8 (SD $\pm$ 5.2)	51.6	$P < 0.001$
Total Functional Score	39.62 (SD $\pm$ 6.60)	87.6 (SD $\pm$ 5.2)	46.3	$P < 0.001$

**Figure 1: Study of parameters of effects of lateral release pre and post surgery****Table 2: Study of different approach for release of correction of genu valgum**

SL No	Particular	No. of patient	Percentage
1	Release of post lat capsule	33	50%
2	Under went both postero-lateral and pie-crusting of Ilio-tibial Band	22	33%
3	Screw alignments	11	16.6%

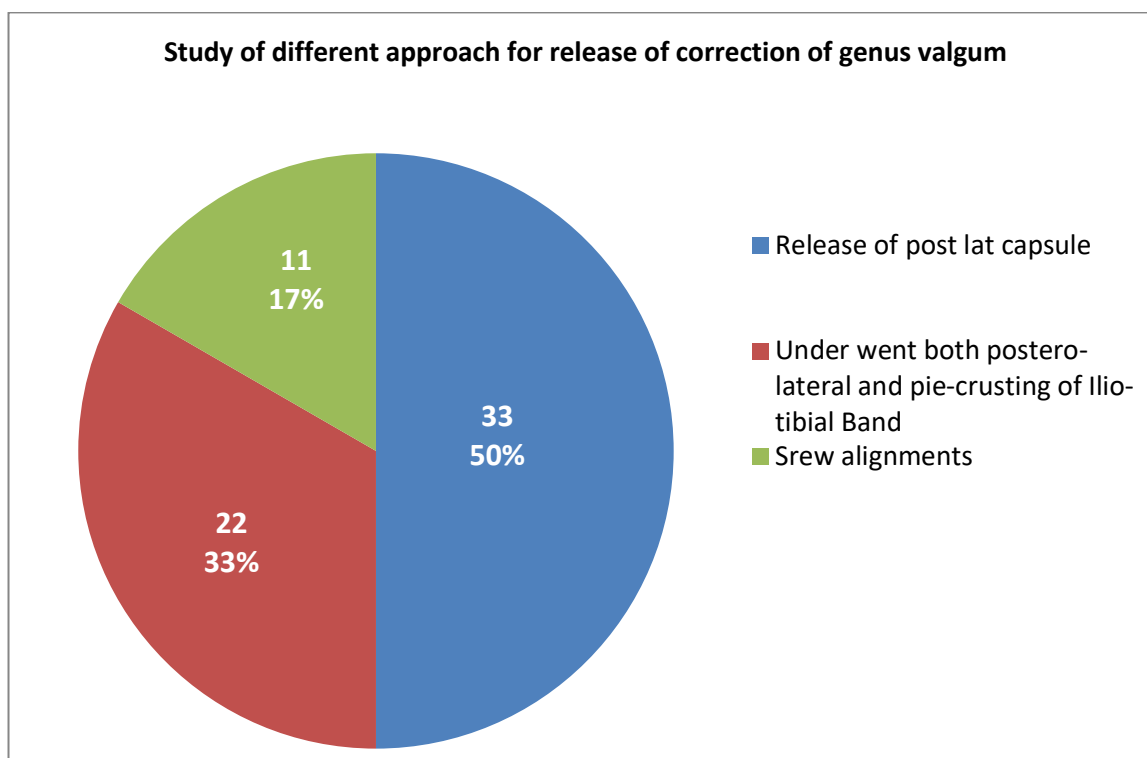


Figure 2: Study of different approach for release of correction of genu valgum

Table 3: Clinical Manifestation of Genu Valgum patients (No. of patients: 66)

Sl No	Manifestation	No. of patients	Percentage
1	Rheumatoid arthritis	25	37.8%
2	Osteoarthritis	19	28.7%
3	Childhood Metabolic disorder (Rickets)	11	16.6%
4	Post-traumatic arthritis	11	16.6%

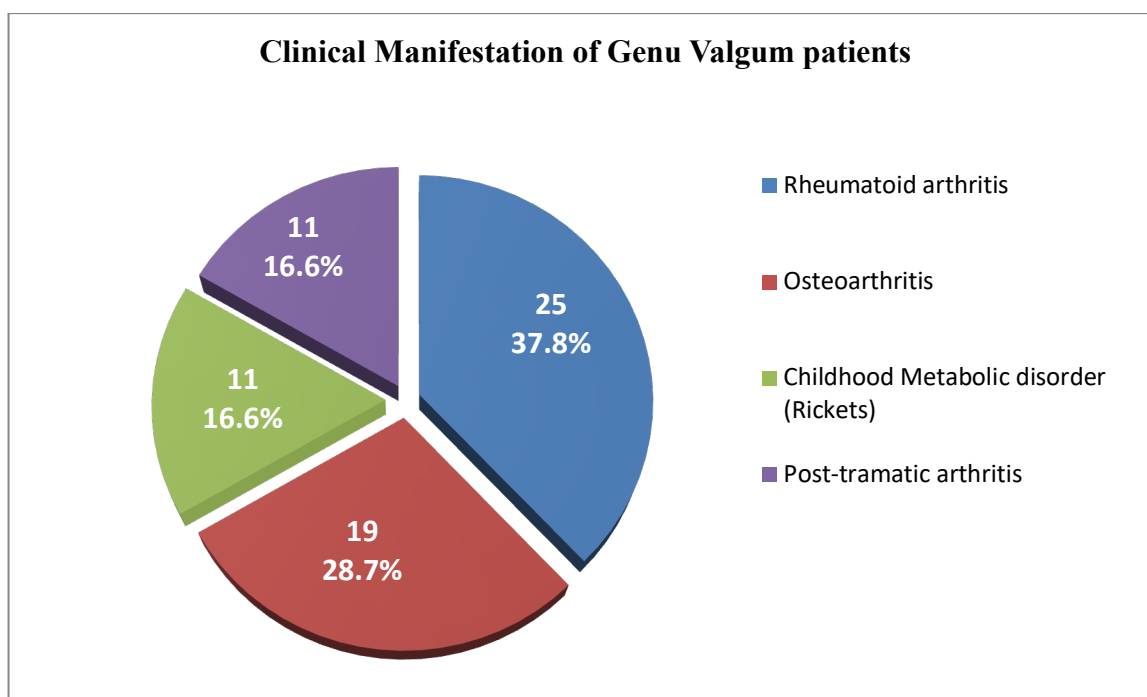


Figure 3: Clinical Manifestation of Genu Valgum patients

Discussion

In the present study of release for correction of genu valgum in total knee replacement in the Telangana population. The clinical manifestations were 25 (37.8%) who had rheumatoid arthritis, 19 (28.7%) who had osteoarthritis, 11 (16.6%) who had rickets, and 11 (16.6%) who had post-traumatic arthritis (Table-3). The various approaches included release of the post-lateral capsule (33, 50%), 22 (33%) who underwent both postero-lateral and pie-crusting of the iliotibial band, and 11 (16.6%) who had screw alignment (Table-2). In the comparison of preoperative and postoperative effects of lateral release. Valgus angle, flexion of deformity, ROM, pain, walking score, total knee score, and total functional score had a significant p-value (Table-1). These findings were more or less in agreement with previous studies [8,9,10].

Although the sequencing of lateral release was controversial in 2003 (by the Western France Orthopedic Society) as there were four types of approaches for valgus knee, where the medial approach had only medial laxity and there was patellar dislocation and the medial location was partially reducible, hence the sequencing of the lateral approach was preferred and the total knee score was 88.9 and the functional score was 87.8, which was regarded as an excellent technique [11]. The anterolateral approach was initiated in 1991 for the lateral capsular approach for valgus knee and reported that, in the medial arthotomy, the vascular supply of the extensor mechanism is seriously impaired and the lateral view is the ideal to release the lateral contracted elements and offer a better surgical view. There is a possibility to medicate the tubercle of the required, improving the patellar tracking [12]. In the soft tissue, balancing the release of ITB and LCL. The pie-crusting technique was used. The multiple punctures have many advantages, like allowing gradual stretching of lateral soft tissues, reducing the risk of PCL instability [13], and maintaining the popliteus tendon, but only a person with nerve injury has to be safeguarded [14]. It has to be also noted that the quadriceps muscle forming the ligamentum patellar has a common insertion to prevent hyperextension of the knee and stabilize the position of the patella.

Summary and Conclusion

The present study of release for correction of genu valgum in total knee replacement. The lateral approach was ideal because of the automatic division and elevation of the iliotibial band from Gerdy's tube rule to achieve mobile and stable knees in the large majority of cases without any additional release in tight knees in extension, achieving soft tissue balancing resulting in better load distribution and enhancing component stability and longevity.

Limitation of study: Owing to the remote location of the research center, small number of patients, and lack of the latest techniques, we have limited findings and results.

This research paper was approved by the Ethical Committee of MNR Medical College and Hospital, Sangareddy-502294, Telangana, India.

References

1. Williot A, Rosset P. Total Knee arthroplasty in valgus knee orthop. Traumatol Surg. Res. 2010; 39-43.
2. Rossi R, Rosso F, Cottino U, Dettoni F, Bonasia DE, Bruzzone M. Total knee arthroplasty in the valgus knee. Int Orthop. 2014; 38(2):273-83.
3. Buechel FF. A Sequential Three-Step Lateral Release for Correcting Fixed Valgus Knee Deformities during Total Knee Arthroplasty. Clinical Orthopaedics & Related Research. 1990; 260:170-175.
4. Jaju RG, Aziz AMA, Kade MR, Salokhe SK. Sequential two stage release for genu valgum correction in total knee replacement. Int J Res Orthop. 2018; 4:254-260.
5. Ranwat AS, Ranwat CS, Elkus M. Total knee arthroplasty for severe valgus deformity. J. Bone Joint Surg. Am. 2005; 87 (suppl. 1):271-284.
6. Rossi R, Rosso F. Total knee arthroplasty in the valgus knee. Int. Orthop. 2014; 38:273-285.
7. Apostolopoulos AP. Total knee arthroplasty in severe valgus knee deformity: comparison of a standard medial para patellar approach combined with tibial tubercle osteotomy knee surg. Sports Traumatol Arthros. 2011; 19:1884-1842.
8. Rahul Gopikishan Jaju, Ansari Muqtaqdeer Abdul Aziz. Sequential two stage release for genu valgum correction in total knee replacement. Int. J. of research in orthopedics. 2018; 4(2). DOI <https://doi.org/10.8203/issn-2455-4510> viewed on August 25, 2025.
9. Elkas M, Ranawat CS. Total knee arthroplasty for severe valgus deformity. Five to fourteen year follow up. J. Bone joint surgery AM. 2004; 84-A (12):2671-2676.
10. Ranwat A, Ranwat C. Total knee arthroplasty for severe valgus deformity. J. of Bone and Joint. 2005; 87(1): 271-284.
11. Apostolopoulos AP et al. Total knee arthroplasty in severe valgus deformity. J. of orthop. Traumatol. Surg. Res. 2010; 96(7):777-784.
12. Favorito PJ, Mihalko WM. Total knee arthroplasty in valgus knee. J. Am. Acad. Orthop. Surg. 2002; 10(1):16-24.
13. Hou-shan Lu, Zhonghua Wai Ke Za Zhi. Total knee replacement in Valgus knee. 2005; 43(20):1305-1308.

14. Starek M. Total knee arthroplasty with the beznoska SVL implant: short- term results.

Acta. Chir orthop. Traumatol. 2004; 71(6):352-359.