

# Study of release for correction of genu valgum in total knee replacement in Andhra Pradesh population

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## Abstract

**Background:** The genu valgum is a comparatively less encountered deformity of knee joint bones and soft tissues deformities. Hence during surgery one must be careful about accurate axis restoration, component orientation and joint stability attainment is a difficult task. Hence release for correction of genu valgum in total knee replacement is a great challenge. **Method:** 24 patients aged between 52-76 were operated for unilateral total knee replacement 4 (16.6%) patients required screw and cement augmentation for alignment, 12 (50%) required release of post-lat capsule, 8 (33%) patients underwent both post-lat release and pie-crusting of Ilio-tibial Band. **Results:** Common causes for valgus deformity were 9 (37.5%) had rheumatoid arthritis, 7 (29.1%) had osteoarthritis, 3 (12.5%) childhood metabolic disorder (Rickets), 5 (20.8%) had post-traumatic genu valgum. Pre-operative mean value of valgus deformity is 13.50 (SD±2.09) and post-operative 3.20 (SD±0.6), pre-operative flexion deformity mean value was 8.20 (SD±0.42) post-operatively 0.42 t test 25.3 p<0.00, ROM pre-operatively is 94.2 (SD±10.2) and post operative ROM was 116 ((SD±9.4) t test – 770 p<0.01, pain pre-operatively 17.36 (SD±3.92) post operatively 44.2 (SD±2.9) t test – 26.9 p<0.00, walking score pre-operatively 22.3 (SD±2.80) was post-operatively 49.2 (SD±3.8) t test – 2.78 p<0.01. Total knee score pre-operatively is 42.15 (SD±5.20) and post-operatively 88.9 (SD±0.9) t test – 26.2 p<0.001. Total functional score pre-operative 39.6 (SD±6.62) post-operative 87.8 (SD±5.3) t test – 27.8 p<0.001. **Conclusion:** This study is standard procedure with excellent results for the treatment of advanced arthritis which leads to genu valgum.

**Key Words:** ROM, Flexion, genu, Knee score, Rhumatoid Arthritis.

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## INTRODUCTION

Correction of genu valgum with total knee replacement is a surgical challenge for orthopaedic surgeons even today apart from availability of latest technologies. Excessive pre-operative mal-alignment predisposes to a greater risk

of failure, compared to well aligned knees<sup>2</sup>. It is observed that, the restoration of the correct lower limb mechanical axis post operately; as also the normal balance of the soft tissues are crucial for the final outcome of these joint replacement operations<sup>3,4</sup> thus `the severely valgus deformed knees are related with a worse outcome verses their varus counter parts<sup>5</sup>. There are different and multifactorial etiologic parameters of knee valgus deformity (VD). Apart from congenital osteoarthritis, inflammatory arthritis, (rheumatic arthritis), post-traumatic arthritis (tibial malunion, physal arrest or tibial plateau fracture) or even over correction from a proximal tibial osteotomy performed to correct a pre-existing varus deformity. It may exist in childhood due to metabolic disorder such as rickets and renal osteodystrophy<sup>6</sup>. The genu valgus is may be aggravated due to contracted structures like lateral collateral ligament (LCL),

Posterolateral capsule (PLC). Iliotibial tract or Band(ITB), popliteus, tendon and rarely long head of biceps tendon, lateral head of gastrocnemius muscle. Hence lateral approach to knee joint for complete replacement was proved excellent Outcome Post-operately.

## MATERIAL AND METHOD

24 adult patients aged between 52-76 year visiting Narayana medical college and Hospital, Nellore were studied.

**Inclusive criterion:** Patients with valgus deformity( $>10^0$ ) of knee with Krakow's type I, II willing for total knee replacement were included in the study.

**Exclusion Criterion:** the patient having valgus deformity  $<10^0$  (less than  $10^0$ ), previously operated for high tibial osteotomy and KrackKow type III valgus deformity patients having cardiac and neurological Complications. Immune compromised patients were excluded from the study.

### Method:

Standard physical examination for end-stage degenerative knee disease has been carried out i.e. patient's gait, in order to identify other dynamic instabilities and assessment of lower limb alignment both in the supine and weight-bearing positions. Routine serology like CBC, RBS, viral markers were done. Pre-operatively each valgus knee was evaluated for degree of alignment, flexion contracture and ligamentous instability. Mandatory Pre-operative radiography protocol with scanography of both lower limbs, Standing AP and lateral, Sky line views of knee were observed. They knee society clinical and functional scoring system was used for preoperative and post-operative evaluation. With slight modification of knee alignment scanning <sup>(6)(7)</sup>. With the knee society score, points are deducted when the anatomic alignment of knee  $<5^0$  or  $>10^0$  of valgus. But the aim of alignment was  $3^0$  to  $5^0$ . The scanning system was modified so that deduction were made for alignment  $<2^0$  or  $>7^0$  of valgus. The clinical and functional scores were more than 85 points were classified as excellent, 70 to 84 points were as good, 60 to 69 points as fair and  $<60$  as poor .

### Surgical Procedure

Combined spinal and epidural anaesthesia was administered to patients, standard medial parapatellar approach and posterior cruciate ligament was resected the

distal femoral cut was taken in  $3^0$  of valgus in relation to the anatomical axis of femur as compared to the typical  $5^0$  to  $7^0$  of valgus used for a varus knee. Knee was then flexed and proximal tibial surface was cut at  $90^0$  and proximal tibial surface was cut at  $90^0$  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 iliotibial tract (band), to create balanced extension gap. Caution was taken that; electrocautery must not injure peroneal nerve. Both medial and lateral soft tissue sleeve were made 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 remain in extension gap after the intra-articular release, the ilio-tibial tract was lengthened in a controlled manner as necessary from inside with the use of pie-crusting technique which consists of multiple stab incisions. 1cm above the joint line, Extension gap was again checked using distracter and 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 chamfer of femoral bone cuts were made to adjust them to attain the correct soft tissue, the tibial cut was in fact  $90^0$  to the long axis of the tibia and that the soft tissues were balanced in extension. None of the patients required release of lateral collateral ligament, popliteus tendon or lateral head of gastrocnemus for balancing, four (4) patients required screw augmentation for placement of tibial components because of bony loss while 12 (twelve) required release of postero lateral capsule and 8 (eight patents) required release of both postero lateral and pie-crusting of Iliotibial tract (ITT). The duration of study was about 18 months (October 2018 to December 2020).

**Statistical analysis:** The Effect of lateral release technique were compared pre operatively and post-operately and t test was done at spss software. The ratio of male and female was 2:1.

This research paper was approved by the ethical committee of Narayana medical college and Hospital, Nellore. AP

## OBSERVATION AND RESULTS

**Table 1:** (No of patients: 24) Study of parameters of effects of lateral release pre and post surgery

Parameters	Pre operative	Post operative	t test value	P value
Valgus angle	13.50 (SD±2.09)	3.20 (SD±0.6)	22.8	P<0.00
Flexion deformity	8.20(SD±2.62)	0.42 (SD±1.30)	25.3	P<0.00
ROM (Range of movement)	94.28(SD±10.12)	116(SD±9.4)	7.70	P<0.001
Pain	17.36(SD±3.92)	44.2(SD±2.9)	-26.9	P<0.001
Walking score	22.33(SD±2.80)	49.2(SD±3.8)	-27.8	P<0.001
Total Knee score	42.15(SD±5.20)	88.9(SD±7)	-26.2	P<0.001
Total Functional Score	39.63(SD±6.62)	87.8(SD±5.3)	-27.8	P<0.001

**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	12	50%
2	Under went both postero-lateral and pie-crusting of Ilio-tibial Band	8	33 %
3	Srew alignments	4	16.6%

**Table 3:** Clinical Manifestation of Genu Valgum patients (No. of patients: 24)

Sl. No	Manifestation	No. Of patients	Percentage
1	Rhumatoid arthritis	9	37.5
2	Osteoarthritis	7	29.1
3	Childhood Metabolic disorder (Rickets)	5	12.5
4	Post-tramatic arthritis	5	20.8

**Table-1:** Common causes for valgus knees were 9 (37.5%) had Rhumatoid arthritis, 7 (29.1%) had osteoarthritis, 3 (5%) had Rickets, 5 (20.8%) post-tramatic arthritis.

**Tbale-2:** Study of different approach for release of correction of genu vulgum 12 (50%) released by postero-lat and pie-crusting I lio-tibial bond, 4 (16.6%) underwent screw alignment.

**Table-3:** Comparative study of various parameters of effect lateral release of genu valgum. In the study of valgus angle mean value in pre operative was 13.50 (SD±0.6) t test value was 22.8 (p<0.001).

In the study of flexion deformity mean value before surgery was 8.20 (SD±2.62) and post surgical mean value was .42 (SD±1.30) t test value was 25.3 and p<0.0001. In ROM Mean value in preoperative 94.2 (SD±10.12) and post-operative 116 (SD±9.4), t test -7.70 and p<0.0001 In the study of pain mean value 17.36 (SD±3.92) pre surgically 44.2 (SD±2.9) post-surgically t test -26.9 and p<0.001. In walking score pre-surgically 49.2 (SD±3.8) t test -27.8 and p<0.001. Total knee score pre-operative mean value was 42.1 (SD±5.20) post-operative 88.9 t test value was 26.2 p<0.001. Total functional score mean value pre-operative was 39.6 (SD±6.62) and post-operatively 87.8 (SD±5.3) t test -27.8 p<0.01.

## DISCUSSION

In the present study of release for correction of genu valgum in total knee replacement in Andra Pradesh population. Primary cause of valgus deformity were 9

(37.5%) had rheumatoid Arthritis, 7 (29.1%) had osteoarthritis 3 (12.5%) had Rickets, 5 (20.8%) had post-tramatic arthritis (Table-1). The various modalities used for balanacing included release of post lat capsule in 12 knees (50%), 8 (33%) underwent both postero-lat and pie-crusting of iliotibial Band, 4 (16.6%) had screw augmenatation for alignment (Table-2). In the comparison of pre-operative and post-operative effects of lateral release. Mean value of pre-operative 13.5 (SD±2.09) and post-operative 320 (SD±0.6) in valgus angle. In flexion deformity mean value of pre-operative was 8.20 (SD±2.62) and post-operative 0.42 (SD±1.30) t test value was 25.3 p value was highly significant (p<0.00). Range of movement (ROM) pre-operative. Mean value was 94.28 (SD±10.12), post operative 116 (SD±9.4) t test 7.70 p value (p<0.001) severity of pain. Mean value pre-operative was 17.36 (SD±3.92) post-operative. Mean value of pain was 44.2 (SD±2.9) t test value was 26.9 p value was highly significant (p<0.001) walking score mean value pre-operative was 22.3 (SD±2.80) post-operative 49.2 (SD±3.8) t test was -27.8 p value was highly significant. Total knee score mean value pre-operative was 42.1 (SD±5.20) post-operative 88.9 t test value was 26.2 p value was highly significant (p<0.001) Total functional score before surgery mean value was 39.6 (SD±6.62) and post-operatively 87.8 (SD±5.3) t test value was -27.8 and p value was highly significant (p<0.001) (Table-3). These findings were more or less in agreement with previous studies <sup>8,9,10</sup>. Although the sequencing of lateral release is controversial in 2003 (by western France orthopedician

society) as there were four types of approach for valgus knee, where medial approach had only medial laxity and there was patellar dislocation and medial location was partially reducible hence ultimately sequencing of lateral approach was preferred and total knee score was 88.9 and functional score was 87.8 which was regarded as excellence technique anterolateral approach was initiated in 1991 for lateral capsular approach for valgus knee and reported that, in the medial arthotomy vascular supply of the extensor mechanism is seriously impaired and lateral view is the ideal to release lateral contracted elements and offer better surgical view. There is possibility to medialize the tubercle of required, improving the patellar tracking<sup>12</sup>. In the soft tissue balancing the release of ITB, LCL. The pie-crusting technique was used. The multiple punctures have many advantages like- allow gradual stretching of lateral soft tissues, reduce the risk of PCL instability<sup>13</sup> and maintain popliteus tendon but only peroneal nerve injury has to be safe guarded<sup>(14)</sup>. It has to be also noted that quadriceps muscle forming ligamentum patellar has common insertion to prevent hyperextension of knee and stabilize the position of patella.

### SUMMARY AND CONCLUSION

The present study of release for correction of genu valgum in total knee replacement. The lateral approach was ideal because automatic division and elevation of the iliotibial band from Gerdy's tubercle to achieve mobile and stable knees in the large majority of cases without any additional release in tight knees in extension, achieve soft tissue

balancing resulting in better load distribution and enhancing component stability and longevity.

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