ORIGINAL RESEARCH PAPER
Volume-9 | Issue-3 | March-2020 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

"SMALL TWEAKS MAKE A BIG DIFFERENCE" CORRECTION OF SIGNIFICANT VARUS DEFORMITIES BY UKA.

Orthopaedics

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ABSTRACT

Aim: It has so far been considered challenging to correct large combined varus & flexion deformities (more than 12 degrees)with partial knee replacement. Hence UKR despite its many advantages in function & durability, remains restricted in use to a small proportion of osteoarthritic knees. Surgeons opt for the assumedly safer option of TKR which is less function friendly and not suited for Asian lifestyle. Also TKR involves extensive bone resection including often the uninvolved compartment, significant soft tissue injury & thus prolonged rehabilitation. We aimedto investigate the efficacy of correction of close to 15 degree varus and 10 degree fixed flexion deformity, by a unique combination of osteophytectomy, complete menisectomy and intraarticular peri tibial capsular release and keeping bone cuts & removal to the minimum.

Materials & Methods: 25 patients with deformities of more than 12 degrees Varus & fixed flexion deformity were enrolled for the study. All patients had primarily medial compartment affliction with relevant inclusion & exclusion criteria.

Scoring was done by VAS and Oxford knee score.

Results: reduction in VAS from 7-8 to 1-2. Mean Oxford score went up from a mean of 24 to 45 .Average correction was from 12.25 degree Varus deformity (range 8 to 16 degrees) to 3.96 degrees varus deformity (range 2.95 to 6 degrees)&7.8 degrees fixed flexion deformity (range 7 to 14 degree) to 3 degrees FFD post op.

Results were maintained for next 3 to 6 months. FFD further reduced from average 3 degree to 0 degrees over 6 months.

Conclusion: Our proposed method and protocol can help correct deformities upto 15 degrees in frontal plane and 10 degrees in sagittal plane. The good to excellent results were maintained or improved over the next 6 months.

KEYWORDS

Unicondylar knee replacement, UKR, correction, varus , valgus , menisectomy, capsular release

INTRODUCTION

Osteoarthritis of knee is a progressive degenerative disease that causes wear and tear in cartilage which reflects as pain, deformity, and functional / movement limitations. The Burden of disease is likely to increase keeping in view with increasing lifespan, busier lifestyles, lack of fitness etc[1]. In most patients of osteoarthritis knee, involvement begins with medial compartment. In almost 70% of patient's arthritis remain confined to medial compartment till their death[2]. A variety of factors, intrinsic (genetics, bone stock, pre existing bony/joint deformity) and extrinsic (weight, inflammatory arthritis, osteoporosis, trauma, previous surgery, etc.), have been accused of contributing to this altered alignment[3].In most arthritic knees, some degree of instability, deformity, contracture or a combination of these elements, can be found[3],[4,5].

Varus deformity is often combined with medial soft tissue flexion contracture with lateral soft tissue laxity. Medial soft tissue serves a static stabilizing (superficial medial collateral ligament, posterior oblique ligament and posterior capsule) and a dynamic stabilizing (*pesanserinus* and semimembranosus tendon) function. The critical structures on the medial side of the kneeinclude the superficial medial collateral ligament (sMCL) fibers on the anterior aspect, and posterior structures such as the posterior oblique ligament (POL) and the semimembranosus (SM) tendon fibers that merge into the posterior capsule[15].

Unicompartmental knee arthroplasty (UKA) is a worldwide-recognized procedure for the treatment of Unicompartmental femoro-tibial degeneration. Over the last decade, the advent of the concept of minimally invasive surgery,together with the development and refinement of surgical techniques and implant design, has led to a favorable evolution of clinical results and, consequently, renewed interest in UKA. In selected patients, UKA has been shown to be a satisfactory and less invasive alternative to total knee arthroplasty (TKA) for specific indications[6]. Several reports have recently demonstrated survival rates > 90% at 10 years or even 93% at 15 years and 90% at 20 years after UKA.[7,8,9].

We investigated the possibility of mechanical deformity correction, doing a UKA performing a 1)osteophytectomy, 2) complete menisectomy, 3)capsulotomy at the level of tibial cut, 4)and keeping bone removal to minimum.

MATERIALAND METHODS.

Study type- Prospective

25 patient subjects(Male-12 and Female-13) with an age range between 54 to 70 years, with a spectrum of radiological medial compartment knee osteoarthritis (OA) at our center (which is a tertiary-health care setup attached to a rural medical college situated in Western Maharashtra, India) who were planned for operative intervention in the form of partial knee arthroplasty , were included in this study. Each subject had scanogram and a radiographical examination performed with a weight bearing antero-posterior and lateral view of affected knee. On Scanogram we measured Pre operativevarus deformity and post operative correction of varus deformity. Clinically by using Goniometer. Pre operative flexion contracture / FFD and post operation FFD Correction was also measured. Aim was to keep correction of varus deformities to 3 to 5 degrees of Varus and zero degrees of FFD.

Overcorrection was avoided to prevent loading of normal compartment as was excessive bone removal which caused weakening of implant bearing bone and predisposition to periprosthetic fractures.

Inclusion criteria:

- Imaging investigation showing Isolated medial compartment degenerative osteoarthritis of the knee(Rim sign)[11].
- Intact Anterior cruciate ligament(ACL), Posterior cruciate ligament(PCL), Medial collateral ligament(MCL), Lateral collateral ligament(LCL).

- Flexion contracture up to 10 degree.
- Varus deformity up to 15 degree.

Exclusion criteria:

- Tri compartmental arthritis.
- Septic arthritis.
- Inflammatory arthropathy.
- Ligament laxity.

TECHNIQUE

Performed in 5 steps:
Step 1: Preoperative planning
Step 2: Exposure and Osteophytectomy
Step 3: Minimal Tibial and femoral cuts , Complete meniscectomy
Step 4: capsulotomy with bent tip cautery up to 5 to 7mm below joint line.
Step 5: Flexion and Extension gap balancing
This is followed by the routine steps of trial of components, cementing & wound closure.

Step 1: Preoperative Planning

Analyze preoperative radiographs as a key step in planning the surgery for the required amount of osseous cuts and soft-tissue release. Measure the amount of varus deformity on scanogram and anteroposterior and lateral knee radio-graphs. Confirm the radiographic degree of the deformity with physical examination.

Step 2: Exposure and ACL and Lateral compartment checking

Minimally invasive surgery was done using medial parapatellar incision (longitudinal skin incision from the medial border of the patella down to the joint line distally). This incision is described by the Von Langenbecks approach[11]..An incision of 6 cm to 8 cm was made, extending proximally along the quadriceps tendon and distally into the anteromedial surface of tibia. Joint space opened.Lateral compartment, ACL and PCL ligaments were checked. The deep menisco-tibial layer of the medial capsule was reflected. to check any tibial osteophytes. Osteophytectomy was done from femur, tibia , patella including Anvil osteophyte.

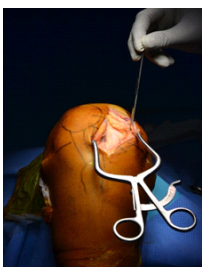
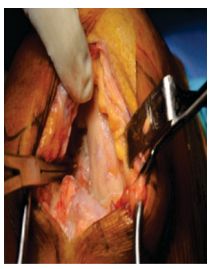

Fig – 3 **Fig - 4**

Step 3- Tibial and Femoral Cuts

Adequate and minimal bone cuts with proper alignment are an essential step of this technique.

Cut the proximal part of the tibia at 90° to the long axis of the tibia so that the cut surface is perpendicular to the long axis of Tibia at the appropriate slope. We have rarely needed to take more than 2 mm of the medial tibial margin even in the deformities close to 15 degrees.

Step 4: Posteromedial Capsulotomy

This is an important step forbalancing in knees with flexion contracture; the postero medial aspect of the capsule in varus deformity should be released at the level of the tibial cutupto a depth of 5 mm from the cut surface of the joint. This results in correction of the deformity. Remaining correction is also obtained by the size of the spacer & by the implants.

Remove the spacer and place a lamina spreader to tension the extension gap. Irrigate and dry the posterior aspect of the capsuleand remove any reminant of menisci. Release the tight postero-medial aspect of the capsule with electrocautery at the level of the tibial cut from the insertion of the PCL to the posterior margin of the sMCL . One may use a hook to evaluate the completeness of the release .

mechanical alignment is checked with varus/valgus stress tests using the spacer block.

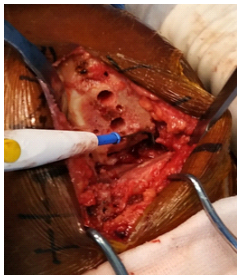
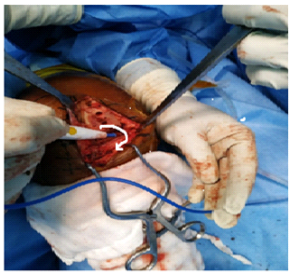

Fig – 5 **fig - 6**

Curved cautery Tip bent by 5 to 7mm and capsular Release done with cautery

Tip : The depth of release seldom goes beyond 5 mm . In Our experience it was 7 mm in 3 patients who were large sized. Tip is bent accordingly.


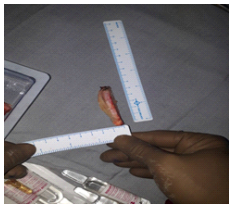

Fig -7 **fig - 8**

And then cementing, implantation and closure dene according the surgical procedure guideline. Below the picture is after implantation.


Fig – 9 **Fig 10**

Thus to summarize again, this stepwise release technique involves performing a osteophytectomy, complete medial menisectomy & posteromedial capsulotomy at the level of the tibial cut alongwith minimal bone cuts to preserve strength of bone is adequate to correct both varus deformity and flexion contracture of knee even in significant deformities upto 15 degrees of varus & 10 degrees fixed flexion deformity quite easily.

This saves both the superficial and deep MCL which are static and dynamic stabilizers of the knee as well as valuable subchondral bone which is the strongest.. Stronger bone prevents implant failure , maintains bone stock, prevents iatrogenic fracture etc.Hence , the above is a safe, reproducible, and precise technique for complete correction of so called large deformities and can give a fresh lease of life to the joint both in function & durability by UKA.

PRE OP AND POST OP SCANNOGRAM AND CLINICAL PHOTOS


Fig -11 **fig -12**

Fig – 13

fig -14

Above scanogram showing deformity correction pre operatively and post operatively

POST – OP PROTOCOL.

- 1st post op day, patient was taught static quadriceps/hamstring exercises and made to stand , sit on edge of the bed and full weight bearing walk with walker within 7 to 8 hour of surgery.
- 2nd post op day, the dressing was changed and wound inspected. Advised to continue static quadriceps exercises, stand, sit on edge of the bed and full weight bearing walk with walker.
- 3rd post op day, knee flexion was started and patient was taught dynamicquadriceps exercises. And reverse walking[12] with walker (Dervan protocol) started. And discharged.
- Sitting cross legged[13] and squatting started after 1 month of operation

RESULTS

In our study of 25 patients with Medial compartment osteoarthritic knees, we observed that

- There were 12 males and 13 females
- The mean pre operative varus deformity of knee measured on scanogram was 12.25 (range 8 degrees to 16 degrees)degrees whereas post op correction of varus on scanogram was upto 3.96 degrees(2.95 degrees to six degrees). And P value was 0.002.
- The mean pre operative Flexion contracture FFD of knee was 7.8 degrees Range 14 to 7 degrees)whereas mean post op correction was to 3 degree and P vale was 0.004.
- The mean pre-operative ROM was 105.2 degrees whereas mean post-operative ROM was 127.4 degrees and P value was 0.018 at six months.

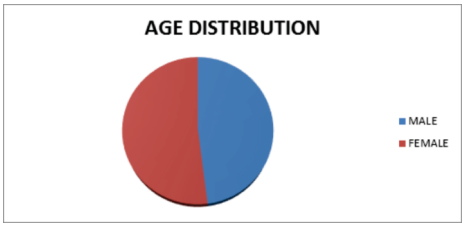

Fig -15

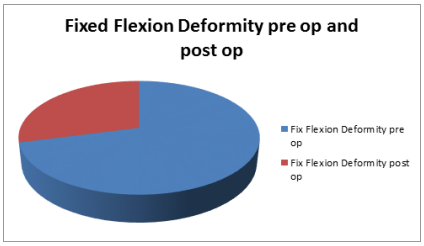

Fig -16

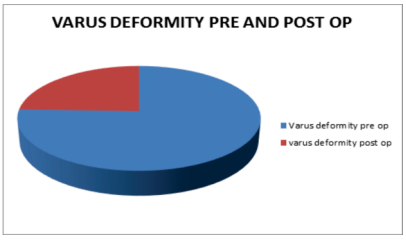

Fig -17

DISCUSSION

As highlighted in above results,Varus deformity is often combined with medial soft tissue flexion contracture with lateral soft tissue laxity. At our center 25 patient subjects(Male-12 and Female-13) with an age range between 54 to 70 years, with a spectrum of radiological medial compartment knee osteoarthritis (OA) , who were planned for operative intervention in the form of partial knee arthroplasty , were included in this study. Each subject had scanogram and a radiographical examination performed with a weight bearing antero-posterior and lateral view of affected knee. On Scanogram we measured Pre operative varus deformity. Clinically by using Goniometer Pre operative flexion contracture / FFD measured.

In our technique we did osteophytectomy, complete menisectomy , posteromedial capsulotomy at the level of the tibial cut, and bone preserving cuts.

During follow up (3 to 6 months post op) All patients were able to participate in activities of daily living such as personal care, squatting, sitting cross-legged and other ground level activity. Anteroposterior and lateral weight-bearing radiographs at the time of follow-up showed acceptable position of the components with satisfactory alignment and cement mantle.

CONCLUSION

Our novel stepwise release technique involves performing a osteophytectomy, complete medialmenisectomy & posteromedial capsulotomy at the level of the tibial cut along with bone preserving minimal bone cuts to preserve strength ofbone and is adequate to correct both varus deformity and flexion contracture of knee even in significant deformities up to 15 degrees of varus & 10 degrees fixed flexion deformity quite easily. This saves both the superficial and deep MCL which are static and dynamic stabilizers of the knee as well as important subchondral bone stock. Stronger bone prevents implant failure , maintains bone stock, prevents iatrogenic fracture. The above is a safe, reproducible, and precise technique for complete correction of so calledlarge deformities and can give a fresh lease of life to the joint both in function & durability by UKA.Keeping in line with the significant advantages of function friendly and more durable type of knee replacement i.e UKA, the above surgical technique should give predictable results even for so far considered moderate to large deformities. So far these were treated by TKR or if Unicondylar replacement was done , large bone removal was needed thus exposing weak bone . But now they could be considered for UKR with bone preservation using the above technique, This will enable knee Arthroplasty patients especially in Asia to live a more functional and region friendly lifestyle which involves activities like squatting, sitting cross legged for praying and meditation etc.(14)

Conflicts of interest - NIL

Acknowledgements-

Author are thankful to Dr Phil Hirsch, Dr. Shankar Kashyap, Dr Ananda Nanu (UK) for their guidance in refinements of surgical technique and operative procedure.

REFERENCES

1) Kohli PK, Rajurkar P, Nawale A, Warunjikar M, Nadkarni S. Results of unicondylar knee arthroplasty in Indian rural population. Should UKA be the first choice in surgical treatment for osteoarthritis in India? IOSR J of Dent and Med Sciences.2018;17(2):01-08.
2) Bhalodiya HP, Shah AA, Modi J V, Singh SP. Unicondylar knee arthroplasty in unicompartment osteoarthrits : early results. 2006;40(2):74–77.
3) Vail TP, Lang JE. Insall and Scott surgery of the knee. 4th ed. Philadelphia:Churchill Livingstone, Elsevier; 2006. p. 1455-1521
4) Insall J, Ranawat CS, Scott WN, Walker P. Total condylar knee replacment: preliminary report. Clinical orthopaedics and related research. 1976 ;(120):149-154
5) Kim RH, Scott WN. Operative techniques: total knee replacement. Philadelphia: Saunders-Elsevier. 2009:91-103
6) Siman H, Kamath AF, Carrillo N, et al. Unicompartmental knee arthroplasty vs total knee arthroplasty for medial compartment arthritis in patients older than 75 years:comparable reoperation, revision, and complication rates. J Arthroplasty 2017;32(6):1792-1797.
7) Koshino T, Sato K, Umemoto Y, et al. Clinical results of unicompartmental arthroplasty for knee osteoarthritis using a tibial component with screw fixation. Int Orthop 2015;39(6):1085-1091.
8) Vasso M, Del Regno C, Perisano C, et al. Unicompartmental knee arthroplasty is effective: tenyear results. Int Orthop 2015;39(12):2341-2346
9) Yoshida K, Tada M, Yoshida H, et al. Oxford phase 3 unicompartmental knee arthroplasty in Japan—clinical results in greater than one thousand cases over ten years. J Arthroplasty 2013;28(9)(suppl):168-171.
10) Kohli P, Chavan S, Nawale A, Gulati M, Nadkarni S et al. Dervan Rim sign - New , Simple Radiological sign for unique Indian medial Femoral condylar Osteoarthritis.ijos 2018;4(4):654-657
11) Salvi AE.Von Langenbeck's Medial Parapatellar Approach for Unicompartmental Knee Arthroplasty, Orthopedics. 2009;32(7):470.

12) Kohli P, Nawale A, Chavan S, Palkhade M, Nadkarni S. The Dervan protocol: A new improved rehabilitation protocol for faster recovery of knee replacement surgery. Int J Orthop Sci. 2018;4(4):728–731.
13) Kohli P, Patel P, Waybase H. The value of cross legged sitting: Virtue or vice for health . A review from sports medicine , physiology and yoga . Implications in joint arthroplasty . 2019;5(3):607–610.
14) Kohli P, Chavan S, Nawale A. A nature friendly knee arthroplasty for prayer and meditation in Asiatic A nature friendly knee arthroplasty for prayer and meditation in Asiatic lifestyle. 2018;(October).
15) Maeseneer MD,Roy FV, Lenchi L, Barbaix E, Ridder FD.Three layers of the medial capsular and supporting structurs of the knee:MR imaging –anatomic correlation.RG vol 20, oct 2000.