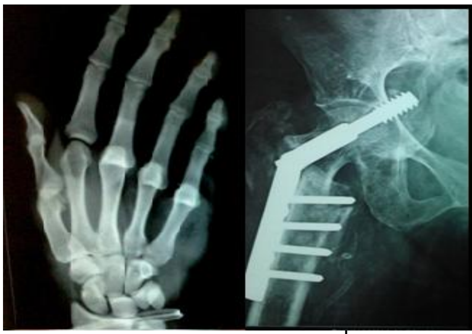

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Clinical profile of patients with osteoarthritis underwent total knee arthroplasty

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Abstract
Knee motion during normal gait has been studied by many investigators, who have found it to be much more complex than simple flexion and extension. Knee motion occurs in flexion and extension, adduction and abduction and rotation about the long axis of the limb. Knee flexion, which occurs about a varying transverse axis, is a function both the articular geometry of the knee and the ligamentous restraints. All cases of Total knee replacement done using computer navigation. 65 patients with 72 knee were available for the follow-up with their previous records, annual x-rays and follow-up papers. Pre operative deformities and its values were recorded for the study from the hospital case sheets and discharge summaries. There were 22 males and 43 females with ages ranging from 44 to 80 with an average age of 65.3 yrs at the time of surgery.
72 knees had been replaced using navigation in our study, all 72 knees had TCP. Of the 72 knees (65 patients) with an average of follow up of 1yr and 2 months, 50 were completely pain free. Of the 11 patients who complained pain (16.92 %) had pain occasionally and 4(6.15 %) patients complained pain only on stair climbing. The pre operative range of movement was 0-110 degrees which improved to 0-140 degrees. The maximal ROM was recorded to be 140 degrees. With a minimum of 110 degrees of ROM.

Keywords: Clinical Profile, Osteoarthritis, Total knee arthroplasty

1. Introduction
The knee is the largest synovial joint in the body. It consists of three distinct and partially separated compartments, which form a complex 'hinge' joint. This arrangement offers a fulcrum for propulsive muscles, and allows the limb to be folded away in confined spaces and to get closer to ground. The price of its mobility is a tendency to instability. To counter this tendency a complex ligament arrangement, vulnerable to injury, has evolved. The understanding of knee anatomy has improved considerably in recent years, driven in large measure by the advances in surgery in this region [1].
The constraints provided by the femoral and tibial joint surfaces are not adequate for functional stability. The distal femur is convex, where as the proximal tibia is partially flat, slightly concave medially and slightly convex laterally. However, the tibial intercondylar eminence and the articular geometry do provide some potential for stability. Hsieh and Walker found that geometric conformity of the condyles was the most important criterion for decreasing laxity under load bearing. They stated that in order to perform anterior posterior, rotatary and medial – lateral movements, the femur must ride upward on the tibial curvature, similarly, to rotate the femur "screw out", giving an upward movement. Medial –lateral motion produces this effect to an even greater degree because of the tibial spines. This is called the "uphill" principle. These authors concluded that under normal loading conditions, the soft structures provided joint stability and that as loading increases, the condylar surface conformity becomes the most important factor [2].
Knee motion during normal gait has been studied by many investigators, who have found it to be much more complex than simple flexion and extension. Knee motion occurs in flexion and extension, adduction and abduction and rotation about the long axis of the limb.
Knee flexion, which occurs about a varying transverse axis, is a function both the articular geometry of the knee and the ligamentous restraints. Failure to account for these complex knee

motions and their attendant problems was a short coming in many early knee prosthesis designs and probably is the main factor in the dismal longevity of the pure hinged prosthesis. Many current prosthesis designs attempt to closely reproduce normal knee kinematics, where as others settle for an approximation of normal knee motion, especially with regards to PCL function.

Kettlekamp, in the kinematic studies of the knee during selected activities of daily living, found that normal gait required 67 degrees of flexion during the swing phase, 83 deg of flexion for stair climbing, 90 degrees for descending stairs and 93 degrees to rise from the chair [3].

Correct alignment of the Navigation of total knee arthroplasty is an exciting new development in the field of computer-assisted surgery. It allows the surgeon to obtain accurate mechanical alignment, to verify the alignment and adjust surgery accordingly while in the operating theatre. All navigation systems require tracking the body and instruments in space, kinematic and anatomic registering these objects to the computer and finally guiding the surgeon to perform the surgery on the virtual plan. Most systems also give information on kinematic and ligament balance and allow a printout of the information to be stored with the patient's record. Human error and the use of conventional jigs may be the reasons for the inaccuracy of conventional total knee arthroplasty. TKA are conventionally performed with use of intramedullary or extra medullary alignment guides and achieve high rate of success [4].

It has been suggested that the most common cause of revision TKA is errors in surgical technique [5], from malpositioning of component which results in poorer postoperative outcome. Computer navigation system fall broadly into two categories-

1. Image based which rely on data acquired from pre or intra operative modalities such as CT or fluoroscopy.
2. Image free which require intraoperative registration of certain key anatomical points which determine mechanical alignment of tibia, the femur and the lower limb and hence define the site of bony cuts required for implant placement [6].

Methodology

A total of 72 knees in 65 patients were performed with computer navigation. A prospective and retrospective study was conducted to evaluate the results. A follow-up was conducted in 65 patients with 72 knees that were replaced (7 bilateral) had returned for the follow-up. The minimum period of follow-up was 6 months and the maximum period for follow-up 2yrs and 6 months, with an average follow-up of 1Yr 2months.

All cases of Total knee replacement done using computer navigation. 65 patients with 72 knee were available for the follow-up with their previous records, annual x-rays and follow-up papers. Pre operative deformities and its values were recorded for the study from the hospital case sheets and discharge summaries. There were 22 males and 43 females with ages ranging from 44 to 80 with an average age of 65.3yrs at the time of surgery.

Inclusion Criteria

- Patients with osteoarthritis(OA) and Rhematoid arthritis(RA)
- Patients above 40 and below 80 years of age

Exclusion Criteria

- Patients with hip and ankle deformities.
- Patients with systemic and local infections.

Results

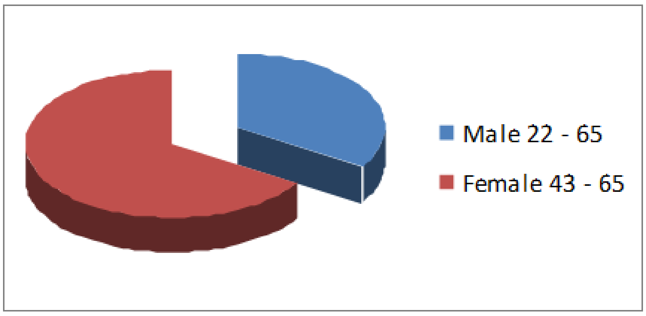

Fig 1: Gender Distribution

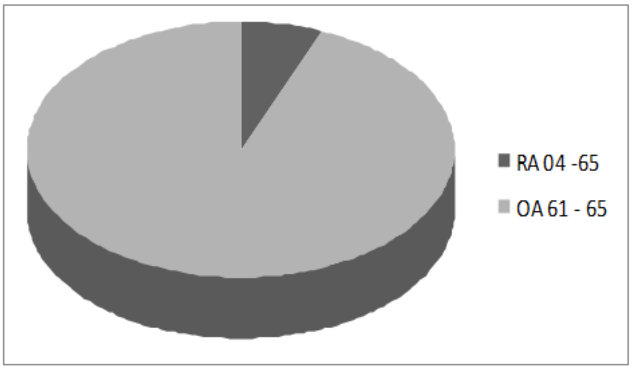

Fig 2: Diagnosis

Table 1: Comparison of Clinical Outcome

Study	Pre-Op Deformity	Postop Deformity Satisfactory Alignment	Satisfactory Femoral Prosthesis Alignment	Satisfactory Tibial Prosthesis Alignment
Sparman *et al.*	varus 14±8	varus 1.3±33 (71%)	94.3%	86.5%
Bathij.*et al.*	varus 8.4º	0º (96%)	92%	98%
Haaker *et al.*	varus 6.3º	varus 0.77(79)	-	-
Our study	varus 10.37º	varus 1.25 (90.27%)	91.66%	93.02%

72 knees had been replaced using navigation in our study, all 72 knees had TCP. Of the 72 knees (65 patients) with an average of follow up of 1yr and 2 months, 50 were completely pain free. Of the 11 patients who complained pain (16.92 %) had pain occasionally and 4(6.15 %) patients complained pain only on stair climbing.

The pre operative range of movement was 0-110 degrees which improved to 0-140 degrees. The maximal ROM was recorded to be 140 degrees, with a minimum of 110 degrees of ROM.

Two patients developed superficial infection which eventually healed with intravenous antibiotics. Six patients developed DVT despite starting pharmalogical agents to prevent DVT. Another had post operative fall in the 5th post operative month and sustained MCL avulsion, which was managed with a hinged knee brace.

One patient had developed cellulites of leg during the 4th postoperative month which was managed conservatively. There were no deep infections in our study at the time of final follow-up. No patient in our study had imediolateral instability at the time of final follow up. There were no problems related to the navigation in our study, pin loosening, tracker problems.

Discussion

Precise pre- and post operative measurements of limb alignment are necessary to plan, perform, and evaluate the success of TKA. Standard radiographs, computed tomography, MRI, or intra operative navigation systems can be used to perform these measurements. Standard radiographs can, in a controlled setting and in normal patients with minimal deformity, be quite accurate. However, these required conditions are difficult to achieve and are not applicable to patients with extremity-deforming osteoarthritis. The use of an intra operative navigation system, which has a technical accuracy previously validated to within, may allow for an objective assessment of the accuracy and reproducibility of radiographic measurement of TKA components and alignment. This type of relationship is important to examine given that numerous previous studies have used standard radiographs to evaluate and relate TKA limb and implant alignment to clinical and functional outcome measures.

Navigation assisted total knee arthroplasty is fast gaining popularity among the surgeons although no long term report of advantages of Computer navigated TKA over the conventional jig based TKA has been published, the potential advantage of the accurate positioning of the implants has been well understood. An increased incidence of aseptic loosening has been seen in patients with post-operative malalignment of the mechanical axis of the leg. Several authors have reported superior results if 3° of varus/valgus deviation in the frontal plane were not exceeded [7]. Rand and Coventry [8] found a rate of survival of 90% at ten years for patients with less than 4° of deviation from the neutral axis. Jeffrey *et al*. 24 reported revision rates of 3% in patients with ideally reconstructed mechanical axis and 24% in patients with not as well restored mechanical axis (> 3° of Mikulicz's line) within 8 years. However, not all investigators consider malalignment a major contributing factor of implant failure. Whereas Jeffrey *et al*. [9] consider the post operative angle to be a major concern, Hsu *et al*. and Tew and Waugh [10] do not.

In our study the mechanical axis radiological score was 90.27% excellent and 9.72 % had good score. One knee in our study had a mechanical axis greater than -4 degrees of varus, however no knee in our study had a mechanical axis greater than 5 degrees. In our study 37 knees (51.38%) had 0 degrees mechanical axis which is comparable to the results from other studies

Conclusion

Navigation is relatively safe and allows surgeon to obtain accurate mechanical alignment without significant complications. Navigation also gives information on kinematic and ligament balance and allows a printout of information to be filled with patient record.

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