

## Outcome of Total Knee

# Arthroplasty with Insall Burstein-II Prosthesis

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### ABSTRACT

**Objective:** Evaluate the functional outcome of total knees arthroplasty with IB II prosthesis and evaluate the alignment of prosthetic components by radiological parameters and its conflation with functional outcome.

**Study Design:** Descriptive / case series study

**Place and Duration of Study:** This study was conducted at the Orthopaedic Surgery at Shaikh Zayed Hospital, Lahore from 1st September 2006 to 31st August 2009.

**Subject and Methods:** Sixty knees of sixty patients were replaced by using Insall Burstein II prosthesis postoperative radiographs were evaluated for alignment of knee and prosthesis components by criteria selected from knee society Roentgenographic evaluation system. Functional outcome from evaluated by rationale of knee society knee rating system.

**Results:** Prosthesis component was aligned in 93% and mal-alignment in 7% of the cases. There was significant improvements in function score  $33.8 \pm 315.5$  to  $59.5 \pm 17.7$  and knee score from  $3 \pm 712.5$  to  $76.4 \pm 2.2$ . Postoperative functional score was found correlated with alignment significantly.

**Conclusion:** Total knee arthroplasty with 1-B-II prosthesis is safe durable and predictable procedure with proper surgical technique and expertise good alignment and satisfactory functional outcome can be achieved.

**Key Words:** Total Knee Arthroplasty, Osteoarthritis, Rheumatoid Arthritis

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### INTRODUCTION

Knee pain is the common presenting complaint in the middle age and elderly patients, interfering the activities of daily living. Pain free and mobile knee joint is essential for good quality of life.<sup>1-3</sup>

Knee osteoarthritis is common cause of severe pain and functional limitations, affecting approximately 6% of Adult population; this percentage is increased in people who are more than fifty-five years old.<sup>4,5</sup>

Rheumatoid arthritis is another disabling disease affecting the knee joint along with other joints involvement. Females are effected more commonly than males, in a ratio of 2.5:1.

The primary management of the knee pain is with analgesics, change of life style, physiotherapy, intra articular steroids or hyaluronic acid injections. However after failure of this conservative management, options left for treatment includes Arthroscopic joint lavage and debridement open debridement, high tibial

osteotomy for medial or lateral uni-compartmental osteoarthritis, hemi or total knee arthroplasty.

The posterior stabilized condylar knee (Insall Burstein -II) is an improvement of the total condylar design evolved in 1987. It was designed to provide posterior circuital ligament substitution by means of a central post in tibial component, which articulates against a transverse cam on the femoral component. It was designed specifically to improve range of motion, stair climbing ability and to prevent posterior subluxation.<sup>6-9</sup> This prosthesis has excellent knee score and pain free range of motion up to 120 degree with stability.<sup>10,11</sup> Also demonstrated excellent survivorship of the prosthesis 96% over 10 years.<sup>12,13</sup>

Alignment refers to the relationship of each prosthetic component to the relevant bone, as well as over all alignment of the limb. Incorrect alignment can lead to decrease functional score, abnormal wear, premature loosening and need for revision.<sup>14,15</sup>

### MATERIALS AND METHODS

This study was conducted at the Orthopaedic Surgery at Shaikh Zayed Hospital, Lahore from 1st September 2006 to 31st August 2009. Sixty cases of total knee replacement with IB II prosthesis were selected on convenient basis. All patients were operated by single surgeon. Follow up was done at two weeks for examination of wound and after one month, three month, six month and one year for the complete examination of the patient to evaluate the functional

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status of the patient and status of knee. All patients who were lost from follow up were excluded from study. Postoperative radiographs were evaluated for alignment of prosthetic components and overall alignment of the knee by using criteria (tibio-femoral angle on antero-posterior view, femoral flexion and tibial angle on both antero-posterior and lateral views) selected from Knee Society Roentgenographic evaluation and scoring system.

After the mean follow up of 1 year range from 6 month to 2 years, results were assessed by the Rationale of the knee society clinical rating system. Final rating of the results was compiled as excellent (score 85-100), good (70-84), fair (55-69) and poor (p<55).

## RESULTS

During this study 60 knees of 60 patients were replaced by using Insall BursteinII prosthesis. Mean age of the patients was  $(60.4 \pm 6.12)$  years, range of 46-75 years. Male to female ratio 1:2, males were 33.7% and females 67.3%. Patients of the primary osteoarthritis were 90% and rheumatoid arthritis were 10%.

Evaluation of the preoperative radiographs revealed mean tibio-femoral angle of  $(6.7 \pm 3.9)$  degrees varus range from 0-12 degree. On the evaluation of postoperative antero-posterior radiographs the mean tibio-femoral angle was  $(5.0 \pm 0.53)$  degree range from 4-6 degrees. Mean femoral flexion angle was  $(96 \pm 1.88)$  degrees range from 94-102. Mean tibial angle  $(89 \pm 1.72)$  degrees with range from 84-92.

On lateral radiographs Mean femoral flexion angle was  $(10.83 \pm 1.49)$  degree range from 10-16 degree. Mean tibial angle  $(89.9 \pm 1.24)$  degrees with range from 85-92. No tibio-femoral mal-alignment was found. Alignment of the prosthetic component was accurate in 56 total knee arthroplasties (94%) and in 4 arthroplasties (6%), prosthetic components were not found properly aligned. Pain in the knee joints was significantly relieved ( $P < 0.05$ ) and pain score was improved from mean preoperative 14.3 to 39.5 postoperatively, 80% patients had no pain or mild pain on stair climbing, 17% had mild pain on walking, 3% had continuous moderate pain in the knee postoperatively. Range of motion was also significantly improved from (Mean  $85 \pm 1.7$ ) range 75-100 degree preoperatively to (Mean  $104 \pm 1.9$ ) range 85-120 degree after total knee replacement.

Preoperative flexion contractures of the knee joint was also improved from knee  $(4.5 \pm 6.06)$  degree to  $(2.0 \pm 0.45)$  degree after total knee arthroplasty. Knee score was also significantly improved ( $p < 0.05$ ) from mean preoperative  $(36.63 \pm 12.5)$  to  $(76.4 \pm 2.2)$  postoperatively. Postoperative knee score was excellent in 30%, good in 47%, fair in 20%, poor in 3% of the cases.

Functional score of the patients improved significantly ( $p < 0.05$ ) from the mean score of  $(33.83 \pm 15.52)$  to  $(59.53 \pm 17.7)$  range 15-80 score postoperatively.

Postoperative functional score was excellent in 0%, good in 40%, fair in 37%, poor in 23%.

There was no joint instability in any case. Medio-lateral laxity was less than 5 degree in 90% cases, 6-9 degree in 10% of the cases. There was no wound infection or delayed wound healing. No clinical finding of deep vein thrombosis, pulmonary embolism or fat embolism was observed in any case.

During follow up one patient was diagnosed as post-operative patellar subluxation and three patients reported moderate retro-patellar pain. The prosthetic components were found mal-aligned on the radiographs of three patients.

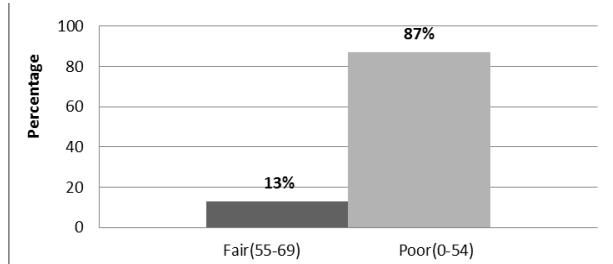
Patients with already replaced other knee had better function score and knee score as compared to patients having knee symptomatic ( $p < 0.05$ ). Both postoperative knee score and functional score was also correlated with preoperative knee score and functional score.

**Table No.1: Correlation of alignment of prosthetic components and postoperative function score**

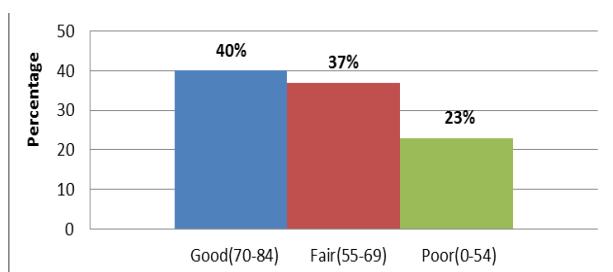
Functional score	Mal-alignment (n=4)	Alignment (n=56)
Excellent	-	-
Good	-	24 (43%)
Fair	-	22 (39%)
Poor	4 (100%)	10 (18%)

**Table No.2: Correlation of condition of other limb and postoperative function score**

Functional score	Mal-alignment (n=4)	Alignment (n=56)
Excellent	-	-
Good	-	24 (43%)
Fair	-	22 (39%)
Poor	4 (100%)	10 (18%)



**Figure No.1: Preoperative function score**



**Figure No.2: Postoperative function score**

Correlation of the knee score and functional score with alignment of prosthetic components was also noted significantly (Chi-square test revealed  $P<05$ ). Both the patients in which prosthetic components was not aligned had poor knee score and function score.

## DISCUSSION

Total knee arthroplasty is now the accepted management for the patients with severe degenerative joint disease to relieve pain, improve stability and restore function.<sup>1</sup>

Pain relief is the single most important determinant for long term outcome after total knee arthroplasty following by deformity.<sup>16</sup> Pain after knee replacement resolves quickly. Significant pain after six months of total knee replacement (TKR) may be indicative of abnormal pain.<sup>17</sup>

In the present study all patients had the significant improvement in the severity of pain and 97% had no pain or mild pain during walking and climbing stairs. Continuous moderate pain was recorded in only 3% of the patients.

Range of motion after knee arthroplasty is an important variable in determining clinical outcome. Motion beyond 90 degree of flexion is beneficial for many activities like walking and going up-stairs, 103 degree of flexion is required for rising out of chair.<sup>18</sup>

Insall et al reported on the posterior stabilized total condylar prosthesis that range of motion improved from a mean of 95 degree preoperatively to 115 degree postoperatively. There was great controversy in literature and high degree of disagreements among different authors on whether the cruciate sacrificing or a cruciate retaining knee replacement give better improvement in postoperative range of motion, as the clinical results using various designs have been essentially the same.<sup>9,17</sup> This controversy is been resolved with the development of posterior cruciate stabilizing prosthesis "The Insall posterior stabilized prosthesis". This design is intended to increase the motion of the knee and provide additional stability. Range of motion was increased to an average of 107 degree with this design as compared to average range of motion 90 degree in their previous series in which total condylar prosthesis was used. However, preoperative range of motion has been found to affect the amount of motion that is regained after any type of knee replacement .In our study range of motion was 105 degree.<sup>17</sup>

Correct positioning of the components and adequate soft tissue balancing are critical steps in successful knee arthroplasty. Optional alignment of the prosthetic component is fundamental to the knee achievement of the long term survival of total knee arthroplasty. Incorrect alignment can lead to decrease survival and patellofemoral problems. There is little margin of error.<sup>14,15</sup> Relation of radiological parameters of the

alignment with clinical outcome of TKA is controversial.

In our study correlation of the knee score and functional score with alignment of prosthetic components was noted significantly. Alignment of the components and overall alignment of the knee mainly effect the long term survival of the total knee arthroplasties. Our study period was too short to comment on the survival of the total knee arthroplasties for which a study is required with long term follow up.

Several studies using conventional intramedullary and extra-medullary rods reported 10-20% failure to achieve ideal positioning of the components. Many studies suggested that computer assisted arthroplasties have improved alignment and have low complications rate and less surgical exposure.<sup>19,20</sup>

In our study alignment of the prosthesis was accurate in 93% of the cases and all the angles are consistent with these studies. The knee score increased significantly and stayed on a constant level from 2 years on, whereas function score reached a maximum at 2 years and declined subsequently. The functional score is influenced significantly by the walking distance, age, body mass index and patient category correlating moderately. The knee score is not affected by any of the factors.<sup>21</sup>

Insall et al reported in his study 88% excellent, 9% good or fair and 3% poor results TKA using IB-II prosthesis. Knee score increased from 50 point preoperatively to 90 points postoperatively.<sup>9</sup> Shah and Pervaiz also reported good to excellent scores in 90% of the patients and mal-alignment in 10% of the total knee arthroplasties with Insall Burstein IB-II prosthesis. Results of our study are consistent with these studies 77% patients had good to excellent prosthesis and 20% fair knee score. Function score was good in 40% and fair in 37%.

Patients with other knee already replaced had good functional outcome as compared to the patients with knee not replaced and symptomatic. In our study the improvement in knee score was (77% good to excellent postoperative) was much more than improvement in function score (40% good postoperative). The reason of less improvement in function score was half of the patients had other knee symptomatic which compromised the patient ability to walk and climb stairs. Other reasons were short-term follow up, poor compliance of the patients for physiotherapy and psychological apprehension to the new joint. Even then most of the patients were able to perform their daily activities with little modification because of increased pain free range of motion.

## CONCLUSION

Total condylar knee arthroplasty with Insall Burstein II prosthesis is a safe, durable and predictable procedure. With proper surgical technique and expertise, it is

possible to restore the mechanical axis of knee with stability and 100 degree or more pain free range of motion. Satisfactory functional outcome can be achieved by using IB-II prosthesis.

**Author's Contribution:**

Concept & Design of Study:	Muhammad Zahid Siddiq
Drafting:	Syed Wasif Ali Shah
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Revisiting Critically:	Syed Wasif Ali Shah, Muhammad Zahid Siddiq
Final Approval of version:	Muhammad Zahid Siddiq

**Conflict of Interest:** The study has no conflict of interest to declare by any author.

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