INTRODUCTION
Successful Total Knee Replacement (TKR) depends on many factors, the two most important being post-operative alignment of the limb and component alignment.

Computer navigation aids to improve accuracy of implant positioning, obtaining an overall alignment of the lower limb within ±3° of the true mechanical axis of the limb.1

AIM
To review the outcome of patients having undergone navigated TKR at Ninewells Hospital, Dundee between January 2006 and November 2009.

OBJECTIVES
• Review data of navigated TKR patients to draw relevant conclusions.
• Establish benefits of navigation in terms of score/function compared with conventional knee replacement.

METHODS & MATERIALS
• A database of all patients who underwent navigation TKR is maintained by Tayside Arthroplasty Audit Group (TAAG).
• There were 128 patients in total between January 2006 and November 2009.
• Navigation TKR in the current study was done with OrthoPilot® system (Figure 1).

Figure 1 - OrthoPilot® system (adapted from Aesculap brochure).

• 121 patients had Columbus® Cruciate retaining implant, 7 patients had Columbus® Cruciate substituting implant.
• All 128 patients completed one-year follow-up and 55 patients had three-year follow-up. Knee Society Score (KSS) was used to assess all patients at each follow-up.
• Surgical steps of navigation TKR are shown in Figure 2.
• 40 navigated TKR patients were compared with 40 patients of conventional TKR after matching demographic parameters and pre-operative deformities.

RESULTS
In this retrospective study, 47 patients were within the age group of 71-80 years, 45 patients within 61-70 years, 20 patients >80 years and 16 patients <60 years of age.
• There were 66 female and 62 male patients.
• 59 patients were obese (body mass index, BMI, between 30-39.9), 48 were overweight (BMI between 25-29.9), 17 were normal weight (BMI between 18.5-24.9) and 4 patients were very obese (BMI >40).
• 122 patients had osteoarthritis; 5 had rheumatoid, and 1 post-traumatic arthritis. 68 knees were left side and 60 were right side. The mean KSS and Knee Function Scores (KFS) are shown in Figure 3.

Figure 2 - Surgical steps of navigation TKR. STEP 1 - Tracking devices attached to the femur and tibia; STEP 2 - Pointing instrument digitizing the malleoli; STEP 3 - Tracker placed on tibial guide; STEP 4 - Tibial guide placed for proximal tibial resection; STEP 5 - Monitor showing proposed cut; STEP 6 - Tracker attached distal femoral cutting block; STEP 7 - Monitor showing proposed distal femoral cut; STEP 8 - Guide being fixed in proper rotational alignment; STEP 9 - Femoral cut being taken in progress; STEP 10 - Cementation of femoral component.

Figure 3 - The mean Knee Society Scores and Knee Function Scores.
• There were 2 revision TKRs, 8 superficial infections and one death.
• Clinical and functional outcome of both groups is shown in Figure 4.

DISCUSSION
• The current study showed statistically significant difference between the KSS of the two groups, however, there was no difference between the KFS.
• Similar results have been reported in various studies.
• Table 1 shows comparison of various studies looking at radiological parameters.

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<thead>
<tr>
<th>Author</th>
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<th>Technique</th>
<th>Study size</th>
<th>Femoral component</th>
<th>Tibial component</th>
<th>Alignment Results (p-value for difference between navigated and conventional TKR)</th>
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<tr>
<td>Jenny et al. 2001</td>
<td>Ortho-Pilot</td>
<td>Nav. Con.</td>
<td>40 TKRs</td>
<td>NS</td>
<td>NS</td>
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<td>Hart et al. 2003</td>
<td>Ortho-Pilot</td>
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<td>60 TKRs</td>
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<td>Cheung &amp; Chiu 2009</td>
<td>Ortho-Pilot</td>
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<td>S**</td>
<td>S**</td>
<td>NS</td>
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<tr>
<td>Current Study 2011</td>
<td>Ortho-Pilot</td>
<td>Nav. Con.</td>
<td>40 TKRs</td>
<td>NS</td>
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NS: Not Significant, S:Significant, p<0.05 = S**, p<0.01 = S***

CONCLUSIONS
Computer navigation TKR affords the possibility to place both femoral and tibial components precisely without risk of any greater axis deviation from the ideal value. It helps in reducing the outliers in alignment of the limb and that of component, which may improve overall implant survival post-operatively.

ACKNOWLEDGEMENTS
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REFERENCES
4. 7.Aesculap orthopaedics.