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Evaluation of the Visionaire Instrumentation for Total Knee Arthroplasty Using Computer Navigation

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Summary:
The aim of this study was to determine the efficacy of patient-specific cutting blocks by comparing them to navigation, the current gold standard.

Abstract:
Purpose:
Patient-matched instrumentation is advocated as the latest development in arthroplasty surgery. Custom-made cutting blocks created from preoperative MRI scans have been proposed to achieve perfect alignment of the lower limb in total knee arthroplasty (TKA). The aim of this study was to determine the efficacy of patient-specific cutting blocks by comparing them to navigation, the current gold standard.

Methods:
60 TKA patients were recruited to undergo their surgery guided by Smith & Nephew Visionaire Patient-Matched cutting blocks. Continuous computer navigation was used during the surgery to evaluate the accuracy of the cutting blocks. The blocks were assessed for the fit to the articular surface, as well as alignment in the coronal, sagittal and rotational planes, sizing, and resection depth.

Results:
All patient-matched cutting blocks were a good fit intra-operatively. Significant differences ($p<0.05$) in the resection depths of the distal femur and tibial plateau were observed between the cutting blocks and computer navigation for the medial compartment. Cutting block alignment of the femur and tibia in the coronal and sagittal planes also differed significantly ($p<0.05$) to navigation measurements. The PSCB would have placed 79.3% of the sample within +3° of neutral in the coronal plane, while the rotational and sagittal alignment results within +3° were 77.2% and 54.5% respectively. In addition, intraoperative assessment of sagittal femoral alignment differed to planned alignment by an average of 4.0 degrees (+/-2.3).

Conclusion:
This study suggests the use of patient-matched cutting blocks is not accurate, particularly in the guidance of the sagittal alignment in total knee arthroplasty. Despite this technique creating well fitting cutting blocks, intraoperative monitoring revealed an unacceptable degree of potential limb mal-alignment, resulting in increased outliers particularly when compared with standard computer navigation. Caution is recommended before PSCB are used routinely without objective verification of alignment.