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# Analysis of Variables Dictating Use of a Mid-Level Constraint Implant During Total Knee Arthroplasty

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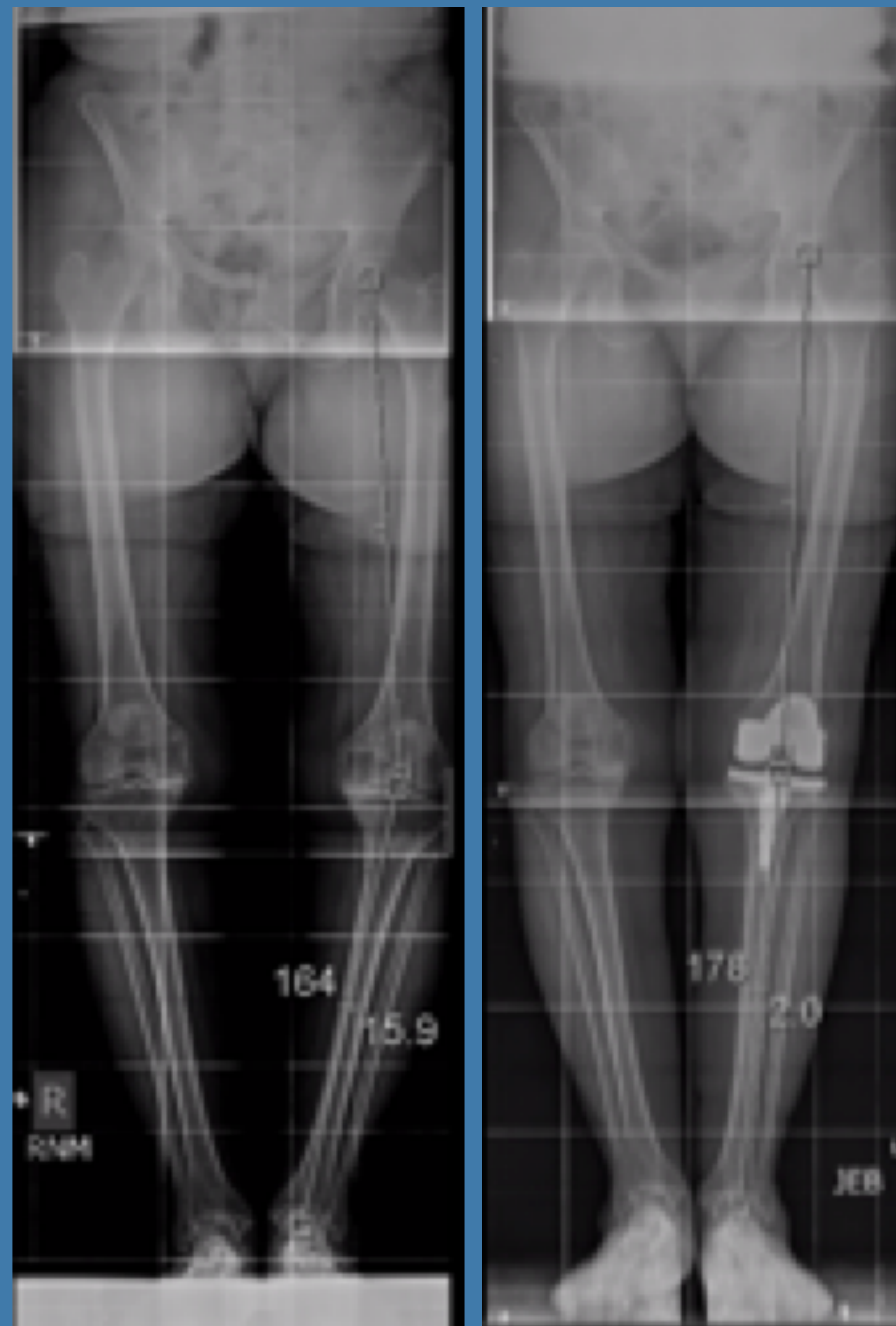
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## INTRODUCTION

A new total knee arthroplasty (TKA) implant design provides surgeons with the option for intra-operative conversion from standard implants to an intermediate level of constraint. This is done using the same cutting blocks and guides, resulting in minimal added surgical time and effort. While ease of use and increased stability make this an attractive tool, this mid-level constraint (MLC) system does have drawbacks including increased expense and the addition of potentially unnecessary constraint. We sought to quantify our usage of this new technology and to determine the variables that dictate the decision to convert to MLC implants.

## METHODS

After obtaining IRB approval, we retrospectively reviewed all primary TKA procedures performed over a two-year period. We excluded cases in which hinged or condylar constrained implants were used. The decision to use a standard constraint (SC) or MLC implant was based on intra-operative stability determined by the lead surgeon. Demographic data (age, gender, BMI) and clinical variables (instability, flexion contracture, presence of inflammatory arthritis) were reviewed for both groups. Full-length films were used to measure the pre- and post-operative mechanical axis. Fisher's exact test and independent sample t-tests were used to evaluate differences between patients receiving SC or MLC implants. All statistical analysis was conducted using Microsoft Excel.



**Figure 1:** (A) Pre-operative full-length film of a patient who received a MLC implant. Mechanical axis on operative leg measured to be 15.9° (B) Post-operative full-length film of the same patient 1 month following total knee arthroplasty using a MLC implant. Post-operative mechanical axis measured to be 2.0°.

## RESULTS

213 patients met our inclusion criteria. 66 patients (31.0%) received MLC implants, 147 (69.0%) received SC implants. Demographic variables were similar between groups. Pre-operative mechanical axis deviation did correlate with use of the MLC implant over the SC implants (9.9° vs. 5.4°,  $p < 0.0001$ ), as did the presence of a flexion contracture (7.3° vs. 4.4°,  $p < 0.005$ ). Varus/valgus instability on pre-operative exam was noted in 59% of patients who ultimately received MLC implants versus just 16% who received SC implants ( $p < 0.0001$ ). BMI ( $p = 0.56$ ) and inflammatory arthritis ( $p = 0.78$ ) did not dictate use of a higher level of constraint. The difference in post-operative mechanical axis deviation was not significant between cohorts (2.9° vs. 2.4°,  $p = 0.11$ ).

## CONCLUSIONS

Increased pre-operative deformity, ligamentous laxity, and the presence of a flexion contracture are predictive of the need for conversion to mid-level constraint implants during TKA. These MLC implants were used in nearly 33% of all primary TKA cases, which underscores the need for additional research to ensure that this technology is not being overused.

## ACKNOWLEDGMENTS

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