"Is it Gender or Surgical Technique?"- A Prospective Evaluation of Femoral Component Sizing Differences Comparing Two TKA Implants of a Single Company

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INTRODUCTION: Controversy exists regarding whether changes in femoral knee component sizes and shapes are necessary to accommodate the more narrow femurs and valgus trochlear groove angles and to potentially fit female femoral anatomy better. In spite of gender marketing, little evidence suggests that gender-based changes to the prosthesis lead to better sizing or clinical outcomes. A manufacturer's next generation knee system modified its standard sizes and also incorporated a different surgical technique for femoral prosthesis placement. The purpose of this study is to prospectively evaluate whether a gender-based component or the newer standard component with the modified surgical technique leads to better femoral component fit.

METHODS: Between 2009 and 2017, 2508 consecutive primary total knee replacements in females were performed by a single surgeon. One knee system had gender-based femoral components available. The second knee system, the manufacturer's updated version, had standard and narrow sizes, but importantly a modified surgical technique for component placement. A trial femoral component is placed in the ideal position prior to drilling for pegs and committing to medial-lateral placement. Femoral prostheses were evaluated intraoperatively and on postoperative radiographs for fit based on overhang and underhang relative to the distal femur.

RESULTS: When the first knee system was used, over 49% of the time the gender component was selected for better fit (894/1820). Component overhang was less with the gender component compared to its standard counterpart (1% vs 18%, $p<0.001$). However, occurrence of underhang was also greater (67% vs 30% ($p<0.02$)). With the newer knee system, the narrower option was selected only 9.3% of the time (64/688). Overhang was rare with both the standard and narrow components (1% and 2%, $p>0.4$). Underhang was also less with use of either component (8% vs 12%, $p>0.3$). Knee Society knee and function scores improved similarly in the groups.

DISCUSSION AND CONCLUSION: While a gender-specific component may provide more sizing options to provide better femoral fit options compared to its own standard size counterpart, it may only be addressing its own system's sizing limitations. The next generation knee system has both less overhang and underhang with its standard size, more likely due to surgical technique improvements, rather than component sizing modifications. Furthermore, the need for a narrower component option appears to be less since the newer design was used only one-fifth of the frequency that the gender component was used relative to its standard option. Overall improvement in fit based on both overhang and underhang suggests that the modified surgical technique plays a greater factor in femoral component fit than gender-specific femoral component sizing changes.