There are no gender differences but size differences in morphology of patella: an aid in patellar component design

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INTRODUCTION:
Although total knee arthroplasty (TKA) provides excellent mid-term and long-term results, failure of patella component was still one of the most serious problems for TKA. Recently, morphology date analysis revealed significant anatomic differences in the shape and size of female knees compared with male knees[1,2,3]. These studies suggested that, for any given anterior-posterior(AP) femoral dimension, women tend to have a narrower medial-lateral(ML) dimension than men. And more, Several studies have suggested that gender specific-prosthesis is needed for total knee arthroplasty (TKA) to accommodate such anatomical differences between males and females[3,4,5]. Some manufacturers provided femoral component for female with narrower width and with different shape and angle of patellar groove.

Establishing the appropriate size and shape of the patellar component will be one of the important steps for success in TKA. To our knowledge, however, there have been no studies on the gender difference of the shape of patella supposing the patellar component design. We performed the 3D-CT analysis of patellar morphology and evaluated the gender difference.

METHODS:
3D-CT data of the knee joint was obtained from 69 knees (30 males, 39 females) of TKA candidates. Bone cut surface following Subchondral bone method [6] for patellar component was evaluated using 3-D template system (3-D template system, JMM, Japan). We measured the position of the central ridge and medial-lateral width (W), longitudinal length (L) of the bone cut surface(Fig. 1). Furthermore, we investigated correlation W/L to L and position of the central ridge to L. The results were assessed statistically with a pearson’s correlation coefficient.

RESULTS:
The mean L of the bone cut surface was 39.2 ± 3.4mm in male, 36.1 ± 3.2mm in female. The mean W was 46.7 ± 3.4mm in male, 43.3 ± 3.1mm in female. The mean central ridge position was located 19.7 ± 2.2mm (42.1 ± 3.7%) in male, 18.8 ± 2.3mm (43.4 ± 3.5%) in female from the medial border. The size (W and L) was larger in male than in female (p<0.001). W/L ratio was significantly correlated to L in male (W/L = –0.02 xL + 1.99, R = 0.69, p =0.001) and female (W/L = –0.02 x L + 1.87, R = 0.63, p=0.001) (Fig. 2). However, there was no significant difference in the regression lines of W/L ratio and L between male and female. Central ridge position was slightly medial in male and female. Central ridge position/L ratio was not significantly correlated to L in male (Central ridge position /L = 0.29 x L + 27.2, R = 0.27) and female (Central ridge position /L = 0.085L + 32.5, R= 0.092) (Fig. 3).

DISCUSSION:
There was no gender difference but size differences in shape of patella. The current study showed that smaller patella needed more oval-shaped component and larger patella needed more round-shaped component.

REFERENCES: