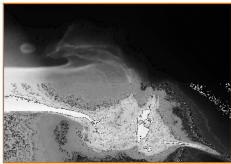
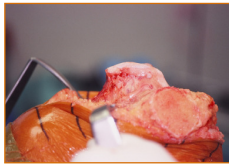


Introduction

Claims that gender differences in anterior condylar anatomy are dramatic, has led to implants designed specifically for women that have thinner anterior condyles. Proponents of this change claim that using a conventional implant in women may overstuff the patellofemoral joint leading to a feeling of tightness and/or a decreased range of motion. We have observed in our patients that the difference in anterior condylar anatomy appears to be highly variable and can depend on the size of the patient, the height of the patient, their ethnicity, as well as their gender. Because of this observed variability in anterior condylar anatomy, we sought to determine if gender differences in anterior condylar anatomy actually exist.



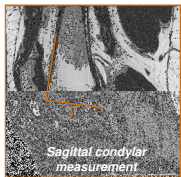
65 year-old female with large anterior condyle



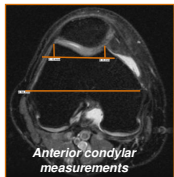
Intraop view of large anterior condyle in a female

Methods

212 randomly selected MRIs were evaluated (112 male and 100 female). The anterior condyle was defined as the area of bone anterior to the anterior femoral cortex 10 mm. above the joint line. The height of the medial and lateral anterior condyles was measured in millimeters directly from MRI data obtained in two planes. Additionally, the medial and lateral dimensions (width) between the epicondyles at this level were measured. In order to determine whether patient size had an effect on the size of the anterior condyles, an aspect ratio between these two was calculated by dividing the anterior condylar height by the medial lateral dimension.



Sagittal condylar measurement



Anterior condylar measurements

$$\text{Aspect Ratio} = \frac{\text{Anterior condylar height}}{\text{Medial-lateral width}}$$

Results

There is no significant difference (p=0.16) between genders with regard to lateral condylar height. The average difference between genders was only 0.5 of a millimeter. There was a significant difference (p=0.001) between genders with regard to medial condylar height. However, the average difference was only 1.1 mm. While the difference in height between genders was nominal, the anterior condylar height measurements were highly variable regardless of gender. Similar bell-shaped curves for each gender were seen (Figures 1 and 2).

When comparing the condylar aspect ratios, there were no significant differences between males and females. The average medial condylar aspect ratio for males was 0.07 mm. (SD=0.03) compared to 0.06 mm. (SD=0.03) for females (p=0.13). The average lateral condylar aspect ratio for males was 0.08 mm. (SD=0.03) compared to 0.09 mm. (SD=0.04) for females (p=0.50). A graphical illustration of the aspect ratios, results in two nearly identical bell-shaped curves for each gender (Figures 3 and 4).

Figure 1: Medial Condylar Height

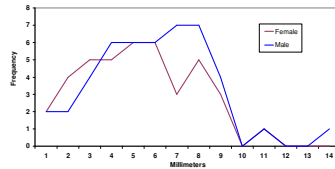


Figure 2: Lateral Condylar Height

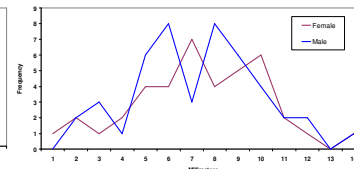


Figure 3: Medial Condylar Aspect Ratio

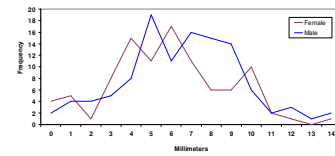
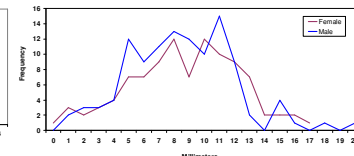


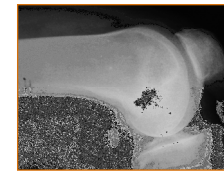
Figure 4: Lateral Condylar Aspect Ratio



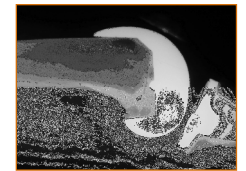
Discussion

The long-term results of total knee arthroplasty in men versus women show that women generally have better results than men. Despite these favorable analyses, the necessity for a gender specific knee has been marketed to patients and surgeons alike. The difference in anterior condylar anatomy is cited as one of three reasons mentioned for the need for a gender specific knee. This is surprising in light of the fact that the differences between genders in anterior condylar anatomy is negligible in both the series reported here and in previously published reviews of the subject.

The aspect ratio reported here, which corrects for the medial lateral dimension, is a surrogate for patient size regardless of gender and is important to consider when analyzing these types of data. The aspect ratio reported in this study seemed to negate any difference based on gender.



58 year-old male with minimal anterior condyle



Gender knee used for reconstruction

Conclusion

We conclude that anterior condylar anatomy is highly variable regardless of gender. The bell-shaped curves noted in our results clearly depict this variability. Some female patients had large anterior condyles while others had very small anterior condyles. A similar pattern was seen in men. While narrowing the prosthetic anterior condyle may diminish retinacular strain or improve range of motion, the clinical advantage of this has not been studied. Placing a thinner anterior condyle in someone who has been used to having a large anterior condyle may have a negative effect on quadriceps function as the quadriceps lever arm would be diminished. Implants as well as surgical techniques should take into account the variability of anterior condylar anatomy and try to reproduce such anatomy regardless of gender.