

CHAPTER II

LITERATURES REVIEW



In TKA, the shape of the knee prosthesis is very important because many complications may arise from a mismatch between the prostheses and the bones. Fehring and Valadie⁽²⁾ reported on 25 revision knee arthroplasties done for instability. Inadequate prosthetic design and surgical error were shown to be common reasons for instability.

TKA requires accurate soft tissue balancing and maximal coverage of components on the bone surface to minimize the stress applied to the bone-implant interface.⁽³⁾ Medial or lateral overhang on the femur or tibia could result in soft tissue irritation and affect balancing efforts. Undersized of either component could leave exposed cancellous bone, which could be a source of increased bleeding into the knee in the immediate postoperative period and may permit increased osteolysis from wear debris with longer follow-up. Overhanging or undersized femoral components could lead to altered soft-tissue tensioning and altered patellofemoral stresses.⁽⁴⁾

Noble et al⁽⁵⁾ have shown that improvements in the procedure and prosthetic design are still needed to restore normal function in patients after TKA. Seedhom et al⁽⁶⁾ in a radiographic and cadaveric study the evaluated sizing for knee prostheses, supported the idea that the required femoral component size should be based on the medial-lateral dimension of the femoral condyle. In the sizing of the femoral component, the anteroposterior diameter is important in maintaining flexion-extension spacing and optimal tension in the quadriceps mechanism⁽⁷⁾ whereas the mediolateral diameter determines adequate coverage of the resected bone surface, allowing even stress distribution, tension-free wound closure, and smooth tracking of the patellar component in the trochlear groove during flexion.⁽⁸⁾

For TKA, the important dimensions are those of the tibial plateau at the level that the bone is cut, because the match situation between the bone surface and prostheses will result in different contact stress which causes osteolysis. Therefore, prostheses of various sizes are needed. Cheng-Kung Cheng et al⁽⁹⁾ suggested that the design of the prosthetic tibial baseplate should be based on data from resected diseased knee, rather than normal knee and the measurement of diseased bones is more suitable than that of the normal bones since they are the ones which require total knee replacement. Also Wei-Pin Ho et al⁽¹¹⁾ suggested that most osteoarthritic knees requiring total knee replacements are deformed and frequently have anatomical dimensions different from normal knees. Members of the Asian-Pacific population have a smaller build and stature compared with their Western population. There has long been the belief among Asian-Pacific arthroplastic surgeons that the prosthetic

components currently available do not fulfill the requirement of this population. In Japan, K.Uehara et al⁽¹⁰⁾ concluded that no prostheses have fulfilled the requirements for Japanese knees. In Taiwan, Wei-Pin Ho et al⁽¹¹⁾ reported that the length of the lateral femoral condyle and the total width of the distal femur of resected femurs in Chinese patients are different from the corresponding morphometrical measurements in Caucasian patients so prostheses suitable for use in Caucasian patients may not be suitable for Chinese patients. In India, Shrinand V. Vaidya et al⁽¹³⁾ found that in Indian patients, especially in women, there is a need for a femoral component having an anteroposterior diameter and mediolateral diameter, which is smaller than the currently available femoral prosthetic sizes. According to this information, it makes this an important issue to also be studied in Thai population that the prostheses which currently use are suitable for Thai population or not.

A McPherson et al⁽¹⁴⁾ showed that measurements of knee kinematics can be studied using MRI. They compared using MRI with RSA/CT and 3D digitization and found that all three methods appear to be equally reliable within two standard deviations of the mean. So in this project we use MRI which is non invasive, available clinically and image the soft tissue as well as the bones for measuring the knee joint structures.