

July 20, 2007

Dear Charles,

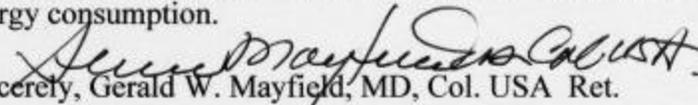
First I wish to thank you for reviving the concept of checking appropriate socket fit and alignment of above knee prosthetic components utilizing standing X-Rays. In my opinion, despite some current opinions to the contrary, I continue to firmly believe that improved functional results in both gait and energy expenditure can be achieved by assuring the femur, hip joint and surrounding stabilizing musculature are in optimum alignment as determined by socket shape and alignment. This can only be determined by taking long, standing x-rays to include the hip, residual femur, socket lateral wall contour and the alignment of the more distal prosthetic components.

You have provided an excellent summary and brought to light the work we did at Fitzsimmons Army Medical Center in the early 1970's utilizing x-ray techniques to assure optimum socket fit and prosthetic alignment on RVN conflict AK amputees. I will not go into the details of this as you are covering those details and outcomes in a review of our paper. I would like however to summarize my concept of the work and the importance of appropriate socket fit and alignment:

The standing x-rays we took of AK amputees in the "usual" or "standard" socket fit and alignment showed invariably the hip joint to be in abduction as compared to adduction of the contra-lateral normal hip. This position puts the hip abductor muscles which act as stabilizers in the stance phase of gait at a weakened and disadvantageous position or length resulting in the typical "gluteus medius lurch" characterized by the displacement of the upper body over the weight bearing extremity. I believe it is extremely important to both alleviate this energy wasting shift by assuring the femur and hip joint on the AK side is maintained in adduction.

In an optimum socket fit to achieve the above adducted position of the hip, the socket shape should be increased in the anterior-posterior axis and decreased in the med/lat axis by building in a convex (inward) lateral wall of the socket and allowing soft tissues to move in the AP axis. The drawings I have previously made for you illustrate this concept. The convex (inward) wall should as much as possible apply femur pressure to maintain the hip in the adducted position. Alignment of the knee, shank, foot distal components should be such that the alignment is in valgus so when the amputee walks the foot/shank component will be brought toward the midline adducting the hip joint.

The x-rays verify this alignment and femur/hip position. That basically summarizes my concept of an appropriate AK prosthetic fit. I believe if the above concepts are adhered to it will benefit AK amputees in both their gait and energy expenditure in walking. I would recommend further studies particularly in the realm of energy consumption.


Sincerely, Gerald W. Mayfield, MD, Col. USA Ret.