Reply to Letter to the Editor

Increased Anteversion of Press-Fit Femoral Stems Compared with Anatomic Femur

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Drs Wettstein and Mouhsine are correct to point out the benefits of advanced axial imaging for total hip replacement planning. It is especially helpful in assessing the rotational anatomy of the femur and acetabulum which may help individualize the best component alignment. They also are correct to point out that determination of the actual rotational version of the femur requires scanning the distal femur. The purpose of my study [1] was not to determine anteversion of the arthritic hip or postoperative version of the surgically treated hip since such studies have been reported. Rather, the purpose of my study was to compare preoperative version with the final postoperative version in the same patient. The methodology used was a fluoroscopic technique at the time of surgery, the interpretations of which are subjective and therefore the data were checked with a different methodology. Given similar findings, I presumed the study methods were valid. Two MRI series were used, one with a group of patients with no arthritis (scanned for other medical reasons) and another with patients who underwent MRI as part of the planning for hip replacement, which did include the knee, as Wettstein and Mouhsine suggested.

Unfortunately, they missed the main point of the study which showed that version of the anatomic femoral head did not predict version of the prosthetic femoral head using a canal filling broach-only bone ingrowth stem. In fact, on

average, the total hip femoral head is more anteverted than the native femoral head, 18.9° (femoral head) versus 27.0° (prosthesis). The range of postoperative version was wide, 0° to 42°, so there were outliers with extremes of retroversion and anteversion. This has implications for polyethylene wear and joint stability. Briefly, as the technique is presented in detail in the paper, a neutral femoral position is determined and marked, and the preoperative proximal femur version is compared with the postreplacement proximal femur. The end points for both of these determinations are subjective, based on change in shape of the image, leaving the conclusions open to criticism regarding the validity of the observation.

As the shape of the femoral canal determines the position of a canal-filling stem, a comparison of the canal shape (and therefore version) of the neck can be compared with the head, using axial imaging, either CT or MRI, and the neck version should differ from the head version in the same direction if the study methods are valid. Both scan series showed the same findings, namely that the neck version was more than the head version, which would lead to the canal-filling stem having more anteversion on average compared with the femoral head. The magnitude of the differences was interesting: the average difference for the fluoro-surgical series between preoperative and postoperative images was 6.1°, whereas the MRI series differences of 15.4° for the nonarthritic group and 11.2° for the arthritic group were in the same ballpark as that of the surgical group.

Therefore, the conclusions of my study were valid, namely that the postoperative femoral stem is, on average, more anteverted than the preoperative femoral head when using a canal-filling broach-only stem, and the surgeon needs to be aware of this fact to keep the appropriate relationship between the acetabulum and femur to avoid

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impingement and excessive polyethylene wear. The increased use of axial imaging for total hip planning is a good idea because it would indicate when a specialized implant is needed or when a change from routine component placement is warranted.

Reference

1. Emerson RH Jr. Increased anteversion of press-fit femoral stems compared with anatomic femur. *Clin Orthop Relat Res.* 2012;470:477–481.