Reducing the risk of dislocation after total hip arthroplasty: the effect of orientation of the acetabular component.

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This paper addresses a very important topic in that dislocation remains a cause of great morbidity after total hip replacement (THR). It is a particularly important problem at present with the introduction of minimal incision techniques of hip arthroplasty where component malposition may become more frequent. There are a number of anecdotal reports of disastrous malposition of components and dislocation with “novel” hip approaches.

Image guidance and navigation may improve matters and facilitate minimal incision procedures but the introduction and availability of these technologies has highlighted how little we know about the ideal position of our implants.

The other issue of particular significance to component malposition and dislocation in the UK is the outsourcing of THRs to treatment centres, the independent sector and waiting list initiatives where the quality and reproducibility of surgery has yet to be proven to be at the level generally expected in a busy district general or teaching hospital.

The authors have studied the impact of the orientation of the acetabular component on the probability of dislocation. They compared dislocated THRs with a cohort undertaken in the same way which did not dislocate. Their findings are primarily in relation to the antero-lateral approach. The authors therefore make recommendations as to the best position of the acetabular component. They challenge the issue of the safe zone.

This paper is effectively a marker for the way forward in trying to define what is the best ultimate position for components and how we should guide our robotic or image guidance software to introduce them in the optimal position.

The authors have quoted previous literature on the subject which, given the importance of dislocation, is relatively sparse. What is clear is that we do not have a precise understanding of the optimal position of both components and indeed more significantly of their relationship and how to evaluate the position both intra- and post-operatively.

The study is interesting because the authors have access to a large database of their own THRs undertaken in a relatively standard fashion and can therefore review the dislocations in that group. An EBRA method was used to measure acetabular position. They measured anteversion and abduction. The technique that the authors used to measure anteversion is not a widely available one but is a useful technique for research purposes. It is a technique that they have described before.

The authors’ data is useful in that it confirms that the dislocation rate after primary THR is > 2% and that after revision is almost 5% even in a high volume specialist unit. Patients with osteoarthritis had fewer dislocations than those with developmental dysplasia of the hip or AVN which suggests that patients with disease of recent onset and young patients or patients in whom surgery is technically complex are at high risk of dislocation. This would all fit in with the expected difficulties that hip surgeons encounter replacing hips in young patients with anatomical abnormalities or high activity levels.

The authors present some useful data suggesting that patients with tumours and those with femoral neck fractures have higher dislocation rates. This fits in with our concerns that these patients have a normal hip capsule pre-operatively and therefore a greater range of movement and expectation than patients with osteoarthritis. It fits in nicely with data previously in the literature and emphasises the need for greater care in these patients.

The authors have analysed their data in a number of ways and have shown clearly that anteversion of the acetabular component of < 10º leads to a much higher risk of posterior dislocation whereas anteversion of > 20º leads to a much higher risk of anterior dislocation. Measures therefore need to be put in place to put components in within the middle of that range. Likewise, they have clearly shown that opening the cup or increasing the abduction angle increases the risk of instability. They have effectively narrowed down the safe zone of Lewinnek et al.1

It is clear that many factors contribute to dislocation including soft tissue tension, length, offset, type of stem, head neck diameter ratio of the stem, patient compliance and neuromuscular control and that the narrowing of the safe zone probably relates to the fact that these factors come into play in those hips that are within the previously considered safe zone.

The conclusion that can be drawn is that component malposition remains a good predictor of hip instability. This is particularly the case in relation to anteversion or retroversion of the acetabular component which can be difficult to quantify intra-operatively and will hopefully improve as our navigation tools get better. On the other hand, optimal positioning of the component does not guar-
antee a satisfactory THR and there are still scenarios where other factors will still play a role.

The study has not gone on for long enough to look at late dislocation. There is however some data within the study that confirms that a large proportion of patients who have one dislocation will go on to suffer further dislocation. One very important fact from this study is that patients with dislocation after revision surgery have a more than 50% risk of requiring further surgery to stabilise their replacement. This reinforces the critical importance of length, offset and soft tissue management at the time of revision surgery.

Dislocation after THR is a multi-factorial process which includes issues that relate to the patient, the approach, the surgical technique, the implants, the soft tissue/neuromuscular envelope and the position of the components. This study only really addresses component position. It is also only really relevant strictly to the antero-lateral approach although its main messages can be extended to other approaches. The study also touches on the fact that inexperienced surgeons are at greater risk of malpositioning components than experienced surgeons. No broad conclusions can be concluded from this paper about that, but this is a critical issue that needs to be reviewed in view of the use of treatment centres and other non-standard institutions to perform more and more THRs.

This study stresses the position of the acetabular component. The authors consider the possibility of measuring the position of the femoral component. Ultimately the key to success in THR is the relationship between the two components, and with the bony anatomy to reduce impingement, and putting methods in place to ensure that we can define the safe position and range for each THR and that both the components are optimally positioned for that particular patient’s anatomy, offset, length, etc.

In brief this is an excellent paper that highlights an important topic. Component malposition is not the only factor responsible for hip dislocation but it is a key factor and one that is under the surgeon’s control. It is our duty as orthopaedic surgeons to ensure that well trained hip surgeons undertake hip replacement surgery and that they have access to the latest tools to ensure optimal component position; and that we continue to strive to define what is the best position for the components, building in issues such as offset and head/neck ratios. We are not that far away from being able to make very accurate pre-operative plans and simulate the exact position of the implants that we want. Very soon we should be able to reproduce that plan intra-operatively. This should ultimately dramatically reduce the incidence of dislocation after THR.

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References