Dual Mobility

A Summary Of Economic Outcomes

Evidence Brief

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Dislocation remains one of the most common complications following primary total hip replacement (THR).

There are several factors that can lead to dislocation following primary total hip replacement (THR). Patient-specific risk factors include age, neurologic disease, and impaired compliance, while surgery related factors include suboptimal implant position, insufficient soft-tissue tension, implant design, femoral head size, and surgeon variability.[1]

Dislocation remains a common issue associated with THR across multiple geographies and healthcare systems with varying treatment practices. Blom et al[7] reported an overall dislocation rate of 3.4% in primary THR (53/1,567). The authors also noted that different surgical approaches were associated with differences in dislocation rate. Twenty-three revisions (4.1%) were recorded for the posterior approach, 30 revisions (3.4%) for the modified Hardinge approach and 0 for the Omega (direct lateral) approach. Of the 53 cases 64.2% of the dislocations took place within the first 3 months of the index operation and 31 of 53 (58.5%) became recurrent. The mean number of dislocations per patient was 2.81, and of the 31 recurrent cases, 10 required revision surgery.

Malkani et al[2] reviewed a total of 39,266 primary THR patients within the Medicare population. A total of 1,868 patients (4.76%) from this cohort were diagnosed with postoperative dislocation, with the majority (80.6%) taking place within the first 2 years post-surgery. Bozic et al[3] established that dislocation was the most common indication for revision THR in the US population, while Phillips et al[4] reported that from 58,521 Medicare patients who underwent primary THR, 3.9% experienced a dislocation in the first 26 weeks. Patel et al[5] report that the incidence rate of dislocation following primary THR varies from 0.2% to 7%, while Kosashvili et al[6] report that the incidence rate can vary from 0.5% to 5%.

Kamath et al[8] reported that dislocation requiring urgent treatment is one of the main reasons for unplanned readmissions following THR. These patients were associated with longer and more complicated treatment pathways when compared to elective admissions. Unplanned readmissions following THR were more likely to be admitted to intensive care, had a higher mortality score and were twice as likely to require a blood transfusion.

In addition to the peer-reviewed data, the prevalence of dislocation requiring revision can be assessed in national joint registry data. The UK NJR[9] shows dislocation to be the cause of single stage revision in 15.5% of revisions, which is the third most common reason. In the AOA NJRR[10], dislocation is cited as the second most prevalent reason for revision, accounting for 21.1% of the revision cases, while the New Zealand registry[11] shows dislocation to be the most common failure mechanism with 1284 cases from 5848 revisions reported.

Dislocation following primary THR has both cost and resource implications.

Sanchez-Sotelo et al[12] analysed the hospital costs associated with treatment of post-operative dislocation. In their analysis 99 (2.4%) of 4,054 consecutive THRs dislocated. In 62 cases (63%) stability was achieved following one or more closed reductions. The hospital cost of each closed reduction episode represented 19% of the costs of an uncomplicated primary THR. The remaining 37 (37%) cases required surgical intervention, and these revision procedures represented 148% of the cost of an uncomplicated primary THR.

De Palma et al[13] found that an early dislocation increased the cost of a primary THA by 342%, while Vanhegan et al[14] described the mean costs of surgical treatment for dislocation to be £10,893 per case. Abdel et al[15] found that the mean cost of non-operative treatment of dislocation was £14,584 (Range - £5,900-£54,700), while the mean cost of operative treatment following the failure of conservative management was £19,801 (Range - £11,500-£42,150). Overall in cases of recurrent dislocation requiring operative treatment the costs increased by 300% in comparison to a standard primary THR (P<0.0001).

The longer, more complicated treatment pathway described by Kamath et al[8] also resulted in higher costs and charges. Median total costs were 24% greater for patients admitted for unplanned hip arthroplasties ($18,206 [$15,261–27,491] versus $14,644 [$13,511–16,309]; p<0.0001) for patients admitted for elective arthroplasties. Patients with unplanned admissions had a 67% longer median hospital stay
(5 days [range, 4–9 days] versus 3 days [range, 3–4 days]; p<0.0001) than for patients with elective admissions.

Dual Mobility (DM) technology can reduce the rate of dislocation following primary THR.

Darrith et al[16] performed a systematic review of Dual Mobility publications that includes 54 articles and assesses survivorship, as well as rates of aseptic loosening, intra-prosthetic dislocation and extra-articular dislocation. 10,783 primary dual mobility THAs were identified. The incidence of aseptic loosening was 1.3% (142 hips); the rate of intra-prosthetic dislocation was 1.1% (122 hips) and the incidence of extra-articular dislocation was 0.46% (41 hips). The overall survivorship of the acetabular component and the dual mobility components was 98.0%, with all-cause revision as the endpoint at a mean follow-up of 8.5 years (2 to 16.5). The authors noted that the rate of intra-prosthetic dislocation was low and was associated mainly with older designs.

De Martino et al[17] performed a systematic review of Dual Mobility publications that includes 59 articles and assesses the rates of dislocation and intra-prosthetic dislocation. 12,844 primary dual mobility THAs were identified. The mean age at surgery was 68.8 years (SD 9.7 years) and the mean follow up was 6.8 years (SD 5.1). The mean rate of dislocation was 0.9% (SD 1.9) and the mean rate of intra-prosthetic dislocation was 1.3% (SD 2.2)

When compared with standard cups, Dual Mobility cups have demonstrated a decreased risk of revision for dislocation without increasing the risk of revision for other causes or the risk of osteolysis.[18] Laurenden et al[19] report on a series of 100 Dual Mobility cases with 100% survivorship at 10 years with aseptic loosening of the cup as the endpoint, and no cases of dislocation. Combes et al[20] report on 2,480 primary THRs using Dual Mobility cups, implanted between 1998 and 2003. The mean follow up was 7 years (0.17-11 years). There were 15 dislocations (0.6%), with 2 recurring (0.08%) and only one requiring revision (0.04%).

Dual mobility cup designs can also reduce the rate of dislocation in treatment of displaced fractures of the femoral neck when compared to conventional cups in primary THA and hemiarthroplasties.[21-24] Dislocation rates following conventional primary THA treatment for fractured neck of femur appear to be 7-15 times greater than the rates observed with dual mobility cups in a similar patient cohort.[21]

Dual Mobility in primary THR is a cost-effective procedure.

Cost-effectiveness analysis evaluates the effectiveness of two or more treatments relative to their cost. It is a widely used approach which enables healthcare professionals and decision makers to calculate the relative efficiency of treatments so resources can be allocated to optimise value for money.

Two cost effectiveness studies, based on real world data, demonstrate THA using DM provide greater health gain and are cost saving compared to standard THA. Markov modelling and sensitivity analyses were used in both studies to establish the cost effectiveness of DM technology versus standard THR.

The first study by Epinette et al[25] considered the perspective of the French healthcare system. Using a French nationwide database (Programme Médicalisé du Système d'Information), 80,405 patients who underwent THR in 2009 were identified; their outcomes and healthcare costs were subsequently collected over a 4-year period. The authors concluded that dual mobility was associated with a relative risk of dislocation of 0.4 compared to standard THR and reported this would annually translate into 3,283 fewer dislocations, 28.3 million euro savings and 441 QALYs gained per 100,000 patients in the French healthcare system if THA-DM was performed instead of standard THA.

At a patient level this equated to a saving of 283 euros per case. This comparative cost-effectiveness analysis suggests that THA-DM may induce substantial cost-savings compared to standard THA.

The second study by Barlow et al[26] concluded similar findings. This cost effectiveness study considered a US societal perspective and showed lower accrued costs and better quality of life for THA using Dual Mobility under specific conditions. Sensitivity analysis also illustrated that Dual Mobility remained cost saving until DM implant costs exceeded those of standard THR by $1,023. The model assumptions used in this study were based on evidence from established European brands such as BI-MENTUM™ Dual Mobility System.

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Table HT15 Primary Total Conventional Hip Replacement by Reason for Revision (Primary Diagnosis OA)

Reason for Revision	Number	Percent
Loosening	3223	25.0
Prosthesis Dislocation	2720	21.1
Fracture	2626	20.3
Infection	2332	18.1
Lysis	278	2.2
Pain	241	1.9
Leg Length Discrepancy	202	1.6
Malposition	189	1.5
Instability	156	1.2
Implant Breakage Stem	136	1.1
Wear Acetabular Insert	114	0.9
Implant Breakage Acetabular Insert	112	0.9
Metal Related Pathology	107	0.8
Implant Breakage Acetabular	87	0.7
Incorrect Sizing	86	0.7
Implant Breakage Head	42	0.3
Other	256	2.0
TOTAL	**12907**	**100.0**

Note All procedures using metal/metal prostheses have been excluded.

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