

## Dislocation Rates Following Primary Total Hip Arthroplasty Have Plateaued in the Medicare Population



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### ABSTRACT

The purpose of this study was to determine if the use of larger femoral head diameters, in combination with recent practice including enhanced soft tissue choices and various operative exposure choices has led to any further decline in dislocation rates. 51,901 patients undergoing primary THA were identified from 5% Medicare Part B (physician/carrier) claims between January 1, 1997 and December 31, 2011. Dislocation rate at 6 months following THA was 2.84% over the study period (1997–2011). From 2005 to 2011, dislocation rates following primary THA have plateaued in the United States at approximately 2%. This suggests that the full benefits using large femoral head sizes are now realized. For further improvement in dislocation rates, a greater emphasis will be required on patient selection, surgical technique and component alignment.

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Total hip arthroplasty continues to be a very successful operation with a high patient satisfaction rate [1–3]. Despite the high success rate, hip dislocation remains one of the most frequent complications and a significant reason for revision following primary total hip arthroplasty [4]. Numerous risk factors for dislocation have been identified [5]. These include patient related factors such as neuromuscular and cognitive disorders, as well as surgical factors including operative approach, component positioning, and ability to restore offset and soft tissue tension [5]. Other risk factors for dislocation following primary total hip arthroplasty include age, co-morbidities, and surgeon case volume [5,6]. Awareness of these risk factors has led to efforts to improve surgical technique and implant design to reduce the risk of dislocation. Improvements in surgical technique have included incorporation of posterior soft-tissue repair and recognizing the importance of restoring offset and correct component positioning [5–7]. Recent advances in polyethylene and availability of other bearing materials led to introduction of large diameter femoral heads. Large femoral heads improve hip stability by increasing the impingement free range of motion as well as increasing the jump distance [8,9]. Previous studies have reported a decline in dislocation rate which seemed to coincide with the increased use of large diameter femoral heads [8,10]. The purpose of this study

was to determine if dislocation rates are still further declining since the large femoral heads in patients undergoing primary total hip arthroplasty became common practice in the United States.

### Methods

Patients undergoing primary THA were identified from 5% Medicare Part B (physician/carrier) claims between January 1, 1997 and December 31, 2011. These patients were identified using Current Procedural Terminology (CPT) code 27130. The 5% data set contains individual claims records for a random sample of Medicare beneficiaries, totaling about 2.4 million enrollees. Those aged under 65 years receiving Medicare insurance coverage were therefore excluded from the study. Patients who received Medicare health benefits through health maintenance organizations (HMOs) were also excluded because their healthcare expenses were not submitted to the Centers for Medicare and Medicaid Services (CMS) for payment and, therefore, claims from these beneficiaries were not complete or available from the database.

Demographic factors such as age, gender, ethnic group, and geographic location were recorded. The incidence of dislocation within 6 months following primary THA was evaluated by the coding of International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) diagnosis codes 718.35, 835.00–835.03, and 996.42 (effective October 2005). The incidence was stratified by age and gender. The proportion of head diameter of 32 mm and larger was obtained from the Orthopedic Network News, which includes a survey of hospital purchasing data from a network of hospitals. In 2009, the dataset

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**Table 1**  
Demographic Characteristics of the Patients Undergoing Primary THA in the Medicare Population.

	White	Black	Asian	Hispanic	Other/Unknown	Midwest	Northeast	South	West	Total
<b>Male</b>										
65–69	5081	255	8	12	46	1533	966	1921	982	5402
70–74	4936	177	12	18	26	1533	987	1796	853	5169
75–79	4308	129	14	20	26	1362	911	1424	800	4497
80–84	2678	52	10	12	10	848	578	846	490	2762
85+	943	16	6	8	3	277	178	327	194	976
All	17,946	629	50	70	111	5553	3620	6314	3319	18,806
<b>Female</b>										
65–69	7457	407	25	32	77	2254	1366	2883	1495	7998
70–74	7935	393	43	50	70	2440	1619	2972	1460	8491
75–79	7858	336	38	37	39	2495	1651	2781	1381	8308
80–84	5401	147	21	26	17	1675	1156	1784	997	5612
85+	2542	98	15	17	14	817	529	853	487	2686
All	31,193	1381	142	162	217	9681	6321	11,273	5820	33,095
Total	49,139	2010	192	232	328	15,234	9941	17,587	9139	51,901

included about 34,000 components from 129 hospitals [11]. This dataset has specific implant part numbers.

## Results

This study included 51,901 patients undergoing primary THA between 1997 and 2011 (Table 1). Women comprised 63.8% of the cohort. Patients in the 65–69, 70–74, 75–79, 80–84, and 85+ year old age groups comprised 25.8%, 26.3%, 24.7%, 16.1%, and 7.1% of the cohort.

The overall dislocation prevalence at 6 months post-surgery was 2.84% over the entire study period (1997–2011). In the late 1990s, the dislocation prevalence at 6 months was steady at about 4% (Fig. 1). In the early 2000s, the 6 month dislocation prevalence decreased sharply to just over 2% in 2005 [10]. Compared to 1997, the rates were not significantly different until 2003 ( $P < 0.0589$ ). From 2003 onwards, the dislocation risk continued to be significantly lower compared to in 1997. In 2003, the dislocation risk was 29.1% lower than in 1997 ( $P = 0.0104$ ), while the dislocation risk was 53.9% lower than in 1997 ( $P < 0.001$ ).

When stratified by gender, male patients had higher 6 month dislocation prevalence than female patients from 1997 through 2002 (Fig. 2). After 2002, the 6 month dislocation prevalence for males started to decline to levels that were then lower than those for females. However, overall, the dislocation risk for males and females was similar ( $P = 0.7183$ ) For all age groups, the 6 month dislocation prevalences exhibited a declining trend from 1997 onwards (Fig. 3). The change in

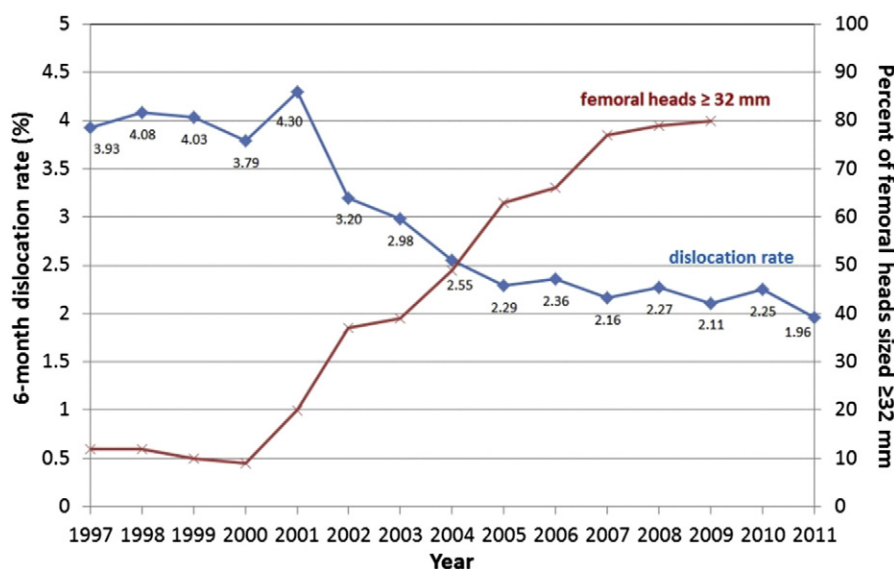
prevalence was greater for older patients, particularly those aged 80 and older [10]. Patients in the 80–84 year old age group and 85+ year old age group had a 22.0% and 46.0% higher adjusted risk of dislocation than patients in the 65–59 year old age group.

Between 1997 and 2009, the proportion of femoral heads, which were diameter 32 mm or greater, has increased from approximately 12% to 80% (Fig. 1). The use of femoral head diameter 32 mm or larger leveled off around 2009 which also coincides with plateauing of dislocation prevalence in the same period.

## Discussion

Dislocation remains one of the most common complications following total hip arthroplasty. The prevalence of dislocation measured at various timepoints after a primary total hip arthroplasty has been quoted in various studies to be approximately 2% to 4% [8,10,12–26,28]. Over the last few years there has been an effort to reduce the incidence of dislocation by improvements in both surgical technique as well as implant design. In recent years the use of larger diameter femoral head sizes in primary THA has grown rapidly [10]. Several studies have demonstrated an associated decreased incidence of postoperative dislocation associated with larger diameter femoral heads [8,10,15,16].

This study of the dislocation rate in the Medicare population from 1998 to 2007 demonstrated a decline in the 6 month dislocation rate from 4.21% to 2.14% [10] which coincides temporarily with the increasing



**Fig. 1.** Temporal trends in dislocation rate at 6 months post-primary THA in the Medicare population.

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