

# Ten-Year Cumulative Incidence and Indications for Revision Total Hip Arthroplasty among Patients with Sickle Cell Disease

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**INTRODUCTION:** Total hip arthroplasty (THA) implant survivorship and etiology for implant failure in patients with sickle cell disease (SCD) remains understudied. Therefore, the purpose of this study was to estimate and compare 10-year THA implant survivorship and indications for revision in those with SCD undergoing THA for osteonecrosis (ON) versus to control cohorts of patients THA for osteoarthritis (OA).

**METHODS:**

Patients who underwent primary THA were identified using a large insurance database. Sickle cell disease patients undergoing ON-indicated THA were propensity-score matched in a 1:4 ratio by age, gender, and Charlson Comorbidity Index (CCI) to control patients undergoing ON-indicated THA. The 10-year cumulative incidence rates of revision were determined using Kaplan-Meier survival analysis. Multivariable analysis was conducted using Cox proportional hazard modeling. Chi-squared analysis was conducted to compare the indications for revisions between cohorts.

**RESULTS:**

In total, 1,669 SCD patients were identified; 6,653 patients included in the matched ON control; 78,972 included in the unmatched ON control; and 757,303 patients included in the unmatched OA control. Patient demographic information can be found in Table 1 and Table 2. Compared to the unmatched OA control, SCD patients had higher a 10-year all-cause revision rate (HR: 1.36; 95% CI: 1.06-1.74; P = 0.017; Table 3; Figure 1), with patients being more likely to undergo revision for PJI (1.02% versus 0.57%; P = 0.025; Table 5). There was no significant difference in 10-year all-cause revision nor difference in the indications for revision in the SCD cohort when compared to both the unmatched and matched ON-control cohorts (P > 0.05 for all; Table 4).

**DISCUSSION AND CONCLUSION:** This study demonstrates comparable 10-year all-cause revision rates in SCD patients when compared to ON controls. The higher all-cause revision, most likely due to periprosthetic joint infection (PJI), when compared to the general OA population may be associated with the higher infectious burden of those with SCD and/or the indicated ON. Thus, perioperative and postoperative optimization should be prioritized in this patient population to minimize both the prior demonstrated short-term risk as well as the newly demonstrated long-term risk when compared to the general population.

**Table 1: Demographic characteristics of SCD patients (N=1,669)**

Characteristic	N	%
Age (Mean ± SD)	58.2 ± 12.5	
Female	1,012	60.7
Male	657	39.3
White	1,123	67.3
Black	546	32.7
Hispanic	100	6.0
Other	90	5.4
CCI (Mean ± SD)	0.8 ± 1.2	
CCI 0	1,012	60.7
CCI 1	412	24.7
CCI 2	185	11.1
CCI 3	50	3.0
CCI 4	10	0.6
CCI 5	0	0.0
CCI 6	0	0.0
CCI 7	0	0.0
CCI 8	0	0.0
CCI 9	0	0.0

**Table 2: Demographic characteristics of matched ON control patients (N=6,653)**

Characteristic	N	%
Age (Mean ± SD)	58.1 ± 12.4	
Female	3,987	59.9
Male	2,666	40.1
White	4,567	68.6
Black	2,090	31.4
Hispanic	380	5.7
Other	116	1.7
CCI (Mean ± SD)	0.8 ± 1.2	
CCI 0	3,987	59.9
CCI 1	1,643	24.7
CCI 2	745	11.1
CCI 3	200	3.0
CCI 4	40	0.6
CCI 5	0	0.0
CCI 6	0	0.0
CCI 7	0	0.0
CCI 8	0	0.0
CCI 9	0	0.0

**Table 3: Cox proportional hazard analysis of 10-year all-cause revision rates by SCD cohort (matched ON control)**

Characteristic	HR	95% CI	P Value
SCD vs Matched ON Control	1.36	1.06-1.74	0.017
SCD vs Unmatched ON Control	1.36	1.06-1.74	0.017
SCD vs Unmatched OA Control	1.36	1.06-1.74	0.017

**Table 4: Indications for revision in SCD patients (N=1,669)**

Indication	N	%
All-cause	1,669	100
Periprosthetic Joint Infection (PJI)	17	1.02
Instability	102	6.1
Loosening	102	6.1
Dislocation	102	6.1
Other	1,386	82.7

**Table 5: Indications for revision in matched ON control patients (N=6,653)**

Indication	N	%
All-cause	6,653	100
Periprosthetic Joint Infection (PJI)	38	0.57
Instability	245	3.7
Loosening	245	3.7
Dislocation	245	3.7
Other	6,065	91.3

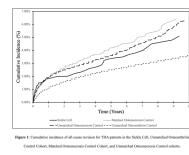


Figure 1: Cumulative incidence of all-cause revision for THA patients in the SCD cohort (N=1,669) compared to matched ON control patients (N=6,653).