

Comparison of Mortality and Complications After Total Hip Arthroplasty in Patients with Sickle Cell Disease: A Retrospective Match-Controlled Study from Türkiye

Orak Hücre Hastalığı Olan Hastalarda Total Kalça Artroplastisi Sonrası Mortalite ve Komplikasyonların Karşılaştırılması: Türkiye'den Retrospektif Eşleştirme Kontrollü Bir Çalışma

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Abstract

Objective: Sickle cell disease (SCD) is a well-recognized cause of osteonecrosis of the femoral head, and total hip arthroplasty (THA) in these patients is associated with higher complication rates. Because SCD is rare in the general population, large-scale studies are limited. This study aimed to evaluate complications and mortality after THA in patients with SCD.

Materials and Methods: Data from the national e-health database of Türkiye (e-Nabız) were used to identify 138 patients with SCD who underwent primary THA between 2016 and 2022. These patients were matched by age, sex, and Charlson Comorbidity Index score with 552 non-SCD patients. The groups were compared for 90-day medical and surgical complications, hospital stay, and mortality.

Results: Venous thromboembolism and pneumonia were more frequent in SCD patients ($p=0.028$ and $p=0.005$, respectively). The need for blood transfusion was significantly higher in the SCD group ($p<0.001$). No significant differences were observed in mortality at 7 days or 1, 3, or 12 months ($p>0.05$ for all). Similarly, there were no differences in 90-day mechanical or infectious complications ($p=0.68$ and $p=0.57$). The overall 90-day medical complication rate was higher

Öz

Amaç: Orak hücreli anemi (OHA) kalça eklemine osteonekrozuna yol açabilen faktörlerden biridir. Bu hastalarda total kalça artroplastisi (TKA) sonrası komplikasyon oranları daha yüksektir. OHA'nın toplumda nadir görülmesi nedeniyle geniş ölçekli çalışmalar sınırlıdır. Bu çalışmada, OHA hastalarında TKA sonrası komplikasyonlar ve mortalitenin değerlendirilmesi amaçlanmıştır.

Gereç ve Yöntemler: Ulusal e-sağlık veri tabanı (e-Nabız) kullanılarak 2016-2022 yılları arasında primer TKA uygulanan 138 orak hücre hastası belirlendi. Bu hastalar yaş, cinsiyet ve Charlson Komorbidite İndeksi açısından 552 orak hücre hastalığı olmayan hasta ile eşleştirildi. Gruplar 90 günlük tıbbi ve cerrahi komplikasyonlar, hastanede kalış süresi ve mortalite açısından karşılaştırıldı.

Bulgular: OHA grubunda venöz tromboemboli ve pnömoni kontrol grubuna göre anlamlı olarak daha sık görüldü ($p=0,028$ ve $p=0,005$). Kan transfüzyonu gereksinimi OHA grubunda belirgin şekilde yüksekti ($p<0,001$). Yedi gün, bir, üç ve on iki aylık mortalite oranlarında fark saptanmadı (hepsi, $p>0,05$). Doksan günlük mekanik veya enfeksiyöz komplikasyon oranları da benzerdi ($p=0,68$ ve $p=0,57$). Toplam 90 günlük medikal komplikasyon oranı OHA grubunda daha yüksekti



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Abstract

in the SCD group (13% vs. 6%; $p=0.005$). The mean duration of hospital stay did not differ between the groups ($p=0.35$).

Conclusion: Patients with SCD who underwent THA had higher rates of venous thromboembolism, pneumonia, and increased transfusion requirements. Preoperative optimization and multidisciplinary perioperative care are essential to reduce these complications.

Keywords: Femoral head osteonecrosis, Perioperative complications, Hypercoagulability, Blood management, Registry-based study

Öz

(%13 vs. %6; $p=0,005$). Hastanede kalış süresi açısından fark yoktu ($p=0,35$).

Sonuç: OHA'lı hastalarda TKA sonrası venöz tromboemboli, pnömoni ve kan transfüzyonu ihtiyacı daha yüksektir. Bu komplikasyonların azaltılabilmesi için perioperatif medikal optimizasyon ve multidisipliner yaklaşım büyük önem taşımaktadır.

Anahtar Sözcükler: Femur başı osteonekrozu, Perioperatif komplikasyonlar, Hiperkoagülabilite, Kan yönetimi, Kayıt tabanlı çalışma

Introduction

Osteonecrosis of the femoral head (ONFH) is more common in patients with sickle cell disease (SCD) than in the general population [1]. Sickle-shaped red blood cells may cause occlusion in the small nutrient arteries that supply the femoral head, leading to ONFH [1,2]. The rate of ONFH varies between 52% and 87% in patients with SCD undergoing total hip arthroplasty (THA), and the average age of patients who require THA is reported to range between 22 and 39 years [3,4,5].

Cytokine release is triggered by surgery, creating an environment in which sickle cell production is stimulated. An increased number of sickle cells leads to blockage in circulation, causing vaso-occlusive crises [6]. In both the perioperative and postoperative periods, patients with SCD are more prone to medical and surgical complications such as anemia, acute renal failure, pneumonia, sepsis, deep vein thrombosis (DVT), pulmonary embolism (PE), respiratory failure, and cerebrovascular accidents than non-SCD patients are [6,7,8]. Although preoperative blood transfusion has been shown to reduce postoperative complications, SCD-related complications may still occur in the early period in 30% of cases [9,10]. Previous studies have reported longer hospital stays, higher hospital costs, and increased complication risks in patients with SCD undergoing THA [9]. The 30-day mortality rates of SCD patients following THA vary from 0% to 2.5% [9].

SCD is predominantly observed in countries along the Mediterranean coast. However, larger studies investigating subsequent complications in SCD patients after THA are mostly reported from U.S. databases [11]. To our knowledge, the present study involves one of the largest SCD cohorts reported to date from the Mediterranean Region. In this study, we hypothesized that the postoperative medical and surgical complication and mortality rates of SCD patients would be higher than those of a control group.

Materials and Methods

A total of 138 patients who underwent primary THA between 1 January 2016 and 31 December 2022 and had already been diagnosed with SCD were identified. The evaluation of patient

data was conducted after obtaining approval from İstanbul Medipol University Non-Interventional Clinical Research Ethics Committee (decision no: 691, decision date: 19.06.2025). The e-Nabız e-health database, a digital health platform provided by the Ministry of Health of Türkiye, was used to identify patients with a diagnosis of SCD based on the relevant International Classification of Disease-10th Revision (ICD-10) codes: D57 with subcodes D57.0, D57.1, D57.2, and D57.8. Patients with sickle cell traits (D57.3) were not included. Operation-specific procedure codes were used to identify patients who underwent primary THA. Data extraction was performed in May 2023 via the Ministry of Health's Health Coding Reference Server (<https://skrs.saglik.gov.tr/>) [12].

The study was conducted in accordance with the Declaration of Helsinki. Due to the retrospective nature of the research, approval was received from the Turkish Ministry of Health with a waiver of individual informed consent for retrospective data analysis and the health information privacy law (ID: 95741342-020/27112019). However, stringent protocols were still implemented to ensure the utmost protection of patients' health information privacy and to maintain strict confidentiality standards.

Patients were considered eligible for inclusion if they had a confirmed diagnosis of SCD, underwent primary unilateral THA, and were aged 18 years or older at the time of surgery. Patients were excluded if THA was performed for a proximal femoral fracture, if revision or bilateral THA procedures were undertaken, or if there was a documented history of prior ipsilateral hip surgery. Propensity score matching was applied for 138 patients. Thus, the study ultimately included 138 patients with SCD and an additional 552 matched THA patients without SCD (Figure 1).

Demographic data including age, sex, Charlson Comorbidity Index (CCI) score, and the geographical region in which the surgery was performed were recorded. Length of hospital stay, medical and surgical complications, and mortality outcomes were also noted.

The age-adjusted CCI was used to classify comorbidities [13]. Furthermore, a comprehensive analysis of complications

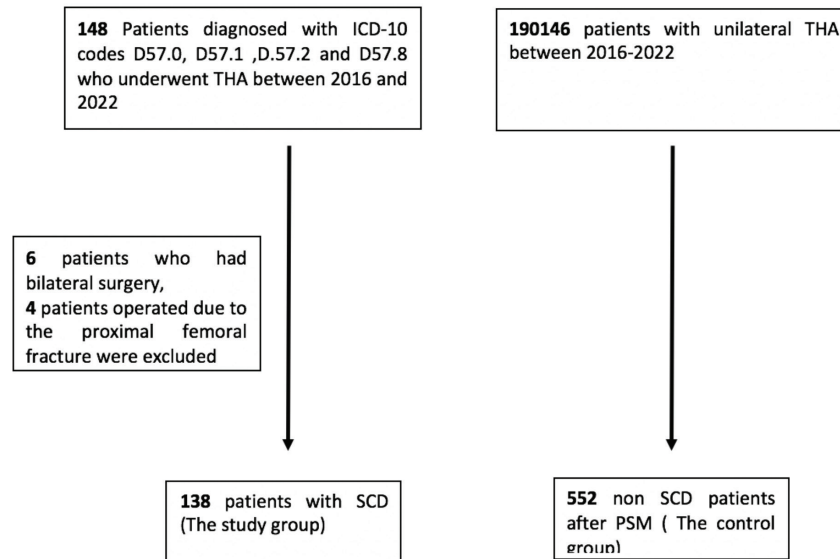


Figure 1. Flow diagram of the patient selection process for the study.

ICD-10: International Classification of Disease-10th Revision; THA: total hip arthroplasty; SCD: sickle cell disease; PSM: propensity score matching.

including acute renal failure, venous thromboembolism (VTE), PE, DVT, pneumonia, fluid and electrolyte imbalances, urinary tract infection, and gastrointestinal bleeding was conducted. Perioperative (intraoperative and first 10 postoperative days) blood transfusion rates were also examined. As the study data were retrieved from the e-Nabiz system, a standardized perioperative blood management protocol was not uniformly implemented across the study population. We utilized the ICD-10 codes T84.0 through T84.4 to identify mechanical complications (dislocations and periprosthetic fractures) and T84.5 through T84.9 to classify infectious complications related to internal orthopedic prosthetic devices, implants, or grafts. The medical records of patients with these codes were scrutinized for more detailed information regarding the complications, which were further categorized on the basis of their definitions according to ICD-10 and operation-specific codes. Mortality outcomes were divided into different time intervals according to 7-day, 1-month, and 3-month rates. Mortality rates and 90-day postoperative surgical and medical complications were compared between the SCD patients and matched controls.

Propensity Score Matching

This study incorporated a propensity score matching algorithm to adjust for the impact of potential confounding variables on the basis of methodologies previously described in the literature. This involved constructing a logistic regression model to generate propensity scores. A one-to-four matching approach was adopted, whereby each patient with SCD was matched with four unique non-SCD patients chosen on the basis of the closest propensity scores. Any data points beyond the common support were eliminated from both groups to adequately balance the

covariates. The best caliper width was determined by taking 0.2 times the standard deviation of the logit of the propensity score, as previously outlined [14]. Following this procedure, satisfactory matching was achieved between 138 SCD patients and a quadruple number ($n=552$) of non-SCD patients (Figure 1). The adequacy of the model was further substantiated by comparing the significance and the mean difference of the propensity scores of the datasets before and after matching. In the end, four variables were effectively balanced: patient age, sex, follow-up time, and CCI score.

Statistical Analysis

The data were analyzed with IBM SPSS Statistics 25.0 (IBM Corp., Armonk, NY, USA). To assess the normality of the data distribution, skewness and kurtosis values were used as statistical measures. Categorical variables were compared via the Pearson chi-square test. The independent-samples t-test was employed to compare parametric variables. Quantitative variables were presented as means \pm standard deviations, whereas qualitative variables were expressed as numbers (n), frequencies, or ratios. Statistical significance was accepted for values of $p < 0.05$.

Results

The average follow-up period was 3.4 years (range: 3 months to 7 years) for the patients in both groups. The mean age was 35.6 ± 12.1 years in the SCD group and 35.6 ± 12.1 years in the control group, and the age distribution within the SCD group is given in Table 1. Among the SCD patients, 85 were women (61%), whereas in the control group, there were 340 women (61%). The length of hospital stay was similar between the SCD and control groups (5.1 days [range: 2-12 days] and 5.3 days

Table 1. Demographic data of the main cohort undergoing total hip arthroplasty, the analyzed patients with sickle cell disease, and the matched control group.

		Before propensity score matching		p	After propensity score matching		p
		Sickle cell disease group	Control group		Sickle cell disease group	Matched control group	
		(n=150) (%)	(n=73,784) (%)		(n=138) (%)	(n=552) (%)	
Sex	Men	59 (39.3)	28,050 (38)	0.739	53 (38.4)	212 (38.4)	1.00
	Women	91 (60.7)	45,734 (62)		85 (61.6)	340 (61.6)	
Age, years	<25	33 (22)	1176 (1.6)	0.001	27 (19.6)	108 (19.6)	1.00
	25-40	77 (51.3)	7621 (10.3)		71 (51.4)	284 (51.4)	
	41-60	34 (22.7)	40,111 (54.4)		34 (24.6)	136 (24.6)	
	>60	6 (4)	24,876 (33.7)		6 (4.4)	24 (4.4)	
ACCI		1.69±2.04	2.62±2.31	0.001	1.45±1.92	1.43±1.86	0.95

ACCI: Age-adjusted Charlson Comorbidity Index.

Table 2. Distribution of patients with sickle cell disease according to the geographical regions of Türkiye.

Geographical regions of Türkiye	n	%
Eastern Anatolia Region	1	0.7
Central Anatolia Region	4	2.9
Black Sea Region	0	0
Mediterranean Region	117	84.9
Aegean Region	10	7.2
Marmara Region	5	3.6
Southeastern Anatolia Region	1	0.7
Total	138	100

[range: 1-12 days], respectively; $p=0.33$). The incidence of SCD was significantly greater in the Mediterranean Region of Türkiye (85%) than in other regions ($p<0.001$) (Table 2).

Regarding the etiology of hip osteoarthritis, the rate of ONFH was significantly higher in the SCD group (83%) than in the control group (5.6%) ($p<0.001$). No significant differences were observed between the two groups for surgical complication rates (Table 3). The 90-day periprosthetic joint infection (PJI) rate in the control group was 0.4%, whereas no infections were observed in SCD patients during the perioperative period ($p=0.68$).

During the follow-up period, the 90-day medical complication rate was significantly higher in the SCD group than in the control group (13% vs. 6%, respectively; $p=0.005$). The rate of perioperative blood transfusion was higher in the SCD group than in the control group (96% vs. 65%, respectively; $p<0.001$) (Table 3). However, when the relationship between postoperative blood transfusion and complications in patients with SCD was analyzed, no significant difference was observed between those who received blood transfusions and those who did not (Table 4). The number of SCD patients who experienced pneumonia and VTE was significantly higher than that of non-SCD patients ($p=0.03$ and $p<0.001$, respectively). However, there was no significant

difference between the groups in terms of acute renal failure, gastrointestinal bleeding, or fluid-electrolyte imbalance ($p>0.05$ for all) (Table 1). Furthermore, no significant differences were found between the two groups for 7-day, 1-month, 3-month, or 12-month mortality ($p<0.05$ for all) (Table 3).

Discussion

This national database study revealed an increased rate of pulmonary complications and VTE in patients with SCD during the postoperative period following THA. Additionally, nearly all patients in the SCD group required perioperative blood transfusions. However, mortality rates did not differ between the SCD and non-SCD groups.

SCD is the world's most common monogenic disorder and its prevalence is high in sub-Saharan Africa, South Asia, the Middle East, and the Mediterranean Region [12]. This disease is an important health problem in the Mediterranean Region of Türkiye and there are significant regional differences in its frequency.

The incidence of ONFH in SCD patients is reported to range between 11% and 89% in the literature [15,16,17]. Most cases of ONFH occur by the age of 35 [16], and THA may be necessary at an average age of 36 [3,17]. This age is considerably lower than the mean age of THA patients without ONFH. In our study, the mean age at the time of THA in the SCD group was similar to that reported in the literature [2,18]. In addition, 20% of the patients in our study were under 25 years of age.

Patients with SCD are more likely to develop medical complications than individuals without SCD [3,19]. SCD is characterized by a self-perpetuating pathophysiological cascade initiated by deoxygenation-dependent hemoglobin S (HbS) polymerization, which impairs erythrocyte deformability, promotes hemolysis, and predisposes to vaso-occlusion. Abnormal multicellular interactions among sickled erythrocytes, leukocytes, platelets,

Table 3. Mortality and complications in patients with sickle cell disease undergoing total hip arthroplasty and the matched control group.

	Sickle cell disease group	Matched control group	p
	(n=138) (%)	(n=552) (%)	
Overall mortality	6 (4.3)	12 (2.2)	0.15
7-day mortality	0 (0)	1 (0.2)	0.62
1-month mortality	0 (0)	1 (0.2)	0.62
3-month mortality	0 (0)	3 (0.5)	0.38
1-year mortality	2 (1.7)	5 (1.1)	0.59
Renal failure	4 (2.9)	9 (1.6)	0.33
VTE (total)	9 (6.5)	17 (3)	0.06
PE	3 (2.2)	3 (0.5)	0.06
Pneumonia	10 (7.2)	11 (2)	0.001
Fluid-electrolyte imbalance	1 (0.7)	2 (0.4)	0.56
GIS bleeding	0 (0)	2 (0.4)	0.48
Urinary tract infection	7 (5.1)	12 (2.2)	0.06
Blood transfusion*	133 (96.4)	357 (64.7)	0.001
Prosthesis-related complications	1 (0.7)	9 (1.6)	0.68
Mechanical complications	1 (0.4)	7 (1.3)	0.68
Infectious complications	0 (0)	2 (0.4)	0.57

*: Blood transfusion within 10 days after the index surgery. Significant values are presented in bold. VTE: Venous thromboembolism; PE: pulmonary embolism; GIS: gastrointestinal system.

Table 4. Relationship between blood transfusion and complications in patients with sickle cell disease.

	Blood transfusion		p
	Yes	No	
	(n=133) (%)	(n=5) (%)	
Overall complications	17 (12.8)	1 (20)	0.51
Kidney failure	4 (3)	0 (0)	1.00
Venous thromboembolism	9 (6.8)	0 (0)	1.00
Deep vein thrombosis	9 (6.8)	0 (0)	1.00
Pulmonary embolism	3 (2.3)	0 (0)	1.00
Pneumonia	9 (6.8)	1 (20)	0.32
Electrolyte imbalance	1 (0.8)	0 (0)	1.00
Urinary tract infection	7 (5.3)	0 (0)	1.00

and activated endothelium result in recurrent microvascular obstruction and ischemia/reperfusion injury. Concurrent intravascular hemolysis leads to nitric oxide depletion, oxidative stress, endothelial dysfunction, and progressive vasculopathy [20]. The overall rate of medical complications following THA in SCD patients varies significantly in the literature, ranging from 0% to 43% [9,21,22,23]. The most common complications include postoperative systemic sepsis, cardiac complications, DVT or PE, and respiratory system, gastrointestinal system, and urinary system complications [4,19]. Although the rate of medical complications in patients with SCD decreased in the last decade, it still remains higher than that of non-SCD patients [24]. In a review conducted by Kenanidis et al. [11], 15

studies including a total of 971 THA patients presenting with SCD were evaluated. Among those studies, 13 reported medical, intraoperative, and late postoperative complications after THA. The overall mean rate of medical complications was found to be 14.3% [7,22,23,25,26,27,28]. Similarly, in our study, the rate of 90-day medical complications was greater in the SCD group than in the control group (13% vs. 6%, respectively; p<0.01). The main reason for this is probably the pathophysiology of SCD and its deleterious effects on the vascular system. The higher incidence of postoperative blood transfusion may also have contributed to this finding. Consequently, we suggest that perioperative blood management for patients with SCD undergoing THA should be carefully monitored to prevent potential complications.

Blood transfusion is commonly required in the perioperative period for patients with SCD undergoing THA [9]. Perfetti et al. [3] reported that SCD patients received more blood transfusions than non-SCD patients did ($p < 0.001$). Keeping Hb levels at approximately 10 mg/dL in the postoperative period may reduce cardiopulmonary complications [18]. Previous studies have reported that blood transfusions during the preoperative period reduce postoperative complications [18,29]. However, in the systematic review conducted by Estcourt et al. [10], analyzing 434 patients with SCD and comparing those who received preoperative blood transfusions with those who did not, no significant difference was found between the two groups in terms of vaso-occlusive crisis, severe infection, or perioperative complications. Although different results have been reported for acute chest syndrome (ACS), the majority of patients who did not receive preoperative transfusion did not have a significant increase in risk [11,30]. Consistent with the literature, our study revealed a significantly greater rate of blood transfusion in the SCD group (96.4%) than in the non-SCD group (64.7%). However, this rate was still high in the non-SCD group. The probable reason for this is the lack of a standardized protocol for blood transfusion, leading to variability in transfusion practices across different centers. VTEs, including PE and DVT, are serious complications in SCD patients undergoing THA [31]. According to a large case-count study conducted by Chen et al. [19], coagulopathy was found to be approximately 3 times more common in patients with SCD than in those without SCD following THA. In the literature, the rate of VTE in patients undergoing THA for SCD varies between 0.3% and 7.7% [4]. Naik et al. [32] evaluated 1523 patients with SCD in a cohort study and reported that the incidence rate of first-time VTE was 5.2 events/1000 person-years. The cumulative incidence of VTE until the age of 40 years was approximately 11.3%. In the same study, the incidence of PE in patients with SCD was approximately 2 times higher than the incidence of DVT, but no statistically significant difference was found. Stein et al. [33] reported a fourfold higher incidence of PE in SCD patients than in non-SCD patients. Naik et al. [34] reported that the incidence of PE was 50 times greater in SCD patients than in the general population. In our study, the VTE and PE rates were higher in SCD patients who underwent THA than in non-SCD patients, and the obtained values of 6.5% and 2.2%, respectively, were similar to those reported in the literature. This could be attributed to the increased risk of VTE in patients with SCD and the high rate of blood transfusion during the perioperative period.

Due to the similarities between VTE symptoms and the clinical manifestations of SCD in the lower extremities, the diagnosis of thrombophlebitis can be overlooked [35]. Pain, which plays an important role in the diagnosis of VTE, can be attributed to bone infarction. PE can be misdiagnosed as other respiratory problems, such as increased respiratory rate, shallow breathing, decreased oxygen saturation, and suspected pneumonia.

Considering all these factors, VTE should be considered in the postoperative period in SCD patients and the necessary radiological examinations should be performed promptly [30]. In our study, although the rate of PE was higher in patients with SCD than in the control group, the difference was not statistically significant ($p = 0.065$). This study included a relatively large cohort but the number of patients with SCD was relatively small ($n = 138$), which may have resulted in type II error, causing us to fail to identify a difference regarding PE.

Postoperative wound complications and infections are significantly more common in SCD patients after THA [4]. This is likely a result of the impaired microvasculature and immune system seen in SCD patients [3]. The rate of PJI after THA in SCD patients has been reported to range from 0% to 33% in the literature [25,28]. In a meta-analysis of 13 studies, the average PJI rate was 3.7% [4]. In our study, no deep infections were observed in the SCD group during the early postoperative period (90 days). This could be due to the patient cohort being relatively young, with an average age of 35.6 years, as well as the relatively small size of the patient cohort ($n = 138$).

The mortality rate is higher among SCD patients than among individuals without SCD. In the United States, 25,665 deaths due to SCD among people of African descent were recorded from 1979 to 2017, while the average annual age at death increased from 28 years in 1979 to 43 years in 2017 [36]. Mortality rates ranging from 1% to 5% have been reported in patients with SCD undergoing THA during the first postoperative month. In a study conducted by Vichinsky et al. [29] involving 118 patients who underwent 138 orthopedic surgical procedures, two patients (1%) died within the first month due to ACS. Compared to the healthy population and depending on race, sex, age at death, and year of death, SCD-related deaths are more likely to be associated with acute pulmonary complications, acute infection, cerebrovascular events, and acute and chronic cardiovascular complications [36]. In contrast to the literature, our study did not observe any deaths during the first postoperative 3-month period. This discrepancy could be attributed to the increased awareness and early diagnosis of complications such as VTE and ACS, leading to better control of these problems through a multidisciplinary approach. In our study, similar to the literature, the cumulative mortality rate in SCD patients was higher than that in non-SCD patients (4.3% vs. 2.2%; $p = 0.152$). However, this difference was not statistically significant.

Study Limitations

This study has several limitations, including its retrospective design and the fact that multiple surgeons performed the THA procedures in different hospitals. The heterogeneity of the techniques and level of experience may have affected the results; however, this variability may also support the generalizability of our findings. Second, since the surgeries were

performed in different hospitals and the physical conditions of the hospitals may have varied, the complications that occurred may not be solely attributed to the disease. Third, potential errors in diagnostic coding may have resulted in a less accurate interpretation of postoperative complication data. In addition, information regarding implant-related variables, including implant design, manufacturer, and fixation method (cemented versus uncemented), was not available in the national registry and therefore could not be analyzed. An important limitation of this study is the incomplete availability of detailed preoperative hematological data. Information regarding preoperative transfusion strategies (simple versus exchange transfusion), HbS levels, and sickle cell genotypes (homozygous HbSS versus HbS/β-thalassemia) was not consistently accessible or could not be reliably evaluated for all patients in the national registry. However, all registry studies are prone to this drawback. As postoperative problems can also occur in the natural course of SCD, they cannot be attributed solely to THA. The exact cause of mortality may not always be known. Furthermore, miscoding may have reduced the exact number of SCD patients. As the data for etiological examinations were obtained from a national database, the entry of varying ICD codes in different centers may have led to an inability to accurately determine the rate of surgery for osteonecrosis within the primary coxarthrosis patient group. Surgical etiology was not included as a matching variable, as the study was designed to compare patients with SCD undergoing THA with the general THA population; future studies could address etiologically matched cohorts.

Conclusion

Patients with SCD have a significantly increased risk of respiratory system problems following THA. Additionally, the need for blood transfusion is significantly greater among SCD patients undergoing THA than among matched controls. Due to the potential for complications that can reach life-threatening levels in these patients, their follow-up should be conducted with increased attention and diligence. The support of relevant specialists should be sought to better manage any potential complications. Furthermore, SCD patients scheduled for THA should be thoroughly informed about potential complications prior to surgery. Consultation with hematology should be sought before surgery to minimize potential complications. During the postoperative period, patients should be closely monitored for possible complications.

Ethics

Ethics Committee Approval: Istanbul Medipol University Non-Interventional Clinical Research Ethics Committee (decision no: 691, decision date: 19.06.2025).

Informed Consent: Retrospective study.

Footnotes

Authorship Contributions

Surgical and Medical Practices: M.A.Ç., M.B., Ö.S.H., İ.A., B.A.; Concept: M.A.Ç., B.A.; Design: M.A.Ç., İ.T., E.T., İ.A., B.A.; Data Collection or Processing: M.A.Ç., M.B., Ö.S.H.; Analysis or Interpretation: İ.B., U.Ö., N.A., M.A.; Literature Search: İ.B., U.Ö., Ş.B., Ö.G.S.; Writing: M.A.Ç., M.B., Ö.S.H., U.Ö., İ.A., B.A.

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Use of Generative AI and AI-Assisted Technologies: During the preparation of this work, the authors used ChatGPT to edit the language. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

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