

Heightened Revision Risk: Ankle Instability Surgery in Patients with Ehlers-Danlos Syndrome/Hypermobility Spectrum Disorder

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INTRODUCTION:

Joint instability is a significant clinical manifestation in Ehlers-Danlos Syndrome (EDS) and hypermobility spectrum disorder (HSD), heritable connective tissue disorders characterized by defects in collagen formation. These conditions lead to joint hypermobility and instability, significantly limiting daily activities for patients with HSD and EDS, who also suffer from issues with walking, balance, and a reduced sense of joint proprioception. The surgical outcomes for these populations remain poorly characterized compared to non-hypermobility individuals. Due to altered biomechanical properties of connective tissues in EDS/HSD, surgical procedures carry an increased risk of complications and failure. Connective tissue disorders like EDS/HSD are linked to revision rates as high as 35% in small cohort studies, though robust comparative data are lacking. No studies have directly compared surgical failure rates between EDS/HSD patients and matched controls, leaving surgeons without evidence to guide risk stratification. The purpose of this study is to investigate the rates of revision surgery between patients with EDS/HSD and matched controls following ankle surgery. We hypothesize that patients with a preoperative diagnosis of EDS/HSD will experience higher rates of revision surgeries for ankle instability compared to those without such diagnoses.

METHODS: A retrospective cohort study was conducted using the PearlDiver Mariner 170 Database. Patients undergoing ankle ligament repair procedures were identified using CPT codes. The experimental cohort included patients with EDS/HSD with at least two years of follow-up data, excluding other connective tissue disorders and confounding conditions. Propensity score matching was used to create a matched control group. The primary outcome was the rate of revision ankle ligament repair within 2 years and 5 years. The secondary outcome was the effect of patient risk factors associated with revision surgery. Revision rates were compared between cohorts using multivariable logistic regression. Statistical significance was set at $p < 0.05$.

RESULTS:

The 2-year cohort included 805 patients with EDS/HSD and 805 matched controls, while the 5-year cohort consisted of 480 patients in each group. Procedures primarily involved modified Brostrom repair, lateral ankle ligament reconstruction, and arthroscopic-assisted repairs. Patients with EDS/HSD had significantly higher revision rates at two years (13.8% vs. 6.3%) and five years (19.4% vs. 7.3%) ($p < 0.0001$). Multivariate analysis identified EDS/HSD as an independent risk factor for revision surgery, with adjusted odds ratios of 2.41 at two years and 3.11 at five years ($p < 0.0001$).

DISCUSSION AND CONCLUSION:

This study highlights the significant challenges in the surgical management of ankle instability in patients with EDS and HSD. The risk of surgical failure persists and intensifies over time, with a 3.1-fold increase in revision surgery rates at five years postoperatively compared to matched controls. These findings emphasize the need for specialized surgical approaches and comprehensive perioperative care to address the unique risks and complications in this population.

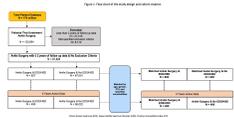


Table 1. Demographic Characteristics of Included Patients

Characteristic	2-Year Follow-Up		5-Year Follow-Up	
	EDS/HSD	Matched Control	EDS/HSD	Matched Control
Count	805	805	480	480
Age (Mean ± SD)	35.2 ± 12.5	35.2 ± 12.5	35.2 ± 12.5	35.2 ± 12.5
Gender (M/F)	50.5%	50.5%	50.5%	50.5%
CCI	0.81 ± 1.24	0.81 ± 1.24	0.81 ± 1.24	0.81 ± 1.24
Diabetes	12.5%	12.5%	12.5%	12.5%
Obesity	45.2%	45.2%	45.2%	45.2%
Revision Rate	13.8%	6.3%	19.4%	7.3%

Table 2. Rates of Revision Surgery After Ankle Ligament Reconstruction

Characteristic	2-Year Follow-Up		5-Year Follow-Up	
	EDS/HSD	Matched Control	EDS/HSD	Matched Control
Count	112	112	68	68
Revision Rate	13.8%	6.3%	19.4%	7.3%

Table 3. Multiple Variable Regression Analysis for Revision Surgery

Characteristic	OR (95% CI)	p-value
EDS/HSD	2.41 (1.52-3.85)	<0.0001
Age	0.95 (0.94-0.96)	<0.0001
Male Gender	1.05 (0.93-1.18)	0.504
CCI	1.01 (0.95-1.07)	0.822
Diabetes	1.02 (0.82-1.28)	0.887
Obesity	1.42 (1.12-1.71)	0.003

* p-value < 0.05 indicates statistical significance between EDS/HSD and Matched Control.

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