

Regional disparities in Minimally Invasive Surgery for Inguinal Hernia Repair Across Europe: Secondary Analysis of an International Cohort Study

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Introduction

Healthcare systems in Europe vary in funding, accessibility, and health spending per capita, potentially influencing the advanced surgical techniques given to patients. This study aimed to evaluate the utilization of minimally invasive surgery (MIS) for elective inguinal hernia repair across Europe.

Material and Methods

Secondary analysis of an international, prospective observational study of inguinal hernia repairs between January 30 and May 21, 2023. Adults undergoing elective repair in Europe were included for this analysis. The four European regions were compared according to the United Nations (UN) geoscheme: Southern, Eastern, Northern, and Western Europe.

A multilevel multivariable logistic regression model explored factors associated with MIS use.

Results

A total of 8,355 patients from 254 hospitals across 23 European countries were included: 5,590 from Southern, 587 from Eastern, 1,541 from Northern, and 637 from Western Europe. Most hospitals were public (88.8%) and tertiary-level (49.9%). Patient and hernia characteristics were generally similar, except Western Europe reported higher rates of bilateral hernias (24% vs. 14.1% overall).

MIS was performed in 26% (2,169/8,355) of cases: 70.6% in Western, 37.9% in Northern, 46.5% in Eastern, and 15.4% in Southern Europe.



Participant countries according to the UN geoscheme

Surgical technique	Southern n: 5527		Eastern n: 587		Northern n: 1541		Western n: 637	
	n (%)		n (%)		n (%)		n (%)	
Approach								
MIS/MIS converted	862 (15.4%)		273 (46.5%)		584 (37.9%)		450 (70.6%)	
Open	4728 (84.6%)		314 (53.5%)		957 (62.1%)		187 (29.4%)	
Approach (detailed)								
Laparoscopic	813 (14.5%)		265 (45.1%)		553 (35.9%)		374 (58.7%)	
Laparoscopic converted	23 (0.4%)		8 (1.4%)		17 (1.1%)		6 (0.9%)	
Robotic	26 (0.5%)		0 (0.0%)		14 (0.9%)		70 (11.0%)	
Open	4728 (84.6%)		314 (53.5%)		957 (62.1%)		187 (29.4%)	
Mesh use	5533 (99.0%)		576 (98.1%)		1527 (99.1%)		636 (99.8%)	
Surgical technique (mesh based)*								
TAPP - Transabd. preperitoneal	566 (10.2)		237 (41.1)		404 (26.5)		263 (41.4)	
TEP - Totally extra-peritoneal	260 (4.7)		23 (4.0)		137 (9.0)		180 (28.3)	
Lichtenstein	3752 (67.8)		309 (53.6)		886 (58.0)		177 (27.8)	
Other	955 (17.2)		7 (1.2)		100 (6.6)		16 (2.6)	

Significant regional variation in MIS use was identified through multivariate analysis. Greater MIS use was associated with bilateral hernias, more experienced surgeons, and private hospitals, whereas hernias involving the scrotum or extending beyond were more likely to be treated with open surgery.

Conclusion

Significant disparities in MIS adoption for elective inguinal hernia repair exist across Europe. Targeted initiatives should prioritize Southern Europe and Eastern Europe to ensure more equitable access to advanced surgical techniques.

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Multivariate regression		Odds ratio	95% CI	p-value
European Regions	Southern Europe	-		
	Western Europe	34.64	15.26 – 78.65	< 0.001
	Eastern Europe	22.26	10.03 – 49.36	< 0.001
	Northern Europe	6.22	3.40 – 11.39	< 0.001
Sex	Male	-		
	Female	1.14	0.90 – 1.45	0.268
Indication	Asymptomatic	-		
	Symptomatic	0.80	0.63 – 1.00	0.054
Hernia size	Inguinal region	-		
	Limited to scrotum	0.24	0.19 – 0.31	< 0.001
	Mid-thigh or beyond	0.17	0.06 – 0.50	0.001
Hernia site	Unilateral	-		
	Bilateral	14.33	11.76 – 17.47	< 0.001
Hospital funding	Public	-		
	Public-private	2.99	1.02 – 8.74	0.045
	Private	2.80	1.03 – 7.65	0.044
Hospital type	Primary	-		
	Secondary	0.94	0.41 – 2.13	0.881
	Tertiary	0.71	0.31 – 1.60	0.405
Experience of primary operator	0 – 50	-		
	51 – 200	2.55	1.97 – 3.30	< 0.001
	≥201	3.54	2.75 – 4.54	< 0.001

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