

INTRODUCTION

- Inguinal hernia repair (IHR) is one of the most common surgical procedures.
- While Robot-assisted IHR using da Vinci surgical system (dV-RIHR) have been increasing as an alternative to a laparoscopic (LIHR) or Open surgical approach.
- A meta-analysis is needed to guide evidence-based decisions and optimize IHR treatment strategies.

AIM

This study aims to review the latest evidence on dV-RIHR and compare its pooled outcomes with those of standard LIHR and Open procedures.



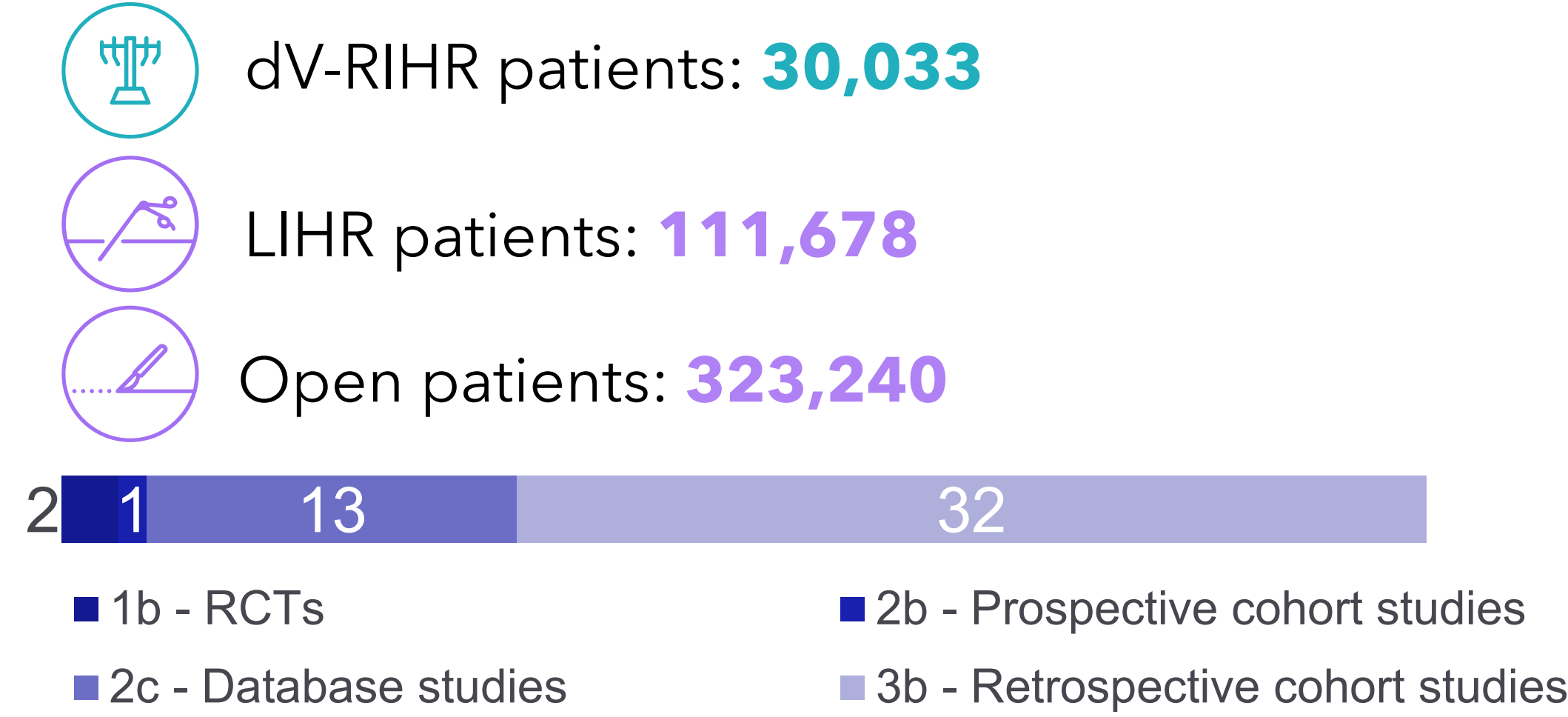
METHODS

- A search of PubMed, Embase, and Scopus covering the period from January 1, 2010 to December 31, 2024 was conducted for studies comparing dV-RIHR, LIHR, and Open approach.
- Publications were excluded for the following: if not in English, pediatric cases, mixed procedures or study arms, no relevant outcomes, or redundant data.
- Outcomes assessed include:

Follow up	Outcomes
Intraoperative	Operative time, conversions, blood transfusions
Index hospitalization	Hospital stay, pain scores (VAS)
Postoperative 30-days	Postoperative complications, surgical site infections, pain event, reoperations, readmissions, mortality
Postoperative 90-days	Need for pain medication, Return to activities of daily living (ADL), return to work
Postoperative 1-year	Hernia recurrence, pain event, pain scores (VAS)
Postoperative 2-years	Hernia recurrence, pain event, pain scores (VAS)

RESULTS

- **48 publications** including:



RESULTS

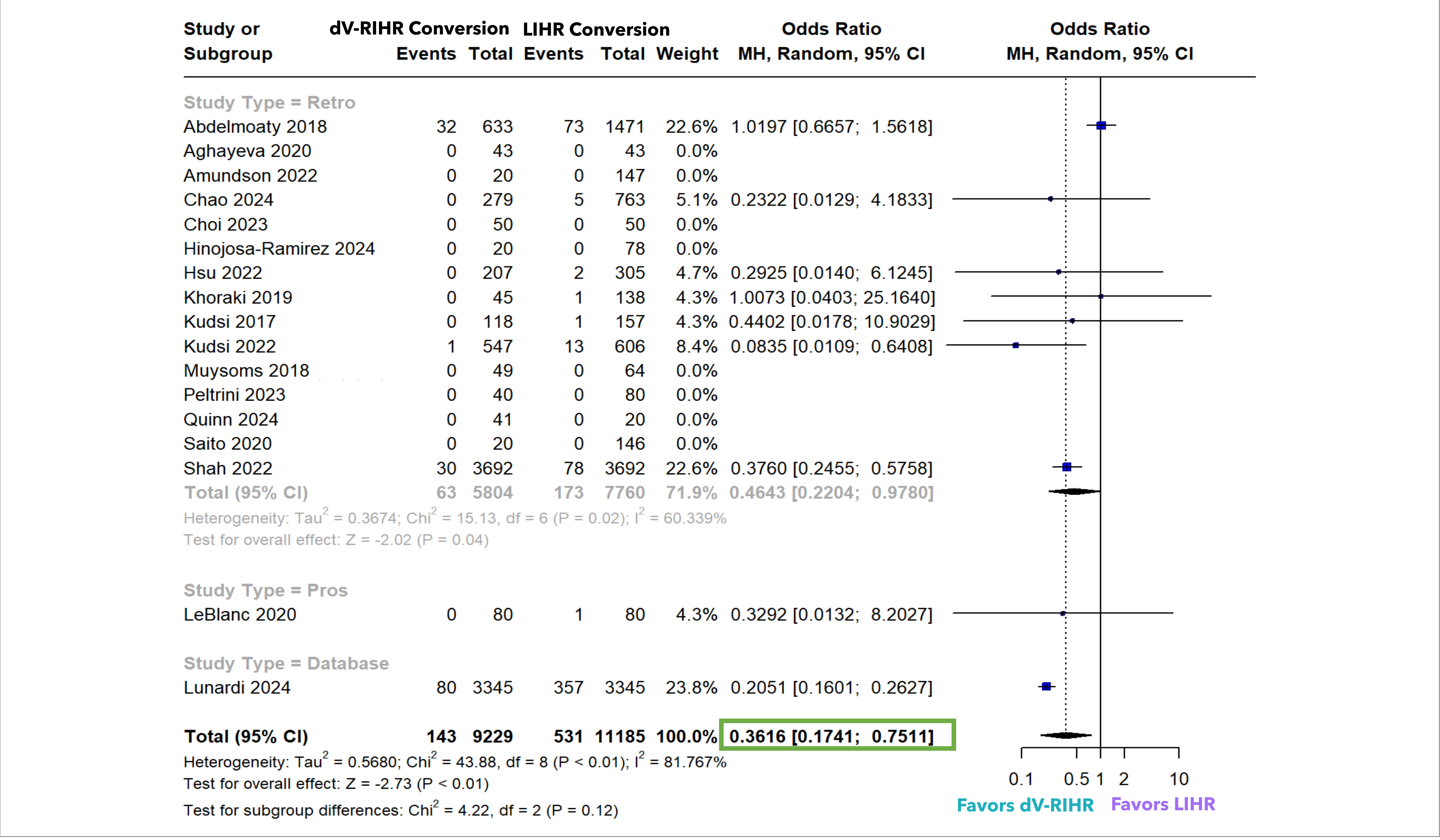
Table 1. Comparative analysis by between dV-RIHR vs LIHR:

Outcome	Studies	dV-RIHR N	LIHR N	Effect size	Effect p-value	Heterogeneity	Model	Conclusions
Operative time: Bilateral repair (min)	15	556	996	MD: 24.17 [14.93, 33.42]	p<0.01	I² = 87%; p<0.01	Random	Favors LIHR
Operative time: Unilateral repair (min)	20	3445	14172	MD: 19.88 [13.57, 26.19]	p<0.01	I² = 94%; p<0.01	Random	Favors LIHR
Conversion to Open (%)	17	9229	11185	OR: 0.36 [0.17, 0.75]	p<0.01	I² = 82%; p<0.01	Random	Favors dV-RIHR
1-year Recurrence (%)	11	2792	5508	OR: 0.5 [0.31, 0.78]	p<0.01	I² = 0%; p=0.58	Fixed	Favors dV-RIHR
≥2-year Recurrence (%)	9	2921	5347	OR: 0.51 [0.33, 0.79]	p<0.01	I² = 0%; p=0.58	Fixed	Favors dV-RIHR
Index hospitalization VAS pain (score)	4	156	133	MD: -1.02 [-1.85, -0.19]	p=0.02	I² = 81%; p<0.01	Random	Favors dV-RIHR
* All other outcomes were comparable between dV-RIHR and LIHR.								

Table 2. Comparative analysis by between dV-RIHR vs Open-IHR:

Outcome	Studies	dV-RIHR N	Open N	Effect size	Effect p-value	Heterogeneity	Model	Conclusions
Operative time: Bilateral repair (min)	5	159	287	MD: 26.69 [10.04, 43.34]	p<0.01	I² = 70%; p<0.01	Random	Favors Open
Operative time: Unilateral repair (min)	8	2166	68949	MD: 24.44 [12.1, 36.78]	p<0.01	I² = 99%; p=0	Random	Favors Open
Index hospitalization VAS pain (score)	2	124	197	MD: -3.37 [-6.30 ; -0.44]	p=0.02	I² = 69%; p=0.07	Random	Favors dV-RIHR
30-days Postoperative Pain (%)	3	2249	2236	OR: 0.32 [0.16, 0.67]	p<0.01	I² = 0%; p=0.96	Fixed	Favors dV-RIHR
90-days Pain medication (%)	4	855	2715	OR: 0.49 [0.37, 0.66]	p<0.01	I² = 44%; p=0.14	Fixed	Favors dV-RIHR
* All other outcomes were comparable between dV-RIHR and Open-IHR.								

Figure 1. Detailed Forest-plot for Conversion to open surgery Forest plot between dV-RIHR vs LIHR:



RESULTS

Compared to LIHR, patients undergoing dV-RIHR had:

- ↑ Operative time for bilateral repair by **24 minutes**
- ↑ Operative time for unilateral repair by **20 minutes**
- ↓ Conversions by **64%**
- ↓ Index hospitalization pain scores (VAS) by **1.02 points**
- ↓ 1-year hernia recurrence by **50%**
- ↓ 2-year hernia recurrence by **49%**
- All other outcomes were comparable

Compared to Open, patients undergoing dV-RIHR had:

- ↑ Operative time for bilateral repair by **27 minutes**
- ↑ Operative time for unilateral repair by **24 minutes**
- ↓ Index hospitalization pain scores (VAS) by **3.37 points**
- ↓ 30-day postoperative pain by **68%**
- ↓ 90-day pain medications by **51%**
- All other outcomes were comparable

CONCLUSIONS

- The da Vinci system is a safe and effective option for benign IHR, offering improved conversion rates, lower pain scores and better recurrence rates at 1- and 2-year follow-ups compared to LIHR.
- dV-RIHR demonstrates superior pain-related outcomes and comparable results in other metrics when compared to the open approach.
- Further research is necessary to better understand pain and quality of life outcomes.

TABLES/REFERENCES



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