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INTRODUCTION

- > da Vinci assisted robotic cholecystectomy (dV-RC) offers improved precision and visualization.
- \succ Laparoscopic (LC) and open (OC) techniques remain the gold standard due to their widespread accessibility and proven effectiveness.
- \succ Consolidating literature is crucial to assess dV-RC benefits compared to LC and open methods.

AIM

To compare the perioperative outcomes in patients undergoing dV-RC, LC, and OC for benign indications such as inflammation, stones, polyps, and dyskinesias.



METHODS

- \succ A PRISMA-guided systematic review and meta-analysis using R analyzed 14 years (2010-2024) of studies from PubMed, Embase, and Scopus, comparing dV-RC with LC and open surgery.
- \succ Studies were excluded if non-English, pediatric-focused, mixed procedures, lacked relevant outcomes, or contained redundant data.
- > Outcomes assessed include operative time, conversion, blood loss, blood transfusions, hospital stay, bile duct complications, surgical site infection, pain, 30-days complications, readmissions, reoperations and mortality.
- \succ Subgroup sensitivity analysis by admission type (Elective vs. Emergent) was performed to verify the robustness of the main analysis results.



Robotic-Assisted Cholecystectomy Using the da Vinci Surgical System Compared to Laparoscopic or Open Approach - A Systematic Literature Review and Meta-Analysis

Mansi Mathur, MPH, Ana Yankovsky, MSc, Usha Kreaden, MSc. Intuitive Surgical, Sunnyvale, CA, USA

RESULTS

Table 1. Comparative analysis for Cholecystectomy: dV-RC vs LC

Outcome	Studies	dV-RC	LC	Effect size	p-value of	Heterogeneity	Model	Conclusion	
		Ν	N		Effect size				
Operative time (min)	20	20872	114879	MD: 8.11 [3.92, 12.29]	p<0.01	p=0; l ² =100%	Random	Favors LC	
Conversion to open (%)	22	49997	884759	OR: 0.51 [0.35, 0.74]	p<0.01	p<0.01; l ² =88%	Random	Favors dV-RC	
Estimated blood loss (mL)	7	1317	1465	MD: -5.95 [-11.4, -0.51]	p=0.03	p<0.01; l ² =72%	Random	Favors dV-RC	

* All other outcomes were comparable between dV-RC & LC

Table 2. Comparative analysis for Cholecystectomy: dV-RC vs OC

Outcome	Studies	dV-RC	OC N	Effect size	p-value of	Heterogeneity	Model	Conclusion	
		IN			LITECT SIZE				
Blood transfusions (%)	2	2737	2737	OR: 0.40 [0.22, 0.74]	p<0.01	P=0.10; I ² =63%	Random	Favors dV-RC	
Length of hospital stay (days)	2	2462	2461	MD: -3.51 [-4.49, -2.53]	p<0.01	P<0.01; I ² =95%	Random	Favors dV-RC	
Bile duct injury (%)	2	27138	266735	OR: 0.42 [0.13, 1.38]	0.15	P<0.01; I ² =92%	Random	No difference	
Surgical site infections (%)	2	2737	2737	OR: 0.25 [0.19 <i>,</i> 0.33]	p<0.01	P=0.27; I ² =19%	Fixed	Favors dV-RC	
Post-op complications 30-day (%)	2	27138	266735	OR: 0.55 [0.46, 0.66]	p<0.01	P=0.01; I ² =84%	Random	Favors dV-RC	
Mortality 30-day (%)	2	2737	2737	OR: 0.45 [0.34, 0.6]	p<0.01	P=0.19; I ² =41%	Fixed	Favors dV-RC	
'All other outcomes were comparable between dV-RC & OC									

Compared to LC, the evidence for dV-RC demonstrates:

- ↑ Operative time by **8 minutes**
- Conversions by **49%**
- Estimated blood loss by an average of **6mL**
- \succ All other outcomes were comparable

Table 3. Sensitivity analysis between dV-RC & LC by admission type: Elective vs Emergent Cholecystectomy

	Conversions to open by 87%
N	Estimated blood loss by 14mL
5	\downarrow 30-day readmissions by 52%
	≈ Bile duct injury
	≈ Bile duct leak
	≈ Length of stay
	↑ Operative time by 10 min
*1:	d data available an all tha athan avtages as an art rationts
Limite	a data available on all the other outcomes amongst patients
Signif	ficant difference favoring dV/PC 📃 No significant difference

Compared to OC, the evidence for dV-RC demonstrates:

- Blood transfusion rate by **60%**
- ↓ Length of stay by average **3.5 days**
- ↓ Surgical site infection rate by **75%**
- ↓ 30-day postoperative complications by **45%**
- ↓ 30-day mortality by **55%**
- > All other outcomes were comparable



who underwent elective or emergent/urgent cholecystectomy

🗾 Significant difference favoring dV-RC 🛛 🖬 No significant difference; comparable outcomes 🚽 Significant difference favoring LC



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RESULTS

Figure 1. Forest plot for Conversion dV-RC vs LC

ıdy or	dV-RC Conv	/-RC Conversion LC Conversion					tio	Odds Ratio		
bgroup	Events	Total	Events	Total	Weight	MH, Random,	95% CI	MH, Random	, 95% C	
ıdy Type = Retro										
oo 2014	2	179	3	147	3.2%	0.5424 [0.0894;	3.2899]		_	
mpbell 2023	190	9996	317	9996	10.6%	0.5916 [0.4932;	0.7097]	.		
ngemi 2016	1	676	13	289	2.6%	0.0315 [0.0041;	0.2416]			
ardi 2024	450	26241	800	26241	10.8%	0.5549 [0.4937;	0.6236]	a		
enberg 2024	41	3158	500	26785	10.1%	0.6915 [0.5018;	0.9528]	-		
ai 2023	0	165	9	105	1.5%	0.0307 [0.0018;	0.5331]			
zo 2024	0	42	0	61	0.0%					
2021	1	171	29	441	2.7%	0.0836 [0.0113;	0.6184]	-		
z 2020	33	408	113	418	9.6%	0.2351 [0.1548;	0.3570]	-		
fman 2021	51	1046	1051	31380	10.3%	1.4791 [1.1089;	1.9729]			
a 2014	2	50	0	50	1.3%	5.2062 [0.2437;	111.2381	1	+	
niński 2014	18	1608	2237	733929	9.4%	3.7012 [2.3214;	5.9012]		-	
in 2024	2	130	1	130	2.0%	2.0156 [0.1805;	22.5066]			
rthandam 2024	1	100	3	100	2.2%	0.3266 [0.0334;	3.1944]	•	_	
/ 2024	0	50	0	50	0.0%	- ,				
en 2024	0	89	17	361	1.6%	0.1100 [0.0066;	1.8464]			
osberg 2017	1	140	7	97	2.5%	0.0925 [0.0112]	0.7645]			
arma 2018	2	96	17	191	4.1%	0.2178 [0.0493]	0.96291			
ntschnigg 2023	2	112	12	122	4.0%	0.1667 [0.0364]	0.76211			
al (95% Cl)	797	44457	5129	830893	88.4%	0.5108 [0.3366:	0.77511	÷		
erogeneity: Tau ² = 0.37 for overall effect: Z = -	69; Chi ² = 147. 3.16 (P < 0.01)	21, df =)	16 (P < 0.	.01); I ² = 8	89.132%					
dy Type = Databas	e									
2020	0	20	3	70	1.4%	0.4/04 [0.0233;	9.4870]			
egawa 2024	43	5470	1047	53746	10.2%	0.3988 [0.2936;	0.541/]			
al (95% Cl) Progeneity: Tau ² = 0: Cl	43	5490	1050 91): 1 ² = 0	53816	11.6%	0.3995 [0.2946;	0.5418]	-		
for overall effect: $Z = -$	5.90 (P < 0.01))								
dy Type = Pros										
2021	0	50	0	50	0.0%					
tal (95% CI)	840	49997	6179	884759	100.0%	0.5051 [0.3455:	0.73831			
erogeneity: Tau ² = 0.34	42; Chi ² = 155.	65, df =	18 (P < 0	.01); I ² = 8	8.435%	•			10	
st for overall effect: $Z = -3.53$ (P < 0.01)								10		
t tar aubaraup difforana	Δs^2 Chi ⁺ = 0.87	′ df = 1	(P = 0.35)					Favors dV-RC	avors	

CONCLUSIONS

- \succ The dV-RC is safe and effective for benign conditions, with outcomes comparable or superior to OC.
- > dV-RC offers better or similar outcomes to LC, despite longer operative times.
- > For elective cholecystectomy, dV-RC reduces conversion rates, readmissions, and blood loss.
- \succ In emergent cases, dV-RC lowers conversion rates with similar outcomes in other aspects.
- > It shows promise for treating complex cases, though further high-quality evidence is needed to confirm these findings.

TABLES/REFERENCES



CONTACT