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Minimally Invasive Liver Resection: Peri-operative Outcomes from Two Specialist Units

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Background

Minimally invasive liver surgery (MILS), including laparoscopic and robotic approaches, is increasingly utilised in hepatobiliary surgery, with advantages including shorter length of stay, reduced morbidity and improved surgical outcomes compared with open surgery[1]. Despite these advantages, MILS has not been widely adopted as standard practice in Australia with limited local literature. This study aimed to describe the contemporary practice of MILS and its outcomes in Melbourne.

Method

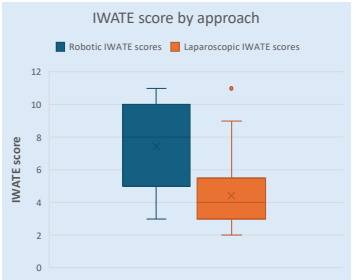
A retrospective analysis was conducted using prospectively maintained databases across both Austin and Alfred HPB units for all MILS performed between January 2022 and December 2025. Demographic data, operative data, and postoperative outcomes were analysed. Major liver resection was defined as resection of ≥3 segments.

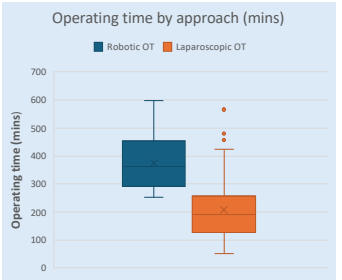
Key Findings

- 74 MILS cases (25 robotic, 49 laparoscopic); cirrhosis present in 16 patients (21.6%)
- Charlson Comorbidity Index 7 (IQR 3–9) vs 4.5 (IQR 2–6) (p=0.05).
- IWATE score 8 (IQR 5-10) vs 4 (IQR 3-5) for robotic vs laparoscopic (p<0.001)
- Operating time of 362 min (IQR 315-451) vs 191 min (IQR 128-248) for robotic vs laparoscopic (p<0.001).
- Major morbidity (Clavien Dindo ≥III) 3-25 vs 4/49; 30-day mortality 0 vs 1 (laparoscopic).

Results

Variable	Robotic (n=25)	Laparoscopic (n=49)	p-value
Age, Median (IQR)	69 (61–75.5)	64 (48–69)	0.11
Cirrhosis, n (%)	6 (24)	10 (20)	0.77
Charlson Comorbidity Index, Median (IQR)	7 (3–9)	4.5 (2–6)	0.05
IWATE difficulty score, Median (IQR)	8 (5–10)	4 (3–5)	**<0.001**
Operating time (minutes), Median (IQR)	362 (315–451)	191 (128–248)	**<0.001**
Major morbidity (Clavien–Dindo ≥III), n (%)	3 (12.0)	4 (8.2)	0.68
30-day mortality, n (%)	0 (0)	1 (2.0)	1.00
Conversion to open, n (%)	3 (12)	3 (6.1)	0.40
Major liver resection, n (%)	12 (48)	5 (10.2)	**<0.001**
Body Mass Index, Median (IQR)	30 (25.08-37.15)	27 (24-31)	0.18
Length of stay, Median (IQR)	6 (5-9)	5 (4-6)	0.42
Bile leak, n (%)	0 (0)	1 (2)	1.00
Liver failure, n (%)	1 (4)	0 (0)	0.34





Conclusion

- Minimally invasive liver resections can be safely performed with acceptable peri-operative outcomes, including in complex and high-risk patients.
- Robotic liver resection appears to be utilised even for higher-complexity cases and demonstrated comparable major morbidity to laparoscopic surgery.
- These findings suggest a role for robotics within a specialist MILS program, with robotic cases undertaken at higher complexity yet similar major morbidity.

References

1. Fichtinger RS, Aldrighetti LA, Abu Hilal M, Troisi RI, Sutcliffe RP, Besselink MG, et al. Laparoscopic versus open hemihepatectomy: the ORANGE II PLUS multicenter randomized controlled trial. J Clin Oncol. 2024;42(15)1799-1809