

Risk of Bleeding in Laparoscopic Liver Surgery

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Background

- Minimally invasive liver resection is gaining acceptance world-wide, with recent large series showing excellent results
- Bleeding continues to be the Achilles' heel of laparoscopic liver surgery, frequently necessitating transfusion and conversion to open
- Blood loss necessitating transfusion increases operative morbidity, mortality and tumour recurrence
- Here, we present the results in laparoscopic liver resections, highlighting the impact of bleeding
- We compare our experience with recently published large series
- We describe the techniques and technological advances that have helped facilitate haemostasis

Methods

- A retrospective review of all patients undergoing a totally laparoscopic liver resection at SUHT between 2003 and 2007 was conducted

Results

- 80 laparoscopic liver resections were completed
- Median age at time of surgery: 64 (21-86) years
- 54% of resections were for malignant disease
- Median operative time: **150 minutes**
- Median blood loss: **120 ml**
- Only 2 intra-operative and no post-operative blood transfusions were required
- Right sided resections took longer (326 vs.149 minutes, p=0.019) and led to more blood loss (821 vs. 147 ml, p=0.012) than left sided resections

Table 1. Analysis of operation time and blood loss, by operation type

Operation type	Number	Median operation time	Median blood loss
Left lateral sectionectomy	25	145	75
Left hemi-hepatectomy	2	155	52.5
Extended left hemi-hepatectomy	1	480	1500
Right hemihepatectomy	5	300	550
Single wedge	9	95	75
Multiple wedges	3	180	450
Single segmentectomy	5	120	120
Bisegmentectomy	14	175	300
Trisegmentectomy	2	250	800
Left lateral sectionectomy plus single segmentectomy	2	182.5	200
Right hemihepatectomy plus single segmentectomy	2	265	750
Others (including cyst resections)	3	75	100

- 7 cases were converted to open procedures (for bleeding in 4 cases)
- There were 8 peri-operative complications and 1 bile leak
- Median resection margin for malignant conditions was 11.5 mm (with one R1 resection)
- Median hospital stay was 3 days (1 day in HDU)

Table 2. Comparison of the Southampton experience of totally laparoscopic liver resection with recently published large US series

	Koffron* Annals of Surgery(246:3)	Buell Annals of Surgery (248:3)	Southampton
Number of procedures	90	253	80
Operative time (mean)	95	162	168
Blood loss (mean)	100	222	268
Transfusion (%)	0	7	2.5
Length of stay (mean)	1.7	2.9	2.9
Bile leaks (%)	2	1.58	1.25
Complications (%)	9.3	16	11
Conversion rate (%)	8	0.8	8

*All major resections in this series were performed with hand assistance

Discussion

- Laparoscopic liver surgery is safe and effective even in major resections
- Despite limited blood loss and very low transfusion rates, bleeding continues to be a major cause of open conversion
- Techniques used to limit blood loss fall into 3 broad categories:
 - Vascular inflow control
 - Parenchymal transection
 - Treatment of the resection margin
- Haemostasis is reliant on the application of modern laparoscopic technologies to allow safe parenchymal transection (LOTUS and CUSA)
- We routinely apply absorbable haemostats and fibrin glue (Quixil) to the resection margin leading to low rates of post-operative complications
- An intimate knowledge of the techniques and technologies available for preventing and managing haemorrhage is required for all surgeons performing laparoscopic liver surgery

