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Research Letter

Model for safe elective liver resection during the SARS-CoV-2 (COVID-19) pandemic: lessons for enhanced recovery

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Dear Editor

The rapid outbreak of SARS-CoV-2 (COVID-19) necessitated National Health Service England to postpone all non-urgent elective surgery from 15 April 2020, with the number of cancelled operations weekly estimated at 43 307[1]. Shortage of healthcare professionals and limited bed capacity were major hurdles in continuation of the resectional cancer service. The Society of Surgical Oncology[2] recommended that surgery was still indicated for 'aggressive hepatobiliary malignancies', also stating that neoadjuvant chemotherapy, ablation or stereotactic radiotherapy could be considered for resectable liver metastases. A similar approach was suggested by an Italian group[3]. The authors advocated liver surgery in selected patients with potentially curative disease, recognizing the challenges of reduced resources.

This study analysed the impact of changes to previously established protocols by comparing short-term outcomes of patients undergoing elective liver resection during the pandemic with outcomes of a cohort treated in the same period in the previous year.

Key changes were introduced in the patient pathway, with close communication between referring hospitals, local Gold Command, and the liver surgery team. All multidisciplinary team meetings were held virtually using Microsoft Teams© (Microsoft, Redmond, Washington, USA) and follow-up consultations by telephone, to reduce face-to-face contact and nosocomial spread of the virus.

The entire patient journey was contained within a separate unit, the Diagnosis and Treatment Centre. This 'green' area was reserved for elective work. Patients were instructed to self-isolate for 14 days and undergo COVID-19 testing 48 h before admission. Patients were preferably admitted on the day of surgery, regardless of distance travelled (up to 400 miles). All resections were performed by an open approach (UK Intercollegiate Guidance)[4] owing to concerns raised over aerosols released during pneumoperitoneum. Theatre staff wore full personal protective equipment, including grade 3 filtering face piece masks as protection against aerosols generated from anaesthesia and the cavitron ultrasonic surgical aspirator used for parenchymal transection. Postoperative analgesia entailed intercostal nerve blockade using bupivacaine infusion and patient-controlled analgesia, in accordance with published techniques[5].

A total of 58 patients were included in this study, of whom 24 underwent liver resection during the 3-month study interval in 2020 and 34 patients over the same period in 2019. Decision-making and quality of care were not altered as there was no statistical difference in patient demographics, indications for surgery, complexity of procedures, perioperative characteristics (including blood loss), and major complications (*Table* 1). No patients contracted COVID-19 during the hospital stay.

Median total duration of hospital stay during the COVID-19 pandemic was 4 (i.q.r. 4–6) days, 2 days shorter than in 2019 ($P = 0.006$), with the postoperative stay reduced to 3 (3–4) days, compared with 4 (4–7) days in 2019 ($P = 0.015$). Reasons for this included patient factors, admission on the day of surgery, and pushing the boundaries of an existing enhanced recovery protocol. During the pandemic, patients were notably keen not to stay longer in hospital than was clinically necessary. Drains, central line, and urinary catheter were often removed on the first postoperative day, as opposed to the second or third day previously, facilitating earlier mobilization, active engagement with physiotherapy, and enhanced psychological recovery.

This study has highlighted the importance of robust perioperative protocols, changes in the admission pathway, and use of a pre-existing geographically separate facility, which allowed the hepatobiliary service to continue during the pandemic, ensuring avoidance of nosocomial COVID-19 transmission. Most importantly, patient selection was unbiased, care was not compromised, and duration of hospital stay was reduced. Using this model, liver resection could be performed safely in the pandemic and this can be replicated in other units.

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Table 1 Patient demographics and indications for liver resection during pandemic and prepandemic intervals

	Pandemic (April–June 2020) (*n* = 24)	Before pandemic (April–June 2019) (*n* = 34)	*P*†
Perioperative characteristics			
Age (years)*	61.5 (52.0–70.3)	63.5 (54.3–71.8)	0.761‡
Sex ratio (F : M)	10 : 14	14 : 20	0.991
ASA fitness grade			0.991
II	20	28	
III	4	6	
Indications for surgery			0.533
Colorectal metastases	21	31	
Hepatocellular carcinoma	0	1	
Cholangiocarcinoma	0	1	
Liver cysts	1	1	
Melanoma metastases	1	0	
Colon tumour infiltration	1	0	
CEA (μg/l)*	12.0 (2.9–63.5)	3.8 (1.2–6.2)	0.019‡
No. of metastases*	2 (1–3)	1 (1–2)	0.177‡
Size of largest metastasis (mm)*	35 (25 - 55)	25 (20–40)	0.175‡
Neoadjuvant or conversion chemotherapy	9	17	0.346
Surgery for recurrence	3	6	0.722
Extent of resection			0.920
Major	9	12	
Minor	15	22	
Duration of surgery (h)*	4.3 (3.5–4.7)	4.2 (3.5–4.4)	0.492‡
Blood loss (ml)*	198 (54–285)	125 (73–303)	0.463‡
Short-term outcomes			
Duration of stay in theatre recovery and critical care (days)*	1 (1–1)	1 (1–1)	0.992‡
Major complications (Clavien–Dindo grade)			0.996
III	1	2	
IV	0	0	
90-day mortality	0	1	1.000
Duration of postoperative hospital stay (days)*	3 (3–4)	4 (4–7)	0.015‡
Duration of total hospital stay (days)*	4 (4–6)	6 (5–9)	0.006‡
Readmissions	1	2	0.979

* Values are median (i.q.r.). † Pearson's χ^2 test or Fisher's exact test, except ‡ Mann–Whitney *U* test. $P < 0.050$ was considered significant. Statistical analyses done using SPSS® version 27 (IBM, Armonk, New York, USA).

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