

Letter to the editor

Early Resectional Debridement for Blunt Liver Injury: Still a Treatment Option?

Tan JH^{1,2}, Yuzaidi M², Tan HCL^{1,2}, Rizal IA²

¹Pusat Perubatan Universiti Kebangsaan Malaysia, Cheras

²Department of Surgery, Hospital Sultanah Aminah, Johor Bahru, Malaysia

With increasing proportion of non-operative management (NOM) for liver injury in western literature, liver resection is less often required. In Malaysia, trauma patients are managed in hospitals with high casualty loads. Intensive care facilities are shared across multiple disciplines. Specialized surgical intensive care unit is yet to be developed. Due to these reasons, the applicability and safety of NOM in local or Malaysian setting is unknown. To date, there is no published report on safety of NOM from the country. However, non-operative approach remains popular.

Liver resection is the least favoured operative procedure for treatment of liver injuries due to high morbidity and mortality. Recent data of complex liver injuries contradict this with good outcome despite the major surgery (1). We present a middle aged lady with blunt liver injury after a motor vehicle accident, treated with resectional debridement using non-anatomical technique. We discuss the indication of the early operative management (OM), the benefit of liver resection and the advantage of non-anatomical technique.

A 34 years old Chinese lady presented to a district hospital after a motor vehicle accident. Her car hit a tree while she was trying to avoid another car from opposite direction. She complained of abdominal pain. But there was no loss of consciousness or limb deformity. Her blood pressure one hour from the time of injury was 124/69mmHg and heart rate was 90bpm. There was localized tenderness over right hypochondriac region. Focused assessment sonography for trauma (FAST) initially excluded intraperitoneal free fluid. Within 4 hours from time of injury, she developed hypotension that responded to fluid resuscitation and 2 units of packed red blood cells transfusion. Blood parameters revealed haemoglobin of 10.6 g/dl with a normal renal function and coagulation profile. Twelve hours following the injury, she complained of increasing abdominal pain and had generalized abdominal tenderness with mean arterial blood pressure of 60mmHg and tachycardia of 110 bpm. She was transfused with another 2 unit of packed red blood cells due to repeated haemoglobin level of 8g/dl. Repeated FAST show free fluid in Morrison's pouch. Contrast CT abdomen was performed and showed part of the liver was ischemic with hypodensity at segments VI, VII, VIII and patchy small areas of hyperdensity seen. There was moderate hemoperitoneum (figure 1). She was transferred to a tertiary hospital with trauma team and underwent an

exploratory laparotomy due to borderline hemodynamic status, evidence of hemoperitoneum and persistent requirement of packed red blood cells transfusion. Intraoperatively, we found the right liver lobe involving segment VI, VII and VIII was devascularized with dark congested appearance (figure 2). Two liters of hemoperitoneum was drained. Mean arterial pressure able to maintain above 65mmHg with no inotrope. Hence, a non-anatomical liver resection was carried out.

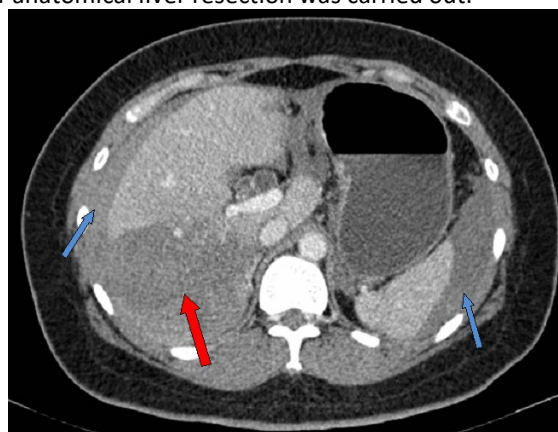


Figure 1: Contrast enhanced computed tomography of abdomen in Axial view showing devascularized liver segments of VI, VII and VIII (red arrow) with hemoperitoneum over perihepatic and perisplenic area (blue arrow).

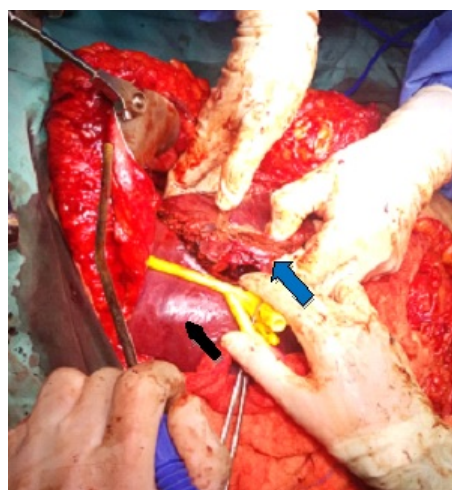


Figure 2: Intraoperative Pictures. Devascularized liver segments VI, VII and VIII (blue arrow) are dissected from remaining healthy liver parenchymal (black arrow). Foley catheter was encircled around the liver at border to reduce bleeding and facilitate retraction.

Postoperative, she was extubated and put on oxygen via a facemask. She was monitored in high dependency ward for 2 days and later in the general ward for one week. She had no signs of bile leak or jaundice.

The popularity of non-operative management (NOM) for liver injury has made liver resection a least favourable treatment option. NOM can avoid non-therapeutic laparotomy and unnecessary liver resection. It is associated with fewer intra-abdominal complications, reduced number of transfusions, reduced hospital cost and earlier discharge (2). About 80% of the liver injuries can be treated with NOM but it is contraindicated in patients with peritonitis or hemodynamic instability. (2) Other than these 2 contraindications, there is lack of evidence when one shall proceed with an operative management for liver injury. It was reported that patients with severe head injury or elder age, early aggressive operative management maybe necessary to prevent any episode of hypotension (3). Other predictors for surgery include grade of liver injury and presence of multiple organs injuries (4). A centre capability for precise diagnosis of the severity of liver injuries (5) and provision of an intensive management (frequent hemoglobin controls, frequent clinical monitoring and 24-h CT-scan, angiography and operating room availability) is another factor to be considered when choosing a patient for NOM. (2)

In this case, we decided early surgery because her haemoglobin dropped despite being transfused with packed red blood cells within twelve hours of trauma and there was evidence of hemoperitoneum with grade 3 liver injury. A multicentre study shown that NOM can lead to a high rate of liver related complications especially in those with higher grade of liver injury and first 24 hours blood or blood components transfusion (6). The authors reported 61 of 699 patients with complex liver injuries developed 87 hepatic complications (bleeding, biliary, abdominal compartment syndrome, infections) which required 86 multimodality treatments (angioembolization, endoscopic retrograde cholangiopancreatography and stenting, interventional radiology drainage, paracentesis, laparotomy and laparoscopy). (6) Another reason for early surgery is due to our centre incapability of providing a consistent intensive management. Though we have trauma surgeon in house, but the hospital's intensive care unit and operating rooms are heavily loaded with patients from multiple disciplines. There is a need for the setup of a trauma theatre and surgical/trauma intensive care unit (ICU) to provide a sustainable, effective intensive management on patients suitable for NOM. As there are increasing evidences of a surgical/trauma ICU lower post-injury complications and death. (7) (8)

Excessive use of NOM is associated with increased morbidity including early and late haemorrhage with biliary complications (6) (9). Though, initial report on liver resection for liver injury was associated with high mortality, recent evidence proves otherwise. Patricio et al retrospectively reviewed 216 adult liver trauma, reported 56 patients underwent liver resection with 23 cases being non-anatomical. The liver resection related morbidity was

30% and mortality was 9% (1). Liver transplant surgeons also reported better rate of liver related morbidity with early liver resection. (10) Another author reported liver resection is the only life saving option in a complex hepatic injury with torn right hepatic vein. Our hospital possesses the only trauma unit equipped with trauma surgeon in the country. The trauma surgeons are trained to perform liver surgery. Weighing the risk of keeping the devitalised liver segments for which liver abscess, biloma and continuing bleed from torn intrahepatic vessels can complicate this patient, early liver resection was performed.

Resectional debridement in liver injury can be done with anatomical and non-anatomical technique. (1) (11) Anatomic liver resection is defined by the complete removal of a liver segment or sub-segment that receives blood through the segmental or sub-segmental portal vein, respectively. In contrast, line of dissection for non-anatomic liver resection doesn't follow the limit of the liver segments. The benefit of this is preserving more healthy liver tissue, reduce the risk of developing post-operative hepatic failure, better operative risk and reduced surgical stress (12). In blunt liver trauma, non-anatomic resection is preferred in unstable patients and during damage control surgery as it is safer and easier. (13)

Early resectional debridement for blunt liver injury in selected patients can lower liver injury related morbidity and mortality. A local study on patients with liver injuries is warranted to guide the treatment algorithm in our setting.

References

1. Polanco P, Leon S, Pineda J et al. Hepatic resection in the management of complex injury to the liver. *J Trauma*. 2008 Dec;65(6):1264-1269-1270.
2. Stassen NA, Bhullar I, Cheng JD et al. Nonoperative management of blunt hepatic injury: an Eastern Association for the Surgery of Trauma practice management guideline. *J Trauma Acute Care Surg*. 2012 Nov;73(5 Suppl 4):S288-293.
3. Fabian TC, Bee TK. Ch.32 Liver and biliary tract. In: Feliciano DV, Mattox KL, Moore EE, editors. *Trauma*. 7. 870: The McGraw-Hill Companies, Inc; 2013. p. 851.
4. Stein DM, Scalea TM. Nonoperative management of spleen and liver injuries. *J Intensive Care Med*. 2006 Oct;21(5):296-304.
5. Fang J-F, Wong Y-C, Lin B-C et al. The CT risk factors for the need of operative treatment in initially hemodynamically stable patients after blunt hepatic trauma. *J Trauma*. 2006 Sep;61(3):547-553-554.
6. Kozar RA, Moore FA, Cothren CC et al. Risk factors for hepatic morbidity following nonoperative management: multicenter study. *Arch Surg Chic Ill 1960*. 2006 May;141(5):451-458-459.
7. Bukur M, Habib F, Catino J et al. Does unit designation matter? A dedicated trauma intensive care unit is associated with lower postinjury complication rates and death after major complication. *J Trauma Acute Care Surg*. 2015 May;78(5):920-927-929.
8. Timmers TK, Verhofstad MH, Leenen LP et al. Intensive care organisation: Should there be a separate intensive care unit for critically injured patients? *World J Crit Care Med*. 2015 Aug 4;4(3):240-3.
9. Trunkey DD. Hepatic trauma: contemporary management. *Surg Clin North Am*. 2004 Apr;84(2):437-50.
10. Li Petri S, Gruttadauria S, Pagano D et al. Surgical management of complex liver trauma: a single liver transplant center experience. *Am Surg*. 2012 Jan;78(1):20-5.
11. Piper GL, Peitzman AB. Current management of hepatic trauma. *Surg Clin North Am*. 2010 Aug;90(4):775-85.

12. Ziparo V, Balducci G, Lucandri G et al. Indications and results of resection for hepatocellular carcinoma. Eur J Surg Oncol EJSO. 2002 Nov;28(7):723-8.
 13. Coccolini F, Catena F, Moore EE et al. WSES classification and guidelines for liver trauma. World J Emerg Surg WJES [Internet]. 2016 Oct 10.
-

Corresponding Author

Dr Tan Jih huei

Department of General Surgery, Jalan Abu Bakar, Masjid Sultan Abu Bakar, 80000 Johor Bahru, Johor, Malaysia.

Email: huei_87@hotmail.com

Tel: (006017) 6113305

Fax: (00607) 3535957