

Immediate postoperative extubation after liver transplantation at our centre: A report of two cases

Address for correspondence:

Dr. Sanjeev Aneja,
E 84, Kalka Ji,
New Delhi-110 019, India.
E-mail: sanjeevaneja@
hotmail.com

Sanjeev Aneja, Raman Raina

Department of Anesthesia and Intensive Care, Indraprastha Apollo Hospitals, Sarita Vihar, New Delhi, India

ABSTRACT

Liver transplantation is a dynamic field undergoing continuous changes in management. Prolonged postoperative mechanical ventilation has been a norm but now there is a trend towards early extubation. We developed a protocol for early extubation based on bispectral index monitoring. This protocol was applied in two cases with satisfactory outcome.

Key words: Bispectral index monitoring, immediate postoperative extubation, liver transplantation

Access this article online
Website: www.ijaweb.org
DOI: 10.4103/0019-5049.84861
Quick response code


INTRODUCTION

Liver transplant is an expensive procedure. Early extubation is expected to lead to economic and clinical benefits. Preoperative co-morbidities, long duration of surgery, large fluid shifts, and delayed correction of metabolic derangements by the transplanted liver are the common factors responsible for preventing primary extubation after liver transplantation. Moreover, until very recently, a postoperative period of mechanical ventilation was considered a standard of care for anyone undergoing liver transplantation as it was believed that reducing the stress associated with arousal from anaesthesia and the resumption of spontaneous ventilation contributed to ensuring a soft and controlled transition from the surgical to the postoperative recovery phase.^[1] However, now there is a substantial body of evidence proving that patients who undergo large and complex surgeries including transplants can be extubated immediately after surgery with few complications and no effect on 1 or 3 year graft survival.^[2] Keeping in view these advantages we made two successful extubations on operation table.

CASE REPORTS

The first patient was a 45-year-old male Hepatitis C related cirrhosis with hepatocellular carcinoma,

child grade C, with refractory ascites, coagulopathy and mild hepatorenal syndrome. The second patient was a 64-year-old male with alcoholic liver disease that had decompensated with refractory ascites and coagulopathy. Preoperatively both the patients were conscious and well oriented having stable cardiovascular, respiratory, and renal systems. Anaesthesia was induced and maintained as per our institutional protocol. Standard monitoring was applied consisting of invasive blood pressure measurement, central venous pressure, pulmonary artery pressure, urine output, temperature and bispectral index in addition to routine monitoring. Rapid sequence induction using fentanyl 2 mcg/kg, propofol 1.5 mg/kg and scoline 1.5 mg/kg, and was followed by fentanyl infusion 2 mcg/kg/hr, atracurium infusion 0.5 mg/kg/hr and patient ventilated with isoflurane in oxygen air mixture. Bispectral index monitoring was started before induction and then continued throughout the procedure. Fentanyl was reduced to 1 mcg/kg/hr after reperfusion. The average time from reperfusion to completion of hepatic artery anastomosis was 45 min. At the end of hepatic artery anastomosis and after confirmation of good flow on Doppler ultrasound isoflurane was discontinued and infusions of fentanyl and atracurium stopped. Propofol infusion was started for maintenance of anaesthesia

How to cite this article: Aneja S, Raina R. Immediate postoperative extubation after liver transplantation at our centre: A report of two cases. *Indian J Anaesth* 2011;55:392-4.

and infusion rate titrated to maintain bispectral index between 40 and 60. Boluses of propofol were given if additional dose was required. The range of propofol infusion dose required was 2 to 6 mg/kg/hr. We planned to give bolus doses of atracurium 5 to 10 mg, if clinically the need for muscle relaxation was felt, but both the patients did not require any additional doses of atracurium. During bile duct anastomosis, the patient was evaluated for feasibility of immediate post-operative extubation using standard criteria. Good donor liver function was defined as Normal pH, no clinical bleeding with an acceptable prothrombin time as judged by the anaesthetist. Because a need for massive transfusion is known to be associated with a negative outcome in liver transplantation, transfusion requirement of less than 10 U of packed red blood cells was necessary.^[3] Haemodynamic stability was defined as no need for noradrenaline infusion more than 200 nanogram/kg/min. Finally, SaO₂ on 40% FiO₂ needed to be more than 94%. Our patients fulfilled all of these criteria (see tables). The average time taken after hepatic artery anastomosis to the completion of closure of skin in the two cases was 90 minutes. At the closure of the skin standard reversal was given and propofol infusion stopped. During the time dressing and cleaning was being done, breathing was manually assisted with 100% oxygen. After about 20 minutes when all the routine criteria for extubation were met (viz., breathing spontaneously, fully awake and able to follow simple commands; respiratory rate less than 35 breaths/min, and tidal volume was greater than 5 mL/kg; and no sign of respiratory distress, heart rate not more than 20% above baseline), the patient was extubated. Then humidified oxygen was given by facemask and patient shifted to recovery for observation. Later, after about one hour the patient was transferred to the intensive care unit (ICU) in a stable condition. Chest physiotherapy was started as soon as possible. Both the patients continued to do well without any adverse event related to early extubation and finally discharged home in a satisfactory condition.

DISCUSSION

Fast tracking is an attempt to make efficient use of resources and to improve recovery of the patient. The economical benefits are gained by reduced ICU stay and reduced overall ICU costs. Clinical advantages include lower risk of post-operative infection and improved haemodynamic conditions promoting hepatic venous drainage and graft circulation. On basis of our experience and after going through literature

there was a consensus that early awakening could be achieved by reducing the total dose of fentanyl infused. Fentanyl has a long context sensitive decrement time, and therefore, on the basis of our clinical experience we decided to reduce the infusion dose early and stop it altogether when good vascular flows were confirmed in the transplanted liver. Residual levels of fentanyl continue to provide analgesia for long time after prolonged infusion for several hours. Remifentanyl can be a better alternative to fentanyl for fast tracking because of its rapid elimination. However, the drug is not available in India yet. Desflurane may be a better alternative because of its low solubility coefficient but isoflurane has the theoretical advantage of maintaining better hepatic blood flow. Drugs having a faster elimination facilitate fast tracking, but more important is the optimal anaesthetic management and a good surgical technique. In order to achieve our goal and at the same time diverting minimally from our routine protocol, we planned to continue our routine anaesthetics till hepatic artery anastomosis. Then all routine anaesthetics were stopped and propofol infusion started using bispectral index as a guide to maintain anaesthesia. This protocol provided sufficient time for reduction of the levels of fentanyl, isoflurane and atracurium so that we had an awake, stable patient twenty minutes after cessation of propofol ready for extubation. Patient safety is of utmost importance. It should not lead to increased morbidity and mortality. Moreover, adult right lobe living donor liver transplant tends to be technically more difficult and of longer duration intraoperatively, and to have more post-operative complications than straightforward full size orthoptic liver transplantation. Under specified conditions, using strict criteria early extubation is a safe procedure.^[4] We selected our patients carefully, they did not have any pre-operative contraindication for fast tracking, viz., acute liver failure, encephalopathy, morbid obesity, pre-operative need for mechanical ventilation or re-transplantation. Moreover, intraoperatively the feasibility of fast tracking was done applying standard criteria strictly [Table 1]. Recently a 'safe operating room extubation after liver transplantation score' (SORELT score) has been suggested to select the patients for extubation in operating room.^[5] We performed our cases before the publication of this paper. We did not apply the score in patients. Applying this score to our patients shows that they were feasible for operating Table extubation. [Table 2] Post-surgical pain control is not generally a problem. We use morphine 1.5 to 3 mg boluses i. v. on as and when required basis in the transplant ICU.

Table 1: Intraoperative criteria for immediate post-operative extubation in liver transplantation

Criterion	Value/status in our patients (mean)
Normal pH	7.36
PRC transfused less than 10	4
INR less than 2	1.5
No clinical bleeding	NIL
Normal body temp	36.9
SaO ₂ on 40% FiO ₂ more than 94%	100%
Haemodynamic stability (Adr/noradrenaline less than 200 nanogram/kg/min)	Stable not requiring inotropes

Table 2: SORELT score

	Patient 1	Patient 2
Major criteria		
No. of packed red cell transfusions-higher than/or equal to 7 U	3	5
Lactate at the end of surgery-higher than/ or equal to 3.4 mmol/l	3.0	2.51
Minor criteria		
Status before LT-home vs. hospitalized patient	Hospitalised	Home
Duration of surgery-longer than/ or equal to 5 hrs	>5 hrs	>5 hrs
Vasoactive drugs at the end of surgery-Dopamine higher than 5 microg/kg/min or norepinephrine higher than 0.05 microg/kg/min	nil	nil

Patients who fulfill the SORELT score-derived criteria (fewer than two major/ one major plus two minor/three minor criteria) can be considered for OR extubation

Analgesic requirements in patients with end-stage liver disease undergoing liver transplantation appear to be significantly decreased compared with other major abdominal surgery. The neuropeptide metenkephalin, which is involved in pain modulation, has been shown to be significantly elevated in liver transplant patients compared with the control population. The exact mechanism of this clinical observation is unknown,

and perioperative administration of large doses of steroids may play some role.^[6] Postoperatively, the patients did not have any morbidity related to fast tracking and were discharged in a satisfactory condition. We found the technique safe, reliable and very useful. Immediate extubation after liver transplantation is possible in a substantial percentage of cases; confidence, habit and a spirit of emulation are decisive factors in encouraging anaesthetists to extend this practice to the largest possible number of patients.^[4] With more and more experience it is possible that such patients be shifted directly to an high dependency unit setting thus saving costs further. A successful immediate extubation may be an important indicator of perioperative quality of care in liver transplantation.

REFERENCES

1. Biancofiore G, Bindi ML, Romanelli AM, Boldrini A, Bisà M, Esposito M, *et al.* Fast track in liver transplantation: 5 years' experience. *Eur J Anaesthesiol* 2005;22:584-90.
2. Mandell MS, Hang Y. Pro: Early extubation after liver transplantation. *J Cardiothorac Vasc Anesth* 2007;21:752-5.
3. Cammu G, Decruyenaere J, Troisi R, de Hemptinne B, Colardyn F, Mortier E. Criteria for immediate postoperative extubation in adult recipients following living-related liver transplantation with total intravenous anesthesia. *J Clin Anesth* 2003;15:515-9.
4. Mandell MS, Stoner TJ, Barnett R, Shaked A, Bellamy M, Biancofiore G, *et al.*, A multicenter evaluation of safety of early extubation in liver transplant recipients. *Liver Transpl* 2007;13:1557-63.
5. Skurzak S, Stratta C, Schellino MM, Fop F, Andruetto P, Gallo M, *et al.* Extubation score in the operating room after liver transplantation. *Acta Anaesthesiol Scand* 2010;54:970-8.
6. C. Spencer Yost, Claus U. Niemann. *Miller's Anesthesia. Anesthesia for Abdominal Organ Transplantation*, 7th ed. Philadelphia, USA: Churchill Livingstone Elsevier; Chapter. 67-2176.

Source of Support: Nil, **Conflict of Interest:** None declared