Anaesthetic management for liver resection in a patient with myelodysplastic syndrome

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Abstract

We describe the anaesthetic management of a patient with myelodysplastic syndrome undergoing liver resection. Despite vitamin K, platelet (PLT), fresh frozen plasma (FFP), methylprednisolone, desmopressin and aprotinin administration, bleeding occurred after hepatectomy and was treated with tamponade, PLT and FFP. The patient was extubated on the 1st postoperative day. On the 11th postoperative day the patient developed fever with shivering, haemodynamic instability and reduced PLT number due to a systemic infection by *Staphylococcus aureus*. During his hospitalization the patient received 27 units of red blood cells, 55 units of FFP and 233 units of platelets in total.

Key words: myelodysplastic syndrome, liver resection, anaesthetic management.

Case report

We refer to a 66-year old male patient suffering from myelodysplastic syndrome (MDS), who underwent left liver resection due to metastatic liver disease after colon adenocarcinoma. Preoperative assessment did not reveal any other problems.

On arrival at the theatre a 16G catheter (Helm Pharmaceuticals GMBH, Hamburg, Germany) and two 14G catheters (Helm Pharmaceuticals GMBH, Hamburg, Germany) were inserted into the peripheral veins, a 20G arterial catheter (Hydrocath TM Arterial Catheter Kit Seldinger Technique, Becton Dickinson Critical Care Systems, Singapore) into the right radial arterial and an 8.5 Fr, 3 lumen catheter (Arrow-Howes Multi-lumen, Arrow International, Reading, USA) into the right internal jugular vein, under local anaesthesia. Anaesthesia was then induced with thiopental 375 mg and fentanyl 200 µg. Vecuronium 8 mg was used to facilitate endotracheal intubation with an 8.5 cuffed endotracheal tube. The patient's lungs were ventilated to maintain end-tidal CO2 at about 35 mm Hg with oxygen in air mixtures at an FiO2 of 0.35. Anaesthesia was maintained with isoflurane 0.4-2% and repetitive doses of fentanyl (up to 2 mg). Repetitive doses of vecuronium (up to 35 mg) were used to maintain neuromuscular blockade. Adrenaline (0.01 mg/ml) and phenylephrine (0.1 mg/ml) infusions were ready for use in case of acute bleeding if needed.

The monitoring (Criticon, Dinamap TM Plus, Vital Signs Monitors, Tampa, FL, USA) included pulse oximetry, ECG, capnography (ET CO2), continuous measurement of systemic arterial blood pressure and central venous pressure. Urine output was recorded hourly. Arterial blood gas analysis was also performed hourly.

To maintain a satisfactory coagulation profile during the operation the patient received vitamin K (20 mg *i.m.*), 9 units of platelets (PLT) and 2 units of fresh frozen plasma (FFP), 10 and 2 hours preoperatively respectively, methylprednisolone 500 mg before induction of anaesthesia and desmopressin infusion (0.3 µg/kg), vitamin K (20 mg *i.v.*) and aprotinin (1,000,000 units bolus and 500,000 units per hour) intraoperatively. Full coagulation profile and thromboelastography (TEG) were performed twice and at 4 time points intraoperatively, respectively: a) before incision, b) after 15 units of PLT and 4 units of FFP, c) after 20 units of PLT and 8 units of FFP, and d) after 26 units of PLT and 11 units of FFP. TEG revealed that closure time and maximum clot formation were kept within normal limits at all time points measured (Table I, Figures 1, 2). The operation lasted 8 hours and included cholecystectomy and left hepatectomy. Despite our measures, uncontrolled bleeding occurred after hepatectomy and the liver was tamponaded for approximately one hour, while FFP and PLT were administered. Haemodynamics were stable throughout the procedure, except the period of acute bleeding, when 0.5 mg phenylephrine was used to maintain arterial pressure. The patient was extubated on the 1st postoperative day. On the 11th postoperative day the patient developed fever with shivering, became haemodynamically unstable and had reduced PLT number because of a systemic infection by *Staphylococcus aureus*. He was treated with intravenous vancomycin (based on blood culture results), needed inotropic support (noradrenaline) and received an increased number of PLT and FFP units. He was discharged from the hospital a week later, 21 days after operation. During his hospitalization, the patient received 27 units of PRBC, 55 units of FFP and 233 units of platelets in total.

Discussion

This case verifies the susceptibility to bleeding of patients with MDS. Despite our efforts to improve the patient's coagulation profile by the administration of PLT, FFP, desmopressin and aprotinin, we eventually transfused a lot of units of blood products. MDS is characterized by a variable degree of ineffective haemopoiesis and cytopenia (anaemia, thrombocytopenia), and multiple factors such as fever, sepsis, infection, coagulopathy, hyperleukocytosis and anatomic lesions are considered as risk factors for bleeding [1]. Especially fever and infection have been found to precede serious bleeding in throbocytopenic patients [2]. Our patient also needed more PLT transfusions after development of fever and infection.

Desmopressin was chosen due to its known ability to increase release of von Willebrand factor, tissue-type plasminogen activator and prostaglandins from

Table I. Haematological profile

	Preoperatively	ICU	Release
WBC [×10⁶/µl]	6700	6000	4000
HCT [%]	24.7	24	28
HB [g/dl]	8.4	8.8	9.4
PLT [/µl]	100 000	35 000	24 000
RBC [×10⁶/µl]	2.75	2.15	3.10
PT [sec]	12.1	17.6	12.3
APTT [sec]	22.3	30.9	20
Fibrinogen [mg/dl]	320	202	392
INR	1.03	1.53	1.04

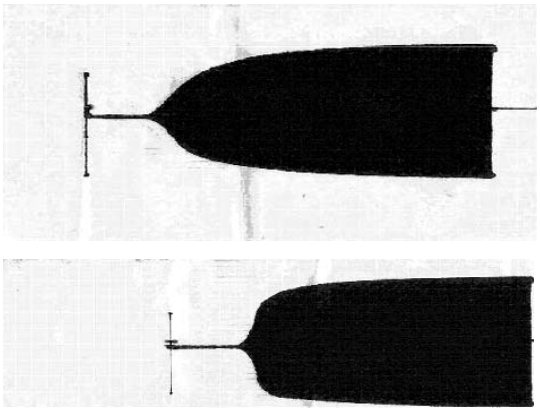

Figure 1. TEG 1 – before incision, after 10 units of PLT and 2 units of FFP; TEG 2 – perioperative after 15 units of PLT and 4 units of FFP

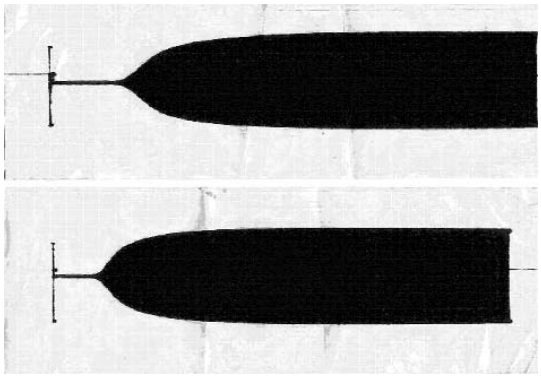

Figure 2. TEG 3 – perioperative after 20 units of PLT and 8 units of FFP; TEG 4 – perioperative after 26 units of PLT and 11 units of FFP

endothelial cells, promoting platelet adhesiveness to the vascular endothelium [3]. Therapeutic uses of aprotinin are based on its ability to inhibit human trypsin, plasmin, and tissue and plasma kallikrein by forming reversible enzyme inhibitor complexes and decreasing bleeding by inhibiting fibrinolytic activity and preserving platelet membrane binding functions [4]. Aprotinin has been found to significantly reduce blood loss and transfusion requirements in patients undergoing elective liver rejection [5].

Since the number of our patient's PLT was always marginal, we applied a policy of prophylactic daily PLT transfusion. Traditionally the trigger value for transfusing PLT is 20,000 /μl. We decided to transfuse PLT even at higher values based on our patient's susceptibility to bleeding due to his underlying disease and the kind of his operation. However, despite the daily transfusion, their absolute postoperative count never exceeded the amount of 50,000/μl, probably because of the underlying disease and the varying viability of the exogenous transfused PLT. Their quality was tested by thromboelastography, which is a low cost and effective method of coagulation monitoring that facilitates early and reliable detection of abnormalities in the haemostatic mechanisms and offers anaesthesiologists the possibility of acute interventions [6].

In conclusion, major surgery on MDS patients carries significant risks and the coagulation profile of these patients needs very close monitoring, as it can be easily distorted by factors such as surgery and infection. A tight multimodal approach and aggressive treatment of coagulation disorders improves the prognosis.

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