Case Report

Anesthetic management of a patient with sickle cell disease for common bile duct exploration

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Abstract

Patients with sickle cell disease (SCD) may present to the anesthetist in different clinical settings like perioperative care, management of acute painful crisis and intensive therapy for acute respiratory failure. We describe the successful management of a 34-year-old female patient with SCD, posted for cholecystectomy with common bile duct exploration under general and epidural anesthesia. The importance of preoperative stabilization and careful anesthetic strategy is emphasized.

Key words: Analgesia, cholecystectomy, exchange transfusion, sickle cell crisis

Introduction

Sickle cell disease (SCD) is a complex clinical entity characterized by an inherited chronic hemolytic anemia associated with variable number of acute painful vaso-occlusive episodes. Polymerization of hemoglobin-S (HbS) after deoxygenation is the fundamental molecular event that underlies the protean clinical manifestation of SCD.[1] Cholelithiasis is the well-recognized complication of chronic hemolysis. About 7% of all deaths among patients with sickle cell anemia are related to surgery.[2] Increased perioperative complications may result from vaso-occlusion after transient hypoxia, hypothermia, dehydration or acidosis. Inadequate post-operative pain of incision may reduce respiratory effort, leading to poor pulmonary toilet and relative hypoxia. We planned anesthesia and analgesia of the patient to avoid vaso-occlusive episodes and prevent complications.

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Case Report

A 56-kg, 158-cm, 34-year-old woman was posted for elective common bile duct (CBD) exploration. She was diagnosed to have sickle cell anemia with homozygous trait 15 years back and hypertension 3 months back. On admission, she had complaints of fever on and off, generalized weakness, and jaundice. She was prescribed oral hydroxyurea, levetiracetam, allupurinol, vitamin K, amlodipine 2.5 mg twice daily for hypertension. Antibiotic prophylaxis with intravenous (IV) ciprofloxacin and metronidazole was administered. She had recent history of one episode of convulsion and her computerized tomography scan showed transverse venous thrombosis. However, her magnetic resonance image (MRI) report was negative. She was not evaluated further for convulsion. She did not give any recent or past history suggestive of respiratory infection or complications, bone pain, joint pains, chest pain suggestive of cardiac involvement and renal problems suggesting impaired renal function. Endoscopic retrograde cholangio-pancreatography stenting with sphincteroplasty was done 7 days before surgery. Ultrasound abdomen showed an impacted CBD stone and so she was posted for an emergent CBD exploration. On general examination, she was icteric and had stable vital parameters with regular pulse rate 90/min and blood pressure (BP) 110/86 mmHg. On per abdomen palpation, there was no visceromegaly. Her investigations were as follows: Hb, 7.2 gm%; HbA2, 2.1%; HbF, 16.1%; HbS, 78.3%; baseline coagulation parameters, liver function tests, renal function tests, blood sugar, electrocardiogram, X-ray chest, 2D echocardiogram and arterial blood gas (ABG)

were within normal limits. Since her HbS was 78.3%, she underwent two partial exchange transfusions after which her HbS dropped to 36.6%, Hb was 11.3 gm%, packed cell volume (PCV) 32%, total count 8300/cu.mm and platelets 1,02,000/cu.mm.

The patient was started on incentive spirometry preoperatively. She was kept fasting after 12 midnight and was started on IV ringer lactate 100 ml/hour to avoid dehydration. Her urine output was monitored and pulse oximeter showed 100% oxygen saturation. As her preoperative baseline coagulation profile was normal, an epidural catheter was passed under local anesthesia before induction at T12-L1 level and was kept 5 cm inside the epidural space. Right internal jugular vein was secured under local anesthesia after sedation with IV fentanyl 1 μg/kg and midazolam 1 mg. The patient received oxygen by facemask.

The patient received IV glycopyrrolate 0.2 mg, midazolam 1 mg, fentanyl 1 μg/kg, ranitidine 50 mg and ondansetron 4 mg before induction. Anesthesia was induced with IV propofol and atracurium, and trachea intubated with 7.5 cuffed polyvinyl endotracheal tube. Utmost care was taken during induction to avoid hypotension and hypoxia. Left radial artery was secured and ABG done, which was normal. A nasopharyngeal temperature probe was passed for temperature monitoring and temperature was maintained at 36° C – 37° C. Anesthesia was maintained with 50:50 O_2:N_2O, isoflurane, IV atracurium and continuous epidural infusion of 6 ml/hour of 0.25% bupivacaine. Sevoflurane was avoided as significant percent of these patients have impaired kidney function. The patient was mechanically ventilated using closed circuit with end-tidal carbon dioxide ($ETCO_2$) monitoring. IV fluids were infused to maintain a central venous pressure (CVP) of 8-9 cms of H_2O and urine output of 2 ml/kg/hour. Intraoperative blood loss was 400 ml which was replaced with 500 ml hydroxyethyl starch. Throughout surgery, the patient remained hemodynamically stable with pulse rate 64-78/min and systolic BP of 104-126 mmHg. Intraoperative repeated ABG was done to rule out hypoxia and acidosis. The patient was extubated on table and shifted in the high dependency unit for postoperative monitoring. She received oxygen supplementation at 4-5 l/ min and epidural infusion of 0.125% bupivacaine for 3 days. Regular ABG analysis was done to rule out hypoxia and acidosis. The patient was started on low molecular weight heparin as thromboprophylaxis and incentive spirometry on day 2 of postoperative period. Throughout her stay, hemodynamics remained stable and urine output was maintained between 50 and 100 ml/hour. On day 5, epidural catheter and arterial line were removed and the patient was shifted to the ward.

Discussion

Vaso-occlusive phenomena and hemolysis are the clinical hallmarks of SCD, an inherited disorder due to homozygosity for the abnormal hemoglobin, that is, HbS. Vaso-occlusion results in recurrent painful episodes and a variety of serious organ system complications that can lead to disabilities and early death. Hydroxyurea and other agents have been used to increase the production of HbF, inhibiting HbS polymerization.[3] Induced hyponatremia has been used to reduce the HbS concentration, but was found to be impractical.[4] Alkalinization using magnesium glutamate, to increase oxygen affinity of Hb in the RBC, has been tried. Oral magnesium supplement reduces erythrocyte dehydration, reducing the cellular concentration of HbS in SCD patients.[5]

Acute chest syndrome is one of the most serious complications of SCD, with a mortality rate of 10%, but its pathogenesis is not clearly understood.[6] Progressive fibrosis has been detected in children with multiple episodes of acute chest crisis.[7] It is difficult to differentiate respiratory symptoms due to bacterial infection from acute chest syndrome. So, it is always advisable to start patients on broad-spectrum antibiotics in the perioperative period. Functional hyposplenism makes these patients susceptible to streptococcal infection and amoxicillin has good activity against streptococcal pneumonia. To prevent pulmonary complications, prophylactic continuous positive airway pressure and incentive spirometry should be started.[8]

Proper planning and optimal perioperative preparation is a key to successful management of SCD patients. Adequate hydration to decrease the viscosity of blood, control of infections and getting the hemoglobin levels normal and PCV between 30% and 35% is essential. Many of these patients have impaired kidney function due to renal medulla infarction which may interfere with their ability to maintain fluid and electrolyte balance during periods of stress. Preoperative need for exchange transfusion depends on the general condition of the patient and the type of surgical procedure. Exchange transfusion is generally recommended before major surgical interventions in order to minimize sickling and reduce the circulating HbS concentration below 30%.[9] In our patient, partial exchange transfusions done before surgery reduced the HbS level from 78.3 to 36.6% which drastically improved the perioperative outcome.

In conclusion, meticulous anesthetic management in the form of avoiding acidosis, hypoxia, hypothermia, hypovolemia, maintaining normocarbia, good intraoperative and postoperative pain relief with epidural infusion, postoperative thromboprophylaxis, postoperative oxygen therapy with inspired concentration up to 40%, chest physiotherapy,

nebulization, incentive spirometry with early mobilization and regular ABG monitoring played an important role in improving the patient outcome. Postoperative monitoring and pain relief play a vital role in avoiding pulmonary complications.

References

1. Bunn HF. Pathogenesis and treatment of sickle cell disease. N Engl J Med 1997;337:762.
2. Vinchinsky EP, Lubin BH. Sickle cell anemia and related haemoglobinopathies. Pediatr Clin North Am 1980;27:429-47.
3. Goldberg MA, Brugnara C, Dover GJ, Schapira L, Lacroix L, Bunn HF. Treatment of Sickle cell anemia with hydroxyurea and erythropoietin. N Engl J Med 1990;323:366-72.
4. Rosa RM, Brierer BE, Thomas R, Stoff JS, Kruskall M, Robinson S, *et al*. A study of induced hyponatraemia in the prevention and treatment of sickle cell crisis. N Engl J Med 1980;303:1138-43.
5. De Franceschi L, Bachir D, Galacteros F, Tchernia G, Cynober T, Alper S, *et al*. Oral magnesium supplements reduce erythrocyte dehydration in patients with sickle cell disease. J Clin Invest 1997;100:1847-52.
6. Castro O, Bramlifle DJ, Thorington B, Reindorf CA, Scott RB, Gillette P, *et al*. The acute chest syndrome in sickle cell disease: Incidence and risk factors. The co-operative study of sickle cell disease. Blood 1994;84:643-9.
7. Bowen EF, Crowston JG, De Ceulaer K, Serjeant GR. Peak expiratory flow rate and the acute chest syndrome in homozygous sickle cell disease. Arch Dis Child 1991;66:330-2.
8. Bellet PS, Kalinyak KA, Shukla R, Gelfand MJ, Rucknagel DL. Incentive spirometry to prevent acute pulmonary complications in sickle cell diseases. N Engl J Med 1995;333:699-703.
9. Morrison JC, Whybrew WD, Bucovaz ET. Use of partial exchange transfusion preoperatively in patients with sickle cell hemoglobinopathies. Am J Obstet Gynecol 1978;132:59-63.

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