Case Report

Access this article online
Website: www.afrjpaedsurg.org
DOI: 10.4103/0189-6725.115055
Quick Response Code:

Uncorrectable coagulopathy due to intestinal obstruction: A clinical dilemma of competing priorities in a child

V. Raveenthiran, S. Balachandran

ABSTRACT

Disseminated intravascular coagulation (DIC) is a contraindication for major surgical operations. However, if surgery is required to correct the underlying cause of DIC, a clinical conflict is created. In such complex scenario, standard resources such as textbooks and journals offer very little guidance. In this communication, we report a 22-month-old boy who developed sepsis-induced DIC following intestinal obstruction. Pre-operative attempts to normalize coagulation parameters failed. Damage control laparotomy was undertaken as it was considered essential to control the underlying cause of DIC. His abnormal coagulation status reverted quickly after surgical relief of intestinal obstruction. Paradoxically intraoperative blood loss was less than anticipated amount. There are a few case reports of adult patients who have successfully undergone major surgery despite the presence of abnormal coagulation. However, this appears to be the first paediatric report of successful surgery in DIC status. Lessons learnt from this case and hypothetical speculations of clinical paradoxes are discussed.

Key words: Anaesthesia in coagulopathy, bleeding disorder, coagulopathy, damage control surgery, disseminated intravascular coagulation, intra-operative bleeding, paediatric age, sepsis

INTRODUCTION

Major surgical operations are usually contraindicated in the presence of uncorrected disseminated intravascular coagulation (DIC).[1,2] The conventional recommendation is to defer surgery until coagulopathy is corrected.[2] In sepsis-induced DIC, control of infection is essential to correct coagulopathy.[3] If the source of sepsis is localized, in addition to appropriate antibiotics, surgical evacuation of septic material is frequently indicated.[3] Thus, when surgery is necessary to treat the underlying cause of DIC, a clinical conflict is created. Standard resources such as textbooks and journals offer very little guidance in such complex scenario. In this report, we share the lessons learnt from one such patient whom we successfully managed.

Departments of Pediatric Surgery and Anesthesiology, Sri Ramasamy Memorial Medical College, Sri Ramasamy Memorial University, Kattankulathur, Chennai, Tamil Nadu, India

Address for correspondence:
Prof. V. Raveenthiran,
200. Fifth Street, Viduthalai Nagar,
Sunnambu Kolathur, Chennai - 600 117, Tamil Nadu, India.
E-mail: vrthiran@yahoo.co.in

CASE REPORT

A 22-month-old male child was admitted with clinical features of complete intestinal obstruction (abdominal distension, bilious vomiting, obstipation, and fever) of 6 days' duration. He was born with high-variety of imperforate anus for which he had undergone decompressing sigmoid colostomy at birth. Posterior-sagittal-anorectoplasty had been carried out at the age of 12 months. Eight weeks later he had the colostomy closed. He had been asymptomatic during the 8-months interval between colostomy closure and the present admission.

He had transient diarrhoea 14 days prior to present admission. A week later, when he developed features of intestinal obstruction, a community paediatrician diagnosed post-diarrhoeal ileus and treated him with nil-per-oral, antibiotics and intravenous fluids. He developed fever on the 4th day of illness and oliguria on the 5th day. On the 6th day he was transferred to our hospital.

On admission, he was grossly dehydrated and malnourished and his weight was 6.5 kg. He was conscious but lethargic. His pulse was 100/min; blood pressure was 100/60 mmHg and the capillary refill time was 5 s. The abdomen was distended but not tender. Bowel sounds were absent and his rectum was empty. Abdominal imaging showed dilated bowel loops and multiple fluid-levels. It was suggestive of post-operative adhesive intestinal obstruction. Serum sodium was 125 mmol/l, potassium was 2.3 mmol/l, calcium was

7.4 mmol/l and bicarbonate was 17 mmol/l. In arterial blood sample PaO_2 was 80 mm Hg and $PaCO_2$ was 32 mm Hg. Serum protein was 3.9 g/dl and there was reversal of albumin-globulin ratio (1.6 g/dl vs. 2.3 g/dl respectively). However, serum bilirubin (Total 0.8 mg/dl; Direct 0.3 mg/dl) and serum levels of liver enzymes such as aspartate aminotransferase (12 U/l), alanine aminotransferase (41 U/l) and alkaline phosphatase (128 U/l) were within physiological range. Although, serum urea (79 mg/dl) and creatinine (1.6 mg/dl) were elevated on admission, they reverted to normalcy after fluid correction. Blood cultures were negative; but C-reactive protein was elevated (47 mg/dl). Negative bacterial culture was considered to be an artifact due to pre-hospital administration of antibiotics.

In the first 24 h, he was resuscitated with appropriate intravenous fluids and empirically chosen broad spectrum antibiotics (Cefotaxime 125 mg/kg/day + Gentamicin 5 mg/kg/day + Metronidazole 21 mg/kg/day). Electrolyte imbalance was corrected. Although, a laparotomy to relieve intestinal obstruction was intended after 24 h of resuscitation, it had to be postponed due to coagulation abnormality noted on the second day [Table 1]. DIC due to sepsis was diagnosed on the third day based on the scoring system of International Society on Thrombosis and Haemostasis.[3,4] In the ensuing 72 h platelet count progressively dropped and prothrombin time (PT) remain prolonged despite multiple transfusions of platelet-concentrates, whole fresh blood and fresh frozen plasma (FFP) [Table 1]. The platelet depletion was consistent with consumption thrombocytopenia of DIC. Although, the surgical and anaesthetic teams carefully considered the prospects of emergency laparotomy, a consensus clinical decision could not be arrived due to lack of published evidence to support major surgery in children with uncontrolled coagulopathy.

As there was no clinical improvement during the initial 48 h, empirical antibiotics were changed to Cefaperazone (200 mg/kg/day), Amikacin (15 mg/kg/day) and Metronidazole (21 mg/kg/day). On the 4th day of hospitalization, he developed toxic epidermolysis and clinical signs of overt DIC such as nasal bleeds, subcutaneous bruising and petechial haemorrhage of skin. As aggressive replacement therapy evidently failed, it was then realized that the sepsis-induced DIC could not be reverted unless the underlying intestinal obstruction is corrected. However, any surgery with a platelets count of 4000 per μl and a PT of 3.07 International Normalized Ratio would also be dangerous. After explaining these concerns and dilemmas, an informed consent was obtained from parent to proceed with surgery under American Society of Anaesthesiologist risk category 5E.

On the 5th day of hospitalization, a mini midline-laparotomy was carried out under endotracheal inhalation anaesthesia. The patient did not receive pre-medication. Anaesthesia was induced with propofol (2 mg/kg) and Fentanyl (2 μg/kg). Suxamethonium chloride (1 mg/kg) was given to facilitate orotracheal intubation with a 4.5 mm cuffed endotracheal tube. Anaesthesia was maintained with 2% sevoflurane in 100% oxygen, with positive pressure ventilation

Table 1: Summary of hematological investigations and transfusions

Hospital days	Platelet count (per µl)	Total leukocyte count (per µl)	Differential leukocyte count*	Hemoglobin (g/dl)	Prothrombin time (INR)	APTT Test vs. control (s)	Transfusion details	Remarks
1	125000	18500	N80 L18 E2	8.2	1.43	35 vs. 30		
2	72,000	22,000	N85 L12 E3	8.5	1.86	40 vs. 30	Fresh blood 1 unit	
3	30,000	24,000	N63 L34 M2 E1	-	2.14	40 vs. 30	Platelet concentrate 1 unit FFP 1 unit	DIC score was 6
4	12,000	21,600	N40 L54 E2 M4	13.2	2.40	48 vs. 30	Platelet concentrate 2 unit FFP 1 unit	
5	4000	16000	N48 L50 E2		3.07	63 vs. 30	Fresh blood 1 unit	Laparotomy done
6	10,000	-	-	-	1.50	-	Platelet concentrate 1 unit FFP 1 unit	
7	40,000	16,000		12.2	1.43	37 vs. 30		
12	120,000	12,100	N57 L42 E1	12.6	1.04			Antibiotics discontinued
20	226,000	11,800	N60 L35 E3 M2	12.8	1.04	32 vs. 30		

*The letters N, L, E and M indicate Neutrophils, Lymphocytes, Eosinophils and Monocytes respectively; the numbers following each letter indicate the percentage of the particular cell type, FFP: Fresh frozen plasma; 1 Unit is approximately 350 ml; INR: International normalized ratio; APTT: Activated partial thromboplastin time; DIC: Disseminated intravascular coagulation

in a circle system. Bolus doses of Atracurium (1 mg) and Fentanyl (3 μg) were injected intermittently to maintain muscle relaxation and analgesia respectively. Laparotomy revealed dense adhesion of colonic loops at the site of colostomy closure. As adhesiolysis may leave behind a large raw area with heavy oozing of blood, it was considered imprudent in the presence of coagulopathy. Hence, a proximal decompressing loop colostomy was performed. Intraoperative blood loss was estimated to be around 100 ml, which was adequately replaced. Throughout the peri-operative period, he remained hemodynamically stable and at the end of the operation neuromuscular blockage was reversed with neostigmine (50 mg/kg) and glycopyrolate (7 μg/kg).

Within 24 h of surgery, platelets count and PT started improving. On the post-operative day 7, coagulation profile returned to normalcy [Table 1]. Oral feeds were resumed and intravenous antibiotics discontinued on 5th and 7th post-operative day respectively. Multiple blood cultures in the intervening days were negative. Skin lesions resolved gradually. On the 16th post-operative day he was discharged and had gained 750 g since admission and weighed 7.25 kg on discharge. At the time of this reporting (1 year after DIC), his temporary colostomy has been reversed.

DISCUSSION

A major surgical operation in the presence of uncontrolled DIC is only rarely reported in the literature. Oba *et al*.[5] reported 2 adult patients with chronic DIC due to aortic aneurysm. As pre-operative attempts failed to correct DIC, aneurysmal surgery was performed despite uncorrected coagulopathy. Yoshioka *et al*.[6] reported a 52-year-old male who presented with DIC complicating infected left atrial myxoma. Septic embolization from the tumour necessitated an emergency open cardiac surgery to remove the tumour. Garg *et al*.[7] successfully performed emergency caesarean section in a 29-year-old pregnant female who presented with DIC complicating hemolysis, elevated liver enzymes and low platelet (HELLP) syndrome. Arai *et al*.[8] did emergency subtotal colectomy in a 69-year-old man with toxic megacolon and DIC. Tsukahara *et al*.[9] reported successful evacuation of intra-abdominal hematoma in acute DIC patient. In all these patients, surgery was essential to remove the underlying cause of DIC and predictably coagulation status reverted to normalcy soon after surgery. Adding to these anecdotes, our case appears to be the first report of successful surgery in a child with uncontrolled DIC.

We adopted several surgical techniques to minimize intraoperative bleeding. All incisions were made in anatomically avascular planes such as mid-line laparotomy and colostomy through anti-mesenteric tenia coli. Lengths of incisions were kept to the essential minimum. Electro-cautery was used liberally to make all incisions including the colonic one. Prior to electro-cautery incision, combustible gases in colon were decompressed using needle aspiration. Human hand rather than instruments were used gently to hold and retract tissues. Peri-operatively, multiple transfusions of FFP, platelet concentrates and whole blood were given. Although, these manoeuvres were helpful, they do not appear to fully explain the paradoxical lack of the much anticipated huge amount of intraoperative or post-operative bleeding. Hypothetically this phenomenon may be attributed to micro vascular occlusion due to fibrin deposition and thrombosis in DIC patients. Interestingly, similar phenomenon has also been noted in other types of bleeding disorders. Bishop *et al*.[10] noted excessive intra-operative bleeding in only 7% of acute leukaemia patients who had platelet counts below 50,000 per μl. Recent publications suggest that invasive procedures can be undertaken at a platelet count as low as 20,000 per μl.[11] However, our case illustrates the feasibility of a major surgery even at a very low-platelet count of 4000 per μl. As Schiffer[11] remarked, there seems to be an "imbalance between how much we worry about bleeding and how infrequently it actually occurs."

In conclusion, our experience with a single patient suggests that life-saving surgery need not be withheld in a DIC patient especially, when the operation is indispensable to control the underlying cause of coagulopathy. Contrarily, aggressive surgery in such patients appears to facilitate early recovery. However, we would like to emphasise that further evidence needs to be accrued as to the safety of surgery in DIC. Until then, clinical decisions should be made on case-to-case basis without any generalisation.

REFERENCES

1. Cafferata HT, Aggeler PM, Robinson AJ, Blaisdell FW. Intravascular coagulation in the surgical patient: Its significance and diagnosis. Am J Surg 1969;118:281-91.
2. Stone HH, Strom PR, Mullins RJ. Management of the major coagulopathy with onset during laparotomy. Ann Surg 1983;197: 532-5.
3. Levi M, Seligsohn U. Disseminated intravascular coagulation. In: Kaushansky K, Lichtman MA, Beutler E, *et al.*, editors. Williams Hematology. 8th ed. New York: McGraw Hill; 2010. p. 2101-20.
4. Taylor FB Jr, Toh CH, Hoots WK, Wada H, Levi M; Scientific Subcommittee on Disseminated Intravascular Coagulation (DIC) of the International Society on Thrombosis and Haemostasis (ISTH). Towards definition, clinical and laboratory criteria, and a scoring

system for disseminated intravascular coagulation. Thromb Haemost 2001;86:1327-30.
5. Oba J, Shiiya N, Matsui Y, Goda T, Sakuma M, Yasuda K. Preoperative disseminated intravascular coagulation (DIC) associated with aortic aneurysm – Does it need to be corrected before surgery? Surg Today 1995;25:1011-4.
6. Yoshioka D, Takahashi T, Ishizaka T, Higuchi T. Successful surgical resection of infected left atrial myxoma in a case complicated with disseminated intravascular coagulation and multiple cerebral infarctions: Case report. J Cardiothorac Surg 2011;6:68. Available from: http://www.cardiothoracicsurgery.org/content/6/1/68. [Last accessed on 2012 Aug 12].
7. Garg R, Nath MP, Bhalla AP, Kumar A. Disseminated intravascular coagulation complicating HELLP syndrome: Perioperative management. BMJ Case Rep 2009;2009, bcr10.2008.1027. (Accessed from Pubmed Central on 12 August 2012).
8. Arai H, Hanai H, Furuta T, Sato Y, Yamada M, Kaneko E, *et al*. A patient who survived total colonic type ulcerative colitis complicated by toxic megacolon, disseminated intravascular coagulation, methicillin-resistant *Staphylococcus aureus* infection and bilateral femoral phlebothrombosis. J Gastroenterol 1999;34:395-9.
9. Tsukahara E, Gomyo I, Hitomi K, Minagawa J, Matsuoka T. A patient with HELLP syndrome who underwent surgical removal of abdominal hematoma in acute phase of DIC. Masui 1995;44: 438-41. (English Abstract).
10. Bishop JF, Schiffer CA, Aisner J, Matthews JP, Wiernik PH. Surgery in acute leukemia: A review of 167 operations in thrombocytopenic patients. Am J Hematol 1987;26:147-55.
11. Schiffer CA. What to do if there is no evidence? The issue of surgical procedures in patients with thrombocytopenia. Transfusion 2011;51:2262-4.

Cite this article as: Raveenthiran V, Balachandran S. Uncorrectable coagulopathy due to intestinal obstruction: A clinical dilemma of competing priorities in a child. Afr J Paediatr Surg 2013;10:195-8.

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