Archives of Anesthesiology and Critical Care (Autumn 2022); 8(4): 330-332.

Available online at http://aacc.tums.ac.ir

Case Report

Peri-Operative Anesthetic Management of a Patient with Aplastic Anemia for Total Hip Replacement: Case Report

Shalvi Mahajan, Kavita Dugg, Sanjay Kumar, Shankey Garg*

Department of Anaesthesia and Intensive Care, PGIMER, Chandigarh India.

ARTICLE INFO

Article history:
Received 24 November 2021
Revised 16 December 2021
Accepted 30 December 2021

Keywords:
Aplastic anemia;
Infections;
Thrombocytopenia

ABSTRACT

Aplastic anemia is rare hematological disorder with approximate incidence 1.5-7 cases per million individuals per year. Osteonecrosis, a frequently seen in patients with aplastic anemia. With improved treatment modalities, the life expectancy of patients with aplastic anemia has increased considerably, so are the patients undergoing surgery for various pathologies. Due to rarity of the diseases, there are no specific formulated guidelines on the anesthetic management of these patients. Here, we describe successful anesthetic management of a young male patient with aplastic anemia who was posted for bilateral hip surgery.

Aplastic anemia, a non-malignant bone marrow failure syndrome first described in late 18th century [1]. The ability of hematopoietic stem cells to proliferate and produce mature cell lineages is lost in this rare entity. Aplastic anemia characterized by bone marrow hypoplasia/aplasia leading to pancytopenia. Hence, term "aplastic anemia" is a misnomer since pancytopenia is present instead of only anemia. Anesthetic challenges in this group of patients are secondary to decreased blood counts. Due to rarity of the diseases, there are no specific formulated guidelines on the anesthetic management of these patients. Here, we describe successful anesthetic management of a young male patient with aplastic anemia who was posted for bilateral hip surgery.

Case Report

A 65 kg, 156 cm, 34-year-old male was posted for total hip replacement (on left side) and core decompression (on right side). He was diagnosed to have aplastic anemia 4 years back for which he has been taking tab danazol 200mg BD. He suffered orbital apex syndrome (extramedullary hematopoiesis) 2 years back which was medically managed with steroids. On pre-operative assessment, no recent history of fever (suggesting infection) or any episode of bleeding was present. Systemic and airway examination was unremarkable.

Blood investigations were Haemoglobin 6gm/dl, total leucocyte count of 2800/l and platelet count of 80000/l. Hematology consultation was obtained. It was advised to maintain at least Hb of 8gm/dl and adequate levels of platelets and to arrange blood products for surgery (> 1 lakh). Immediately blood bank team was informed and Packed red blood cells(PRBCs) and Single donor aphresis platelets (SDAP) were arranged. 2 unit PRBCs and 1 SDAP was transfused preoperatively. 2 SDAP were arranged along with 2 packed red blood cells (PRBC's) for surgery. On the day of the surgery, after confirming the fasting status and availability of cross-matched SDAP and PRBCs, patient was wheeled inside the operation theatre (OT). Routine monitoring was done inside OT. Two large bore intravenous cannulas were taken (18 and 16 G). Inj cefuroxime 1.5gm for antimicrobial prophylaxis. Owing to refractory nature of thrombocytopenia requiring multiple platelet transfusion since admission, it was decided to administer general anesthesia (GA). Although regional anesthesia has been a better option for these type of surgery. However, Thrombocytopenia with short life span of transfused platelet contraindicated neuraxial blockage. Patient was induced as per institutional protocol using propofol 100mg, morphine 7.5mg, atracurium 30mg. Gentle and

The authors declare no conflicts of interest.
*Corresponding author.
E-mail address: shankey6489@gmail.com

atraumatic laryngoscopy was performed to avoid mucosal trauma. Nitrous oxide was avoided during maintenance of anesthesia as it has propensity to cause marrow suppression. and anesthesia was maintained with isoflurane along with oxygen and air mixture. All sterile precautions during intubation, insertion of cannulas, catheterization and surgical steps ought to be ensured by both anesthesia and surgical team. One-unit SDAP was transfused just before the incision. Surgery took around 3hours and blood loss were around 600 ml. Intraoperatively, one more SDAP and one PRBC (220ml) was transfused. Rest of the surgery went uneventful. Patient was extubated after the surgery. In the post-operative period, pain control was done by paracetamol and tramadol, regular hematology tests were within normal limits and patient was successfully discharged from hospital after 7 days.

Discussion

Aplastic anemia is a rare hematological disorder with approximate incidence 1.5-7 cases per million individuals per year [2]. Marrow failure can be inherited (Fanconi's anemia, diamond blackfan anemia, schwachman diamond anemia etc) or acquired (direct injury to stem cells by drugs, chemicals, irradiation, viral infections, pregnancy etc) [3]. The clinical spectrum depends upon predominant cell lineage depression. It varies from asymptomatic to anemia, easy bruisability, ecchymoses, bleeding gums, epistaxis, blisters in mouth, fever, cellulitis, pneumonia or sepsis. Treatment options include supportive care, and specific treatment. The specific treatment includes bone marrow transplant and immunosuppressive therapy with Anti-thymocyteglobulin/cyclosporine/Eltrombopag, anabolic steroids, corticosteroids [4]. Immunosuppression further decrease immunity and increases risk of infection and cancers. With improved treatment modalities, the life expectancy of patients with aplastic anemia has increased considerably, so are the patients undergoing surgery for various pathologies.

Osteonecrosis, a frequently seen in patients with aplastic anemia [5]. The bony compartment is closed compartment, expansion of one component is at the expense of other components. Hence, increase in fat cell component of hematopoietic marrow causes collapse of vascular sinusoids in proximal femoral metaphysis leading to osteocyte necrosis and eventually collapse of affected joint. Consequently, more patients are being posted for hip replacement surgeries.

Perioperative anesthesia concern revolves around the consequences of pancytopenia (anemia, thrombocytopenia, neutropenia) and the type of surgical procedure. Anemia is linked with decrease oxygen carrying capacity of blood and hence stress on heart and impaired healing of surgical wound. Thrombocytopenia if not corrected pre-operatively can lead to hemorrhage and hematomas during intraoperative and postoperative period. Increased predisposition to perioperative infections due to neutropenia. Therefore, hematologist opinion for optimization of cell counts and availability of adequate blood products is crucial for best surgical outcome.

Platelet transfusion refractoriness refers to the inability of maintaining desired platelet levels after platelet transfusion. This entity is well documented in patients with aplastic anemia. This refractoriness can be due to immune (alloimmunization) or non-immune causes (drugs or infections). In non-immune causes treating the underlying cause and frequent transfusion of the products should be considered. Alloimmunization can be prevented by using single donor platelets, ensuring ABO compatibility and leukoreduction of the transfused products.

There is paucity of literature on the safe level of platelet counts for giving central neuraxial blockade in these patients, we decided to administered general anesthesia. However, American Society of Anesthesiologists (Schaumburg, Illinois) and the Society for Obstetric Anesthesia consider the threshold to be between 75 -100 $\times 10^3$ cells/µl. In our case though it was difficult to predict the life span of transfused platelet, we considered frequent transfusions in the pre-operative period to maintain range around 1 lakh as per hematology opinion.

The use of immune-suppressant drugs and presence of neutropenia due to disease per se increases susceptibility to infections. Antibiotic administration in right dose and at right time in perioperative period is essential. All sterile precautions during intubation, insertion of cannulas, catheterization and surgical steps ought to be ensured by both anesthesia and surgical team. For the same reason, bacterial and viral filters along with disposable anesthesia circuits is indispensable.

Smooth, gentle and atraumatic laryngoscopy and intubation should be carried by experienced anesthesiologist to avoid mucosal trauma. Nitrous oxide should be avoided during maintenance of anesthesia as it has propensity to cause marrow suppression. Hence, oxygen and air mixture should be chosen. Extubation should also be similar to intubation.

Maintenance of intraoperative hemodynamics with avoidance of sympathetic surges at different surgical steps helps in minimizing blood loss. For the same reason, tranexamic acid was administered, meticulous surgical hemostasis and fresh blood products were used.

Post operatively, theses patient should be nursed in isolation area with regular oral hygiene using chlorhexidine mouth wash, receive prophylactic antibiotics. Postoperative analgesia management is extremely important owing to lack of performance of central neuraxial blockade. Paracetamol, tramadol in intravenous form either by patient-controlled infusion pumps or regular round the clock administration and

transdermal patch can provide good analgesia. Drugs such as non-steroidal anti-inflammatory drugs should be avoided. Early mobilization and limb physiotherapy should be encouraged.

Conclusion

The potential implications during surgery in aplastic anemia are due low cell count. Adequate blood and blood products, strict asepsis, smooth induction and extubation and good postoperative analgesia form basis of successful perioperative management of surgical intervention in aplastic anemia patients.

References

[1] Ehrlich P. Uber einen fall von anaemie mit bemerkungen uber regenerative veranderungen des knochenmarks. Charite-Annale 1888; 13:300-305.

[2] Vaht K, Goransson M, Carlson K, Isaksson C, Lenhoff S, Sandstedt A, et al. Incidence and outcome of acquired aplastic anemia: real-world data from patients diagnosed in Sweden from 2000–2011. Haematologica. 2017;102: 1683-1690.

[3] Elizabeth P, Arber D. The differential diagnosis and bone marrow evaluation of new onset pancytopenia. Am J Clin Pathol. 2013; 139:9-29.

[4] Marsh JC, Ball SE, Cavenagh J, Darbyshire P, Dokal I, Gordon-Smith EC, et al. Guidelines for the diagnosis and management of aplastic anemia. Br J hematol. 2009;147(1):43-70.

[5] Park J, Jun J, Kim Y, Lee J, Kim C, Hahn S. Osteonecrosis of the hip in patients with aplastic anemia. J Korean Med Sci. 2002; 17(6):806-10.