

Case Report

Extreme Intraoperative Hemodilution in Elderly Jehovah's Witnesses Patient with Hip Fracture Case Report

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Abstract

Background: In the medical field, Jehovah's Witnesses are widely known for their prohibition against the receipt of blood transfusions. For this reason, this topic remains a critical issue in medical practice and ethics.

Case Report: A 77-year-old female patient who is a Jehovah's Witness presented with subtrochanteric fracture of the right femur. History of hypertension controlled by hydrochlorothiazide and losartan. Her hemoglobin was 8.4 g/dL, 28% hematocrit, and 2,790,000/mm³ red cells. Patient was prepared with erythropoietin, folic acid, infusion of iron and vitamin B12. Seventeen days after treatment the hemogram revealed: 3,200,00/mm³ red cells, hematocrit 33%, hemoglobin concentration 10.5 g/dL, 375.000/mm³ platelets, 6,900/mm³ leukocytes, normal coagulation, indicated the surgical procedure for the following day.

Patient was continuously monitored with NIBP, pulse oximetry, and ECG. Continuous lumbar plexus and spinal anesthesia. Intraoperatively, 4 mL/kg of crystalloids and 1,000 mL of 6% hydroxyethyl starch 130/0.4 in 0.9% sodium chloride solution (Volume[®]) were administered intravenously. The patient was discharged from the POU for wards on 8th postoperative day with hemoglobin was 7.4 g/dL, 23% hematocrit, 2,100,000/mm³ red cells. She remained in the ward for another week and was discharged to his residence on the 15th postoperative hemodynamically stable.

Conclusions: Preoperative preparation is critical to manage Jehovah's Witnesses patients. Abbreviation of fasting is fundamental in the elderly patient. Postoperative analgesia management is fundamental for patient evolution, remaining 80 hours without pain. A good planning of the whole team (clinician, surgeon, anesthesiologist, and intensive care staff) allows us to perform surgical procedures associated to major blood losses.

Keywords: Blood Transfusions; Continuous Plexus Block; Erythropoietin; Hip Surgery; Jehovah's Witnesses; Spinal Anesthesia

Introduction

A major orthopedic surgery is one that elicits a major fluid shift and causes a metabolic response to trauma. Most hip surgeries will require blood transfusion following blood loss from the operation and so planning a major surgery in a Jehovah's Witness with the comorbidity disease is a dilemma to throughout the surgical team and

intensive care unit. The on the appropriate hemoglobin threshold for transfusion continues to this day. Under current guidelines, blood transfusion is not indicated in the treatment of patients with Hb levels of >10.0 g/dL, and should only be considered in patients with Hb levels of <6.0 g/dL, and possibly, although not wholly justifiably, in ischemic heart disease patients with Hb levels of <8.0 g/dL [1].

In 2010 the population of Paraiba was 3,766,528 people, of whom 17,584 were Jehovah's Witnesses, corresponding to 0.5% of the population [2]. This report aimed at describing a case of

major blood loss resulting in 4.1 g/dL hemoglobin in elderly Jehovah's Witness patient with hip fracture.

Case Report

AA 77-year-old female patient who is a Jehovah's Witnesses presented with subtrochanteric fracture of the right femur. Patient with history of hypertension controlled by hydrochlorothiazide (25 mg/day) and losartan (50 mg/day), and she had no history of hyperlipidemia, diabetes, and cardiac arrhythmia. Her hemoglobin was 8.4 g/dL, 28% hematocrit, and 2,790,000/mm³ red cells. In a meeting with the patient and her relatives there was a strict refusal of blood transfusion. We obtained informed consent and discussed throughout the anesthetic technique with the patient and family. Patient was prepared with erythropoietin (7,500 U) three times a week to stimulate erythropoiesis, folic acid (5 mg/day), iron (200 mg) and vitamin B₁₂ (1g) infusion three a week. Seventeen days after treatment the hemogram revealed: 3,200,00/mm³ red cells, hematocrit 33%, hemoglobin concentration 10.5 g/dL, 375.000/mm³ platelets, 6,900/mm³ leukocytes, and normal coagulation, being indicated the surgical procedure for the following day. Tests revealed all electrolytes normal. Bilirubin, urea, creatinine unchanged. Chest X-ray and ECG were normal. Heart rate of 73bpm and blood pressure of 148/64mmHg.

As part of the program ACERTO, two hours thirty minutes before the surgery the patient took 200 mL of supplement (Fresubin Jucy®). In the wards the patient was placed in dorsal decubitus for inguinal lumbar plexus block, for analgesia and transport to the operating room without pain. The access to the lumbar plexus was achieved using a stimulator (HNS12 B. Braun, Melsungen) connected to a 50-mm (22G x 2") needle (B. Braun Melsungen). (Table 1)

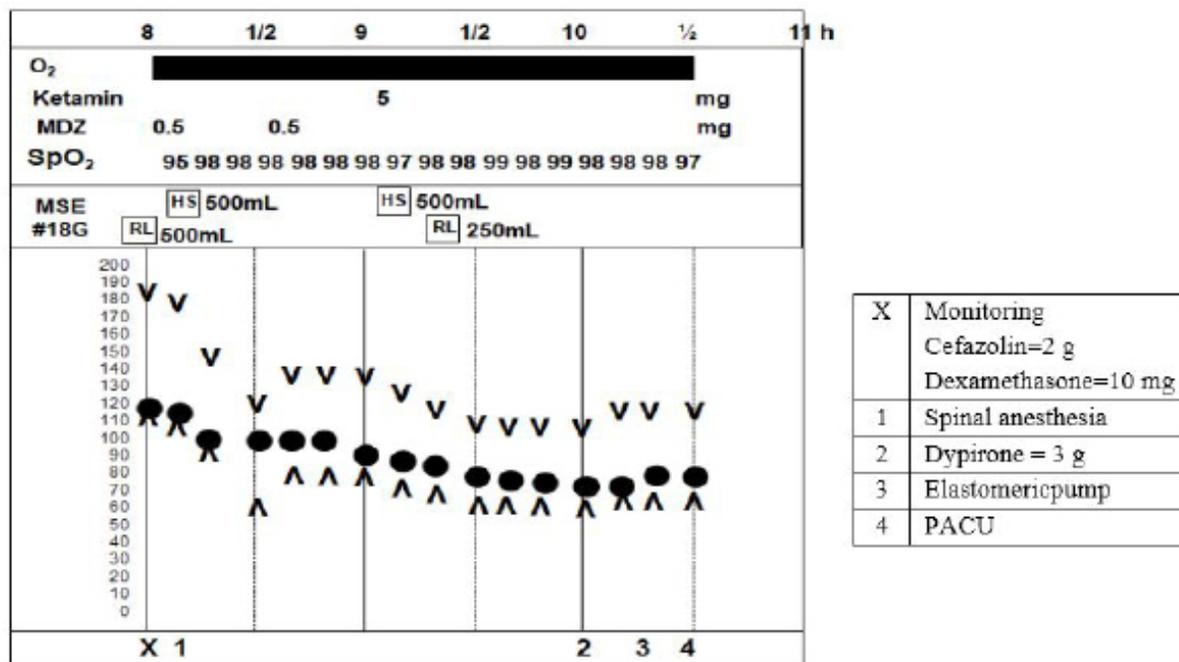


Table 1: Anesthesia Document.

The needle was advanced, and the quadriceps was stimulated with a 0.5 mA current until a response was observed. After negative aspiration of blood, 20 mL of 0.5% bupivacaine and 20 mL of 2% lidocaine plus epinephrine 1: 200,000 were injected through the extension connector of the needle. Maintaining the needle in the same position, a 20G catheter was introduced 7 cm in the psoas compartment, being fixed in place with adhesive material and an occlusive dressing. Twenty minutes after the patient was transferred to the operating room. Before induction of spinal anesthesia, routine monitoring (electrocardiogram, pulse oximetry, and noninvasive blood pressure measurement) was started and an intravenous line was placed. After sedation with midazolam (0.5mg) intravenously and cleaning the skin with chlorhexidine and removal of excess spinal puncture was performed with the patient in the sitting position, by the median line in the L₃-L₄ interspaces using 25G Quincke needle. After appearance of Cerebrospinal Fluid (CSF) 12.5 mg of 0.5% isobaric

bupivacaine were administered at a speed of 1 mL.15s⁻¹. Patients were immediately placed in the supine position to the beginning of surgery.

The level of sensory block was observed in T₁₂ and motor blockade (grade 3) of the lower limbs. During the surgical procedure, the blood loss was evaluated around 1,500 L. Intraoperatively, 4 mL/kg of crystalloids and 1,000 mL of 6% hydroxyethyl starch 130/0.4 in 0.9% sodium chloride solution (Voluven®) were administered intravenously. The surgical procedure lasted 2:10 hours without hypotension, bradycardia or decreased oxygen saturation. During the procedure the patient received 1 mg midazolam and 5 mg dexroketamine for sedation and 10 mg dexamethasone for the prevention of nausea and vomiting. First analgesic dose was performed at end of surgery in the operating room dipyrone (3g) were administered intravenously. Before her discharge, a disposable elastomeric pump (Easypump®, B. Braun, Germany) containing 400 mL of 0.1% bupivacaine was connected to the catheter in the inguinal lumbar plexus. The pump was programmed for infusion at a rate of 5 mL.h⁻¹. At the end, the patient was transferred to the PACU, with BP=130x70 mmHg, HR=111 bpm, SpO₂em environment=97%. She received instructions to trigger the bolus device, which is part of the pump, in case of severe pain. Toxicity symptoms of the local anesthetic were recorded.

During the 80 postoperative hours, boluses were not necessary. The catheter was removed without interurrences. After catheter removal, pain was controlled with oral ketoprofen and dipyrone. Full recovery from motor blockade of the lower limbs occurred 3:15h after injection of local anesthetic. The patient received 200mL of supplement (Fresubin Jucy®) at the end of the blockade of spinal (4:00 h after spinal local injection anesthetic) and before discharge from the PACU.

For safety reason, the patient was transferred to the Postoperative Unit (POU) for monitoring, intravenous hydration and started oral diet for arterial hypertension six hours after the end of surgery. The bladder catheter was passed and the surgical wound drain was evaluated. The evolution of the examinations during the hospitalization time is in (Table 2).

	Immediaty PO	Day 1 st	2 nd Day	3 rd Day	4 th Day	5 th Day	6 th Day	7 th Day	8 th Day
RBCs	1,760,000	1,460,000	1,430,000	1,400,00	1,400,00	2,080,000	2,082,000	2,130,000	2,150,000
Hb (mg/DL)	5.3	4.6	4.1	4.3	4.6	5.8	6.4	7.1	7.3
Ht (%)	18.2	15	15	15	15.5	18.1	19.3	22.5	23
PC (cells/mm ³)	314,000	241,000	102,000	270,000	243,000	325,000	342,000	395,000	502,000
Leu (cells/mm ³)	13,800	12,300	9,600	8,600	8,500	10,000	11,300	14,200	11,600
INR	1,1	---	1,0	---	---	---	---	---	---
RBCs: Red Blood Cells PC: Platelet Count Hb: Hemoglobin Leu: Leukocytes Ht=Hematocrit INR: International Normalized Rate									

Table 2: The evolution of the examinations during the hospitalization time.

On the 3rd postoperative day, the bladder catheter and the surgical wound drain were removed. Likewise, he could only take one blood sample per day for the exams, and all of its oral feeding. The patient was discharged from the POU for wards on 8th postoperative day with hemoglobin was 7.4 g/dL, 23% hematocrit, 2,100,000/mm³ red cells. She remained in the ward for another week and was discharged to his residence on the 15th postoperative hemo dynamically stable, and with the following blood count:hemoglobin was 9.4 g/dL, 30% hematocrit, 3,200,000/mm³ red cells.

Discussion

There are reports on survival of surgical patients with low hematocrit values [3,4] and the lowest hemoglobin value in the literature is 1.1 g/dL [5]. Hip fracture surgery may be associated with considerable blood loss and successful management without blood transfusion presents a considerable challenge to surgeon and anesthetist. Many reports, as ours, have suggested that surgical and critical patients tolerate much lower hemoglobin and red cell levels than it has been previously believed. This is an interesting case because it reports

different therapeutic alternatives.

In Brazil, freedom of belief is protected by own Constitution of 1988 [6] in its Article 5, VI, which guarantees the inviolability of freedom of conscience and belief, and ensures the free exercise of cults and guarantees the protection of places of worship and their liturgies. Administration of blood products against the wishes of a competent patient is a potentially criminal act subject to prosecution. Jehovah's Witnesses do not admit total blood, red cells, leukocyte concentrate, and plasma or platelets transfusion. Religious understanding, however, does not absolutely prohibit the use of blood products such as albumin, immunoglobulins, fibrin preparations, self-transfusion (provided there is no disconnection between blood removal and infusion), erythropoietin and organ transplantation. In our case, erythropoietin, folic acid, iron and vitamin B₁₂ were used in the preoperative and postoperative period and colloids was used during surgery.

Before surgery, either oral or i.v. iron can be used; however, i.v. iron produces a more rapid and reliable increase in Hb concentrations [7]. The effect of i.v. iron on erythropoiesis may only last up to 10 days [7], and patients may require repeated doses for preoperative optimization. Vitamin B₁₂ and folate should also be replaced if a preoperative deficiency is identified. The effects of recombinant erythropoietin are partly governed by ferritin, transferrin, iron, vitamin B₁₂, and folic acid concentrations [8]. All these products were used in the preoperative period and in the postoperative period, contributing to the recovery of the patient without the use of blood components.

Blood loss increases morbidity, and the authors showed that mortality throughout the perioperative period increases with blood loss >500 mL irrespective of the preoperative Hb concentration, which is why cessation of blood loss is a top [9]. Despite the large incision (10-bolt plate), the continuous use of the electric scalpel was still a loss of 3 times that recommended by other authors [9] but without hemodynamic repercussion and patient survival. In this intervention, any blood lost is suctioned, anticoagulated, collected, centrifuged, washed, and later reinfused. Its use in elective and emergency scenarios is well established and has provided a safe and cost-effective alternative to allogeneic blood transfusion [10]. Unfortunately, our hospital did not have this type of device.

In 2000 it was established that in healthy volunteers, a reduction in Hb concentration from 13 g/L to 70 g/L can be tolerated without a detrimental effect on oxygen transport [11]. The level of anemia that a patient will tolerate varies depending on the clinical practitioner and the setting (elective or emergent, preoperative or postoperative). However, Hb concentrations below 50 g/L is associated with a drastic increase in mortality [12].

Human volunteers may tolerate up to 5 g/dL [13] due to compensatory systemic and microcirculation mechanisms. However clinical factors such as decreased cardiac output,

decreased oxygen extraction, changes in blood gases and increased oxygen consumption are also important. In addition, there is individual variability. Tachycardia, postural hypotension and ST-segment changes at ECG are factors to be considered. In our case, despite the patient's age (77 years) and being hypertensive there were no HR or ST-segment changes.

Regional and central neuraxial anesthesia, when compared with general anesthesia, are associated with reduced estimated blood loss and postoperative transfusion requirement [14]. Continuous lumbar plexus block was performed in the ward, spinal anesthesia was performed for surgery and the installation of the elastomeric pump allowed analgesia of 80 hours, contributing to the success of the procedure. The patient returned to her home on the 15th postoperative day.

Anemia is now recognized as a risk factor for a number of adverse outcomes in older adults, including hospitalization, morbidity, and mortality. The elderly is an important demographic population that is growing rapidly in the context of increasing prevalence of anemia with age [15]. For the most part the anemia is mild, with hemoglobin levels in frequently less than 10 g/dL [16]. The initial guidelines by The American Society of Anesthesiology (ASA) in 1996 [16] identified hemoglobin < 6 g/dL as a transfusion trigger for acute blood loss, whereas the updated ASA guidelines in 2006 [17] noted that although multiple trials have evaluated transfusion

Thresholds on patient outcome, the literature is insufficient to define a transfusion trigger in surgical patients with substantial blood loss. A recent study of elderly population with hip fracture found that while blood transfusion was not associated with changes in mortality, blood transfusion was associated with an increased rate of postoperative infection [18]. The authors concluded that these data add to the wider literature about adverse clinical outcomes in patient receiving blood transfusions, and emphasizes the need for prospective trials to evaluate the role of transfusion in the elderly.

Recently in elderly patients the authors showed three cases with hemoglobin of 3.3 g/dL, 3.5 g/dL and 4.7 g/dL that survived without the use of the blood components refused by the Jehovah's Witnesses [4] acute normovolemic hem dilution may be a valuable means to reduce intraoperative blood loss, the same way that cell salvage is a method of collecting blood loss during an operation and giving it back to the patient. When cell salvage is used, blood that is lost during the operation is collected into a machine. This filter and washes the blood to remove any contaminants. The blood can then be given back to the patient during the operation or afterwards. The advantages of this are that the patient is given a transfusion of their own blood. Cell Salvage is deemed acceptable by many Jehovah's Witnesses as it does not involve transfusion of blood from an unknown donor. This device was not used in our patient for not being part of the institution's therapeutic armamentarium.

Conclusions

1. Preoperative preparation is critical to manage Jehovah's Witnesses patients.
2. Abbreviation of fasting is fundamental to avoid thirst, hunger and dehydration, especially in the elderly patient.
3. Surgical, anesthetic and intensive care teams, in agreement and with the same objective, may work with much lower hemoglobin levels than those classically recommended.
4. Postoperative analgesia management is fundamental for patient evolution, remaining 80 hours without pain.
5. Early oral feeding is important for patient recovery.
6. Early ICU discharge (discharge to the POU in the second PO day) was fundamental to prevent infection.
7. Hemoglobin level of 4.1 g/dL was compatible with surgery and postoperative recovery.

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