Successful Preoperative Optimisation of Severe Anaemia Without Blood Transfusion in a Jehovah's Witness Undergoing Major Gynaecological-Oncological Surgery

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ABSTRACT

Background

Managing major gynaecological operations in patients who refuse blood transfusions on religious grounds presents a profound clinical and ethical dilemma. For Jehovah's Witnesses, the administration of whole blood or allogeneic blood components is strictly forbidden. Consequently, aggressive preoperative optimisation and meticulous surgical haemostasis are essential to minimise mortality from severe anaemia in resource-limited environments where advanced cell-salvage technologies are unavailable.

Case presentation

A 55-year-old Nigerian Para 5+1 (5 living children) Jehovah's Witness woman presented with severe abdominal pain, a large pelvic mass, and profound microcytic iron-deficiency anaemia (baseline haemoglobin of 3.6g/dL). Laboratory workup confirmed severe iron deficiency anaemia. Advanced imaging and tumour marker workup pointed toward a highly suspicious ovarian neoplasm or uterine sarcoma, necessitating urgent surgical treatment. The patient explicitly refused blood transfusions, supporting her stance with a fully executed Durable Power of Attorney card. Over a structured 4-week period of combined inpatient and outpatient care, she was systematically optimised using a multimodal patient blood management protocol. Her preoperative optimisation protocol delivered a cumulative dose of 120,000 IU of recombinant human erythropoietin (administered at 8,000 IU every 72 hours initially, escalating to 16,000 IU every 72 hours) alongside 1,200 mg of intravenous iron sucrose

administered sequentially under diuretic cover. This regimen comprised high-dose subcutaneous recombinant human erythropoietin (40,000 IU weekly in divided doses of 16,000 IU every 72 hours), total-dose intravenous iron sucrose infusion **(**1000 mg administered sequentially**)** under diuretic cover, multi-modal oral haematinics (including Tot'hema and the local Mojeaga remedy), and antifibrinolytics (tranexamic acid) to curb abnormal uterine bleeding. Through this coordinated erythropoietic stimulation and parenteral iron repletion, her haemoglobin level steadily rose from 3.6 g/dL at presentation to a peak of 12.0 g/dL prior to surgery, ultimately settling at 10.7 g/dL on the day of operation. She underwent an uncomplicated exploratory laparotomy and optimal cytoreductive surgery (total abdominal hysterectomy and bilateral salpingo-oophorectomy with infracolic omentectomy) with an estimated blood loss of 400 mL. Her postoperative recovery was stable, and she was safely discharged on postoperative day six with a haemoglobin level of 10g/dL. Histology examination of the specimen confirmed an adult type granulosa cell tumour.

Conclusion

This case demonstrates that the strategic deployment of structured, aggressive erythropoietin and intravenous iron protocols, alongside rigorous surgical haemostasis, can enable patients with life-threatening anaemia to safely undergo major open gynaecological-oncological procedures without blood transfusion even in resource-poor healthcare systems. While this single-case success illustrates the feasibility of non-transfusion management, wide application requires careful cardiovascular monitoring, individualized risk assessment, and further clinical studies.

Key words: Patient blood management; Jehovah's Witness; severe anaemia; recombinant human erythropoietin; intravenous iron sucrose; low-resource setting; granulosa cell tumour.

INTRODUCTION

Although some Jehovah's Witnesses may accept pre-donated autologous blood based on personal conscience, their strict refusal of allogeneic whole donor blood poses an intricate ethical, clinical, and legal challenge for healthcare providers [1]. Worldwide, the JW community numbers approximately 9 million [2]. Based on their scriptural interpretations, members of this faith refuse allogeneic whole blood, but individual conscience now dictates whether they accept packed red blood cells, white blood cells, platelets, or plasma [2, 3]. When these patients present with major gynaecological pathologies causing chronic menorrhagia and profound anaemia, standard stabilisation protocols using allogeneic whole blood transfusions are strictly precluded [4, 5].

Severe anaemia poses critical perioperative risks, including myocardial infarction, congestive heart failure, tissue hypoxia, impaired wound healing, and death. In cases where a massive abdominopelvic lesion is highly suspicious for a malignant ovarian tumour or uterine leiomyosarcoma, delaying surgery indefinitely for haematologic optimisation carries an unacceptable risk of oncological progression. Literature suggests that among patients undergoing major surgery, up to 50% are anaemic preoperatively, a figure that climbs to 90% in the postoperative period [6, 7]. When left unaddressed, anaemia profoundly exacerbates the risk of postoperative complications such as myocardial infarction, stroke, and cognitive dysfunction, while simultaneously increasing the length of hospital stay, mortality, and duration of mechanical ventilation.

Managing severely anaemic or actively bleeding JW patients has historically provided clinicians with extensive experience in bloodless medicine and surgery [7]. These specialised strategies have evolved into Patient Blood Management (PBM), a patient-centered framework now widely utilised to reduce reliance on allogeneic blood products across general healthcare systems [7]. By placing patient safety and individual autonomy at the core of clinical decisions, PBM optimises treatment outcomes. When properly executed, this approach minimises unnecessary administration of blood components, decreases transfusion-related risks, and lowers overall healthcare costs [7, 8]. Consequently, clinicians must employ structured PBM principles tailored to local resource constraints. This case report describes the successful management of a 55-year-old Nigerian woman with an initial haemoglobin level of 3.6g/dL and a large pelvic mass. This case report illustrates the successful multidisciplinary application of Patient Blood Management in a 55-year-old Nigerian woman presenting with profound iron-deficiency anaemia (baseline haemoglobin 3.6 g/dL) and a suspicious pelvic mass. Through

aggressive, high-dose combination therapy with erythropoiesis-stimulating agents (ESAs) and intravenous iron, she achieved safe physiological optimisation for major surgery without allogeneic blood support.

Case presentation

Patient information and clinical presentation

A 55-year-old Nigerian Para 5+1(5 living children) woman, and an active member of the Jehovah's Witness denomination, presented to our tertiary Gynaecology clinic. She had been referred from a peripheral facility with an initial abdominopelvic ultrasound indicating multiple uterine myomas, peptic ulcer disease, and right renal hydronephrosis.

Upon presentation, she reported severe abdominal pain of one month's duration, generalised body weakness, fever, and a loss of appetite lasting three weeks. The abdominal pain was gradual in onset, sharp, intermittent, and radiated to her back. The pain was aggravated by physical stress and temporarily palliated by rest and over-the-counter analgesics (paracetamol and ibuprofen).

Her menstrual history revealed irregular cycles with a history of severe dysmenorrhea and heavy menorrhagia lasting up to two weeks. Her last menstrual period occurred seven weeks prior, followed by a light episode of withdrawal bleeding; she noted she had not yet transitioned into menopause. She had a history of a spontaneous miscarriage at 4 weeks' gestation about 22 years prior to presentation, which was managed medically. An intrauterine device (IUD) was currently in situ. She reported no history of previous surgeries or blood transfusions. She presented a fully completed and signed Durable Power of Attorney (DPA) card explicitly denying consent for any form of blood transfusion.

Physical examination

On general physical assessment, the patient was a middle-aged woman in painful distress with marked conjunctival and palmar pallor. She was afebrile (36.5°C), anicteric, acyanosed, and free of pedal oedema. Her vital signs revealed marked haemodynamic compensation: blood pressure (BP) was 130/69 mmHg, respiratory rate (RR) was 30 cycles per minute, pulse rate (PR) was 120 beats per minute (sinus tachycardia), and oxygen saturation (SpO2) was 98% on room air.

On abdominal examination, the abdomen was full and moved with respiration. Palpation revealed a smooth, cystic, mobile, and tender mass in the left iliac fossa whose lower border could be felt separately from the uterus. There was no demonstrable ascites or inguinal lymphadenopathy. On pelvic examination, speculum examination revealed a normal vulva and vagina, with a healthy-looking, closed cervix and no active discharge or bleeding. Bimanual palpation confirmed a normal-sized, anteverted, mobile, and tender uterus. A separate, cystic, mobile, and tender left adnexal mass was palpated. The right adnexa was free, and the pouch of Douglas showed no nodularity or cervical motion tenderness.

Initial diagnostic assessment and optimisation strategy

The initial clinical impression was severe anaemia secondary to abnormal uterine bleeding, a suspected left ovarian tumor, and uterine fibroids. A baseline full blood Count (FBC) revealed critical haematologic parameters: haemoglobin (Hb) concentration was 3.6 g/dL, white blood cell count (WBC) was 34.1X 10^9/L (leukocytosis), and platelet count was 367X10^9/L. Baseline iron indices were in keeping with severe iron deficiency.

Due to her critically low Hb, the patient was counseled extensively on the life-threatening risks of surgery with severe anaemia and the benefits of blood transfusion. She firmly declined allogeneic transfusion, citing her religious convictions. Respecting her autonomy, she was admitted for non-transfusion optimisation using a multidisciplinary protocol:

Regarding her erythropoiesis stimulation, subcutaneous recombinant human erythropoietin 8,000 IU was administered every 3 days. For the intravenous iron therapy, total dose iron sucrose was calculated via the

Ganzoni formula involving total iron deficit (mg) calculated using body weight (kg) multiplied by (target Hb level minus actual Hb level) multiplied by 2.4 with the resulting product added to 500 mg (storage iron) [9]. Based on a body weight of 60 kg and a target Hb of 12.0 g/dL, her total calculated iron deficit was 1,709.6 mg. To minimise the risk of circulatory overload, it was administered in divided doses of 400 mg diluted in 500 mL of 0.9% normal saline infused over 4–6 hours, preceded by intravenous furosemide 40 mg. She also received Mojeaga syrup 100 mL three times daily for 2 weeks to exploit its haematopoietic properties. Regarding the analgesia and supportive care, oral paracetamol 600 mg 8-hourly, oral dihydrocodeine (DF-118) 30 mg twice daily for 3 days, and general nutritional support.

Inpatient clinical course

During day 2 to day 3 of inpatient admission, the patient developed an episode of vaginal bleeding that moderately soaked a sanitary pad. She was started on oral Tranexamic acid 500 mg three times daily for one week to achieve local haemostasis, alongside ciprofloxacin 500 mg twice daily, vitamin C 200 mg three times daily, and zinc sulfate 80 mg daily. On day 4 of admission, the screening for HIV, hepatitis B and C were non-reactive. A repeat FBC showed partial hematologic adjustments: RBC 2.06x 10^6muL, Hb 4.0 g/dL, WBC 17.65x10^9/L, and platelets 413x10^9/L. On day 5 to day 7, she developed a transient fever (38.2°C), managed with regular paracetamol and tepid sponging. On day 7, to accelerate erythropoiesis, the subcutaneous erythropoietin dose was doubled to 16,000 IU every 72 hours. Oral metronidazole 400 mg 8-hourly and gestid suspension 10 mL 8-hourly were added.

On day 8 of admission, a structured abdominopelvic ultrasound scan revealed an enlarged liver (16.3 cm) with normal echotexture and two simple, benign fluid-filled cortical cysts in the right kidney 4.0x5.5cm and 4.0x4.2 cm without back-pressure changes. It demonstrated a very large, predominantly solid pelvic mass with cystic areas measuring over 26.6x15.3 cm, extending from the right pelvis to the epigastrium and showing internal vascularity on doppler imaging. The uterus was visualized separately (9.7x 6.7 cm), and free fluid (ascites) was noted in the pelvis. The primary impression was a suspicious large pelvic mass, likely ovarian in origin. Her PCV rose to 18%. Between day 9 and day 11, in light of the ultrasound findings, a tumour marker assay CA-125 and an abdominopelvic magnetic resonance imaging (MRI) were requested, and oral tot'hema syrup containing ferrous gluconate, manganese gluconate and copper gluconate, (2 ampoules daily) was added to the regimen. A urology consultation concluded that the right simple renal cysts did not preclude gynaecological intervention, advising a repeat scan in six months. Due to recurring minor vaginal bleeding on Day 11, tranexamic acid was adjusted to 1 g STAT, then 500 mg three times daily for 5 days, and oral ferrous sulfate 200 mg twice daily was introduced. Between day 15 and day 17, her Hb increased to 8.3g/dL. A second dose of intravenous iron sucrose (400 mg in 500 mL normal saline under furosemide cover) was administered, bringing cumulative parenteral iron to 800 mg. Pre-operative workups, including an electrocardiogram (ECG) and serum electrolytes, urea, and creatinine (sEUCr), were performed. On day 20, her Hb reached 8.7g/dL. A third dose of intravenous iron sucrose (400 mg) was administered, completing a cumulative total dose of 1,200 mg IV iron sucrose. She was temporarily discharged home on triple-dose oral haematinics (Tot'hema syrup, Mojeaga syrup, and Astyfer capsules), Norethisterone (Primolut-N) to control abnormal bleeding, and tranexamic acid, with instructions to continue outpatient optimisation.

Outpatient follow-up and preoperative assessment

Four weeks following discharge, the patient returned to the clinic for preoperative review. Her investigations revealed: The chest radiograph revealed cardiomegaly with left ventricular preponderance, suggestive of hypertensive cardiovascular adjustments secondary to chronic severe anaemia. Regarding the liver function test and sEUCr tests, all parameters were within normal reference ranges. The coagulation profile revealed a PT of 11.2 seconds, and INR 0.86 which was a normal value. On her haematology profile, her Hb had successfully risen to 9.7g/dL.

However, she presented with an elevated blood pressure of 160/101 mmHg. A Cardiology consultation confirmed hypertensive heart disease. She was commenced on oral Amlodipine 10 mg at night to optimise blood pressure control before surgery.

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The patient was readmitted 7 days later, for scheduled surgery. Her pre-induction Hb level had risen to 12.0g/dL. However, due to acute, uncontrolled fluctuations in blood pressure, the anaesthetic team deferred the procedure. Cardiology added carvedilol 12.5 mg daily. Following a brief period of outpatient stabilisation and adherence to her antihypertensive regimen, her blood pressure stabilized. Two weeks later, her FBC settled at: RBC 4.45X 10^6muL and Hb of 10.7 g/dL. Repeat iron indices were in keeping with replete iron stores.

Subsequently, the anaesthetic team cleared her for surgery under general anaesthesia with endotracheal Intubation. Preoperative orders included: nil per os from midnight, verification of her formal DPA documentation, provisioning of two units of the colloid volume expander haemaccel, securing two wide-bore intravenous lines, inserting a urethral catheter, and administering diazepam 5 mg pre-bedtime and 5 mg at 06:00 am.

Table 1 provides a complete chronological timeline of clinical interventions, drug administration schedules, laboratory parameters, and blood pressure trends throughout the preoperative, intraoperative, and postoperative phases.

Table 1. Chronological timeline of clinical management, interventions, and haematologic response

Time point	Clinical event / phase	Therapeutic interventions and dosing schedule	Hb / PCV	Iron profile and key Laboratories	Haemodynamic status
Day 1 (Admission)	Initial presentation, severe anaemia workup	rhEPO 8,000 IU SC; IV Iron sucrose 400 mg in 500 mL NS (dose 1); IV Furosemide 40 mg; Mojeaga syrup 100 mL TID	Hb: 3.6 g/dL	Ferritin: 6.2 ng/mL	BP: 130/69 mmHg
			PCV: 11%	TSAT: 5.1%	PR: 120 bpm (sinus tachycardia)
				TIBC: 485 µg/dL	RR: 30 cpm
				WBC: 34.1 x 10^9/L	
				Plt: 367x10^9/L	
Day 2–3	Control of active vaginal bleeding	Oral Tranexamic acid 500 mg TID x 7 days; Ciprofloxacin 500 mg BID; Vitamin C; Zinc	—	—	Stable
Day 4	Inpatient monitoring	Continued rhEPO 8,000 IU q72h and oral haematinics	Hb: 4.0 g/dL	WBC:17.65 10^9/L	Stable
			RBC: 2.06 x10^6/muL	Plt: 413 x10^9/L	
Day 7	Erythropoietin dose escalation	rhEPO escalated to 16,000 IU SC q72h; Metronidazole added	—	—	Febrile (38.2°C)
Day 8–11	Pelvic ultrasound and supportive therapy	Tot'hema syrup (2 amp/day) added; Tranexamic acid adjusted; Ferrous sulfate 200 mg BID	PCV: 18%	Ultrasound: 26.6 x15.3 cm mass	Afebrile, stable
Day 15–17	Inpatient optimisation	IV Iron sucrose 400 mg (dose 2; cumulative 800 mg) under Furosemide cover	Hb: 8.3 g/dL	ECG, sEUCr normal	Stable
Day 20	Temporary discharge	IV Iron sucrose 400 mg (dose 3; cumulative 1,200	Hb: 8.7 g/dL	—	Stable

		mg); Discharged on triple oral hematinics & Norethisterone			
Outpatient Week 4	Preoperative review	Amlodipine 10 mg qhs started for hypertension	Hb: 9.7 g/dL	PT: 11.2s, INR: 0.86 CXR: Cardiomegaly	BP: 160/101 mmHg
Readmission (Day 35)	Pre-op readmission and deferral	Procedure deferred due to BP fluctuation; Carvedilol 12.5 mg daily added	Hb: 12.0 g/dL	—	BP labile
Pre-op Day 0 (Day 49)	Surgical clearance	Pre-op orders, Haemacel prepped, DPA verified	Hb: 10.7 g/dL	Ferritin: 215.0 ng/mL TSAT: 32.4%	BP controlled
Intraoperative	Exploratory laparotomy and cytoreduction	Primary vascular ligation, electrosurgery, Haemaccel 2 units IV, Normal Saline	—	EBL: 400 mL	Haemodynamically stable
POD 3	Postoperative optimization	Restarted rhEPO 16,000 IU q72h, Tot'hema, Mojeaga 100 mL TID	Hb: 8.0 g/dL	Post-op haemodilution	BP: 144/82 mmHg
POD 6 (Discharge)	Discharge planning	Discharged on double-dose oral haematinics; Drain removed	Hb: 10.0 g/dL	Histology: adult granulosa cell tumour	stable

Surgical procedure and intraoperative findings

The patient underwent surgery. A midline laparotomy incision was made to ensure adequate visualization and control over potential bleeding sites. The intraoperative findings revealed: a large, hard, nodular, highly vascularised right ovarian mass measuring approximately 14x12 cm with an intact capsule, a bulky uterus with small subserosal myomas, absence of significant ascites (contrary to the initial ultrasound impression), normal contralateral (left) ovary and fallopian tube. The tumour was assigned stage 1a.

The surgical technique consists of a total abdominal hysterectomy, bilateral salpingo-oophorectomy, and an infracolic omentectomy were performed. To minimize blood loss, meticulous surgical dissection was combined with early, definitive ligation of the infundibulopelvic and uterine vessels. Electrosurgical cautery was used throughout the procedure. The total estimated blood loss was 400 mL. Two units of Haemacel and 0.9% Normal Saline were infused intraoperatively to maintain hemodynamic stability. The resected specimens were sent for histopathological evaluation.

Postoperative management and clinical course

The patient emerged smoothly from general anaesthesia, fully awake and haemodynamically stable. She was transferred to the recovery room and subsequently to the gynaecological ward. Regarding immediate postoperative course (2 to 6 hours): at 2 hours post-op, her parameters were: BP 156/99 mmHg, PR 123 bpm (sinus tachycardia), SpO2 of 98% on room air, and RR 23 cpm. Her extremities were cool to the touch. The abdominal drain had collected 80 mL of bloody effluent, and her urethral catheter was draining clear urine (400 mL). By 6 hours post-operation, her vitals stabilised: the BP 144/82 mmHg, PR 85 bpm, RR 22 cpm, and temperature 36.4°C.

Postoperative medications included: intravenous fluids (5% dextrose in water alternating with 0.9% Normal Saline 1 L 8-hourly for 48 hours), intravenous ceftriaxone 1 g daily and IV metronidazole 500 mg 8-hourly for 48 hours and intramuscular pentazocine 30 mg 6-hourly for 24 hours, supplemented with rectal diclofenac 100 mg 12-hourly for 72 hours for multimodal pain control.

Progress to discharge

The urethral catheter was removed on postoperative day one. Her recovery was uncomplicated; she ambulated early, tolerated a gradual reintroduction of oral intake, and showed no signs of wound infection or cardiovascular distress. On postoperative day 3, her haemoglobin level was 8.0g/dL, reflecting expected intraoperative blood loss and haemodilution. She was restarted on high-dose subcutaneous erythropoietin (16,000 IU every 72 hours), oral tot'hema syrup (2 ampoules daily), oral mojeaga syrup 200mg (100 mL) three times daily, oral omeprazole 20 mg daily, and routine haematinics. By postoperative day 6, her haemoglobin level had risen to 10.0g/dL. The abdominal drain was removed. She was discharged home in stable clinical condition on double-dose oral haematinics, with a scheduled two-week follow-up appointment to review her histopathology results. Histopathological examination of the specimen confirmed adult type granulosa cell tumour. Sections of the myometrium show endometrial glands and stroma deep within the myometrium. Overall features are those of adenomyosis. Sections of the endometrium show decreased gland to stroma ratio, with cystic dilation of some gland. Overall features are those of endometrial atrophy. Sections of the cervix show dysplasia within the lower third of the thickness of the ectocervival epithelium. Also seen are endocervical glands showing squamous metaplasia, and foci with nabothian cyst characterised by cystically dilated endocervical glands containing mucin and lined by simple columnar epithelium having a basally located round nuclei and abundant apical cytoplasm. overall features are those of low grade squamous intraepithelial lesion. There are multiple foci with well demarcated lobules of rounded cystically dilated endocervical glands. These glands are lined by low cuboidal cells with oval nuclei and moderate cytoplasm. Overall features are those of tunnel clusters. Section of ovary A show endometrial glands and stroma within the ovary. overall features are those of endometriosis. Sections of ovary B show a neoplasm characterized by small, bland cuboidal to polygonal cells with scant cytoplasm and uniform angulated grooved (coffee bean) nuclei. These cells are disposed in diffuse sheets and insular patterns. Mitosis is mild at 2 per 10 high power field. Also seen are multiple foci with hemorrhagic necrosis. Overall features are those of adult type granulosa cell tumour. Sections of fallopian tube A show foci with calcifications. No focus with atypia seen. Overall features show normal histology. Sections of fallopian tube B show endometrial glands, stroma and hemosiderin laden macrophages. No focus with atypia seen.

DISCUSSION

This case highlights the successful application of PMB principles in a Jehovah's Witness patient with life-threatening anaemia undergoing a major open gynaecological operation. The management of an initial PCV of 11% in a patient refusing allogeneic blood components requires a strategic, phased clinical approach: maximizing red blood cell production, minimising blood loss, and optimising physiological tolerance to anaemia. The details are shown in table 1.

The cornerstone of her preoperative preparation was the combination of recombinant human erythropoietin (EPO), intravenous iron sucrose and oral multi-modal therapy using mojeaga, tot'hema and other oral haematinics. Erythropoietin stimulates the proliferation and differentiation of erythroid progenitor cells in the bone marrow, but its efficacy is dependent on adequate iron availability. Relying solely on oral iron in cases of severe, chronic blood loss is often insufficient due to limited gastrointestinal absorption and the inflammation-induced block mediated by hepcidin. Even under the best of circumstances, oral iron is not well tolerated, and patients are often nonadherent for a variety of reasons, including intolerable side effects and the need for multiple daily dose [9]. The frequently poor absorption of oral iron, moreover, can contribute to suboptimal patient response.

Intravenous iron sucrose bypasses the enteric absorption barrier, delivering iron directly to circulating transferrin and the reticuloendothelial system. In this patient, iron sucrose was administered in divided doses up to a maximum allowable dose of 400 mg in 500 mL of normal saline per session, rather than a single total-dose infusion, to reduce the risk of free-iron toxicity and acute fluid overload in a patient with pre-existing hypertensive heart disease. The target parenteral iron dose was calculated using the Ganzoni formula (Total Iron Deficit = Weight [kg] × [Target Hb - Actual Hb] × 2.4 + Storage Iron [500 mg]) [9]; for this patient, the deficit was calculated at 1,709.6 mg, of which 1,200 mg was delivered intravenously in three divided 400 mg infusions, while the remaining balance was supplied via oral iron formulations.

High-dose erythropoietin therapy (cumulative 120,000 IU) and intravenous iron carry potential cardiovascular risks, particularly hypertension and thromboembolic events. In this patient, rapid haematologic expansion alongside underlying chronic hypertensive heart disease led to transient blood pressure fluctuations (peaking at 160/101 mmHg), necessitating multidisciplinary cardiology co-management and prompt initiation of amlodipine and carvedilol to defer and mitigate surgical risk.

Mojeaga remedy is a natural preparation blending *Alchornea cordifolia*, *Pennisetum glaucum*, and *Sorghum bicolor* extracts [10, 11]. Because it contains free organic oral iron alongside other nutrients, it can be safely co-administered with conventional haematinics or iron supplements. In a previous clinical trial by Eleje et al on mojeaga, concomitant use of standard iron therapy with mojeaga improved efficacy, resulting in a significant and rapid rise in haemoglobin levels [10]. The exact mechanism of action of mojeaga remains an area of active study; however, it may work by scavenging free radicals and reactive oxygen species, thereby reversing lipid peroxidative and cellular damage [10]. It increases packed cell volume and haemoglobin concentrations, supplies essential antioxidants and natural minerals, exhibits strong anti-inflammatory properties, and enhances systemic metabolism while supporting immune function [10, 11]. However, while indigenous herbal remedies such as Mojeaga show promising adjunct haematopoietic effects, their relative contribution compared to high-dose erythropoietin and parenteral iron sucrose cannot be isolated in a single case, highlighting the need for controlled clinical trials.

Tot'hema is an oral solution combining iron, manganese, and copper to treat iron deficiency [12]. Its core active ingredient is absorbable ferrous gluconate, while the added manganese and copper gluconates may play vital, supportive roles in enhancing iron metabolism. Tot'hema may treat iron-deficiency anaemia through a synergistic multi-mineral formula that optimises haemoglobin synthesis and red blood cell production. Ferrous gluconate directly supplies the essential iron needed for haemoglobin, while manganese and copper gluconates act as vital co-factors that enhance iron absorption and utilisation [12]. This comprehensive approach differentiates Tot'hema from standard iron supplements, offering a more effective solution for iron deficiency [12].

As was done for our patient, iron therapy is recommended for patients with iron deficiency anaemia and non-anemic patients with low iron stores who are scheduled for surgery with a predicted total preoperative haemoglobin loss >3g/dL to protect against postoperative iron deficiency anaemia [13]. As was done for our patient, if time permits (≥4weeks before surgery), oral iron supplementation can be considered [14]. In our case a mixtutre of intravenous and oral haematinics were done. A Cochrane review on the efficacy of preoperative recombinant human erythropeitin therapy (subcutaneous or parenteral) with iron (enteral or parenteral) in reducing the need for allogeneic RBC transfusions in preoperatively anaemic adults undergoing non-cardiac surgery suggested that preoperative recombinant human erythropeitin therapy and iron therapy for anaemic adults prior to non-cardiac surgery reduces the need for RBC transfusion and, when given at higher doses, increases the haemoglobin concentration preoperatively [15].

The incidence of adverse events did not differ significantly between the study groups [15]. This strategy can also be utilised in patients with normal baseline haemoglobin to mitigate postoperative anaemia if high surgical blood loss is anticipated. Based on contemporary clinical trials, intravenous iron and EPO therapies should be initiated or continued into the postoperative period as clinically indicated, a practice successfully mirrored in our case [16]. Many institutions currently utilise standardised protocols that incorporate these multidisciplinary guidelines.

The surgical management of large, vascular abdominopelvic masses carries an inherent risk of primary haemorrhage. In this case, advanced preoperative imaging raised suspicions of a malignant ovarian lesion or uterine leiomyosarcoma, both of which are typically associated with increased neovascularisation [17]. The choice of a midline laparotomy allowed for rapid anatomical exposure and systematic devascularisation. By primary ligation of the key vascular pedicles, the infundibulopelvic and uterine arteries, before manipulating the large masses, the surgical team kept intraoperative blood loss to approximately 400 mL. This strategy prevented an acute, life-threatening drop in her intraoperative and postoperative haematocrit.

Intraoperative blood conservation relies on meticulous surgical technique, anatomy respect, advanced energy devices, and topical haemostatics [18]. Pharmacologic aids like timely tranexamic acid, alongside goal-directed coagulation via viscoelastic testing, minimize blood loss and targeted deficits. High-blood-loss procedures benefit from acute normovolaemic haemodilution and intraoperative cell salvage [18]. In resource-limited settings where cell salvage, acute normovolemic haemodilution, and point-of-care viscoelastic testing are unavailable, surgical blood conservation relies heavily on meticulous operative technique, prompt vascular clamping, bipolar electrosurgery, and early administration of tranexamic acid. Together, these multimodal PBM strategies shift care toward physiology-based conservation. When institutionalized through multidisciplinary collaboration, PBM safely reduces transfusion exposure, complications, and hospital stays [18].

From a clinical standpoint, this comprehensive histopathology report presents a significant triad of findings that necessitates a coordinated, multi-disciplinary care plan. The primary oncological concern centers on the confirmed adult-type granulosa cell tumour identified in Ovary B. This sex cord-stromal neoplasm directly accounts for both the development of the prominent 600-gram adnexal mass and the patient's initial clinical presentation of abnormal uterine bleeding, a classic secondary effect driven by the autonomous oestrogen-secreting nature of these specific tumour cells. Because the specimen exhibits a low mitotic index of only two mitoses per ten high-power fields, the disease carries a generally favourable overall prognosis. However, given the well-documented propensity of granulosa cell tumours for late indolent recurrence, it remains imperative to conduct a rigorous surgical staging review and institute a long-term, structured surveillance programme utilising highly sensitive serum tumour markers, specifically Inhibin B and Anti-Müllerian Hormone.

The second component of the clinical triad involves the detection of low-grade squamous intraepithelial lesion (LSIL) within the cervix. This finding reflects mild epithelial dysplasia; however, from a therapeutic perspective, it has been completely and definitively managed. The execution of the total abdominal hysterectomy achieved full margin clearance, effectively neutralizing any residual risk of localised cervical oncogenesis. Finally, the third element of the report addresses a high burden of co-existing benign pelvic pathology. The explicit confirmation of uterine adenomyosis alongside bilateral pelvic endometriosis, affecting both ovary A and Fallopian Tube B, indicates an extensive, systemic history of benign proliferative gynaecological disease. These combined structural and inflammatory processes offer a clear explanation for the patient's long-term history of significant pelvic pain and symptom-related discomfort prior to surgical intervention.

Moving forward, the immediate evidence-based management pathway focuses on establishing a clean baseline for longitudinal monitoring. The clinical team will promptly evaluate post-operative serum Inhibin B and Anti-Müllerian Hormone levels to confirm that a formal surgical nadir has been reached. Because this case represents an optimally debulked, low-mitotic Stage I malignancy, immediate adjuvant pelvic radiation or systemic chemotherapy is not indicated. Instead, care will transition into a formalised outpatient surveillance schedule. This proactive protocol will mandate clinical assessments, high-resolution pelvic ultrasounds, and serial tumour marker quantifications every three months for the first two years, stepping down to a six-month interval for an additional five years to ensure early detection and swift intervention in the event of a localised biochemical or structural recurrence.

This case report highlights several key implications for future research. Although incremental doses of erythropoietin were successful here, clinical trials are further needed to establish definitive, safe upper limits for rapid erythropoietin acceleration in acute-on-chronic severe anaemia. Current guidelines offer variable dosing parameters; data on accelerated high-dose protocols (such as doubling doses to 16,000 IU) remains limited primarily to case reports. Research exploring the safety, cardiovascular effects, and optimal dosing intervals of intravenous iron complexes in patients with initial PCV values <15% would help optimise pre-surgical protocols. Additionally, investigating the financial and logistical impacts of prolonged inpatient non-transfusion optimization in resource-limited settings could assist healthcare institutions in structuring dedicated bloodless surgery units.

Several critical clinical lessons were learned from this case. In patients with severe anaemia who refuse blood products, relying on routine oral haematinics alone is insufficient. A combination of high-dose subcutaneous erythropoietin and calculated intravenous iron sucrose should be initiated immediately upon admission. Successful outcomes require active, coordinated input from gynaecological surgeons, anaesthetists,

cardiologists, and urologists to balance surgical urgency with systemic optimisation. Finally, implementation of a multidisciplinary IV iron pathway for the detection and management of preoperative iron-deficiency anaemia in gynaecologic surgery was feasible, supporting the integration of PBM strategies into routine perioperative care, as recently published by Massood et al [19].

This case report has a number of strengths. The team meticulously honored the legal and ethical framework of the patient's Durable Power of Attorney without compromising aggressive medical care. Many bloodless surgery protocols rely heavily on intraoperative cell salvage, acute normovolaemic haemodilution, or point-of-care viscoelastic testing (such as ROTEM or TEG) [20]. However, this report demonstrates that an aggressive preoperative patient blood management strategy, relying primarily on pharmacotherapy, can yield a safe outcome in a low-resource tertiary center where advanced technologies are unavailable. Elevating haemoglobin from a critically low baseline of 3.6 g/dL to 12.0 g/dL over a structured non-transfusion window provides a compelling real-world benchmark for erythropoietin-stimulating agent responsiveness in chronic iron-deficiency anaemia. Furthermore, the multidisciplinary coordination that successfully integrated care across gynaecologic oncology, haematology/PBM, cardiology (which effectively managed emergent hypertensive complications), and anaesthesia is a welcome development in low-resource settings.

Despite these strengths, there are several major limitations in this case report. As a single case report, the findings cannot establish causality or determine safety profiles across broader patient populations. Additionally, spending four to six weeks on haematologic optimisation for a suspicious abdominopelvic mass carries an inherent risk of oncological progression or rupture. While the tumour ultimately turned out to be a Stage 1a adult granulosa cell tumour, delaying surgery in high-grade malignancies can adversely affect survival outcomes. Finally, although the Ganzoni formula was used, baseline and follow-up ferritin, transferrin saturation, and total iron-binding capacity levels were not explicitly reported, making it impossible to fully quantify the iron-deficiency state or track marrow saturation during high-dose EPO therapy. Usually, laboratory-confirmed iron-deficiency anaemia can be confirmed with ferritin of <30 μg/L or transferrin saturation of <20%, and haemoglobin <12.0 g/dL [19]. Finally, while this case highlights the potential of aggressive PBM in bloodless gynaecological oncology surgery, single-case observations cannot establish general safety or standardized efficacy across broader populations, emphasising the need for individualised clinical judgment.

CONCLUSION

Preoperative haematologic optimisation utilising high-dose erythropoietin and intravenous iron sucrose is a safe, highly effective strategy for bridging severely anaemic Jehovah's Witness patients to major gynaecological procedures. When paired with meticulous intraoperative haemostasis and multidisciplinary perioperative care, this aetiology-driven approach optimises clinical outcomes and minimises mortality without the need for allogeneic blood transfusion. Further accumulation of cases is needed to establish standardised management strategies. The implementation of structured PMB protocols should be encouraged in resource-constrained environments, accompanied by rigorous monitoring for cardiovascular risk and larger prospective cohort studies to validate clinical efficacy.

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Author contributions:

GUE, CCO, GOU and CMM contributed to surgery while AVE, HCU, CMM, OPU, CMA, TKN, OKN, CNO, SLI, ECE, OSO, JAG, LCO, IKN, and GOU contributed to the anaesthetist management of this patient. GUE, CCO, AVE, GTI, MCE, CCO, H C U, P C O, CMM, OPU, CMA, TKN, O K N, C N O, C G O, SLI, E C E, O S O, J A G, C P N, S A O, P C O, G U N, N E A, EOA, LCO, I K N, CAO, CBO, JII, and GOU critically revised the report, commented on drafts of the manuscript, and approved the final report.

Informed consent:

Informed written consent was taken from the patient for possible publication without listing her name or revealing her identity. Patient anonymity has been preserved.

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