

The Idea of Preoperative Autologous Blood for Postpartum Fatigue

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Abstract

Postpartum fatigue is not only a common complication after childbirth, but also an important factor in maternal postpartum recovery and breastfeeding. In recent years, there is a wide application of autologous blood transfusion (ABT) in the operation of obstetrics, gynecology, orthopedic surgery, rare blood group surgery and others. Obstetrics mainly use preoperative autologous donation (PAD), however, if indication of blood transfusion is not in accordance with the current blood specification, autologous blood transfusion should be contraindicated which not only causes blood waste but also limits PAD applications. Learning from the practical experience of athletes to use blood doping to reduce fatigue and improve athletic performance, as well as the theory of Chinese traditional medicine of blood and mental spirit, this review puts forward an idea of applying autologous blood transfusion for postpartum fatigue.

Keywords

Preoperative Autologous Donation, Postpartum, Fatigue

1. Introduction

Autologous blood transfusion (ABT) has many advantages, not only can it avoid the “window period” of transfusion related virus infection, but also avoid transfusion reaction and immunosuppression caused by allogeneic blood transfusion [1]. In recent years, based on allogeneic blood transfusion risk and resource shortage, bloodless surgery concept has been proposed, hoping to rely entirely on patients own blood transfusion and blood protection management to complete the surgical treatment [2]. There is a wide application of ABT in the operation of obstetrics and gynecology, orthopedic surgery, neurosurgery, hepatobiliary surgery, urology, rare blood group surgery and others [3]. Autologous

blood transfusion rate has increased widely in hospital blood donation and transfusion centers [4]. Obstetrics mainly use preoperative autologous donation (PAD), collecting pregnant women autologous blood in the department of blood transfusion and re-transfusing intraoperatively or post operatively. However, the recovery of autologous blood in post caesarean section is still a matter of debate within the Chinese blood transfusion association, hence only a small number of hospitals in the country perform the procedure.

2. Wastage of PAD Blood

PAD has numerous indications in obstetrics especially for postpartum hemorrhage which is a major risk factor in pregnant women caused due to placenta previa, multiple cesarean section history, history of postpartum hemorrhage, multiple pregnancies, pregnancy complicated by multiple uterine fibroids and other causes. Placenta previa is the best managed by ABT [5]. During gestational period, adequate blood collection and optimal volume from pregnant mother will not cause any complication to her neither the fetus. Blood volume, tolerate 1000 to 1500 ml blood loss with normal hematocrit can naturally be regenerated [6]. PAD can also stimulate the hematopoietic function of pregnant women, improving the tolerance to blood loss in the delivery process.

PAD blood is to re- transfused to maternal circulation according to volume of blood loss. During delivery if blood loss less than 20 percent of body blood volume, the body can generally tolerate without blood transfusion or infusion. When the blood loss is 20 percent of her own blood volume, the blood volume must be compensated to prevent the occurrence of shock. When blood loss is more than 30 percent and maternal hemoglobin less than 80 grams per liter or hematocrit less than 0.24, then autologous blood transfusion can be considered [7]. When blood loss is more than the amount of autologous blood storage, allogeneic blood transfusion should be done to save the lives of mother and child. However if indication of blood transfusion is not in accordance with the current blood specification, autologous blood transfusion should be contraindicated which not only causes blood waste but also limits PAD applications. With blood loss prevention and successful surgery with minimal blood loss, physicians find the use of autologous blood unnecessary. Pregnant women usually hesitate due to risks and costs and rely on doctors' advice. In order to improve the threshold of autologous blood, obtaining solid evidence on causes of bleeding will limit pre autologous donation. If autologous blood would be returned beyond the current provisions of blood transfusion instructions, in case of blood wastage, how much benefit would be brought to the mother?

3. Inspiration of Blood Doping

It is well known that red blood cells are oxygen carriers, and the outside oxygen is bound to red blood cells through the alveolar exchange and is dissociated and released from the red blood cells through the blood circulation at the peripheral

tissue. If the local tissue gets enough oxygen then its function can improve drastically. The concept of blood doping was first proposed in the sports field, referring to blood products that can increase the number of red blood cells, increase hemoglobin levels, improve oxygen carrying capacity, enhance athletic endurance and ability [8]. It contains the use of recombinant human erythropoietin (rHuEPO), hypoxia-inducible factor stabilizers, and blood transfusion techniques to increase erythrocytes and hemoglobin count.

Blood transfusion technology involves the extraction of a number of athletes' blood units a few weeks before the game. The plasma is immediately separated and return to the body after whole blood centrifuge. Red blood cells are stored at 4°C or -80°C and re-transfused to the body 1 to 7 days before the game. Blood transfusion technology is divided into autologous and allogeneic return. Allogeneic return is rejected due to transfusion related risks and complications. Blood transfusion technology began in 1972, later with the development and use of rHuEPO, the technology gradually faded. Nonetheless, with the EPO detection technology advances, blood transfusion technology became prevalent after the year 2000. At present, the International Anti-Doping Agency is actively studying the method of detecting athletes' autologous blood transfusion [9].

The direct benefit of increasing tissue oxygen supply is to reduce lactic acid production and decrease exercise fatigue. Chinese traditional health care product, compound Fufang E Jiao (FEJ) has tremendous anti-fatigue effect. The study found that after 8 weeks of medication, compound FEJ can promote the number of red blood cells and hemoglobin content which gives energy improvement and fatigue tolerance to the subject [10]. Hence, increase in oxygen carrying capacity can improve fatigue.

4. Cause of Postpartum Fatigue

Postpartum fatigue is not only a common complication after childbirth, but also an important factor in maternal postpartum recovery and breastfeeding. It is a health problem which affects physical and mental comfort, choice of delivery and outcome of caesarean section. The cause of postpartum fatigue is inconclusive. Ryden proposed a reversal of energy consumption conceptual model in which subjects were an open system and due to disease or treatment process energy was consumed, thereby insufficient energy causes fatigue [11]. Piper put forward the physical and mental environment of the integrated complex fatigue model. Subject referred to maternal feeling fatigue herself, while objective referred to the physiological, biochemical, behavioral performance [12]. According to this theory, it can be considered that the process of childbirth is the process of energy loss, and return blood is the process of energy supplement and fatigue mitigation. In addition autologous blood transfusion may induce maternal subjective recognition to enhance bodily strength and fatigue reduction.

Chinese medicine considers blood as the material basis of all human life activities. Menstruation, pregnancy, breast-feeding are all associated with blood and

spiritual promotion. Postpartum blood transforms to breast milk which then transforms nutrition to baby, the state of blood directly affects the secretion of postpartum breast milk [13]. There was no blood transfusion therapy in ancient China, physical recovery was carried out by food intake and Chinese medicines with slower effect. The return of autologous blood to restore bodily strength may be the new remedy.

5. Idea/Summary

Learning from the practical experience of athletes to use blood doping to reduce fatigue and improve athletic performance, as well as the theory of Chinese traditional medicine of blood and mental spirit, it is theoretically feasible to apply autologous blood transfusion for postpartum fatigue. At present, this study has not been reported neither in world or China. The next step is to provide experimental data, such as maternal health, red blood cells, hemoglobin, hematocrit, lactate, glucose, a fatigue test table, subjective physical test table, adverse reactions, etc. to support the hypothesis. We will take a prospective randomized controlled study to explore the efficacy and mechanism of preoperative autologous blood for postpartum fatigue. In the course of ABT, we should avoid possible side effects, such as bacterial contamination and cycle overload. The idea is used as complement to the existing blood transfusion indications and is an attempt by blood therapy in obstetric applications.

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