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CLINICAL USE OF FRESH FROZEN PLASMA IN NEONATAL INTENSIVE CARE UNIT

***Dr. Eshrak Abass Hassan**

Alkarkh Maternity Hospital, Baghdad, Iraq

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ABSTRACT

Fresh frozen plasma is the fluid portion of one unit of human blood that has been centrifuged separated and frozen solid at or colder with an eight hours of collection. The optional use of Fresh frozen plasma in a new born infants require a Careful consideration of indications, risks and benefits. Our study is performed to analyze our experience with fresh frozen plasma use in neonatal intensive care unit (NICU) of AL-Karkh maternity hospital from January 2014 to January 2016 a total of 75 neonates were identified as having been treated with fresh frozen plasma .The most indication of fresh frozen plasma use was prolonged PT or PTT representing 30% of all usage of fresh frozen plasma.

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INTRODUCTION

Fresh frozen plasma (FFP) is a blood product made from the liquid portion of whole blood (British national formulary, 2015). It is used to treat conditions in which there are low blood clotting factors [INTER NATIONAL RATIO (INR) >1.5] or low levels of other blood proteins (British national formulary, 2015; Shaz *et al.,* 2013). It is also used as part of plasma exchange (Plasma Intravenous Advanced Patient Information, 2017). The specific batch typically needs to be tested for compatibility before it is given (British national formulary, 2015). Use as a volume expander is not recommended (British national formulary, 2015). It is given by injection into a vein (Plasma Intravenous Advanced Patient Information, 2017). Side effects include nausea and itchiness (British national formulary, 2015). Rarely there may be allergic reactions, blood clots, or infections (British national formulary, 2015; British national formulary, 2015). It is unclear if use during pregnancy or breastfeeding is safe for the baby (Plasma Intravenous Advanced Patient Information, 2017). Greater care should be taken in people with protein S deficiency, IgA deficiency, or heart failure ((Plasma Intravenous Advanced Patient Information, 2017)).

****Corresponding author: Dr. Eshrak Abass Hassan***
Alkarkh Maternity Hospital, Baghdad, Iraq

Fresh frozen plasma is made up of a complex mixture of water, proteins, carbohydrates, fats, and vitamins (British national formulary, 2015). When frozen it lasts about a year (British national formulary, 2015). Plasma first came into medical use during the Second World War (British national formulary, 2015). It is on the World Health Organization's List of Essential Medicines, the most effective and safe medicines needed in a health system (WHO, 2016). In the United Kingdom it costs about £30 per unit. A number of other versions also exist including plasma frozen within 24 hours after phlebotomy, cryoprecipitate reduced plasma, and solvent detergent plasma (Yentis *et al.,* 2013). In the United States it refers to the fluid portion of one unit of human blood that has been centrifuged, separated, and frozen solid at −18 °C (0 °F) or colder within eight hours of collection (Sally, 2015). The phrase "FFP" is often used to mean any transfused plasma product. The other commonly transfused plasma, PF24, has similar indications as those for FFP with the exception of heat-sensitive proteins in the plasma such as factor V. Fresh frozen plasma is the fluid portion of a unit of whole blood that is frozen in a designated time frame, usually within 8 hours. FFP contains all coagulation factors except platelets. FFP contains fibrinogen (400 to 900 mg/unit), albumin, protein C, protein S, antithrombin, tissue factor pathway inhibitor. It is free of erythrocytes and leukocytes. FFP corrects coagulopathy by replacing or supplying plasma proteins in patients who are deficient in or have defective plasma proteins. A standard dose

of 10 to 20 mL/kg (4 to 6 units in adults) will raise factor levels by approximately 20%. An increase of approximately 10% of several factors is enough to effect hemostasis. In addition, FFP provides some volume resuscitation as each unit contains approximately 250 ml. FFP can only be administered intravenously. FFP must be ABO compatible with the recipient's red cells. The FFP container and fluid upon visual inspection should have no leakage, clots, or abnormal color. FFP is stored at -30 C. Prior to administration, FFP is thawed in a water bath at 30 to 37 C over 20 to 30 minutes or in an FDA-cleared device as quickly as 2 to 3 minutes. FFP should be administered immediately after thawing. If FFP is not given immediately after thawing, it should be stored at 1 to 6 C. If the thawed FFP is not used in 24 hours, it should be discarded. Once thawed, the activity of clotting factors, particularly factor V and factor VIII, decline gradually. After initial dosage, re-administration may be needed every 6 to 8 hours if there is continued bleeding due to the short half-life of factor VII. Factor VII has a half-life of 2 to 6 hours. Fresh Frozen Plasma (FFP) is indicated in patients with a coagulopathy who are bleeding or at risk of bleeding where a specific therapy such as vitamin K or factor concentrate is not appropriate or available (Australian Red cross Blood Service, 2012). Many risks of FFP transfusion are similar to those from transfusion of all blood components. However, there can be a higher incidence of transfusion-associated circulatory overload (TACO) (Narick, 2012), transfusion-related acute lung injury (TRALI). (Toy, 2012). And allergic reactions, including anaphylaxis, from FFP compared with other blood components. The risk of transmission of prion disease with plasma products is still uncertain, but is an important consideration for some countries, including the UK (Turner, 2009). Potential adverse events are of particular significance for patients receiving FFP for prophylaxis because they are exposed to the risks of FFP transfusion, even though it is questionable whether patients would be at greater risk of bleeding if plasma had not been transfused prophylactically.

Objective

Fresh frozen plasma is effective to treat hemorrhage in infants with clotting factor deficiency caused by vitamin k deficiency, genetic clotting factor deficiency and consumptive coagulopathy clinically significant hemorrhage is a major cause of morbidity and mortality in extremely preterm infants and a rare event in otherwise healthy term infants.

PATIENT AND METHODS

A case- series study of neonates admitted to (NICU) of AL-Karkh maternity hospital from January 2014 to January 2016 suffering from bleeding tendency and was treated with fresh frozen plasma after analyzing prolongation of PT or PTT.

RESULTS

A total of 75 neonates of gestational age 28-38 wks and Age 1-7 days were treated with fresh frozen plasma, after signs of bleeding and hemorrhage. Prolongation of PT or PPT representing 30% of usage of fresh frozen plasma. Following fresh frozen plasma treatment PT and PPT normalize in 30% and 55% neonates respectively. Our results suggest that fresh frozen plasma were often used in acceptable indication in NICU. As showed in Table 1, 2, 3.

Table 1. Gestational Age

Variables	Results
Gestational Age (Weeks)	28-38 WKs
No. of infants < 28WKs	0
No. of infants < 28-34WKs	7
No. of infants >34 WKs	15
Pre transfusion PT(Seconds)	12.6sec-19.08sec
Post transfusion PT	12.04sec-16.2sec
Pre transfusion PTT	48.3sec-60.2sec
Post transfusion PTT	44.03sec – 55.1sec
no changed	4 neonates
Total neonates	22
Male	13
Female	9
Age(days)	2-7 days

Table 2. Coagulation profile values in healthy Full term neonates during the 1st week of life

Parameters	Mean TSD
PT(Seconds)	13.41 - 1.33
PTT	43.38 - 6.75

Table 3. Coagulation profile – preterm infants

Value	Day1	Day5	Day30
PT(sec)	(10.6-16.2)	(10-15.3)	(10-13.6)
PTT(sec)	(27-79)	(27-74)	(27-62)

DISCUSSION

Fresh frozen plasma for neonates and infants is derived from the harvesting of plasma from regularly attending whole blood donors. The starting donation is then divided into aliquots with a volume of 45 ml to 90 ml and frozen rapidly within 8 hours of collection to a temperature that will maintain the activity of the labile coagulation factors as per standard fresh frozen plasma. The specifications other than the volume are the same as for standard fresh frozen plasma four doses can be obtained from a single duration. The British Committee for Standards in Haematology (BCSH) guidelines for the use of FFP do not recommend the use of FFP for prophylaxis. However, despite this, FFP continues to be used in this setting (O'Shaughnessy, 2004). The national survey of FFP transfusion in England (Sally, 2013). Analysed 4,969 FFP transfusions given to patients in 190 hospitals, of which 93.3% were in adults and 6.7% in children or infants. In adult patients, 43% of all FFP transfusions were given in the absence of documented bleeding, as prophylaxis for abnormal coagulation tests or before procedures and/or surgery. Similarly, ISOC demonstrated that more than half of all FFP transfusions administered to patients who were critically ill were prophylactic (Australian Red cross Blood Service, 2012). There are many reasons why clinicians continue to prescribe procoagulant agents, such as FFP, for prophylaxis despite a lack of evidence to support this approach. For instance, some clinicians might perceive that bleeding has been averted previously by the use of FFP and continue to use it for this purpose; some might feel a moral or psychological need to do everything possible to prevent bleeding, even in the absence of evidence (Lipworth, 2012).

Conclusion

Optimal use of fresh frozen plasma protein components in new born infants require a careful consideration of indications, risks and benefits in general, routine infusions FFP into a

symptomatic infants to treat coagulopathy is without measurable benefit. In contrast FFP is effective to treat hemorrhage in infants with clotting factor deficiency caused by vitamin k deficiency. Genetic clotting factor deficiency.

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