A FFP ratio is an independent predictor of blood loss in Posterior Spinal Fusion

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INTRODUCTION

Fluid management in major trauma with massive blood loss has shifted from large volumes of crystalloid and RBCs to higher ratios of FFP to RBC.

Most trauma centers follow massive transfusion protocols with equal proportion of FFP, RBC, and Platelets. Outcomes have improved substantially with the “high FFP” regimen compared to “low FFP” regimen.

Our population of patients with neuromuscular scoliosis undergoing posterior spinal fusion often need massive blood transfusion.

In this study we examined the effect of FFP to RBC ratio on blood loss in this elective surgical population.

METHODS

After IRB approval, we reviewed 512 patients who had unit rod posterior spinal fusion surgery with the underlying diagnosis of neuromuscular scoliosis due to cerebral palsy from the years 1998 to 2012.

The patients were divided into two groups:

The “low FFP group” received FFP:RBC at ratio of ≤ 0.5

The “high FFP group” received FFP:RBC at ratio of > 0.5.

Intra operative Outcome measures

Total blood loss
Total urine output
Metabolic parameters - lowest serum pH, highest lactate level, lowest base deficit, and lowest temperature

Postoperative outcomes

Incidence of ARDS & Clinical acute pancreatitis.

Incidence of surgical site infection.

Days of intubation & Hospital length of stay.

Subsequently the factors associated with blood loss were analyzed comparing patients who lost >140% and ≤140% estimated blood volume. The variables using a test for continuous variables and Chi square for categorical variables. A logistic regression was performed to understand the contribution of the significant factors to the blood loss.

RESULTS

Low FFP group had 229 patients and High FFP group had 202 patients.

The estimated blood loss (EBL) and Estimated blood volume loss (%EBVL) was higher in Low FFP group (p=0.005 and p=0.0233 respectively).

The total urine output (UOP) was lower in the Low FFP group (p=0.0039).

The Base Deficit was 23% higher in the low FFP group (p=0.002).

Further, patients were divided into two groups using cut off for estimated blood volume loss of 140%, Logistic regression showed Low FFP ratio is independently associated with higher blood loss with the odds ratio of 3.8.

DISCUSSION

The concept of damage control resuscitation and massive transfusion protocol have successfully moved from military to civilian trauma.

There are number of civilian trauma surgeries which can have massive blood loss equivalent to the trauma. But the concept of massive transfusion protocol has not been validated in these instances.

We have shown that in this elective surgical population, higher FFP ratios were associated with less total and percentage blood volume loss, improved urine output, less metabolic acidosis and less postoperative complications.

A FFP:RBC ratio proved to be a significant independent predictor of blood loss. Patients who were in the lower FFP: PRBC ratio (<0.5) group were 3.829 more likely to lose more than 140% estimated blood volume in comparison to high FFP group.

We recommend the use of higher FFP ratios approaching whole blood similar to massive transfusion protocol in trauma can be used in surgical cases that have significant blood loss.

REFERENCES