Nearly half of all very low birth weight (VLBW) premature infants receive their first transfusion during the first two weeks of life, and 80% receive at least one blood transfusion by the end of their hospitalization. These infants are exposed to risks inherent to allogeneic transfusions, such as transmission of infectious agents and immune suppression.

Umbilical cord blood (UCB) has been suggested as a source for autologous transfusions. Placental vessels contain a quarter to a third of the newborn blood volume, and the fetal blood left in the placental vessels may serve as a source of autologous blood. Although studies have shown that the collection and the storage of UCB are feasible for transfusion in newborn infants, the use of UCB for transfusion in preterm infants is reported in few studies. We previously tested the safety and feasibility of the collection and storage method of the autologous blood. We herein report the results of our clinical study to investigate the efficacy and safety of autologous cord blood transfusions in VLBW premature infants. UCB of infants born before the 32 weeks’ gestation was collected by the same pediatrician who was trained specially for this procedure and who could be ready at all preterm deliveries between March 2009 and September 2010 at the Division of Neonatology, Department of Pediatrics, Department of Gynecology and Obstetrics, and Serpil Akdağ Blood Bank of Ankara University School of Medicine. The patients were randomized to receive the autologous or the allogeneic product labeled for each patient at birth in the blood bank. UCB was obtained from the placentas of 50 premature infants, overall, 39 infants were analyzed. Sixteen of 31 transfused patients had been randomized to the autologous group, and the remaining 15 patients had been randomized to the allogeneic group (Fig. 1). The collected UCB volume was not well correlated with the birth weight, while there was an inverse correlation between the relative volume per kilogram birth weight and the birth weight which was similar as reported by Anderson et al. Eight patients never received a transfusion during their hospital stay, and these babies had higher mean gestational age and a mean birth weight than the transfused groups. The volume of collected UCB could not cover all transfusion needs, but replaced nearly one third of all transfusions in this group. The hemoglobin levels at birth, 14th, 28th, and the 35th days, postconceptional 36th and the 40th weeks’ gestation, and 6-months age, the total number and volume of transfusions and phlebotomies were similar (Table I). There was not any bacterial growth in our cord blood samples, and none of the transfusions were complicated. Despite the use of restrictive transfusion guidelines, most premature infants are still frequently transfused. Recently, the use of UCB for transfusion purposes has gained clinical interest. Several studies have shown that it is technically feasible to process and store autologous placental blood like allogeneic blood. Cord blood transfusion has some advantages such as to have immediate availability and to include high levels of hematopoietic progenitor cells. It has been demonstrated that cord blood stem and progenitor cells, may reconstitute marrow hematopoiesis. UCB, enriched with self hematopoietic growth factors and progenitor cells, may be beneficial to premature infants who lack marrow reserves.
Phlebotomy loss is a significant contributor to anemia in premature infants. A wide variation in phlebotomy loss of premature infants have been reported (7-51 ml/kg). In our patient population, the role of ongoing phlebotomy losses was considered as an additional cause for transfusion needs. Cord red blood cell (RBC) source was not sufficient to meet all transfusion needs in the group assigned to have autologous transfusions but at least could decrease allogeneic blood exposure by one third in these patients.

In conclusion, our study showed that autologous cord bloods have the similar efficacy and safety with the allogeneic bloods in VLBW premature infants. Although cord RBC source was not sufficient to meet all transfusion needs, but at least could decrease allogeneic blood exposure in these patients and it might be beneficial as a supplemental source for transfusions in VLBW premature infants. Careful monitorization of phlebotomy losses for laboratory testing, and implementing more restrictive transfusion guidelines may increase the efficacy of cord blood. In this group of infants, placentofetal transfusion during delivery by holding the newborn below the level of the uterus and delaying cord clamping or ‘milking’ of the cord might present alternative preventive measures for anemia of prematurity.

**REFERENCES**


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| Table I. The Placental Weight, the Volume of UCB and Phlebotomies, and Hb Levels of Infants. |
|-------------------------------------------------|-----------------|-----------------|-----------------|-----------------|
| Autologous group (n=16) | Allogeneic group (n=15) | p | Not-transfused group (n=8) | p |
| Placental weight (g)* (range) | 399.7±174.6 (280-620) | 344±11.2 (200-560) | .35 | 408.1±138 (280-610) | .31 |
| Collected UCB volume (ml)* (range) | 35.2±9.7 (22-56) | 31±5.9 (20-46) | .28 | 39.2±7.9 (28-50) | .07 |
| Umbilical cord Hb (g/dl)* | 17±1.7 (15-19.8) | 17.3±1.7 (15-22) | .62 | 18.5±1.5 (16-21) | .12 |
| Volume of phlebotomies (ml/kg) | 38.2±22.4 | 39.4±19 | .82 | 12.7±2.2 | .04 |
| Hb at 14th day (g/dl)* | 12.8±0.9 | 13.6±1.5 | .13 | 13.4±1.6 | .12 |
| Hb at 28th day (g/dl)* | 11.8 ± 1.3 | 11.6 ± 1.0 | .63 | 11.9 ± 1.3 | .8 |
| Hb at 35th day (g/dl)* | 10.7 ± 1.7 | 11.2 ± 1.9 | .47 | 11.2 ± 1.1 | .7 |
| Hb at 36th GW (g/dl)* | 10.2 ± 1.1 | 10.1 ± 1.2 | .7 | 10.9 ± 1.6 | .3 |
| Hb at 40th GW (g/dl)* | 9.7 ± 1.3 | 10 ± 1.5 | .6 | 10.4 ± 0.9 | .5 |
| Hb at 6 months age (g/dL) | 12.2 ± 0.8 | 11.9 ± 0.8 | .55 | 11.8 ± 1.1 | .41 |

UCB: umbilical cord blood, Hb: hemoglobin, GW: gestation week
* Data are reported as mean ± SD

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Fig. 1. Trial profile

Phlebotomy loss is a significant contributor to anemia in premature infants. A wide variation in phlebotomy loss of premature infants have been reported (7-51 ml/kg). In our patient population, the role of ongoing phlebotomy losses was considered as an additional cause for transfusion needs. Cord red blood cell (RBC) source was not sufficient to meet all transfusion needs in the group assigned to have autologous transfusions but at least could decrease allogeneic blood exposure by one third in these patients.


