

## Background and Aims

Delayed cord clamping may not provide adequate placental transfusion in depressed infants and in neonates delivered by cesarean<sup>1,2</sup>. The aim of this study is to compare the effects of cut umbilical cord milking (C-UCM) and intact umbilical cord milking (I-UCM) which permit placental transfusion and resuscitation during transition period.

## Method

Sixty-two healthy term infants not requiring respiratory support were randomized into C-UCM and I-UCM groups at birth. Approximately 25-30 cm length of cord was milked towards the baby 2-4 times within 20 seconds after birth in both C-UCM and I-UCM groups while the umbilical cord was cut in the former, and intact in the latter. Arterial oxygen saturation (SpO<sub>2</sub>), cerebral regional oxygen saturation (crSO<sub>2</sub>), heart rate (2<sup>nd</sup> -15<sup>th</sup> min), arterial blood pressure (within 15-30 min), hemoglobin values (at the 6<sup>th</sup> hour), and residual blood volume in the placenta (Fig. 1) were recorded during transition period after birth.

## Results

There were no differences in terms of gestational age, birth weight, Apgar scores at 1<sup>st</sup>/5<sup>th</sup> min, first respiration timing, mode of delivery, sex, blood pressures, residual blood volume in placenta, and hematologic parameters at 6<sup>th</sup> h (Table 1), SpO<sub>2</sub>, crSO<sub>2</sub>, and cFOE values between two groups except for HR (p>0.05) (Fig. 2). Mean HRs were significantly higher in C-UCM group at 6<sup>th</sup>, 7<sup>th</sup>, 9<sup>th</sup>, 10<sup>th</sup>, 12<sup>th</sup>, and 14<sup>th</sup> min, but within normal range. HR and cFOE levels of two groups were the highest, SpO<sub>2</sub> and crSO<sub>2</sub> levels were the lowest at 2<sup>nd</sup> min, but within normal range. While HR decreased gradually, SpO<sub>2</sub> increased continuously and reached >90% at 7<sup>th</sup> min, and 95% at 10<sup>th</sup> min in C-UCM and I-UCM groups, respectively. The times to reach plateau level were found 10<sup>th</sup> and 7<sup>th</sup> min for SpO<sub>2</sub>, and 6<sup>th</sup> and 6<sup>th</sup> min for crSO<sub>2</sub> in C-UCM and I-UCM groups, respectively (Fig. 2).

Table 1. Characteristics of newborn infants

Characteristics	C-UCM (n=31)		I-UCM (n=31)		p
	Mean±SD	Med. (min-max), (n %)	Mean±SD	Med. (min-max), (n %)	
Gestational age (week)	39±1.2	39 (37-41)	38.8±	39 (37-41)	0.629
Birth weight (g)	3351±254	3300 (2800-3800)	3256±285	3180 (2860-3960)	0.174
Cesarean delivery, n (%)		12 (41.9)		13 (45.2)	0.769
Female sex, n (%)	17 (54.8)	14 (45.2)	16 (51.6)	15 (48.4)	0.799
First respiration timing (sec)	5.42±3.87	5 (1-15)	5.74±4.13	5 (1-15)	0.848
Apgar score at 1 <sup>st</sup> min	8.8±0.3	9 (8-9)	8.9±0.3	9 (8-9)	0.691
Apgar score at 5 <sup>th</sup> min	10±0	10 (10-10)	10±0	10 (10-10)	1
Blood pressure (mmHg)					
Systolic	74.3±8.1	73 (58-92)	72.4±6.2	72 (60-89)	0.3
Diastolic	42.5±7.6	41 (31-58)	42.1±7.4	42 (24-53)	0.84
Mean arterial pressure	52.9±6.9	51 (42-67)	51.8±5.7	53 (39-61)	0.86
Residual blood volume in placenta					
ml	80.16±18	80 (40-110)	75.16±20.19	75 (45-135)	0.308
ml/kg	23.96±4.76	24.9 (12.2-33.5)	22.95±5.42	22.4 (15.3-40.4)	0.439
Hematological parameters at 6 <sup>th</sup> h					
Hb (g/dl)	17.7±1.8	17.7 (14.4-22.3)	18.4±1.4	18.6 (15.6-22.7)	0.111
Htc (%)	53.0±5.6	53.5 (44.8-65.5)	55.3±4.4	55 (45.5-69.2)	0.086

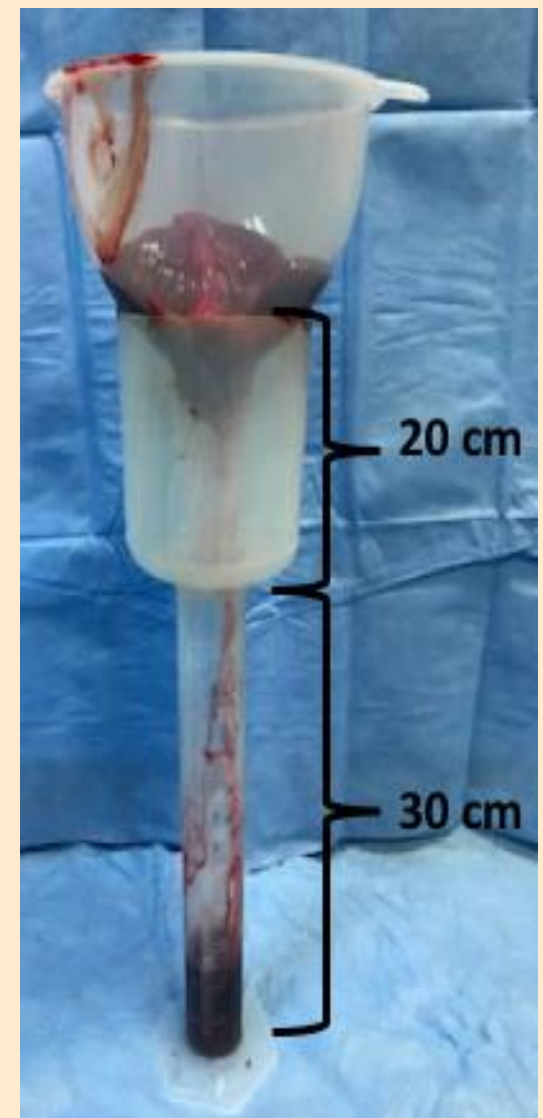


Fig. 1: Assembly prepared for measuring residual blood volume in placenta.

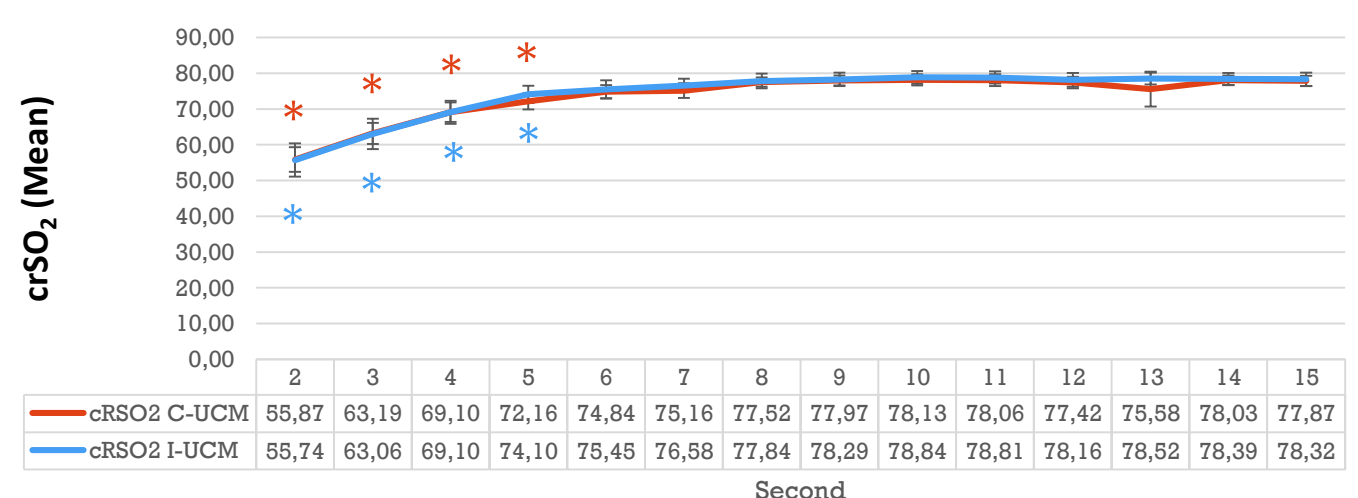
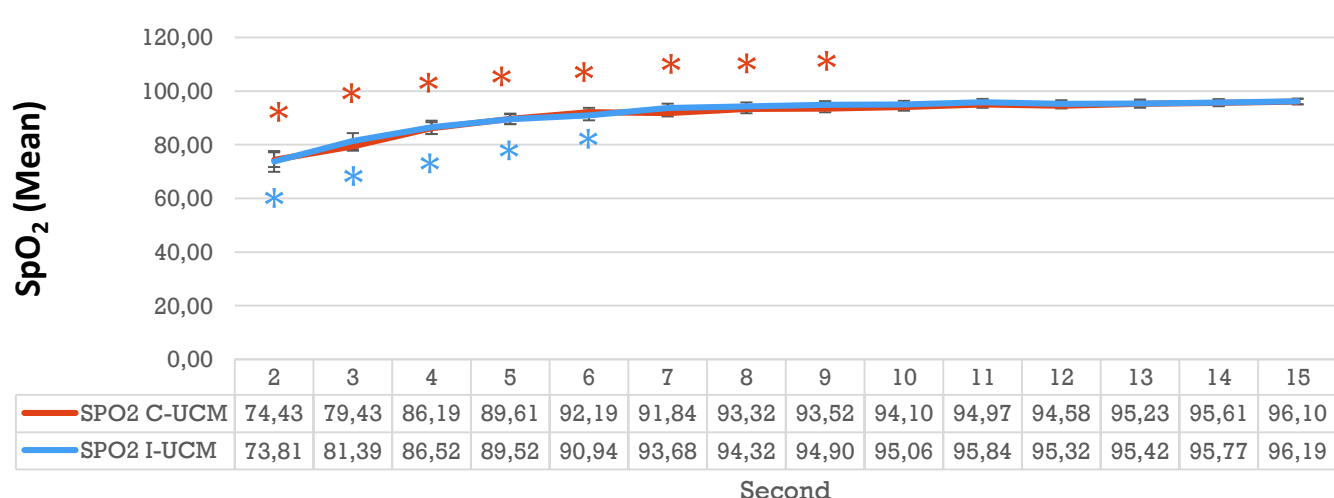
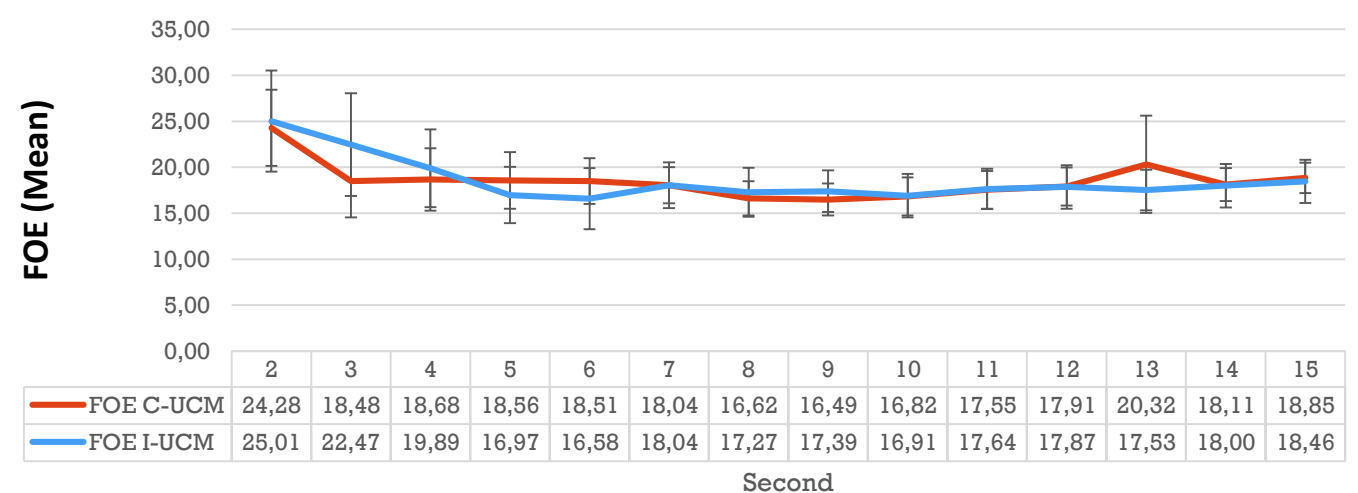
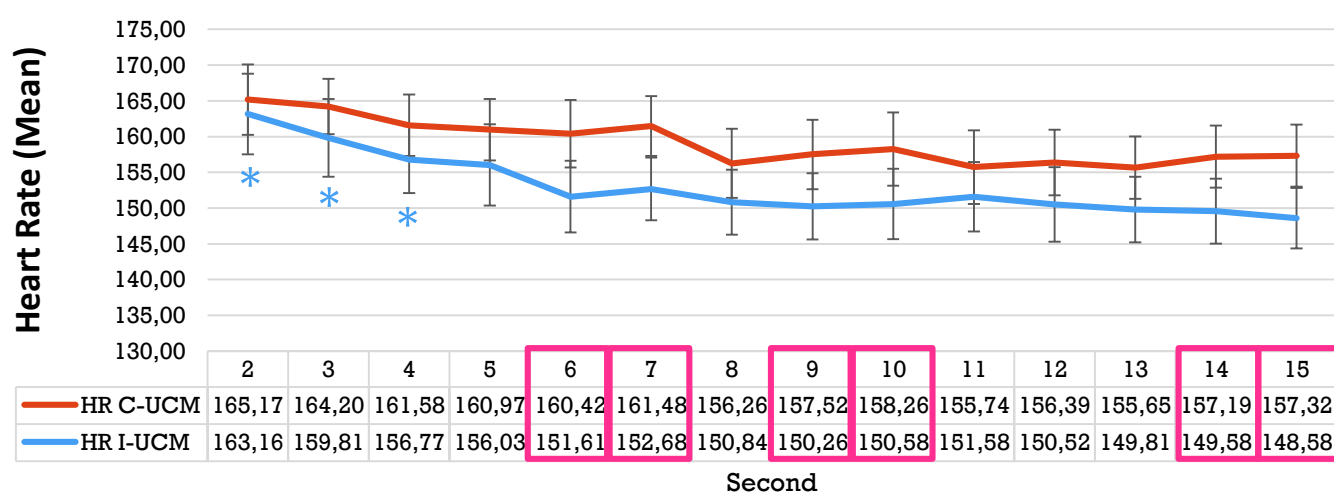


Fig.2: Heart rate, SpO<sub>2</sub>, crSO<sub>2</sub>, and cFOE data of the groups

**Conclusion** This study showed that C-UCM is as effective as I-UCM at hemodynamic adaptation of healthy term infants during transition period. In light of these results, we suggest that C-UCM can provide placental transfusion in neonates requiring resuscitation and born by cesarean.