The Fetal Medicine Foundation

FACULTY OF MEDICINE
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UMBILICAL ARTERY HALF PEAK SYSTOLIC VELOCITY DECELERATION TIME IN EARLY-ONSET FETAL GROWTH RESTRICTION

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INTRODUCTION: Severe and early onset fetal growth restriction (FGR), is infrequent and is associated with significant perinatal morbidity, mortality and maternal complications. The umbilical artery (UA) Doppler flow velocimetry provides important information for evaluating placental vascular resistance and it is a good risk predictor of adverse perinatal outcome. The UA half-peak systolic velocity deceleration time (hPSV-DT) is a Doppler velocimetry index based on the time it takes the UA to halve its maximum systolic velocity (figure 1). UA hPSV-DT is inversely proportional to UA pulsatility index (PI), and it is a validated technique in evaluating placental vascular resistance in fetuses with FGR. Its usefulness to predict mortality in severe FGR diagnosed at 25 weeks or less was now studied .
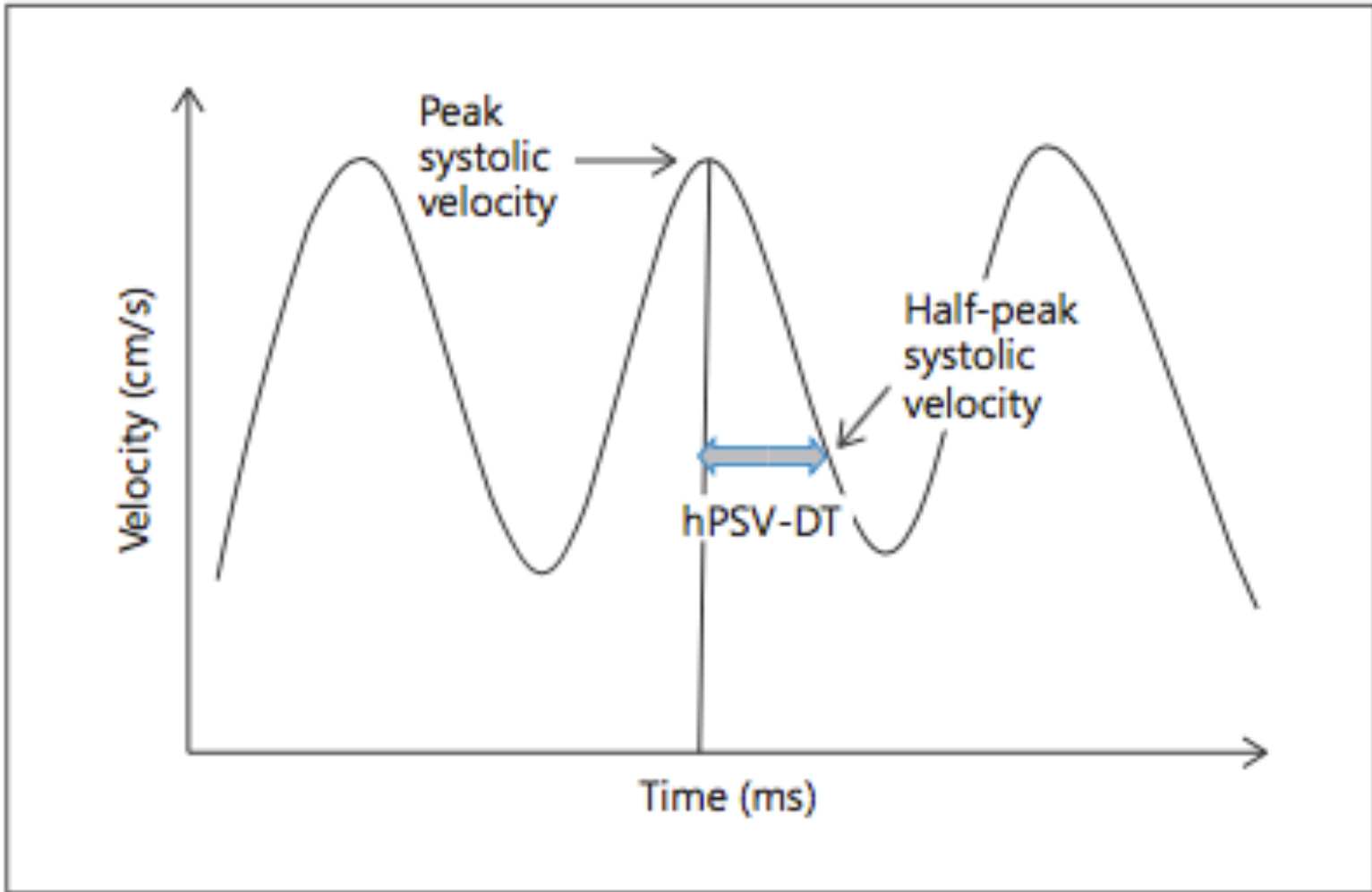

Figure 1

OBJECTIVES: To predict mortality in fetuses diagnosed with FGR at 25 weeks or less, according to the AU hPSV-DT value. A value of 90 ms or less is considered critical, according to a previous study.

METHOD: An observational, cross sectional and analytical study was performed. All singleton pregnancies diagnosed with FGR at 25 weeks or less attended in our ultrasound unit (Hospital San Juan de Dios, Santiago, Chile) from 2008 to 2016 were included. UA hPSV-DT value at the time of diagnosis was recorded and its association with adverse perinatal outcome and mortality was analyzed. The statistical test $\chi 2$ was applied and STATA 12.0 software was used for statistical analysis.

RESULTS: The hPSV-DT was obtained from umbilical artery of 59 early FGR fetuses, the average gestational age at diagnosis was 23 weeks (19-25 weeks) and the gestational age at delivery was on average 28 weeks (19-38 weeks). The mean birth weight was 769 g. (190-2650 g) and the perinatal mortality was 54.2% (32 cases) (table 1).

Table 1: Characterization of studied sample

Total cases	59
Total mortality	54,20%
Average GA when FGR was diagnosed	23 weeks
Average GA at birth	28 weeks
Average birth weight	769 grams

Of all cases, 14 cases (23.7%) presented hPSV-DT ≤ 90ms, considered critical. In this group, there was a 11 cases (78.5%) of stillbirth and immediate postpartum mortality, the three surviving children had extreme low birth weight (<1000 g).
All these fetus (100%) had abnormal UA Doppler IP values (21,5% had increased PI and 78,5% had absent or reverse end diastolic flow) (table 2- 3).
Of those who presented hPSV-DT non critical (> 90 ms) 45 cases, 46.6% were associated with stillbirth and immediate postpartum mortality, in the surviving children 45.8% had extreme low birth weight. 20 (44,5%) had abnormal UA Doppler IP values (28,8% had increased PI and 15,5% had absent or reverse end diastolic flow) (table 2-3)
The positive predictive value for mortality in fetuses with critical hPSV-DT was 78.6% and the negative predictive value was 53.3%. The sensitivity was 34.4% and the specificity was 88.9% (p 0.036) (table 4)

Table 2: Perinatal outcome according to UA hPSV-DT value

	Critical UA hPSV-DT value (≤ 90 ms)	Non critical UA hPSV-DT value (> 90ms)
N	14 (23,70%)	45 (76,20%)
Mortality	78,50%	46,60%
Survival rate	21,50%	53,30%
Extreme low birth weight NB(< 1000 gr)	100%	45,80%

Table 3: Our results compared to the UA conventional Doppler technique

UA Doppler	Critical UA hPSV-DT value (≤ 90 ms)		Non critical UA hPSV-DT value (> 90ms)	
Normal PI	0	0,00%	25	55,50%
Increased PI	3	21,40%	13	28,80%
Absent end diastolic flow	8	57,10%	6	13,30%
Reverse end diastolic flow	3	21,40%	1	2,20%

Table 4

SENSITIVITY	34,4%
SPECIFICITY	88,9%
NPV	53,3%
PPV	78,6%

CONCLUSION: The hPSV-DT shows to be a useful index in the study of early onset fetal growth restriction and a critical hPSV-DT value has a good positive predictive value and specificity to predict mortality in these fetuses.