Prescriptive standards of cardiac cycle time-related parameters in uncomplicated monochorionic diamniotic twins (MCDA) and its applicability in twin-to-twin transfusion syndrome (TTTS)

Torres X.[1,2], Martínez-Crespo JM.[1], Gómez O.[1], Martínez-Portilla R.[1], Masoller N.[1] Soveral I.[2], Crispi F.[1], Bennasar M.[1]

[1] Fetal i+D Fetal Medicine Research Center, BCNatal – Hospitals Clínic and Sant Joan de Déu, CIBER-ER, Universitat de Barcelona, Spain

[2] Hospital Gerenal del Hospitalet, Consorci Sanitari Integral, Universitat de Barcelona, Spain

BCNATAL FETAL MEDICINE RESEARCH CENTER

Consorci Sanitari Integral

Amb tu, per la teva salut

Objective

Cardiac cycle time-related parameters, such as filling time fraction (FTF) and ejection time fraction (ETF) are feasible and reproducible in singletons. However, they have not been assessed in MCDA. We aimed to report the feasibility and reproducibility of fetal FTF and ETF using pulsed Doppler, to provide prescriptive standards and to determine their utility in assessing and monitoring TTTS.

Methods

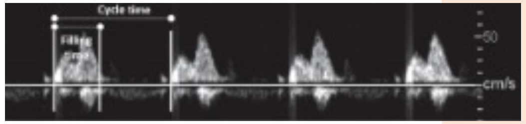
PRESCRIPTIVE STANDARDS

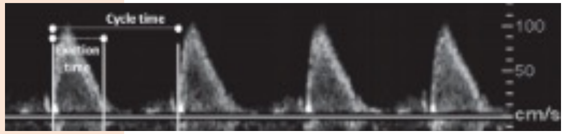
Uncomplicated MCDA (n=110)

Echocardiography every 2 weeks

FTF = (filling time/cycle time) × 100

ETF = (ejection time/cycle time) × 100





Intraobserver reproducibility (ICC, 0.878–0.923) / Interobserver reproducibility (ICC, 0.798–0.866)

Right FTF

Media = $(65.355 - 0.183 \times FHR)$

SD = $\sqrt{(172.90-1.124 \times FHR \times 2 +0.00825 \times FHR^2)}$

Left FTF

Media = $(58.804 - 0.123 \times FHR)$

SD = $\sqrt{(-32.572+0.255 \times FHR \times 2+(-0.001 \times FHR^2)}$

Right ETF

Media = $(39.830 + 0.079 \times FHR - 0.399 \times GA)$

SD = $\sqrt{(11.975)}$

Left ETF

Media = $(43.959+0.023 \times FHR +(-0.214 \times GA)$

SD = $\sqrt{(6.470)}$

Results

Z-scores were calculated in a cohort of uncomplicated MCDA fetuses, TTTS stages I-II and III-IV and compared before and after fetal surgery.

Table 1. Pre and post laser fetal cardiac-cycle parameters normalized to z-scores

	MCDA controls	TTTS I-II			TTTS III-IV		
	(n = 110)	Recipient (n = 44)	Donor (n = 44)	p	Recipient (n = 34)	Donor (n = 34)	p
Pre Laser							
Left ETF z	-0.01 (±0.3)	0.96 (±0.4)	0.25 (±0.3)	0.555	1.43 (±0.6)	0.14 (±0.5)	0.009
Right ETF z	0.01 (±0.3)	0.11 (±0.5)	0.67 (±0.3)	0.235	1.12 (±0.5)	0.34 (±0.7)	0.198
Left FTF z	-0.01 (±0.2)	-1.67 (±0.5)	0.46 (±0.6)	0.010	-2.31 (±0.7)	0.54 (±0.5)	0.007
Right FTF z	-0.02 (±0.3)	-1.22 (±0.6)	0.78 (±0.5)	0.018	-1.42 (±0.5)	0.48 (±0.4)	0.009
Post Laser							
Left ETF z	-0.01 (±0.3)	0.01 (±0.4)	0.14 (±0.3)	0.645	0.71 (±0.4)	0.1 (±0.6)	0.002
Right ETF z	0.01 (±0.4)	-0.12 (±0.6)	0.01 (±0.7)	0.418	0.05 (±0.6)	0.18 (±0.5)	0.201
Left FTF z	-0.01 (±0.3)	-1.03 (±0.5)	0.09 (±0.5)	0.012	-1.39 (±0.7)	0.43 (±0.6)	0.003
Right FTF z	0.02 (±0.2)	-0.88 (±0.3)	0.46 (±0.6)	0.008	-0.89 (±0.5)	0.28 (±0.7)	0.001

Data are mean (SD), as appropriate. MCDA: monochorionic diamniotic; ETF: ejection time fraction, FTF: filling time fraction, z: z-score

Conclusions

FTF and EFT are feasible and reproducible in uncomplicated MCDA fetuses. We provide comprehensive FTF and ETF prescriptive standards for uncomplicated MCDA twin fetuses following current standardized methodology. These parameters specially the FTF are useful for assessing and monitoring recipients in mild and severe cases of TTTS. Further studies are needed to assess their potential predictive value in TTTS.

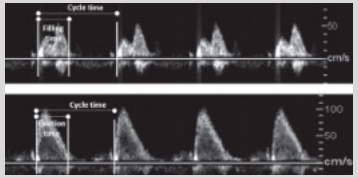
Uncomplicated MCDA (n=110)

TTTS stage I-II (n=72)

TTTS Stage III-IV (n=38)

TTTS

Echocardiography before and after fetoscopy



Impact of COVID-19 on invasive diagnostic prenatal testing

Porcar M, Fernandez S, del Río M, Sun Q, Torres X, Soveral I.

Objective

To analyze the impact of the COVID-19 pandemic on the uptake and characteristics of invasive prenatal testing during the COVID-19 pandemic.

Methods

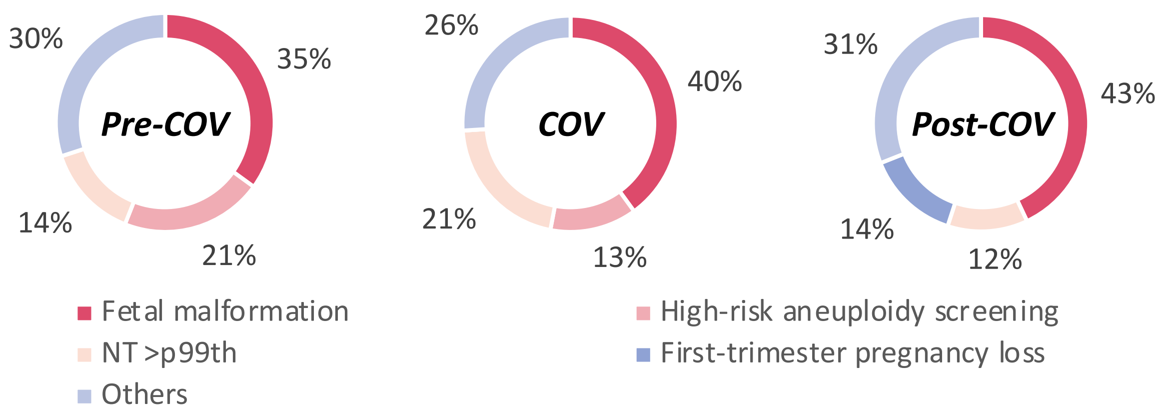
A retrospective study of prenatal invasive tests performed between January 2018 and December 2022. Data on referral reason, gestational age at the time of testing, type of prenatal invasive test, and test results were recorded. To account for yearly variability the pandemic cohort (COV, 2020) was compared to the averaged results of the two previous (pre-COV, 2018-2019) and subsequent years (post-COV, 2021-2022).

Results

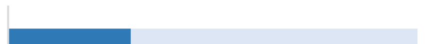
The number of procedures/year was significantly higher in the pre-COV group and the post-COV groups (pre-COV 89/year, COV 47/year, post-COV 78/year, p<0.001). The distribution of the type of procedure (% chorionic villous sampling: pre-COV 39%, COV 40%, post-COV 42%, p=0.913) and gestational age at the procedure was similar in the three groups (pre-COV mean 18.6 weeks (standard deviation 7.3), COV 18.3 (7.0), post-COV 19.2 (8.3), p=0.653)). The distribution of referral reasons care depicted in Figuere1. An rate of abnormal results in Figure 2.

Distribution of referral reasons for prenatal invasive testing

p=0.005



Abnormal genetic results



Number of procedures per year

Conclusions

During the COVID-19 pandemic, there was a significant decrease in the number of prenatal invasive tests performed in our hospital compared to previous and subsequent years, with no change in the type of procedure performed.

Distribution of referral reasons were significantly different during the COVID-19 pandemic and the rate of abnormal genetic test results was higher during the COVID-19 pandemic compared to previous years. However, it did not decrease after the pandemic, likely due to the shift in procedure indications.