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A Stage-Based Approach to the Management of Small Fetuses

Research Article

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Abstract

Objective: To analyze data concerning pregnancies with fetal smallness managed with the stage-based management protocol proposed by Figueras and Gratacós in 2014 at a single tertiary center in Belgium.

Methods: In this uncontrolled case series, we analyzed all consecutive singleton pregnancies presenting fetal smallness from January 2019 to July 2021. We included fetuses with an estimated fetal weight < 10th percentile. We excluded twin pregnancies; pregnancies with first ultrasound at more than 14 weeks of gestation and pregnancies that involved fetal abnormalities. The primary outcome was a composite of severe adverse perinatal outcome defined as fetal/neonatal death or one or more of the following neonatal morbidities: bronchopulmonary, cerebral germinal matrix hemorrhage grade III or IV, cystic periventricular leukomalacia, neonatal sepsis or necrotizing enterocolitis.

Results: We analyzed 121 pregnancies presenting fetuses small for gestational age (SGA) in 24.8% of cases, late-onset fetal growth restriction (FGR) in 46.3% of cases, and early-onset FGR in 28.9% of cases. The rate of a composite of severe adverse perinatal outcomes in the early-onset FGR group was 54.3% with four cases of neonatal death and no cases of fetal death. No cases of severe perinatal outcomes were observed in the late-onset FGR and SGA groups.

Conclusion: The appropriate management of small fetuses is frequently very challenging. The stage-based management protocol proposed by Figueras and Gratacós represents a promising, easily available, and standardized tool for the management of fetal smallness.

Keywords: Fetal Growth Restriction; Intrauterine Growth Restriction; Small for Gestational Age; Stage-Based Protocol; Placental Insufficiency

Introduction

Pregnancies with small fetuses represent a heterogeneous group of patients associated with a wide range of obstetric and perinatal outcomes, which depend on multiple maternal and fetal factors. Fetal smallness is generally subdivided into small for gestational age (SGA) and fetal growth restriction (FGR). SGA represents a subgroup of constitutionally small fetuses, while FGR is defined as the failure of a fetus to achieve its growth potential due to a pathological process. SGA fetuses present perinatal outcomes similar to fetuses with normal growth, while FGR is frequently associated with poorer outcomes.

Appropriate management of small fetuses is crucial to reduce the risk of significant adverse perinatal events. The first step is to identify fetuses at higher risk differentiating between SGA and FGR. Because there is currently no treatment for FGR, the current management strategy includes intensive fetal well-being monitoring and timely delivery, balancing the risks of injury/death and iatrogenic-induced prematurity [1].

At present, proposed management protocols for fetal smallness vary widely, but no recommendations are universally accepted. In 2014, Figueras and Gratacós proposed a systemic approach for the management of fetal smallness, suggesting a stage-based management protocol [2]. Despite its increasing use in several hospitals, to our knowledge, this protocol has never been evaluated in a clinical study. In this report, we analyzed data concerning pregnancies with small fetuses managed with the abovementioned protocol. Through this analysis, we aimed to provide interesting information regarding the daily challenge in the management of fetal smallness.

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Materials and Methods

In this uncontrolled case series, we analyzed all consecutive singleton pregnancies presenting fetal smallness at our tertiary hospital from January 2019 to July 2021. Ethical approval for this study was obtained from the local institutional review board (Comité d'Ethique du C.H.U. Saint-Pierre, CE/20-04-10).

We included fetuses with an estimated fetal weight (EFW) < 10th percentile for gestational age (GA). We excluded twin pregnancies; pregnancies with first ultrasound (US) at more than 14 weeks of GA; and pregnancies that involved fetal chromosomal anomalies, congenital infections, or major malformations.

Gestational age was calculated from the first day of the last menstruation and/or from the first-trimester ultrasound [3]. Cell-free DNA-based non-invasive prenatal testing was proposed to all women for the screening of trisomy 13, 18 and 21. Fetuses with an EFW between the 3rd and 10th percentile and normal Doppler studies were defined as SGA. Fetuses with an EFW < 3rd percentile or an EFW between the 3rd and 10th percentile and Doppler anomalies were defined as FGR. FGR was classified as early-onset if diagnosed before 32 weeks of GA and as late-onset if diagnosed afterward. SGA and FGR fetuses were defined, classified, and managed according to the stage-based protocol proposed by Figueras and Gratacós in 2014 [2]. This protocol was slightly modified for use at our institution (Table 1), where no computerized cardiotocography (cCTG) was available, and aortic isthmus Doppler velocities were not routinely measured.

Table 1: Stage-based classification and management protocol of fetal growth restriction.

Stage	Criteria (any of)	US monitoring	Other monitoring	GA and mode of delivery
SGA 0	EFW 3rd – 10th centile and normal Doppler studies	Every two weeks	**Outpatients:** Starting from 36 weeks CTG, blood pressure profile and urine exam weekly	40 weeks LI
1	EFW < 3rd centile UtA PI > p95 UA PI > p95 CPR < p5 MCA PI < p5	Weekly	**Outpatients:** Starting from 24 weeks CTG, blood pressure profile and urine exam weekly	37 weeks LI
2	UA AEDV	Biweekly	**Inpatients:** CTG and blood pressure profile 2x/day	34 weeks CS
3	UA REDV DV-PI > p95	1 – 2 days	**Inpatients:** CTG and blood pressure profile 3x/day	30 weeks CS
4	DV reverse flow NST/CTG pathologic	12 hours	**Inpatients:** Continues CTG and maternal parameters	26 weeks CS

US = ultrasound; **GA** = gestational age; **EFW** = estimated fetal weight; **CTG** = cardiotocography; **LI** = labor induction; **UtA** = uterine artery; **PI** = pulsatility index; **UA** = umbilical artery; **CPR** = cerebroplacental ratio; **MCA** = Middle cerebral artery; **AEDV** = absent end-diastolic velocities; **CS** = cesarean section; **REDV** = reverse end-diastolic velocities; **DV** = ductus venosus; **FHR** fetal heart rate; **NST** = non stress test; **SGA**= small for gestational age

Every patient underwent serologic screening for congenital infections. Preeclampsia (PE) was actively searched for through blood pressure surveillance, screening for proteinuria and common blood tests. In the case of early-onset FGR and no evident signs of placental dysfunction, amniocentesis was proposed for genetic (karyotyping and chromosomal microarray analysis) and, when relevant, microbiological analyses.

The primary outcome was a composite of severe adverse perinatal outcome defined as fetal/neonatal death or one or more of the following neonatal morbidities: bronchopulmonary dysplasia (defined as oxygen need at 28 days of life or 36 weeks postmenstrual age), cerebral germinal matrix hemorrhage grade III (intraventricular hemorrhage with lateral ventricles dilatation) or IV (intraparenchymal hemorrhage), cystic periventricular leukomalacia, neonatal sepsis or necrotizing enterocolitis. We considered the following secondary outcomes: GA at delivery and cesarean section (CS) rate, birth weight, Apgar score < 7 at 5 minutes, arterial pH < 7.10, neonatal resuscitation, neonatal intensive care (NIC) or neonatal middle care (NMC) unit admission, hospitalization length, respiratory distress requiring mechanical ventilation, hypoglycemia requiring intravenous dextrose, jaundice requiring phototherapy and parenteral nutrition need.

Data were analyzed for the subgroups of fetuses presenting a diagnosis at last control of SGA, early-onset FGR, and late-onset FGR. Differences between groups were compared using ANOVA, Pearson's chi-square, or Fisher's exact test. If analysis gave a significant result, post-hoc two-by-two analyses were done between the three groups to explore intergroup differences. Data analysis was done with IBM SPSS version 20 (NY, USA).

Results

A total of 121 patients were included in this study. The fetuses were classified as SGA in 30 cases (24.8 %), late-onset FGR in 56 cases (46.3%), and early-onset FGR in 35 cases (28.9%).

Maternal demographic and clinical data for the three subgroups are presented in (Table 2).The subgroup of early-

Table 2: Demographic and clinical characteristics.

	SGA (n=30)	Late-onset FGR (n=56)	Early-onset FGR (n=35)	p-value
Maternal age (years)	31.0±7.5	31.2±6.5	32.6±6.7	-
Caucasian ethnicity	12 (40.0)	17 (30.4)	14 (40.0)	-
African ethnicity	8 (26.7)	15 (26.8)	14 (40.0)	-
Nulliparous	14 (46,7)	21 (37.5)	17 (48.6)	-
Mean pregestetional BMI (kg/m2)	25.4±5.7	24.7±4.3	27.9±7.1[b]	< .01
Smoking during pregnancy	7 (23.3)	8 (14.3)	6 (17.1)	-
Low-dose Aspirin prophylaxis	6 (20.0)	22 (39.3)	17 (48.6)	-
Diabetes mellitus (gestational or pregestational)	10 (33.3)	19 (33.9)	9 (25.7)	-
Any hypertensive morbidity	5 (16.7)	15 (26.8)	25 (71.4)[a,b]	< .001
Pre-eclampsia	3 (10.0)	9 (16.1)	22 (62.9)[a,b]	< .001
Mean GA at diagnosis (weeks)	35.9±1.8	35.7±1.7	27.1±3.2[a,b]	< .001
Estimated fetal weight at diagnosis (g)	2088±386	2025±340	812±330[a,b]	< .001
FGR stage at diagnosis				-
Stage 0	30 (100)	13 (23.2)	4 (11.4)	-
Stage 1	-	39 (69.6)	25 (71.4)	-
Stage 2	-	3 (5,4)	4 (11,4)	-
Stage 3	-	1 (1.8)	2 (5.7)	-
Stage 4	-	-	-	-
FGR stage at last control				< .001
Stage 0	30 (100)	-	-	-
Stage 1	-	46 (82.1)	15 (42.9)[b]	-
Stage 2	-	2 (3.6)	3 (8.6)	-
Stage 3	-	1 (1.8)	9 (25.7)[b]	-
Stage 4	-	7 (12.5)	8 (22.9)	-
Stage change between diagnosis and last control	-	19 (33.9)	22 (62.9)[b]	< .001
NST/CTG pathologic	-	7 (12.5) a	7 (20.0)[a]	0.041
Fetal death	-	-	-	-

BMI = body mass index; **GA** = gestational age; **FGR** = fetal growth restriction; **NST** = non stress test; **CTG** = cardiotocography.
Continuous variables are summarized with mean ± standard deviation or and categorical variables with number (%). Only significant p-values are reported.
[a] p-value <.05, the difference is statistically significant compared with the SGA group.
[b] p-value <.05, the difference is statistically significant compared with the late-onset FGR group.

onset FGR presented higher mean pregestational BMI (27.9 kg/m^2; SD 7.1) compared to the late-onset FGR subgroup (24.7 kg/m2; SD 4.3), while no difference was observed between the SGA subgroups (25.4 kg/m^2; SD 5.7) and the other two. Pregnancies with early-onset FGR presented more cases of maternal hypertensive-related disorders (71.4% vs 26.8% in late-onset and 16.7% in SGA) and more cases of PE (62.9% vs 16.1% in late-onset and 10.0% in SGA). Mean EFW and GA at diagnosis were 812 g at 27.1 weeks for early-onset FGR, 2025 g at 35.7 weeks for late-onset FGR, and 2088 g at 35.9 weeks for SGA fetuses. All the SGA cases were diagnosed after 32 weeks of gestation and showed an EFW ≥ 10th percentile at the second trimester US. Seventeen fetuses (14.0%) initially diagnosed as SGA were redefined as FGR due to the appearance of Doppler abnormalities during the follow-up.

FGR stages at diagnosis were not significantly different between early-onset and late-onset fetuses. At last control, 62.9% of early-onset FGR fetuses showed a progression through the stages compared to 33.9% of late-onset FGR. At last control, early-onset FGR fetuses presented fewer cases at stage 1 (42.9% vs 82.1%) and more cases at stage 3 (25.7% vs 1.8%) than late-onset FGR fetuses. No significant difference was observed for stages 2 and 4. Stage 4 was always associated with a pathologic cardiotocographic non-stress test (NST/CTG), except for one case in the early-onset group, which presented reverse atrial flow in the DV Doppler. During the study period, we observed no cases of fetal death.

Mean birth weight and GA at delivery were significantly different between subgroups, with 1251 g at 31.6 weeks of gestation, 2183 g at 37.2 weeks of gestation, and 2570 g at 38.8

weeks of gestation for early-onset FGR, late-onset FGR and SGA fetuses, respectively (Table 3). Significant differences were also

Table 3: Obstetric outcomes.

	SGA (n=30)	Late-onset FGR (n=56)	Early-onset FGR (n=35)	p-value
Mean interval to delivery (days)	20.2±12.4	10.2±9.5[a]	32.0±26.9[a,b]	< .001
Mean GA at delivery (weeks)	38.8±1.7	37.2±1.6[a]	31.6±1.6[a,b]	< .001
Preterm birth (<37 weeks)	2 (6.7)	15 (26.8)[a]	28 (80.0)[a,b]	< .001
GA at delivery between 32 and 36.6 weeks	2 (6.7)	15 (26.8)[a]	8 (22.9)[a]	< .001
GA at delivery between 28 and 31.6 weeks	-	-	15 (42.9)	-
GA at delivery < 28 weeks	-	-	5 (14.3)	-
Indication for scheduled delivery				< .001
FGR Stage based	12 (40.0)	47 (83.9)[a]	25 (71.4)[a]	-
Hypertensive related disorders	2 (6.7)	3 (5.4)	9 (25.7)[a,b]	-
Others	4 (13.3)	1 (1.8)	-	-
Spontaneous labor	12 (40.0)	5 (8.9)[a]	1 (2.9)[a]	-
Mode of scheduled delivery				< .001
Induction of labor	17 (56.7)	32 (57.1)	9 (25.7)[a,b]	-
Primary cesarean section	1 (3.3)	19 (33.9)[a]	25 (71.4)[a,b]	-
Spontaneous labor	12 (40.0)	5 (8.9)[a]	1 (2.9)	-
Mode of delivery				
Vaginal	26 (86.7)	28 (50.0)[a]	6 (17.1)[a,b]	< .001
Cesarean	4 (13.3)	28 (50.0)[a]	29 (82.9)[a,b]	< .001
Cesarean-Urgent (any indication)	4 (13.3)	17 (30.4)	12 (34.3)	-
Cesarean- Urgent during labor for fetal distress	3 (10.0)	10 (17.9)	2 (5.7)	-
Mean birth weight (g)	2570±478	2183±367[a]	1251±554[a,b]	< .001
Male gender	11 (36.7)	26 (46.4)	17 (48.6)	-
Apgar score 5 min <7	1 (3.3)	-	2 (5.7)	-
Mean arterial pH	7.31 ±0.10	7.28±0.10	7.27±0.11	-
Arterial pH <7.1	2 (6.7)	3 (5.4)	1 (2.9)	-

GA = gestational age; **FGR** = fetal growth restriction.
Continuous variables are summarized with mean ± standard deviation or and categorical variables with number (%). Only significant p-values are reported.
[a] p-value <.05, the difference is statistically significant compared with the SGA group.
[b] p-value <.05, the difference is statistically significant compared with the late-onset FGR group.

observed for the mean interval to delivery, with 32.0 days for early-onset FGR, 10.2 days for late-onset FGR and 20.2 days for SGA fetuses. Different preterm birth rates were observed between the groups, with 80.0% in early-onset FGR, 26.8% in late-onset FGR and 6.7% in SGA fetuses. In pregnancies with early-onset FGR, 42.9% of deliveries occurred between 28 and 31.6 weeks and 14.3% before 28 weeks of gestation. Scheduled delivery was more frequently indicated based on the FGR stage (71.4% in early-onset FGR, 83.9% in late-onset FGR and 40.0% in SGA fetuses), followed by maternal hypertensive-related disorders (25.7% in early-onset FGR, 5.4% in late-onset FGR and 6.7% in SGA fetuses). Iatrogenic delivery was more frequently observed in pregnancies associated with FGR (97.1% in early-onset and 91.1% in late-onset) than SGA fetuses (60%). Different CS rates were observed between the groups, with 82.9% in the early-onset FGR group, 50.0% in late-onset FGR and 13.3% in SGA fetuses. No differences were observed for urgent CS. Similar mean arterial pH was observed in all groups (7.27 in early-onset FGR, 7.28 in late-onset FGR, and 7.31 in SGA fetuses) with no differences in rates of Apgar score < 7 at 5 minutes and arterial pH < 7.1.

The rate of the composite of severe adverse perinatal outcomes in the early-onset FGR group was 54.3%, with four cases (11.4%) of neonatal death (Table 4). No cases of severe perinatal outcomes were observed in the late-onset FGR and SGA groups.

Newborns in the early-onset FGR subgroup received intensive resuscitation in 17.1% of cases, while no cases requiring resuscitation were observed in the other subgroups. The hospitalization rate in NMC/NIC units was higher, and mean hospitalization time was longer in the early-onset FGR subgroup

Table 4: Neonatal outcomes.

	SGA (n=30)	Late-onset FGR (n=56)	Early-onset FGR (n=35)	p-value
Composite neonatal severe morbidity and death	-	-	19 (54.3)[a,b]	< .001
Neonatal death	-	-	4 (11.4)[a,b]	0.006
BPD	-	-	14 (40.0)[a,b]	< .001
Sepsis	-	-	6 (17.1)	< .001
NEC	-	-	2 (5.7)	-
GMH grade III or IV	-	-	2 (5.7)	-
PVL grade II or III	-	-	-	-
Others				
Hospitalization in NMC/NIC units	7 (23.3)	34 (60.7) a	33 (94.3)[a,b]	< .001
Intensive resuscitation	-	-	6 (17.1)[a,b]	< .001
Mean hospitalization time	14.3±17.0	15.6±11.8	51.8±28.6[a,b]	< .001
Hypoglycemia	5 (16.7)	21 (37.5)	14 (40.0)	-
Parenteral alimentation	2 (6.7)	6 (10.7)	21 (60.0)[a,b]	< .001
Non invasive ventilation	4 (13,3)	14 (25.0)	28 (80.0)[a,b]	< .001
Invasive ventilation	-	-	11 (31.4)[a,b]	< .001

BPD = bronchopulmonary dysplasia; **NEC** = necrotizing enterocolitis; **GMH** = germinal matrix hemorrhage; **PVL** = periventricular leukomalacia; **NMC** = neonatal middle care; **NIC** = neonatal intensive care.
Continuous variables are summarized with mean ± standard deviation or and categorical variables with number (%). Only significant p-values are reported.
[a] p-value <.05, the difference is statistically significant compared with the SGA group.
[b] p-value <.05, the difference is statistically significant compared with the late-onset FGR group.

(94.3%; 51.8 days) than in the late-onset FGR (60.7%; 15.6 days) and SGA (23.3%; 14.3 days) subgroups. The hospitalization rate was higher for the late-onset FGR subgroup than for the SGA subgroup, but no difference was observed in mean hospitalization time. In the early-onset FGR subgroup, we observed more cases of parenteral alimentation (60.0% vs 10.7% in early-onset and 6.7% in SGA), noninvasive ventilation (80.0% vs 25.0% in early-onset and 13.3% in SGA) and invasive ventilation (31.4% vs 0% in early-onset and 0% in SGA). No difference was observed in the frequency of neonatal hypoglycemia.

Discussion

We reported the results of 121 pregnancies presenting fetal smallness that was managed following a stage-based protocol at a single tertiary center. Despite the small sample size, the analysis of these data, in association with the results previously reported in the literature, allowed us to highlight some important characteristics related to SGA, early-onset, and late-onset FGR.

SGA is a subgroup of small fetuses that do not demonstrate any adaptation to an abnormal intrauterine environment and present perinatal outcomes similar to fetuses with normal growth. In our study, SGA fetuses presented better obstetric and perinatal outcomes than FGR fetuses. We observed low rates of preterm births (6.7%) and CS (13.3%) with no severe perinatal morbidities. These fetuses can usually sustain uterine contractions during the labor [4], as supported by the low rate of intrapartum CS due to fetal distress observed in our cohort (10%). However, for some fetuses, SGA does not just reflect that they are "constitutionally small" but could indicate early or mild stages of FGR. Differentiating SGA from FGR fetuses is therefore extremely important, and clinicians should be aware that classifications could change during the pregnancy. In our study, 17 of the 47 fetuses initially defined as SGA were redefined as FGR during the follow-up. This suggests that some FGR fetuses present a slow degradation of placental functions represented by the late appearance of Doppler abnormalities and are initially wrongly defined as SGA. In the case of a diagnosis of SGA, one can generally be optimistic. However, compared to the general population, a higher level of surveillance should be maintained during the surveillance of these pregnancies.

Early-onset FGR represents the most severe form of FGR. It is often associated with early PE and tends to be associated with progressive fetal deterioration through pregnancy [5-7]. In our cohort, stage worsening was observed in 62.9% of cases, with 48.6% presenting stages 3 or 4 at the last control. These pregnancies were associated with consistently poorer obstetric and perinatal outcomes than the late-onset FGR subgroup. Iatrogenic delivery was performed in all cases but one, with a CS rate of 82.9%. The prematurity rate was very high (80%), comprising 42.9% very preterm (28 to 31.6 weeks of GA) and 14.3% extremely preterm newborns (< 28 weeks of GA). Similar to results reported in the literature, we observe severe neonatal morbidities in 54.3% of cases, with a perinatal death rate of 11.4% [8, 9]. These data suggest that one should be aware of the consistent risk of poor obstetric and perinatal outcomes associated with these high-risk pregnancies.

Late-onset FGR frequently presents a longer fetal compensation state than early-onset FGR [10]. In our cohort, late-onset FGR fetuses often showed stable conditions, with 82.1% presenting as stage 1 at last control, while stages 2 (3.6%) and 3 (1.8%) were rarely observed. Despite this apparently stable state,

late-onset FGR fetuses present some risk of sudden deterioration [4,11], probably explained by the association between near-term fetuses' low tolerance for hypoxia, uterine contractions, and eventual sudden worsening of placental functions. In our cohort, half of the women in this subgroup underwent a CS, and urgent CS was performed in 30.4% of cases, due to antepartum pathologic NST/CTG in 12.5% (stage 4) and intrapartum fetal distress in 17.9%. The preterm delivery rate was 26.8%, and 60.7% of the newborns required hospitalization in NIC/NMC units. Similar results have been reported in other studies [12,13]. Despite the good short-term perinatal outcomes, one should be aware of the near 50% risk of CS and the increased risk of newborn admission to a neonatal unit.

Concerning the mode of delivery, FGR does not represent an indication for systematic CS. However, primary CS should be considered in advanced stages (from stage 2) in which fetuses frequently do not tolerate labor contractions and for whom additional hypoxic stress could increase the risk of adverse outcomes [6, 14, 15]. Conversely, a vaginal birth could be attempted in stage 1 FGR fetuses (early- and late-onset), being aware of their low tolerance to hypoxic stress and the near 50% risk of urgent intrapartum CS. The stage 1 FGR comprehends a broad spectrum of patients, and despite the existence of predictive models, there is currently no definitive indication to precisely identify which fetuses could tolerate labor contractions [4].

FGR and PE are strictly associated, and placental insufficiency is thought to represent the common underlying etiology [16]. Pregnant women with one of these disorders are at increased risk of developing the other [17,18]. As confirmed in our cohort, this association is mostly observed in pregnancies presenting early-onset FGR. PE seems to be an independent risk factor for poor neonatal outcomes in early-onset FGR [19]. It could be associated with more rapid fetal deterioration, leading to earlier delivery for fetal distress, and severe maternal conditions eventually requiring iatrogenic preterm delivery [19,20,21]. These findings support the importance of intensive screening for PE in pregnancies presenting FGR. When this association is observed, one should be aware of the increased risk of rapid fetal deterioration, potentially leading to a higher prematurity rate, poor neonatal outcomes, and the need for urgent CSs.

The protocol described by Figueras and Gratacós [2] was implemented in our clinical practice at the beginning of 2019. We believe that this stage-based protocol is an excellent tool for managing fetal smallness. The main strengths are its pragmatism and ease of application, as well as its tendency to reduce unnecessary US scans, fetal and maternal monitoring, and hospitalizations. Nevertheless, this protocol should be a general guideline, and experts' advice should always be associated. To our knowledge, this is the first report of a clinical experience using this stage-based management protocol. With this study, we shared interesting results concerning its practical use in a single tertiary center, providing important information about expected obstetric and perinatal outcomes associated with fetal smallness. However, more studies are needed to evaluate this protocol in a larger number of patients.

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Conflict of Interest: No potential conflict of interest relevant to this study was reported.

Ethical Approval: Ethical approval for this study was obtained from the local institutional review board (Comité d'Ethique du C.H.U. Saint-Pierre, CE/20-04-10).

Patient Consent: Informed consent was obtained from all patients.

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Author Contributions

Yannick Hurni: Original draft preparation, Data analyses, Reviewing and Editing.

Sara Marcenaro: Original draft preparation, Data analyses.

Caroline Gounongbé: Reviewing and Editing.

Giulia Garofalo: Conceptualization, Reviewing and Editing, Supervision.

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