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Analysis of Perinatal Outcomes of Twin Pregnancy in a Referral Hospital for High Risk

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Abstract

Introduction: The incidence of twin pregnancies has increased significantly in recent decades. These pregnancies require more attention due to their worse outcomes than singleton pregnancies. **Objective**: To analyze the characteristics and perinatal outcomes of twin pregnancies at the Caxias do Sul General Hospital. **Methods**: This is a descriptive and retrospective study that included all births related to twin pregnancies between March 1998 and June 2018. Maternal and perinatal variables were analyzed. Descriptive analyses were carried out using measures of central tendency and dispersion for continuous variables (mean and standard deviation or median and interquartile range), according to a prior assessment of distribution using the Shapiro-Wilk test, and absolute (n) and relative (n%) frequencies for categorical variables. **Results**: 172 pairs of twins/21,972 births (0.8%) were identified. There was a high percentage of interpartum interval of less than 12 months, adherence and prenatal visits, body mass index, and need for neonatal intensive care. Stillbirth and neomortality rates were within acceptable parameters. **Conclusion**: The sample studied showed a percentage similar to that in the literature, a high rate of maternal and perinatal complications, characterizing it as a high-risk fetal pregnancy.

Keywords

Pregnancy, Twin Pregnancy, High Risk Pregnancy, Morbidity, Perinatal Mortality, Perinatal Results

1. Background

Multiple pregnancies have become increasingly common worldwide, resulting in 1 in every 42 births or 1.6 million pairs of twins per year [1]. In Brazil, their incidence is 2% to 3% of all births [2]. Twin pregnancies (TPs), compared to singleton pregnancies, are associated with a significant increase in rates of adverse fetal and gestational outcomes [3].

TPs are considered high-risk and therefore require special attention [4]. Prematurity, low birth weight, neonatal death, twin-to-twin transfusion syndrome, and the need for admission to a neonatal intensive care unit (NICU) are some of the adverse outcomes associated with twinning [1]. A study conducted in Brazil found that twinning was associated with an unfavorable perinatal outcome, especially in the second twin. In this study, TPs were associated with rates of prematurity with gestational age less than 32 weeks, low birth weight, and low Apgar scores as relevant adverse outcomes [2]. It is also known that neonatal complications are more common in TPs, regardless of gestational age, compared to singleton pregnancies [5]. A study conducted in Finland revealed that the majority of patients were nulliparous, at the extremes of reproductive age, and over the study period, an increase in the incidence of preeclampsia and diabetes was identified [3]. Maternal complications, such as hemorrhage, preeclampsia, and maternal death, are also more frequently associated with multiple pregnancies [1].

A study by Santana *et al.*, which included several countries, showed that pregnant women with TPs have a fourfold higher risk of death, mainly due to postpartum hemorrhage and hypertensive disease [6]. A study conducted at the General Hospital in 2009 identified maternal complications such as preterm labor, hypertensive syndrome, HELLP syndrome, and premature rupture of membranes [7].

Given the above, the need for more accurate prenatal care, diagnosing and preventing its complications during pregnancy, labor, and postpartum becomes apparent.

The objective of this study was to review some relevant perinatal outcomes in twin pregnancies occurring in the Obstetrics and Gynecology Services, and Neonatology at a reference hospital for high-risk pregnancies [7].

2. Methodology

This is a descriptive, retrospective study, including all twin births that occurred in the Obstetrics and Gynecology Service of the General Hospital of Caxias do Sul, during the period from March 1998 to June 2018, with gestational age equal to or greater than 22 weeks or fetal weight greater than 500 g. Triplet pregnancies were excluded.

The following variables were analyzed: 1) maternal aspects: race; age; parity; education level; previous abortions before the current pregnancy; interpartum interval; prenatal care; number of weeks prenatal care started; number of con-

sultations; main clinical complications during pregnancy; Body Mass Index (BMI), according to the WHO; initial weight; weight gain during pregnancy; presence of previous hypertension and gestational hypertension; gestational diabetes; 2) perinatal aspects: presentation of both fetuses; main indications for cesarean deliveries; newborn weights at birth; gestational age calculated by first obstetric ultrasound or Capurro method; mode of delivery (vaginal and cesarean); Apgar score at 1st and 5th minute for both fetuses; fetal outcomes (stillbirth, neonatal mortality, need for intensive care treatment); placental morphology and weight; fetal sex; presence of congenital malformations.

The variables were selected according to an existing database at the General Hospital, based on an analysis of variables found in other articles, mainly the 2009 study, so that we could make a comparison with the previous study. These variables have already been analyzed in other studies, which showed some relationship with twin pregnancies. Therefore, we saw the need to bring them into the reality of the General Hospital.

Although retrospective methodological designs are not associated with the best assessments, it is worth noting that deficient and inadequate documentary description of the data recorded in the consulted medical records related to pregnancy and childbirth significantly interfered with the statistical analysis. Being a retrospective study, with data from the years between 1998 and 2018, we may encounter some limitations, such as selection bias, as researchers have no control over the data already collected. However, as the objective was to show the epidemiological profile of the hospital, the retrospective study is beneficial, as it allows a large amount of data to be analyzed in a shorter period of time.

The obtained data were entered into a specific document for subsequent analysis using the SPSS program, version 21.0 (SPSS, Chicago, USA). Descriptive analyses were performed using measures of central tendency and dispersion for continuous variables (mean and standard deviation or median and interquartile range), according to the previous assessment of distribution through the Shapiro-Wilk test, and absolute (n) and relative (n %) frequencies for categorical variables.

3. Results

During this period, 21,972 births resulted in 172 pairs of twins (0.8%) and 344 unborn babies. Table 1 shows the main maternal characteristics. There was an interpartum interval of less than 12 months (n = 67; 39%), an event often associated with compromised gestational progress.

Table 1. Description of variables related to maternal characteristics (n = 172).

Variables	n	%
Maternal Skin color		
White	131	76.2
Non-White	41	23.8

Continued

Education		
≤8 years	54	48.2
>8 years	88	51.8
Parity		
≤3 children	158	91.9
>3 children	14	8.1
Previous abortions		
0	147	85.5
1	19	11
2	5	2.9
4	1	0.6
IPI (months)		
≤12	67	39
14 - 23	11	6.4
24 - 36	19	11
37 - 48	15	8.7
>48	53	30.8

Parity: 69 pregnant women were primiparous; IIP: Interpartal Interval.

Table 2 presents data related to prenatal care and clinical complications diagnosed during pregnancy. It should be emphasized the increased rate of users who underwent prenatal care, as well as the number of consultations exceeding 6, as recommended by the WHO, and the early initiation of care.

Table 2. Description of variables related to prenatal care (n = 172).

Variables	n	%
Prenatal care		
Yes	170	98.8
No	2	1.2
Number of consultations		
≤6	37	21.5
>6	125	72.7
First consultation (weeks)		
≤10	38	22.1
≥11	31	18

Continued

Clinical complications		
No	75	43.6
PTL	17	9.9
UTI	30	17.4
Previous HTN	12	6.9
GDM	15	8.7
Gestacional HTN	14	8.1

PTL: Preterm Labor; UTI: Urinary Tract Infection; HTN: Hypertension; GDM: Gestational Diabetes Mellitus.

Table 3 presents aspects related to the fetuses and placenta. Attention should be given to the rate of pelvic presentation of the 1st and 2nd twins (n = 36; 25.7% and n = 32; 9.3%), as well as the high rate of fetuses in transverse position/breech presentation. Conceptually, the first twin is the fetus closest to the examiner and the second twin is the most distal, *i.e.*, the twin born last.

Table 3. Description of variables related to the type of delivery (n = 172) and to the fetus (n = 344).

Variables	n	%
Delivery type		
Vaginal	96	55.8
Cesarean	76	44.2
Presentation of 1st twin		
Cephalic	101	29.3
Pelvic	36	10.5
Breech	3	0.9
Presentation of 2nd twin		
Cephalic	13	3.8
Pelvic	32	9.3
Breech	26	7.6
Placenta type		
Discoid	148	86
Succenturiate	4	2.3
Battledore	6	3.5
Others	3	1.7

Continued

Indication for cesarean section		
1st twin in pelvic presentation	40	23.3
Two previous cesareans	7	4.1
Fetal distress	9	5.2
Anomalous fetal presentation	9	5.2
Gestational diabetes mellitus	10	5.8
Hipertension	106	61.6

Table 4 presents data related to maternal age, body mass index (BMI), initial weight of the pregnant woman, and Apgar scores of both fetuses.

Table 4. Description of variables related to maternal age, BMI, weight gain, and Apgar scores at 1st and 5th minutes for both fetuses.

Variable	*Missing*	Mean ± sd	Min	Max	Median
Maternal age	0	26.66 ± 6.4	14	41	27
Initial weight	0	65.92 ± 14.97	46	145	62
Weight gain	0	13.81 ± 6.7	0	39	13.3
BMI	1	30.95 ± 5.6	19.95	57.4	30.4
Placental weight	89	859.65 ± 242.5	340	1426.00	854
1st twin weight	0	2160.98 ± 639.6	122	3330.00	2235.00
1st minute Apgar	4	6.99 ± 2.4	0	10	8
5th minute Apgar	4	8.39 ± 1.9	0	10	9
2nd twin weight	0	2139.16 ± 618.4	320	3550.00	2245.00
1st minute Apgar	7	7.7 ± 2.2	0	11	8
5th minute Apgar	7	8.6 ± 1.4	0	11	9

BMI: Body Mass Index; Min: Minimum; Max: Maximum.

Table 5 presents data related to fetal outcomes and sex.

Table 5. Description of variables related to fetal outcomes (n = 344).

Variables	n	%
Fetal sex[#]		
Male	119	34.6
Female	105	30.5
1st twin outcome		
Normal	89	25.9
Early neonatal death	4	1.2

Continued

Stillbirth	4	1.2
No NICU required	46	13.4
NICU and congenital malformation	78	22.7
	1	0.3
2nd twin outcome		
Normal	7	2
Early neonatal death	1	0.3
No NICU required	23	6.7
Congenital malformation	5	1.5

[#]120 fetuses did not have their sex described; NICU: Neonatal Intensive Care Unit.

4. Discussion

The presented study, although not aiming for a historical cohort analysis, merely intends to consider potential variables while reviewing observed data compared to a study conducted in 2009 at the same research site [7].

Several factors contribute to the worse prognosis of twin pregnancies (TP). The tendency towards prematurity is considered by many as the most important factor. Additionally, higher incidences of maternal conditions such as preeclampsia, maternal dyspnea, anemia, premature rupture of membranes, and conditions inherent to twin pregnancies such as twin-to-twin transfusion syndrome and umbilical cord entanglement are cited. Theoretically, these conditions affect both twins similarly, regardless of their intrauterine positioning. It is possible that the less favored twin, in terms of nutrition and oxygenation, and exhibiting inferior weight development compared to its counterpart, tends to occupy an inferior or superior position within the uterine cavity [8].

In the present study, the rate of twin pregnancies was 0.8%, lower than in 2009 (1.3%). The average rates of twin pregnancies are similar to those found in other studies (1.5%), although this percentage can reach higher levels (2.6%) [9]-[12].

The average maternal ages observed were 26.7 vs. 25.7 years in 2009. Literature cites an average age of 29 years [10], as well as an increase in the twin birth rate proportional to maternal age increase [11] [13].

In the sample, prenatal care was provided to 170 patients (98.8%). Only two patients did not receive prenatal care (1.2%). It is noteworthy that 22.1% of them initiated prenatal care early, before the 10th gestational week. In the 2009 study, 6.8% (n = 26) of the pregnant women did not undergo prenatal care. Literature data show that only 3.8% of pregnant women with twins attended three or fewer prenatal visits [10]. In this study, the number of pregnant women who attended fewer than 6 prenatal visits was 37 (21.5%), while 125 patients attended more than 6 visits (72.7%). This difference may be attributed to population characte-

ristics, educational levels, as well as improved awareness of prenatal care importance. Prenatal care is associated with a decrease in preterm birth rates, regardless of whether it is a low-risk or high-risk pregnancy [14].

Black race seems to be associated with twin pregnancies [13] [15]. There was an increase in the number of black women in the current study (23.8% vs. 7.7% in 2009). Observed data differ from Lynch's findings, which do not demonstrate a contribution of black race to multiple pregnancy rates. In his research, only 7.7% were black [16].

In Brazil, there is a marked trend towards cesarean section as the chosen delivery method for completing multiple pregnancies. In the current study, the rate of vaginal deliveries was 55.8% (n = 96), and cesarean section rate was 44.2% (n = 76). The cesarean section rate in 2009 was 57.1%, similar to other studies citing rates of 53.1% in multiple pregnancies. In the present study, the main indications for abdominal delivery were pelvic presentation in the 1st twin (23%), two or more previous cesarean deliveries (4.1%), fetal compromise (5.2%), and anomalous presentation (5.2%) [10]-[12]. In the 2009 study, the main causes were pelvic and cord presentations of the first fetus: 23% vs. 1.1%, respectively. Compiled works cite rates ranging from 8.4% to 12.2% of non-cephalic presentations of the first twin [11] [17]. It is emphasized that in multiple pregnancies, the mode of delivery may be influenced by gestational age, fetal weight, fetal presentations, amniotic fluid volume, and placental location [17].

Multiple deliveries usually occur, on average, between the 35th and 36th week [16] [18]. An average duration of 36.3 weeks is reported for twin pregnancies. In the current study, the average gestational age at delivery was 36 weeks [19] [20]. A 9.9% incidence of preterm labor episodes was observed in the study group vs. 12.2% in 2009. In literature data, the rates of preterm births were around 35% [12] [21].

The average fetal weight for the 1st twin observed in this study was 2160.9 ± 639.6 g and 2139.16 ± 618.4 g for the 2nd twin. No discrepancies were observed among the weights in the studied sample. In the 2009 study, the average weight of both fetuses was 2134.0 ± 820.0 g. Average weights of 1890 g for males and 1780 g for females are reported [12]. A percentage of 48.7% of twins weighing between 1500 to 2500 g is mentioned [10] [22]. Likely, the decreased weights are related to the termination of pregnancy before term, as well as the higher occurrence of clinical complications associated with multiple pregnancies, such as hypertensive syndrome.

The incidence of neonatal respiratory depression, defined as Apgar scores below 7 at 1st and 5th minutes, was similar in the first and second twins. Thus, neither neonatal complications nor perinatal mortality seem to have been influenced by the birth order of the twins. However, discordant findings were reported by Fuchi *et al.*, who observed 34 cases of Apgar scores below 7 among second twins versus 17 cases in first twins, out of a total of 104 pregnancies [23]. Maier *et al.* described a more frequent occurrence of acute asphyxia in second

twins when compared to their counterparts. Several authors mention an improvement in the birth conditions of the second twin in recent years [24]. Saacks *et al.* noted a reduction in the interval between births and an increase in Apgar scores in second twins [25]. Rezende *et al.* pointed out a trend towards equalizing the mortality rates of both twins from the 1940s onwards due to a more active approach, including a more liberal indication of cesarean section [26]. In this study, mean and median Apgar scores at 1st and 5th minutes were used for analysis: for the 1st twin, 6.99 ± 2.4 and 8.39 ± 1.9 at 1st minute, and for the 2nd twin, 7.7 ± 2.2 and 8.6 ± 1.4. The values obtained show a tendency towards a lower Apgar score, especially in the 1st minute, although a good evolution of concept vitality was noted at the 5th minute assessment. Literature data indicate an increased incidence of metabolic acidosis with prolonged labor and a statistically significant increase in the risk of neonatal acidosis with periods longer than sixty minutes [27].

In the present study, the stillbirth and neonatal mortality rates were 1.2% and 0.3%, respectively. Among the first twins, 22.7% required intensive care. The main diagnoses made in the NICU were low birth weight (n = 6), respiratory dysfunction (n = 15), small for gestational age (n = 8), and prematurity (n = 64). Prematurity and low birth weight are variables related to the main causes of NICU admission [10] [11]. Research has suggested that term twins have a mortality rate about three times higher than single pregnancies [28]. NICU admission rates of up to 29.9% for twins are mentioned [11]. Perinatal mortality rates vary from 6.2% to 11.5% [10]-[12]. It is believed that the high prematurity rate equally burdens the prognosis of both twins, while cesarean section tends to standardize factors inherently linked to childbirth. In fact, some researchers have associated the poorer prognosis of the second twin with vaginal delivery, particularly when the presentation is non-cephalic and the interval between births is more than 20 minutes [29] [30]. The data from HG corroborate the concept that the second twin tends to present the same perinatal outcomes as the first, provided that the birth conditions are standardized.

The literature cites a higher frequency of fetal malformations among twin pregnancies [9] [31]. In the present study, one case (0.3%) of congenital central nervous system malformation was observed in the 1st twin and five cases (1.5%) in the 2nd twin (1 case of central nervous system malformation and 4 cases of combined malformations). It is also reported that in monochorionic multiple pregnancies, the risk of congenital anomalies is twice as high as in dichorionic pregnancies [31]. The presence of a fetus with a significant congenital anomaly is associated with an increased risk of preterm birth, low birth weight, and perinatal mortality [32].

Regarding maternal clinical complications diagnosed during pregnancy, a higher prevalence of preterm labor episodes (9.9%), previous hypertension (6.9%), urinary tract infection (17.4%), and gestational hypertension (8.1%) was observed, similar to the 2009 study. Literature mentions that most twin pregnan-

cies with premature rupture of membranes after the thirtieth week of gestation correlate with births within two days after rupture. Infection seems to be more of a consequence than the cause of membrane rupture [33]. Gestational age, premature rupture of membranes, weight discordance, and Apgar score at 5th minute are cited as predictors of perinatal complications [34]. It is a known and emphasized fact that twinning is associated with the onset of preterm labor, fundamentally due to uterine overdistension, the need for hospitalization, substantial use of tocolysis, and premature rupture of membranes. A study by Gerardin P *et al.* showed that hypertensive syndromes are present in 5.1% of twin pregnancies and 1.7% of single pregnancies [10]. Preeclampsia in twin pregnancies was related to small for gestational age newborns when compared to normotensive twin pregnancies, although without alteration in the duration of pregnancies [35] [36].

5. Conclusion

The review of twin pregnancies cases at the Obstetrics and Gynecology Department of the General Hospital of Caxias do Sul presented a percentage consistent with those found in the consulted literature and with the findings of the 2009 study, once again highlighting the high rate of maternal and perinatal complications associated with twin pregnancies, characterizing them as high-risk pregnancies. It is worth mentioning the deficient and inadequate documentary description of the data in the hospital records, as it significantly interfered with the statistical analysis.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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