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# Effects of bariatric surgery on perinatal results in pregnancy classified as high risk

**ABSTRACT** | Objective: To analyze maternal and perinatal outcomes in pregnant women after bariatric surgery and classified as high risk. Method: This is an epidemiological, observational, and retrospective study, with a quantitative approach, based on secondary data from 4,293 high-risk pregnant women at a specialized outpatient clinic in southern Brazil. Of this total, 50 pregnant women had bariatric surgery as a pre-existing condition (case group), and given the characteristics of age, marital status and schooling, the control group was homogenized for comparison in the study, resulting in 150 pregnant women. The independent variable will be the pre-existing clinical condition of bariatric surgery. The outcome variables will be prematurity, low birth weight, Apgar <7 in the 1st and 5th minutes, fetal death, neonatal death and type of delivery. Results: When comparing the control group with pregnant women who had previous bariatric surgery, there was an increased relative risk for Apgar score below 7 in the 1st minute. Conclusion: Based on the analysis of the data obtained, it is concluded that bariatric surgery as a pre-existing clinical condition in high-risk pregnant women does not negatively influence perinatal results. However, prenatal and puerperium follow-up must be carried out by a multidisciplinary and trained team that recognizes any possible complications early.

**Keywords:** Maternal and Child Health; Pregnancy Complications; Bariatric Surgery.

**RESUMEN** | Objetivo: analizar los resultados maternos y perinatales en mujeres embarazadas después de la cirugía bariátrica y clasificarlos como de alto riesgo. Método: Este es un estudio epidemiológico, observacional y retrospectivo, con un enfoque cuantitativo, basado en datos secundarios de 4,293 mujeres embarazadas de alto riesgo en una clínica ambulatoria especializada en el sur de Brasil. De este total, 50 mujeres embarazadas se sometieron a cirugía bariátrica como una condición preexistente (grupo de casos), y dadas las características de edad, estado civil y educación, el grupo de control se homogeneizó para comparación en el estudio, lo que resultó en 150 mujeres embarazadas. La variable independiente será la condición clínica preexistente de la cirugía bariátrica. Las variables de resultado serán: prematuridad, bajo peso al nacer, Apgar <7 en el primer y quinto minutos, muerte fetal, muerte neonatal y tipo de parto. Resultados: Al comparar el grupo de control con mujeres embarazadas que se sometieron a cirugía bariátrica previa, hubo un mayor riesgo relativo de puntaje Apgar por debajo de 7 en el primer minuto. Conclusión: Con base en el análisis de los datos obtenidos, se concluye que la cirugía bariátrica como una condición clínica preexistente en mujeres embarazadas de alto riesgo no influye negativamente en los resultados perinatales. Sin embargo, el seguimiento prenatal y puerperio debe ser realizado por un equipo multidisciplinario y capacitado que reconozca cualquier posible complicación temprana.

**Descriptores:** Salud Materno-infantil; Complicaciones del Embarazo; Cirugía Bariátrica.

**RESUMO** | Objetivo: Analisar os desfechos maternos e perinatais em gestantes pós cirurgia bariátrica e classificadas como alto risco. Método: Trata-se de um estudo epidemiológico, observacional e retrospectivo, com abordagem quantitativa, realizado a partir de dados secundários de 4.293 gestantes de alto risco de um ambulatório especializado do sul do Brasil. Desse total, 50 gestantes tinham como condição clínica pré-existente a cirurgia bariátrica (grupo caso), e diante das características de idade, situação conjugal e escolaridades homogeneizou-se o grupo controle para comparação no estudo, obtendo-se 150 gestantes. A variável independente será a condição clínica pré-existente de cirurgia bariátrica. As variáveis desfechos serão: prematuridade, baixo peso ao nascer, Apgar <7 no 1º e 5º minutos, óbito fetal, óbito neonatal e tipo de parto. Resultados: Ao comparar o grupo controle com gestantes que possuem cirurgia bariátrica previa, notou-se um risco relativo aumentado para índice de Apgar abaixo de 7 no 1º minuto. Conclusão: Com base na análise dos dados obtidos, conclui-se que a cirurgia bariátrica como condição clínica pré-existente em gestantes de alto risco não influencia negativamente os resultados perinatais. Todavia o acompanhamento durante pré-natal e puerpério devem ser realizados por uma equipe multidisciplinar e capacitada, que reconheça precocemente qualquer possível complicação.

**Palavras-chaves:** Saúde Materno-Infantil; Complicações na Gravidez; Cirurgia Bariátrica.

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## INTRODUCTION

The bariatric surgery procedure is currently considered the most efficient method for treating obesity and maintaining weight in the long term. Thus, with the steady increase in the number of obese people, along with the difficulty of conventional (clinical) treatment and the good results from the surgical procedure, the number of bariatric

surgeries has significantly increased in recent years<sup>(1)</sup>.

However, there are indications for this procedure, stipulated by the Ministry of Health (MS), such as: for individuals who have a BMI (body mass index) > 50kg/m<sup>2</sup>; individuals with a BMI > 40kg/m<sup>2</sup> with or without comorbidities and without success in clinical treatment performed for at least two years; and for individuals with a BMI > 35kg/m<sup>2</sup> with comorbidities and without success in clinical treatment, also performed for at least two years. In addition, the MS also lists criteria for indication and contraindication for surgery<sup>(2)</sup>.

According to the Brazilian Society of Bariatric and Metabolic Surgery (SBCBM), in 2016, more than 100,000 bariatric surgeries were performed, and in 76% of cases, the patient was female. Thus, the number of women of childbearing age with previous bariatric surgery is constantly increasing, and the care related to the consequences of the procedure in future pregnant women, be greater and carried out by a trained multidisciplinary team<sup>(3)</sup>.

These precautions refer to the risks of the procedure for pregnant women, and among these risks, the nutritional deficiencies that may occur after the surgery stand out, causing deficits in vitamins, proteins and electrolytes, and inadequate supplementation during the gestation period can cause several changes in the fetus, such as growth retardation and electrolyte imbalance, again emphasizing the role of the multidisciplinary team in this care, more specifically, the nutritionist in this case; in addition, the possible malabsorption caused by bariatric surgery can also generate fetal complications. Thus, the recommendation is for pregnancy to occur 18 months after bariatric surgery, in order to establish homeostasis in women again<sup>(4)</sup>.

Pregnancy is a natural, physiological event, which normally occurs une-



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ventfully, however, in about 20% of cases, there is the possibility of pregnancy evolving in an unfavorable way, both for the mother and the fetus, characterizing a high pregnancy risk. The latter has ample obstetric, social, and clinical conditions, which can cause complications in the gestational period and which, in turn, can compromise the well-being of the maternal-fetal binomial, and lead to the unfavorable outcome of pregnancy. This risk assessment in pregnancy is a recommendation of the MS, and includes several factors to be considered<sup>(5)</sup>.

In this context, the objective of this study was to analyze maternal and perinatal outcomes in pregnant women after bariatric surgery and classified as high risk.

## METHODOLOGY

This is an epidemiological, observational, and retrospective study, with a quantitative approach, based on secondary data from 4,293 high-risk pregnant women from a specialized outpatient clinic in southern Brazil. Of this total, 50 pregnant women had bariatric surgery as a pre-existing condition (case group), and given the characteristics of age, marital status and education, the control group was homogenized for comparison in the study, resulting in 150 pregnant women.

Data were collected in the period from November 2016 to October 2017, using the pregnant woman's medical record, risk classification form and newborn registration book at the hospital of reference for childbirth.

The independent variable will be the pre-existing clinical condition of bariatric surgery. The outcome variables will be prematurity, low birth weight (LBW), Apgar <7 in the 1st and 5th minutes, fetal death, neonatal death and cesarean section.

The data were entered and organized in a Microsoft Office Excel

2017® spreadsheet, later processed, and analyzed with the Epi Info 7.0 software, a public domain program. The data were submitted to the chi-square ( $\chi^2$ ) and Fisher's exact tests at a level of significance of 5% ( $p < 0.05$ ) and a confidence interval (CI) of 95%.

All the standards for Research Involving Human Beings of the National Health Council (CNS Resolution No. 466/2012) were complied with and approved according to opinion No. 2,287,476 of the Standing Commit-

tee on Ethics in Research with Human Beings (COPEP).

## RESULTS

The high-risk pregnant women whose pre-existing clinical condition is bariatric surgery in this study, presented as predominant characteristics: age between 20 and 34 years (70.0%), white skin (82.0%); live with a partner (70.0%) and have an education of 8 years or more (76.0%). It is worth noting

that the control group had the same characteristics in terms of age, marital status, and education, as they were homogenization criteria (Table 1).

When comparing the group of pregnant women who had bariatric surgery as an obstetric history with the control group, there was an increased relative risk only for Apgar score below 7 in the first minute (RR = 0.83,  $p = 0.01$ ) (Table 2).

## DISCUSSION

Given the above, there was an increased relative risk for an Apgar score below 7 in the 1st minute, however, the other variables analyzed, such as prematurity, low birth weight, Apgar in the 5th minute, fetal death, neonatal death and type of childbirth, did not present significant statistical values.

The number of bariatric surgeries in women of childbearing age is increasing, a fact that worries health professionals, since the scientific literature is still scarce and does not sufficiently clarify the risks of the procedure for these pregnant women, with contradictory opinions, according to studies with reduced casuistry. For example, a survey, which explained that pregnancy in the postoperative period of the bariatric surgery procedure is safe, however, some pregnant women showed signs of anemia and significant weight loss<sup>(6)</sup>. Corroborating yet another study, analyzing 159,210 deliveries in which 298 deliveries were for patients after bariatric operations, found that previous bariatric surgery, although an independent risk factor for cesarean section ( $p < 0.001$ ), is not associated with perinatal results adverse<sup>(7)</sup>.

However, despite the scarce results and studies on the subject, the pregnant woman who previously underwent bariatric surgery, for having undergone a procedure that alters the body's metabolism, should take great

**Table 1. Sociodemographic profile of pregnant women stratified as high risk with an obstetric history of Bariatric Surgery and Control Group. Maringá, PR, Brazil, 2017.**

Variáveis	Grupo Controle (n=150)		Cirurgia Bariátrica (n=50)		p
	n	%	n	%	
<b>Idade</b>					<b>1,00</b>
20 a 34	105	70,0	35	70,0	
35 ou mais	45	30,0	15	30,0	
<b>Cor</b>					<b>0,40</b>
Branca	95	63,3	41	82,0	
Preta	07	4,7	01	2,0	
Parda	48	32,0	08	16,0	
<b>Situação conjugal</b>					<b>1,00</b>
Vive com o companheiro	105	70,0	35	70,0	
Não vive com o companheiro	45	30,0	15	30,0	
<b>Escolaridade</b>					<b>1,00</b>
< 8 anos	36	24,0	12	24,0	
≥ 8 anos	114	76,0	38	76,0	

**Table 2. Analysis of Bariatric Surgery and control group in relation to perinatal results. Maringá, PR, Brazil, 2017.**

Resultados Perinatais	Grupo Controle (n=150)		Cirurgia Bariátrica (n=50)		RR	p
	n	%	n	%		
Prematuridade (<37 semanas)	60	40,0	13	26,0	0,81	0,07
Baixo peso ao nascer (<2.500 g)	45	30,0	11	22,0	0,90	0,27
Apgar 1° min. (<7)	38	25,3	05	10,0	0,83	0,01
Apgar 5° min. (<7)	10	6,7	01	2,0	0,95	0,19
Morte fetal	02	1,33	-	-	-	-
Morte infantil	06	4,0	-	-	-	-
Cesárea	109	72,7	41	82,00	1,52	0,18

ter precautions and care. Within the precautions and care, it is possible to emphasize the time after bariatric surgery and before becoming pregnant, which, for some authors, must wait about a year after the procedure to get pregnant, since in this period weight loss will occur more intense, and after this period, the woman's body will adapt, seeking body homeostasis, so pregnancy after this period would become safer<sup>(4)</sup>.

In this study, the Apgar score below 7 was observed in the first minute, as a statistically significant result, however, other changes were not significant. However, one study associated obesity with unfavorable perinatal outcomes, such as increased risk of babies with high gestational age, premature birth, gestational diabetes, congenital malformations, among others. Therefore, obesity can cause complications for the woman and the future child, so obesity must be combated, and in many cases, it is combated by bariatric surgery. This procedure can also cause unfavorable perinatal complications<sup>(8)</sup>.

Bariatric surgery, which induces weight reduction and mitigation of the risks inherent to diseases associated with morbid obesity, has a relationship with reproductive benefits, for both women and men<sup>(9)</sup>.

Perinatal outcomes after the bariatric surgery procedure tend to approximate those of the obstetric population in general. However, special considerations are necessary when caring for a pregnancy after the procedure, and further research should consider a greater role for bariatric surgery in perinatal outcomes in pregnancies<sup>(10)</sup>.

According to a survey, which evaluated biochemical data of pregnant women with previous bariatric surgery, noted that, at the end of pregnancy, women had inadequacies in terms of glucose, total cholesterol, creatinine, zinc, albumin, triglycerides and vitamin D. It is recommended that

determining the nutritional status of the pregnant woman is important, as the gestation period requires specific nutritional needs<sup>(11)</sup>.

When observing biochemical variations in women after bariatric surgery, it is understood that safe pregnancy can only occur after stabilization of body weight and nutritional deficiencies caused by the procedure, therefore, counseling before pregnancy should be done individually, with monitoring and supplementation if necessary, so that when the woman with the previous procedure goes through the pregnancy period, she does not find situations unfavorable to the binomial - mother-baby<sup>(12)</sup>.

The manual of prenatal care of the Brazilian Federation of Gynecology and Obstetrics Associations (FEBRASGO), women who are obese tend to have irregular cycles, and weight loss alone can lead to an increase in post-fertility rates. Surgery and normalize the woman's hormonal levels, in addition to increasing self-esteem and rhythm of sexual activity. Added to this, the reduction of risks related to hypertension, pre-eclampsia, thromboembolic accidents, fetal macrosomia and diabetes, as a consequence of the reduction of the patient's body weight, culminating in the reduction of possible complications for the maternal-fetal binomial<sup>(13)</sup>.

Another study showed that obese patients who underwent gastropasty (a bariatric surgery technique), had a significant decrease in the need for cesarean section, incidence of fetal macrosomia and gestational diabetes. However, the same study explains that patients may develop deficiencies in some compounds, such as vitamin B12, folate, calcium and iron, which may result, if not properly planned and monitored, in an increased risk for maternal and fetal complications such as anemia, restriction of intrauterine growth and neural tube defects. Thus, the study reiterates

the importance of frequent monitoring of pregnant women with previous bariatric surgery<sup>(14)</sup>.

As already mentioned, pregnant women who had previously undergone bariatric surgery have a reduced risk of maternal (gestational diabetes, hypertension) and fetal (fetal macrosomia) complications. Comparing the delivery types there are variations in cesarean sections according to the literature, from 61.5 to 70%. Regarding newborns small for gestational age, there are also variations from 11.5 to 23.3%<sup>(15,16)</sup>.

Regarding prematurity associated with bariatric surgery, the analyzes of this study did not show significant results ( $p = 0.07$ ), disagreeing, a systematic review with meta-analysis, presents the impacts of bariatric surgeries on obstetric and neonatal results, and highlights the incidence of premature birth ( $p = 0.006$ ), in addition, reduced incidence of preeclampsia ( $p = 0.007$ ) and gestational diabetes ( $p < 0.001$ ), greater maternal anemia ( $p = 0.002$ ) and neonatal admission to an intensive care center -  $p = 0.03$ <sup>(17)</sup>.

It is worth mentioning that women with obesity have a three times higher incidence of gynecological problems, in addition, they have endocrine and metabolic changes such as disturbance in steroid metabolism and changes in hormone secretion, obtaining a relationship between obesity and infertility, through hyperinsulinemia, functional hyperandrogenism and anovulation. All these unfavorable outcomes for obesity can encourage obstetric conditions, such as reduced oocyte quality, pre-eclampsia, prematurity, and others. The role of the bariatric procedure is to fight obesity and ends up positively impacting fertility and obstetric prognosis in these previously obese patients. However, even with these positive aspects, there is a recommendation between time for pregnancy after the bariatric procedure

re, due to the changes that occur in the woman's body<sup>(18)</sup>.

The consensus on the effect of improving fertility occurs when the reduction in body weight reaches 10%, and bariatric surgery is an efficient means of achieving this reduction. This same study correlates that about 40% of the women analyzed in the study were not aware that they should wait about 12 to 18 months to become pregnant to reestablish body homeostasis. This same study demonstrates that obesity influences fertility only before the age of 37, and that after this period, the effect of obesity is overcome by age, therefore, weight loss to improve fertility must occur before the age of 37<sup>(19)</sup>.

Women undergoing bariatric surgery may have a lower risk of maternal complications, such as gestational diabetes, compared to obese women.

Furthermore, risks of nutritional deficiency seem rare and low birth weight is not entirely clear. In fact, special attention should be given to women who have undergone previous bariatric surgery to ensure adequate maternal and fetal nutrition, in addition to recognizing possible complications early, such as fetal macrosomia, premature rupture of membranes, perinatal death and others<sup>(20)</sup>.

Based on the findings described and on the analysis of the scientific literature, it is understood that bariatric surgery does not negatively influence perinatal outcomes in pregnancies, so that in some cases it may present positive points from its previous performance. However, attention to pregnant women with previous surgery must be multidisciplinary and careful, seeking to recognize any complications in advance.

## CONCLUSION

With the analysis of the obstetric and perinatal results of the evaluated population, it is concluded that bariatric surgery does not negatively influence perinatal results in high-risk pregnancies, being, therefore, safe, if it is not early. It is necessary to emphasize that the monitoring must be adequate and carried out by a multidisciplinary team, ensuring efficient nutritional and prenatal control. Thus, pregnancy, when occurring in the postoperative period of bariatric surgery, should occur safely. However, further investigations are necessary to establish, in fact, the appropriate recommendations for this segment of pregnancy, since studies of this nature have associated limitations, such as reduced casuistry, non-uniform conclusions and scarce publications. 🐦

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