

Systematic Review and Meta-Analysis of Perinatal Outcome After Gastric Banding vs. Gastric Sleeve

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Abstract

Background: Obesity is a widespread health issue caused by a combination of genetic and environmental factors. The prevalence of obesity is increasing globally, including in Belgium. Bariatric surgery is often used as a treatment option for patients with higher classes of obesity. However, there is a growing population of women who have undergone bariatric surgery and are either planning to become pregnant or are already pregnant. This population poses unique challenges and requires further research to guide their management during pregnancy. There are two main groups of bariatric surgery, malabsorptive and restrictive. This systematic review and meta-analysis aimed to compare perinatal outcomes, specif cally birth weight, preterm birth, and early and late pre-eclampsia, between diferent types of restrictive procedures, namely gastric sleeve and gastric banding.

Methods: English or Dutch language articles were identifed in a Medline, Embase, and Cochrane Library search without publication date restriction using the keywords for pregnancy and bariatric surgery or gastric sleeve or gastric banding. A total of 16 studies were included in the review, consisting of case-control studies, cohort studies, reviews, and guidelines. Meta-analysis was performed using a random efects model.

Results: The meta-analysis of four studies revealed that gastric banding was associated with a reduced risk of having a Small for Gestational Age (SGA) baby compared to obese women without bariatric surgery. Similarly, the odds of having a Large For Gestational Age (LGA) infant were lower after gastric banding. However, these fndings were not statistically signifcant. Gastric banding did show a signif cant reduction in the risk of developing gestational hypertension and pre-eclampsia compared to obese women. The meta-analysis showed no statistically signifcant diference in the risk of preterm delivery between gastric banding and obesity.

Conclusion: The results suggest that gastric banding may have beneficial effects on perinatal outcomes, including a reduced risk of SGA, LGA, gestational hypertension, and pre-eclampsia. It is recommended that restrictive bariatric surgery be considered in women of reproductive age to minimize pregnancy complications. The current evidence does not allow us to compare the differences in perinatal outcomes between gastric banding and sleeve gastrectomy. Most of the research has been done on gastric banding, and there is little evidence about perinatal outcomes after sleeve gastrectomy. More trials are needed to compare the effects of sleeve gastrectomy and gastric banding on pregnancy outcomes.

Keywords: Obesity; Bariatric surgery; Pregnancy; Complications; Genetics; Patients

Introduction

Group	BMI (kg/m²)		
Normal weight	18.5-24.9		
Overweight	25-29.9		
Obesity class I	30-34.9		
Obesity class II	35-39.9		
Obesity class III	40		

Table 1:Classif cation of BMI.

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Quality assessment

Analysis

Meta-analysis

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6 **Pre-eclampsia**

Preterm delivery

Summary according to procedure type

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Reference	Type of surgery	Study population, pre-pregnancy age (y) and BMI (kg/m2)	Controls	Signif cant diference compared with control group	No diference compared with control group	Authors conclusion
Dixon, et al. [9]	Banding	79 women, age 29.9 ± 4.7, no BMI available	 Pre-LAGB pregnancies Obese matched controls 	-	Birthweight	Pregnancy risk after LAGB is comparable to risk of general public
Ducarme, et al. [10]	Banding	13 women, age 31.5 ± 5.7, BMI 34.8 ± 3.2	414 women, age 31.0 ± 6.0, BMI 35.8 ± 4.0	-	Labor induction, PIH, pregnancy duration, post-partum hemorrhage	Risk for obstetric complications is reduced in women after LAGB compared with women without LAGB
Chevrot, et al. [11]	Banding/Sleeve/ Bypass	139 women, age 31 ± 4.9, BMI 34.1 ± 6.0	139 women, age 32.4 ± 5.0, BMI 41.5 ± 1.7	Decreased rate of gestational diabetes and large for gestational age. Increased rate of small for gestational age (only with bypass)	-	Malabsorptive bariatric surgery was associated with an increased risk of fetal growth restriction.
Watanabe, et al. [12]	Banding/Sleeve/ Bypass	Banding: 6 women, age 28, BMI 31.2	Sleeve: 5 women, age 35, BMI 24.8. Bypass: 13 women, age 30, BMI 42	Decrease in birth weight between banding and bypass	-	Maternal anemia after malabsorptive surgery may lead to low neonatal birth weight, which could be attributed to the large-scale reduction in maternal micronutrient levels.

Table 2: Overview of case-control studies.

Reference	Type of surgery	Study population, pre-pregnancy age (y) and BMI (kg/m2)	PET	SGA (<p10)< th=""><th>LGA (>p90)</th><th>Preterm delivery (<37 w)</th></p10)<>	LGA (>p90)	Preterm delivery (<37 w)
Sheiner, et al. [13]	Bypass/Banding	Only Banding: 202 pregnancies, age 31.7 ± 4.7, BMI 31.9 ± 6.2	6.9%	9.4%	4.5%	9.9%
Lapolla, et al. [14]	Banding	83 pregnancies, age 31.4 ± 4.6, BMI 35.0 ± 7.3	12%	1.4%	17.6%	17.6%
Carelli, et al. [15]	Banding	121 pregnancies, age 32.69 ± 3.86, BMI 32.7 ± 7.53	5%	8%	7%	6%
Coupaye, et al. [16]	Bypass/Sleeve	Only Sleeve: 46 pregnancies, age 31.1 ± 4.8, BMI 31.6 ± 6.8	0%	19%	9%	5%
Cornthwaite, et al. [6]	Bypass	290 pregnancies, age 32.9 ± 5.2, BMI 34.5 ± 7.0	-	-	-	-
Cornthwaite, et al. [6]	Banding	107 pregnancies, age 31.8 ± 4.9, BMI 36.4 ± 7.3	2.8%	7%	21%	13%
Cornthwaite, et al. [6]	Sleeve	29 pregnancies, age 34.2 ± 5.8, BMI 32.0 ± 5.3	0%	3%	3%	14%

Table 3: Overview of cohort studies.

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Reference	Type of surgery	PET	SGA (<p10)< th=""><th>LGA (>p90)</th><th>Preterm delivery (<37 w)</th></p10)<>	LGA (>p90)	Preterm delivery (<37 w)
Guelinckx, et al. [17]	Not specifed	Decrease in the risk of pre- eclampsia after bariatric surgery	Increased risk for Intra- Uterine Growth Restriction (IUGR) and SGA	Decrease in mean birthweight after surgery-induced weight loss compared with pre- operative pregnancies	No diference
Magdaleno, et al. [18]	Not specifed	Lower rates of hypertensive disorders after bariatric surgery	Increase in SGA (mainly after malabsorptive bariatric surgery)	Decrease in macrosomia	NA
Vrebosch, et al. [19]	Gastric banding	The incidence of pre-eclampsia is lower in gastric banding pregnancies than in non-gastric banding pregnancies in obese women, but higher than in average- weight women without gastric banding	The incidence of low birth weight is lower in gastric banding pregnancies than in non-gastric banding pregnancies in obese women	Decrease in macrosomia in comparison to non-gastric banding pregnancies in obese women	The rate of preterm deliveries was higher in the gastric banding group than in the average-weight group without gastric banding
Dalfra, et al. [20]	Malabsorptive vs restrictive bariatric surgery	The incidence of pre-eclampsia in pregnancies after bariatric surgery is lower than in pregnancies in obese women but higher than in average- weight women without previous bariatric surgery	More SGA	Decrease in macrosomia	More preterm births with gastric bypass than gastric banding
Galazis, et al. [21]	Not specifed	Lower incidence of pre-eclampsia compared with controls	Higher incidence of small neonates compared with controls	Lower incidence of large neonates compared with controls	Higher incidence of preterm birth compared with controls
Akther, et al. [22]	Not specifed	NA	Higher incidence of small neonates after malabsorptive surgeries, not after restrictive surgeries	Lower incidence of large neonates after malabsorptive surgeries, not after restrictive surgeries	Increase in preterm birth

Table 4: Overview of review studies.



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ID	Study	OR	p-value	Weight	Weight (%)
1.00	Ducarme, et al. [10]	0.70	0.74	0.58	14.28
2.00	Dixon, et al.[9]	0.69	0.55	1.03	25.10
3.00	Lapolla, et al. [14]	0.22	0.00	1.36	33.25
4.00	Chevrot, et al. [11]	1.55	0.42	1.12	27.38
Overall		0.59	0.29	-	-

 Table 5: Study related to incidence of SGA after gastric banding versus obese women.





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ID	Study	OR	p-value	Weight	Weight (%)
1.00	Ducarme, et al. [10]	0.93	0.95	0.71	10.69
2.00	Dixon, et al. [9]	0.18	0.00	2.06	31.04
3.00	Lapolla, et al. [14]	0.35	0.01	2.10	31.55
4.00	Chevrot, et al. [11]	0.85	0.75	1.78	26.72
Overall		0.40	0.02	-	-

 Table 7: Study related to incidence of gestational hypertension after gastric banding versus obese women.



Figure 6: Forest plot of incidence of pre-eclampsia after gastric banding versus obese women. Note: () Efect size of each study; () Estimated overall efect size; () No-efect value; () Stimated overall effect size; () Overall effect size value; () Estimated overall confidence interval; Model: Random-effects model; Heterogeneity: Tau-squared=0.34, H-squared=1.81, I-squared=0.45; Homogeneity: Q=3.48; df=2, p-value=0.18; Axis is shown using log scale.

ID	Study	OR	p-value	Weight	Weight (%)
1.00	Ducarme, et al. [10]	1.10	0.95	0.40	10.39
2.00	Dixon, et al. [9]	0.16	0.00	1.49	38.50
3.00	Lapolla, et al. [14]	0.52	0.11	1.97	51.11
Overall		0.36	0.04	-	-

Table 8: Study related to incidence of pre-eclampsia after gastric banding versus obese women.



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