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Introduction

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vs. Gastric Sleeve. J Obes Weight Loss Ther S6:003.

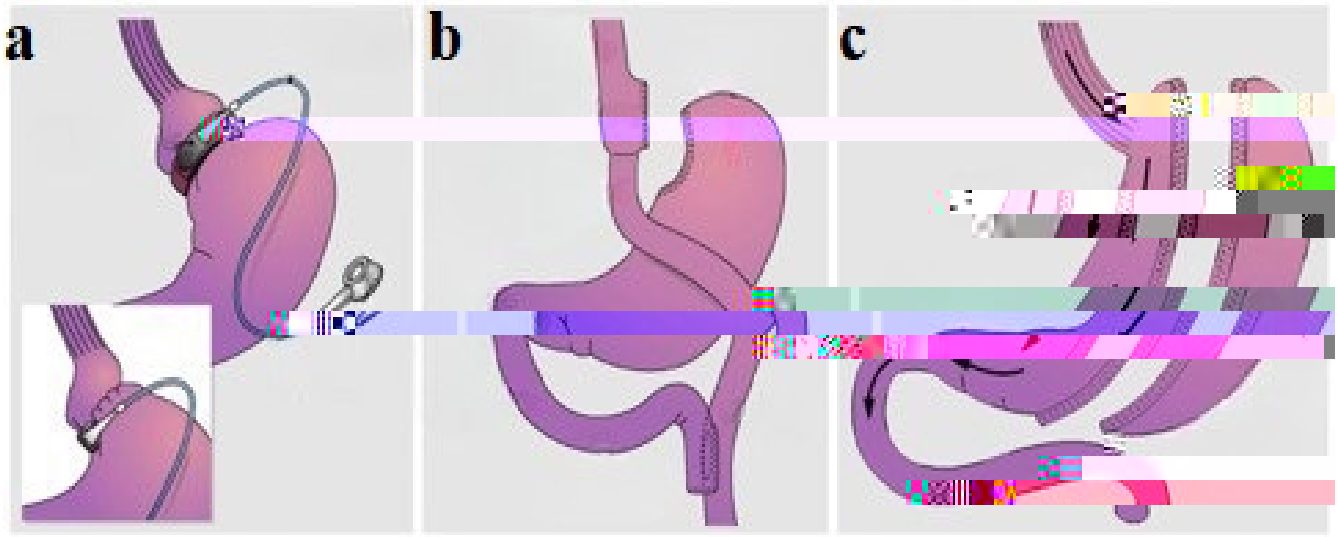

Figure 1: Overview of types of bariatric surgery, adapted from Cornthwaite, et al. [6], a) Gastric banding, b) Roux-en-Y-Bypass, c) Sleeve gastrectomy.

Quality assessment

Analysis

Meta-analysis

Pre-eclampsia

Preterm delivery

Summary according to procedure type

Reference	Type of surgery	Study population, pre-pregnancy age (y) and BMI (kg/m2)	Controls	Significant difference compared with control group	No difference compared with control group	Authors conclusion
Dixon, et al. [9]	Banding	79 women, age 29.9 ± 4.7, no BMI available	1) Pre-LAGB pregnancies 2) 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)	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.

Reference	Type of surgery	PET	SGA (<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 difference
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.

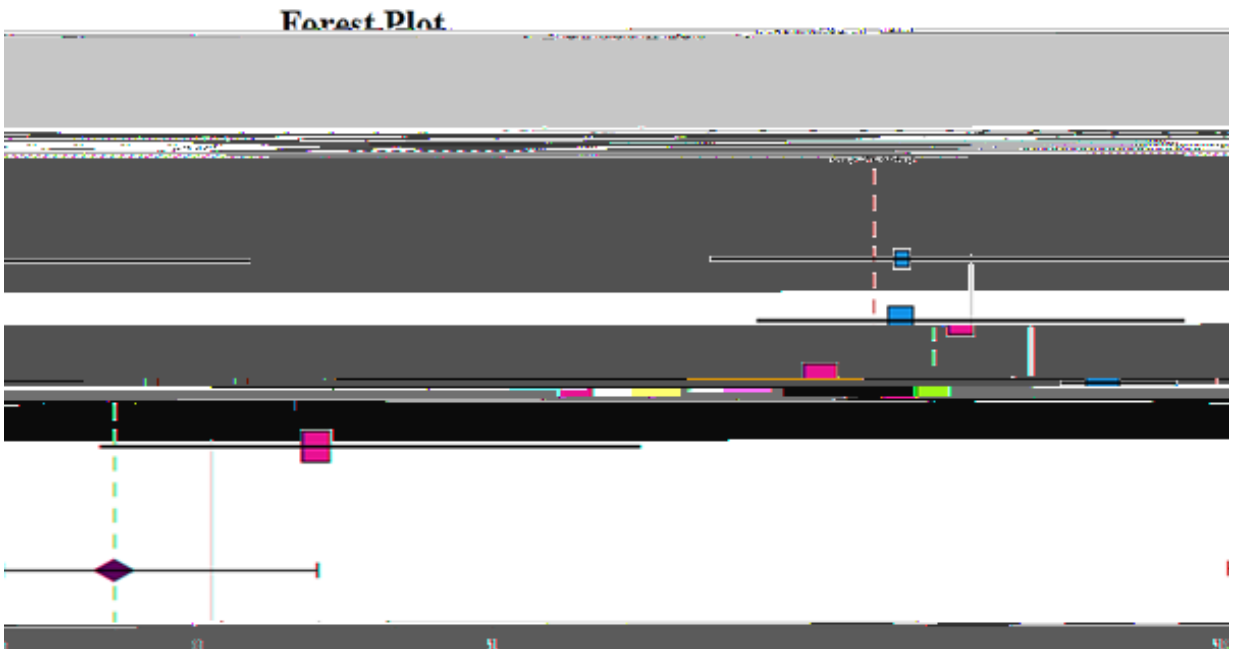

Figure 3: Forest plot of incidence of SGA after gastric banding versus obese women. **Note:** (■) Efect size of each study; (◆) Estimated overall efect size; (┊) No-efect value; (▬) Confdence interval of efect size; (┅) Overall efect size value; (├┤) Estimated overall confdence interval; Model: Random-efects model; Heterogeneity: Tau-squared=0.60, H-squared=2.89, I-squared=0.65; Homogeneity: Q=9.81; df=3, p-value=0.02; Axis is shown using log scale.

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.

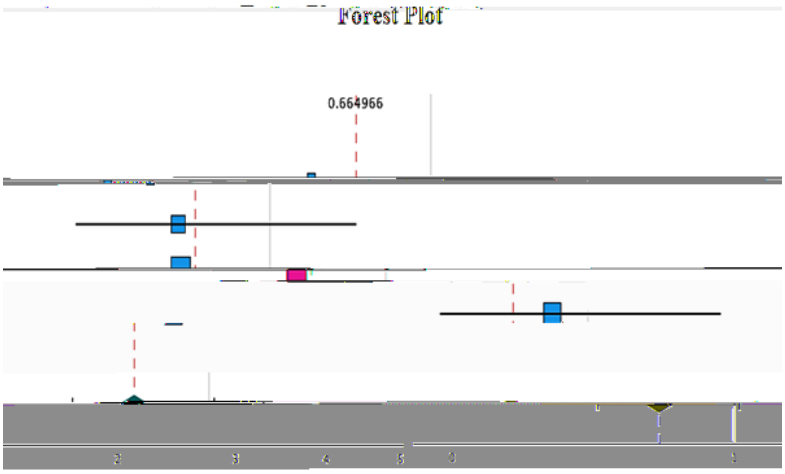

Figure 4: Forest plot of incidence of LGA after gastric banding versus obese women. **Note:** (■) Effect size of each study; (◆) Estimated overall effect size; ( ) No-effect value; ( ) Confidence interval of effect size; ( ) Overall effect size value; (⊢⊣) Estimated overall confidence interval; Model: Random-effects model; Heterogeneity: Tau-squared=0.00, H-squared=1.00, I-squared=0.00; Homogeneity: Q=0.55; df=3, p-value=0.91; Axis is shown using log scale.

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.

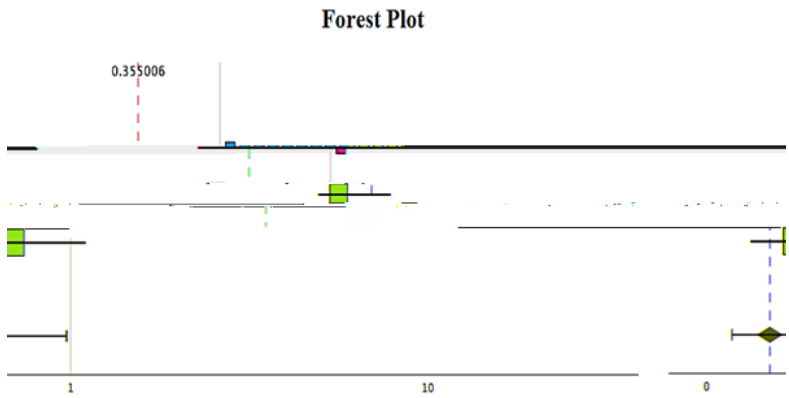

Figure 6: Forest plot of incidence of pre-eclampsia after gastric banding versus obese women. **Note:**( ) Effect size of each study; ( ) Estimated overall effect size; ( ) No-effect value; ( ) Confidence interval of effect size; ( ) Overall effect size value; ( ) Estimated overall confidence interval; 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.

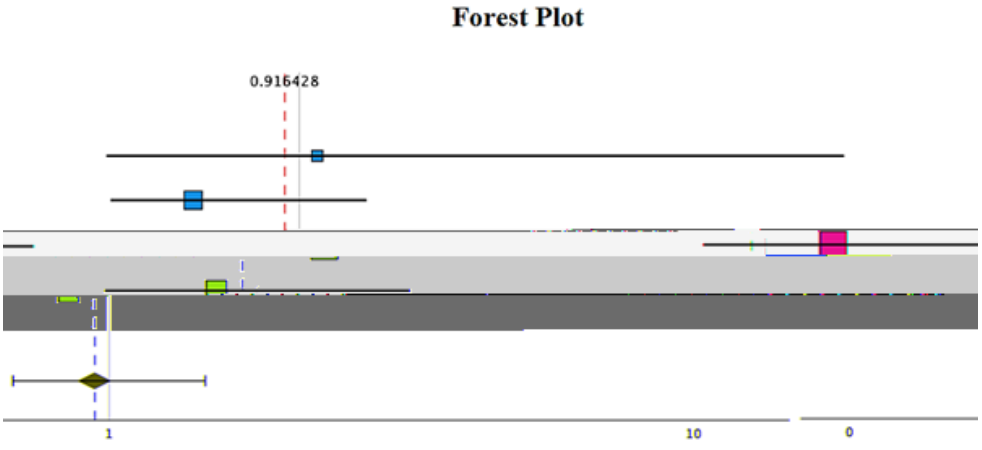

Figure 7: Forest plot of incidence of preterm delivery after gastric banding versus obese women. **Note:** ( ) Effect size of each study; ( ) Estimated overall effect size; ( ) No-effect value; ( ) Confidence interval of effect size; ( ) Overall effect size value; ( ) Estimated overall confidence interval; Model: Random-effects model; Heterogeneity: Tau-squared=0.06, H-squared=1.19, I-squared=0.16; Homogeneity: Q=2.82; df=3, p-value=0.42; Axis is shown using log scale.

12. Watanabe A, Seki Y, Haruta H, Kikkawa E, Kasama K (2019) Maternal impacts and perinatal outcomes after three types of bariatric surgery at a single institution. Arch Gynecol Obstet 300: 145-152.

13. Sheiner E, Balaban E, Dreiher J, Levi I, Levy A (2009) Pregnancy outcome in