Prise en charge d'une grossesse après Chirurgie Bariatrique

Jean-Louis Sadoul
CHU de Nice

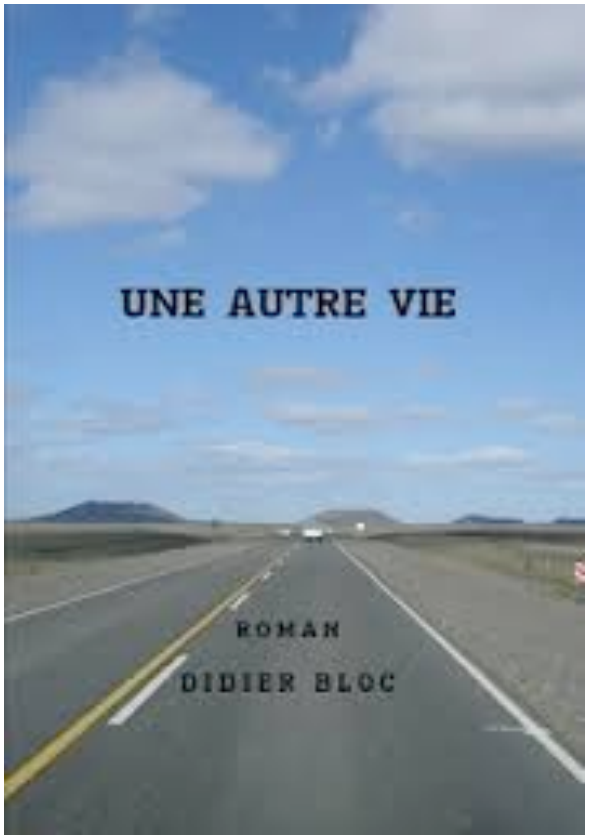
CERON - Nice-Côte d'Azur
CENTRE SPÉCIALISÉ DE L'OBÉSITÉ

CHU NICE

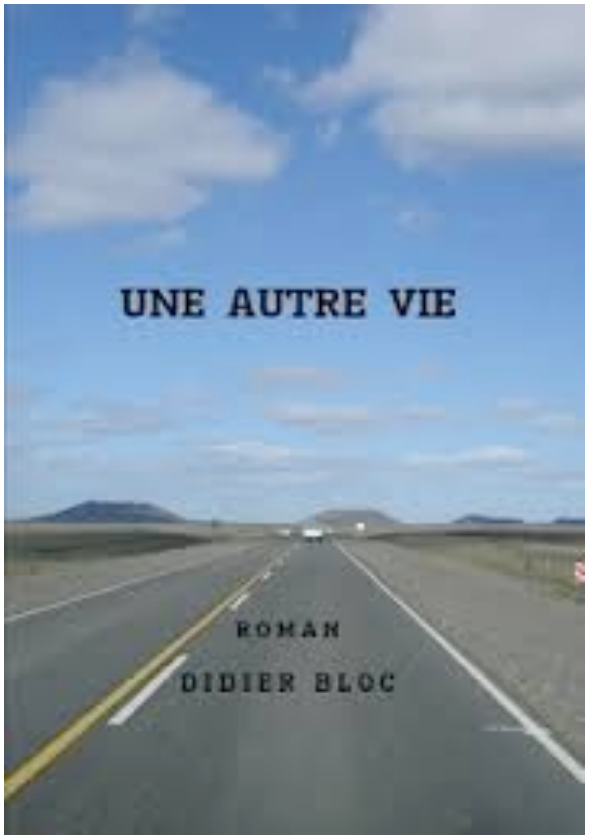
FACULTE DE MEDECINE
UNIVERSITE DE NICE SOPHIA ANTIPOLIS

Centre d'**E**tudes et de **R**echerche sur l'**O**bésité de **N**ice Côte d'Azur

CB → « Docteur c'est une autre vie »



CB → « Docteur c'est une autre vie »



Agenda

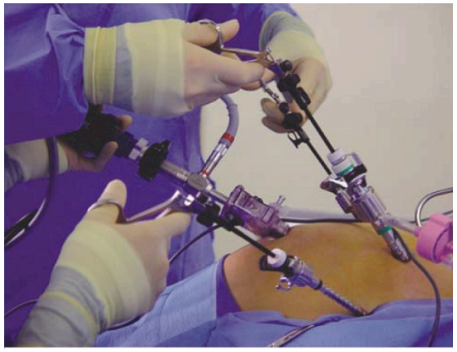
- Un défi pour aujourd'hui et demain
- Quid des G après CB
- Risques nutritionnels
- Risques abdominaux spécifiques
- En pratique

Un défi pour aujourd'hui et pour demain

On devient obèse plus tôt : âge moyen où P.obésité = 10 % → 28 ans

Prévalence obésité massive augmente : 300 % en 15 ans

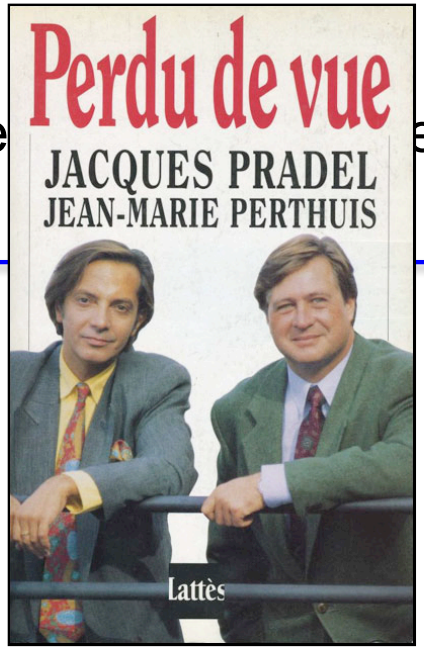
Y compris chez les Femmes jeunes



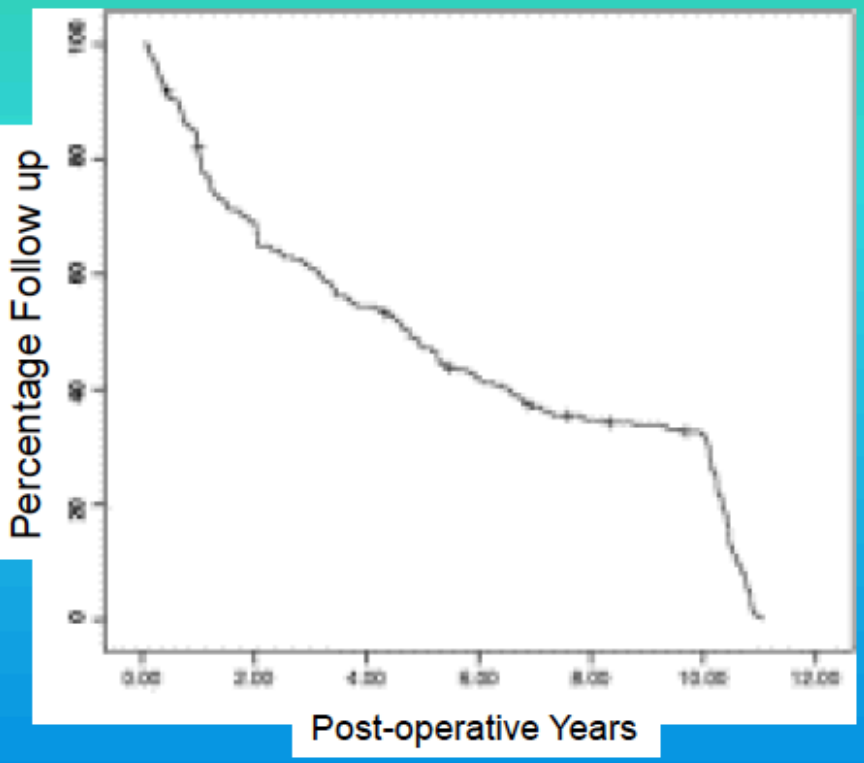
Plus de 50 000

6 à 7 F pour 1 H

40-50 % avant 40 ans, e es



Agenda



Sur 242 patients opérés entre 1998 et 1999
Suivi:
33% à 2 ans
7% à 10 ans

19% de plus par appel téléphonique

Laparoscopic Roux-en-Y gastric bypass: 10-year follow-up

Higa K et al., SOARD 2011

CB et reproduction

- Sexualité : dysfonction sexuelle améliorée

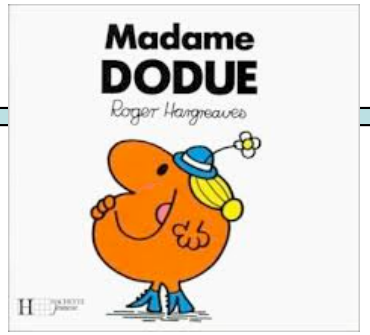
(Camps MF, et al. 1996 ; Kinzl JF, et al. 2001; Sarwer DB et al, 2012)

Change in Sexual Dysfunction Following Bariatric Surgery

Laura R. Wingfield[1] · Myutan Kulendran[2] · Georgia Laws[3] · Harvinder Chahal[4] · Samantha Scholtz[4] · Sanjay Purkayastha[5]

OBES SURG (2016) 26:387–394

CB et reproduction



- Sexualité : dysfonction sexuelle améliorée

  (Camps MF, et al. 1996 ; Kinzl JF, et al. 2001; Sarwer DB et al, 2012)

- Dysovulation – Anovulation *(Mehri ZA, 2009; Sim KA. 2014,…*

Délai entre CB et Grossesse ?

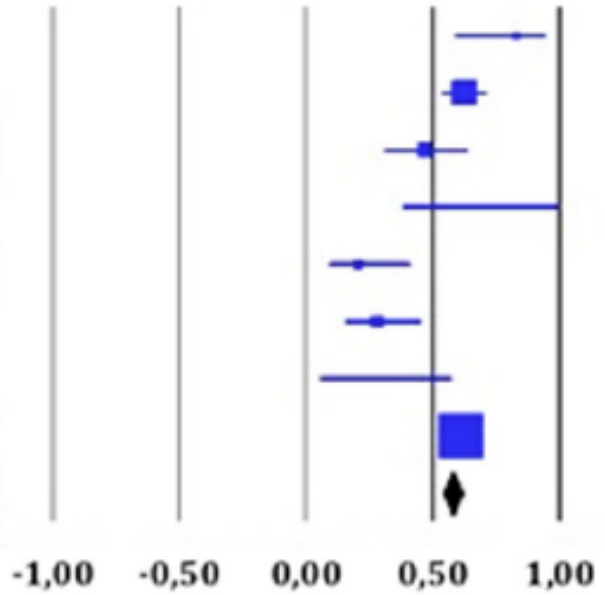
Incidence of Successful Pregnancy After Weight Loss Interventions in Infertile Women: a Systematic Review and Meta-Analysis of the Literature

G spontanée = 58 %

Study name	Event rate	Lower limit	Upper limit	Z-Value	p-Value
MUSELLA 2011	0,833	0,591	0,945	2,545	0,011
MUSELLA 2012	0,627	0,533	0,712	2,640	0,008
MARCEAU 2004	0,469	0,306	0,639	-0,353	0,724
BILENKA 1995	0,917	0,378	0,995	1,623	0,105
EID 2005	0,208	0,089	0,413	-2,656	0,008
DEITEL 1988	0,281	0,153	0,458	-2,386	0,017
NETO 2012	0,222	0,056	0,579	-1,562	0,118
GOSMAN 2011	0,613	0,561	0,662	4,238	0,000
	0,580	0,539	0,621	3,745	0,000

Statistics for each study

I^2: 80.2% P<0.001



Milone M, et al., Obes Surg, 2016

CB et fertilité ?

The Impact of Bariatric Surgery on Polycystic Ovary Syndrome: a Systematic Review and Meta-analysis

pSOPK : 45,8 à 7,6 %

Study or Subgroup	Pre Bariatric Events	Total	Post Bariatric Events	Total	Weight	Odds Ratio (Non-event) M-H, Random, 95% CI
Dixon2002	36	107	14	107	14.4%	0.30 [0.15, 0.59]
Eid 2005	24	24	0	24	4.6%	0.00 [0.00, 0.02]
Eid2014	10	14	0	14	6.5%	0.01 [0.00, 0.31]
George2013	132	156	0	156	7.1%	0.00 [0.00, 0.01]
Jama 2012	17	20	3	20	10.7%	0.03 [0.01, 0.18]
Kyriacou2014	30	96	10	96	14.2%	0.26 [0.12, 0.56]
Luk 2014	24	53	3	53	12.4%	0.07 [0.02, 0.26]
Messiah2013	135	890	89	890	15.3%	0.62 [0.47, 0.83]
Talebpour2011	87	254	17	254	14.8%	0.14 [0.08, 0.24]
Total (95% CI)		**1614**		**1614**	**100.0%**	**0.07 [0.03, 0.21]**
Total events	495		136			

Heterogeneity: Tau² = 1.74; Chi² = 89.85, df = 8 (P < 0.00001); I² = 91%
Test for overall effect: Z = 4.99 (P < 0.00001)

Odds Ratio (Non-event) M-H, Random, 95% CI

0.001 0.1 1 10 1000

Irrégularité menstruelle

Study or Subgroup	Pre Bariatric Events	Total	Post Bariatric Events	Total	Weight	Odds Ratio (Non-event) M-H, Random, 95% CI
Eid 2005	5	24	0	24	4.5%	0.07 [0.00, 1.39]
Dixon2002	2	107	0	107	4.2%	0.20 [0.01, 4.14]
Jama 2012	10	20	4	20	19.7%	0.25 [0.06, 1.02]
Talebpour2011	14	254	4	254	30.7%	0.27 [0.09, 0.85]
George2013	11	156	7	156	40.9%	0.62 [0.23, 1.64]
Total (95% CI)		**561**		**561**	**100.0%**	**0.35 [0.19, 0.65]**
Total events	42		15			

Heterogeneity: Tau² = 0.00; Chi² = 2.99, df = 4 (P = 0.56); I² = 0%
Test for overall effect: Z = 3.31 (P = 0.0009)

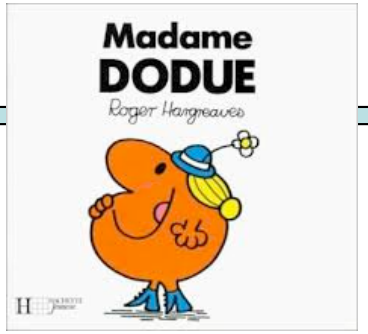
Odds Ratio (Non-event) M-H, Random, 95% CI

0.001 0.1 1 10 1000

Fertilité

Skubleny D,, et al., Obes Surg, 2016

CB et reproduction



- Sexualité : dysfonction sexuelle améliorée

  (Camps MF, et al. 1996 ; Kinzl JF, et al. 2001; Sarwer DB et al, 2012)

- Dysovulation – Anovulation *(Mehri ZA, 2009; Sim KA. 2014)*
  - ✓ SOPK amélioré
  - ✓ **PMA**

Délai entre CB et Grossesse ?

Does Bariatric Surgery Improve Assisted Reproductive Technology Outcomes in Obese Infertile Women?

n = 40
FIV

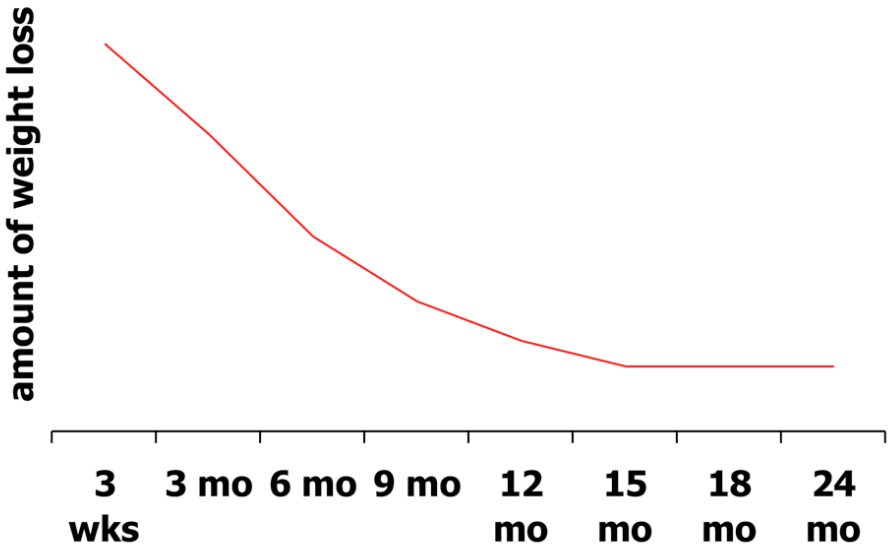
	Before surgery	After surgery	*p*
Total dose gonadotropin (U)	4136.87 (±943.05)	3489.37 (±734.58)	0.001
Duration of stimulation (days)	13.17 (±1.4)	12.12 (±1.3)	0.001
Number of follicles >15 mm (n)	6.4 (±1.6)	7.8 (±2.7)	0.005
Retrieved oocytes (*n*)	6.6 (±1.7)	8.1 (±2.5)	0.004
MII oocytes (*n*)	5.5 (±1.6)	6.9 (±2.8)	0.008
TOP quality oocytes	1.8 (±1.2)	3.3 (±2.4)	0.001
MI oocytes (*n*)	0.9 (±0.7)	0.7 (±0.6)	0.28 (ns)
VG oocytes (*n*)	0.2 (±0.4)	0.3 (±0.6)	0.5 (ns)

	Before surgery (±SD)	After surgery (±SD)	*p*
Fertilized oocytes (*n*)	4.2 (±1.7)	5.3 (±2.4)	0.02
Fertilization rate (%)	0.7 (±0.1)	0.7 (±0.1)	0.8 (ns)
Total number of embryos obtained (*n*)	2.4 (±0.7)	3.1 (±1.4)	0.009
TOP quality embryo (*n*)	0.5 (±0.6)	1.1 (±0.9)	0.003
Transferred embryo (*n*)	1.8 (±0.9)	2 (±0.7)	0.2 (ns)
Pregnancy rate (%)	0	15/40	<0.001
Live birth rate (%)	0	14/40	<0.001
Miscarriage rate (%)	0	1/40	1 (ns)

Milone M, et al., Obes Surg, 2017

Délai entre CB et Grossesse ?

Rebond de fertilité



Recommandations
Bon sens médical
→ Attendre 12 mois
(après perte pondérale massive)

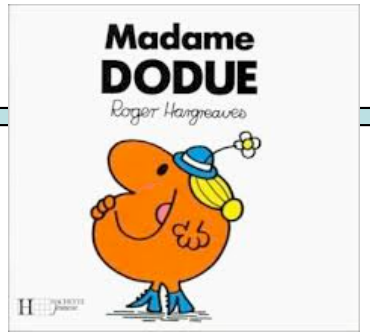
Délai entre CB et Grossesse ?

Pregnancy after Bariatric Surgery: Obstetric and Perinatal Outcomes and the Growth and Development of Children

Among the pregnancies that occurred before the bariatric surgery (11), 4 (36.4 %) had been planned, and among the 32 pregnancies that occurred after the surgical procedure, 11 (34.4 %) had been planned.

Dell Agnolo M, et al., Obes Surg, 2016

Contraception : gérer avant la CB



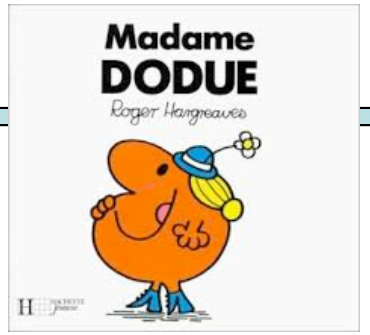
Oui !... Mais pas seulement !

Contraception après CB ?

WHO Medical Eligibility Criteria Rating for Obesity and Related Disorders									
Contraceptive Method	Obesity	Age >40	Hypertension[a]	Diabetes Mellitus[b]	Hyperlipidemia	Cardiovascular Disease (CVD)	Multiple CVD Risk Factors[c]	Bariatric Surgery Malabsorptive[d]	Bariatric Surgery Restrictive[d]
Combined Hormonal Pills	2	2	3	2	2/3	4	3/4	3	1
Patch/Ring	2	2	3	2	2/3	4	3/4	1	1
Progestin Only Pills	1	1	1	2	2	2	2	3	1
Depot-Medroxyprogesterone acetate (DMPA)	1	2	2	2	2	3	3	1	1
Progestin only Implant	1	1	1	2	2	2	2	1	1
Copper IUD	1	1	1	1	1	1	1	1	1
Levonorgestrel IUS	1	1	1	2	2	2	2	1	1

Shaw K, et al., Best Pract Res Clin Endocrinol Metab 2013

Contraception : gérer avant la CB



1000 F ; 563 réponses au Questionnaire
30 % : zéro contraception A1 post-CB
60 % savent : « pas de G durant la première année »

Contraceptive[a]	12 months before, n=563 n (%)	1–2 years after, n=563 n (%)
Longer-acting reversible contraceptives		
Copper intrauterine device	77 (13.7)	61 (10.9)
Lng IUS[b]	86 (15.3)	104 (18.5)
Implant	21 (3.7)	23 (4.1)
Short-acting hormonal contraceptives		
Any oral contraceptive	130 (23.1)	87 (15.5)
Combined oral contraceptives	43 (7.6)	29 (5.2)
Desogestrel progestin-only pill	59 (10.5)	46 (8.2)
Other progestin only pills	28 (5.0)	12 (2.1)
Vaginal ring	6 (1.1)	13 (2.3)
Patch	0 (0)	5 (0.9)
Other contraceptives		
Depo-Provera®	34 (6.0)	32 (5.7)
Condoms/other	110 (19.5)	109 (19.4)
None	182 (32.3)	168 (29.9)

Ginstman C, et al., Obes Surg, 2015

Agenda

- Un défi pour aujourd'hui et demain
- Quid des G après CB
- Risques nutritionnels et métaboliques
- Risques abdominaux spécifiques
- En pratique

Obésité et Grossesse

Obésité sévère de la mère	Odds ratio
Fausse couche	1,31
Prématurité	1,5
SGA	2,1
LGA	2,2 à 3,6
Dystocie épaules	1,51
Admission NICU	1,28
Apgar < 5	1,9
Mortalité périnatale < 28jrs	1,15 à 1,9

Jeve YV. Best Practice and Research Clin Obst Gyn 2015

G après CB

Outcomes of Pregnancy after Bariatric Surgery

METHODS

We identified 627,693 singleton pregnancies in the Swedish Medical Birth Register from 2006 through 2011, of which 670 occurred in women who had previously undergone bariatric surgery and for whom presurgery weight was documented. For each pregnancy after bariatric surgery, up to five control pregnancies were matched for the mother's presurgery body-mass index (BMI; we used early-pregnancy BMI in the controls), age, parity, smoking history, educational level, and delivery year. We assessed the risks of gestational diabetes, large-for-gestational-age and small-for-gestational-age infants, preterm birth, stillbirth, neonatal death, and major congenital malformations.

Johansson K, et al., NEJM, 2015

G après CB

Surgery-to-delivery interval	
Mean — yr	2±1
<1 Yr — no. (%)	42 (7.0)
1 to <2 Yr — no. (%)	305 (51.2)
2 to <5 Yr — no. (%)	247 (41.4)
≥5 Yr — no. (%)	2 (0.3)
Mean change in weight and BMI from surgery to early pregnancy**	
Weight loss — kg	37±12
Decrease in BMI — units	13.4±4.3

Matching 1:5 for maternal age, parity, presurgery BMI, smoking history, educational level, and delivery year

Johansson K, et al., NEJM, 2015

G après CB

Variable	Bariatric-Surgery Group (N=596)	Matched Control Group (N=2356)	Odds Ratio (95% CI)*	P Value
	no./total no. (%)			
Gestational diabetes†				
Total	11/578 (1.9)	157/2294 (6.8)	0.25 (0.13 to 0.47)	<0.001
Insulin-treated	4/578 (0.7)	83/2294 (3.6)	0.17 (0.06 to 0.49)	<0.001

Johansson K, et al., NEJM, 2015

G après CB

Variable	Bariatric-Surgery Group (N=596)	Matched Control Group (N=2356)	Odds Ratio (95% CI)*	P Value
	no./total no. (%)			
Gestational diabetes†				
Total	11/578 (1.9)	157/2294 (6.8)	0.25 (0.13 to 0.47)	<0.001
Insulin-treated	4/578 (0.7)	83/2294 (3.6)	0.17 (0.06 to 0.49)	<0.001
Large-for-gestational-age infant‡	51/590 (8.6)	523/2336 (22.4)	0.33 (0.24 to 0.44)	<0.001
Macrosomia‡	7/590 (1.2)	221/2336 (9.5)	0.11 (0.05 to 0.24)	<0.001
Small-for-gestational-age infant‡	92/590 (15.6)	178/2336 (7.6)	2.20 (1.64 to 2.95)	<0.001
Low-birth-weight infant‡	40/590 (6.8)	105/2336 (4.5)	1.34 (0.88 to 2.04)	0.17

Moins de DG et Macrosomie

Plus de SGA

Johansson K, et al., NEJM, 2015

G après CB

Variable	Bariatric-Surgery Group (N=596)	Matched Control Group (N=2356)	Odds Ratio (95% CI)*	P Value
	no./total no. (%)			
Gestational diabetes†				
Preterm birth§	59/590 (10.0)	176/2344 (7.5)	1.28 (0.92 to 1.78)	0.15
Stillbirth¶	6/596 (1.0)	12/2356 (0.5)	1.89 (0.59 to 6.05)	0.28
Neonatal death <28 days after live birth§	4/590 (0.7)	5/2344 (0.2)	2.93 (0.57 to 15.14)	0.20
Stillbirth or neonatal death	10/596 (1.7)	17/2356 (0.7)	2.39 (0.98 to 5.85)	0.06
Major congenital malformations§				
Total	14/590 (2.4)	83/2344 (3.5)	0.72 (0.40 to 1.29)	0.27
Excluding chromosomal abnormalities§	12/590 (2.0)	79/2344 (3.4)	0.63 (0.34 to 1.18)	0.16

Johansson K, et al., NEJM, 2015

G après CB

Variable	Bariatric-Surgery Group (N=596)	Matched Control Group (N=2356)	Odds Ratio (95% CI)*	P Value
	no./total no. (%)			
Gestational diabetes†				
Preterm birth§	59/590 (10.0)	176/2344 (7.5)	1.28 (0.92 to 1.78)	0.15
Stillbirth¶	6/596 (1.0)	12/2356 (0.5)	1.89 (0.59 to 6.05)	0.28
Neonatal death <28 days after live birth§	4/590 (0.7)	5/2344 (0.2)	2.93 (0.57 to 15.14)	0.20
Stillbirth or neonatal death	10/596 (1.7)	17/2356 (0.7)	2.39 (0.98 to 5.85)	0.06
Major congenital malformations§				
Total	14/590 (2.4)	83/2344 (3.5)	0.72 (0.40 to 1.29)	0.27
Excluding chromosomal abnormalities§	12/590 (2.0)	79/2344 (3.4)	0.63 (0.34 to 1.18)	0.16

Johansson K, et al., NEJM, 2015

G après CB

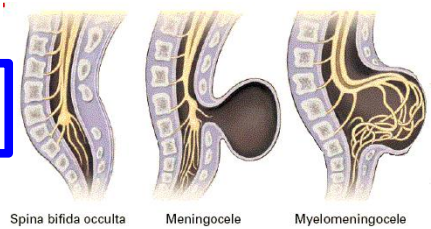
Conséquences sur le NN	Effet CB
Prématurité	↑
SGA	↑
Macrosomie	↓
Mortalité périnatale < 28jrs	→
Malformations	→

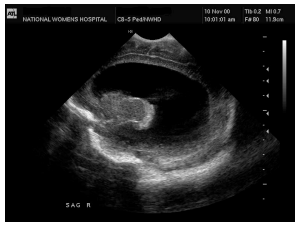
Josefsson A, A national cohort. BJOG 2013;120:1477–1482.
Roos and al. BMJ 2013;347:f6460
Willis K et al, Best Practice Research Clin Obst Gyn 2015; 29: 133-44
Canadian Institute for Health Information. Bariatric surgery in Ottawa 2014
Galazis N et al., EJOG 2014
Johansson K et al, NEJM 2015; 372: 814-24

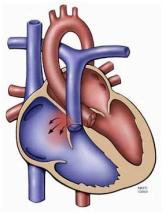
G après CB : Risque malformatif

- Malformations *Stothard KJ, et al. JAMA. 2009*

AFTN





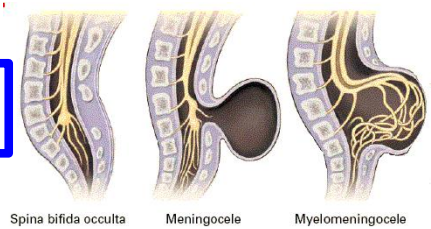


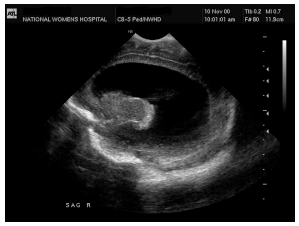
RR : 1.8 si Obésité…. Après CB : majoré si aucune Supplémentation

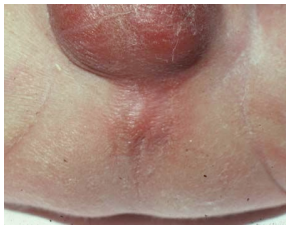
G après CB : Risque malformatif

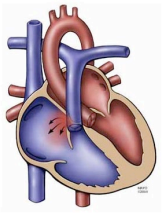
- Malformations *Stothard KJ, et al. JAMA. 2009*

AFTN









RR : 1.8 si Obésité…. Après CB : majoré si aucune Supplémentation

Results: Newborns 1 and 2 presented with dorsal myelomeningocele and ventricular dilation. Both underwent surgery and a ventriculo-peritoneal shunt was inserted in the first month of life. Newborn 3 had microcephaly, bilateral microphthalmia and sensorineural deafness.

Table 1 Clinical and anthropometric data of the three mothers

	MOTHER 1	MOTHER 2	MOTHER 3
Age at bariatric surgery (years)	39	22	17
Co-morbidities at surgery	no	no	no
Bariatric procedure	roux en Y gastric bypass	roux en Y gastric bypass	bilio-pancreatic diversion with gastroplasty
BMI at bariatric surgery (kg/m^2)	40	40.5	48
Pre-gravidic BMI (kg/m^2)	23.4	25.4	24.2
Age at pregnancy (years)	40	27	35
Time interval between bariatric surgery and pregnancy (years)	1	5	18

Pelizzo G, et al., Nutrition J 2014

G et CB : Risques pour l'enfant à naître

- Malformations

	MOTHER 1	MOTHER 2	MOTHER 3
Clinical signs	fatigue	fatigue	nyctalopia
Nutritional supplements before pregnancy	no	no	yes
Nutritional supplements during first trimester	no	no	no
Nutritional status during pregnancy (gestational age)	24 w	20 w	22 w
-Folates (ng/ml; nv 2–19.9)	5.1	>24	*
-Vitamin B12 (pg/ml; nv 243–894)	201	<15	*
-Vitamin A (mcg/ml; nv			*
–1,25-dihydroxyVitD (p			*
–25-hydroxyVitD (nmo			*
-Iron (mcg/dl; nv 25–1			*
-Ferritin (ng/ml; nv 18–440)	2	10	*
-Hb (g/dl; nv 11.7-15.5)	8.7	12	*
-Pre-albumin levels (mg/dl; nv 20–40)	19	17	-

EDUQUEZ !

SURVEILLEZ !

Pelizzo G, et al., Nutrition J 2014

G après CB

Pregnancy outcomes in women with bariatric surgery as compared with morbidly obese women

The Journal of Maternal-Fetal & Neonatal Medicine

Haim A. Abenhaim, Nouf Alrowaily, Nicholas Czuzoj-Shulman, Andrea R. Spence & Stephanie L. Klam

Methods: We carried out a retrospective cohort study using the healthcare cost and utilization project – Nationwide Inpatient Sample from 2003 to 2011 comparing outcome of births among women who had undergone bariatric surgery with births among women with morbid obesity. Logistic regression was used to estimate the adjusted effect of bariatric surgery on maternal and newborn outcomes.

Results: There were 8 475 831 births during the study period (221 580 (2.6%) in morbidly obese women and 9587 (0.1%) in women with bariatric surgery). Women with bariatric surgery were

2003 à 2011
8 471 831 naissances
221 580 (2,6 %) F avec IMC > 40
9587 (0,1 %) : F après CB

Abenhaim HA et al., J Mat Fetal Neonat Med 2016

G après CB

Outcomes	Bariatric surgery N=9587(%)	Morbid obesity N=221 580(%)	Adjusted OR* (95% CI)	Adjusted p values
Antepartum complications				
Hypertensive disorder	28.23	26.58	0.92 (0.88–0.97)	0.0032
Gestational diabetes	10.55	8.55	1.01 (0.93–1.09)	0.8892
Premature rupture of membrane	2.64	4.87	0.54 (0.47–0.62)	<.0001
Chorioamnionitis	0.99	2.07	0.69 (0.56–0.87)	0.0012
Placenta previa	0.49	0.47	0.99 (0.72–1.36)	0.9456
Placental abruption	1.02	0.94	1.12 (0.90–1.41)	0.3137
Intrapartum complications				
Cesarean delivery	42.18	60.11	0.44 (0.42–0.47)	<.0001
Induction of labor	60.89	51.34	1.69 (1.62–1.77)	<.0001
Assisted vaginal delivery	2.14	2.58	0.78 (0.66–0.91)	0.0022
Postpartum complications				
Postpartum hemorrhage	1.40	2.97	0.47 (0.39–0.57)	<.0001
Blood transfusion	1.85	1.25	1.53 (1.28–1.82)	<.0001
Postpartum infection	1.07	2.31	0.69 (0.56–0.85)	0.0006
Wound complications	0.60	0.70	0.80 (0.60–1.08)	0.141
Venous thromboembolism	1.04	0.55	1.76 (1.40–2.21)	<.0001
Length of hospital stay >=6 Days	3.47	5.89	0.78 (0.69–0.89)	0.0001
Maternal death	0.02	0.01	0.90 (0.11–7.47)	0.925

Abenhaim HA et al., J Mat Fetal Neonat Med 2016

G après CB

Outcomes	Bariatric surgery N=9587(%)	Morbid obesity N=221 580(%)	Adjusted OR* (95% CI)	Adjusted p values
Antepartum complications				
Hypertensive disorder	28.23	26.58	0.92 (0.88–0.97)	0.0032
Gestational diabetes	10.55	8.55	1.01 (0.93–1.09)	0.8892
Premature rupture of membrane	2.64	4.87	0.54 (0.47–0.62)	<.0001
Chorioamnionitis	0.99	2.07	0.69 (0.56–0.87)	0.0012
Placenta previa	0.49	0.47	0.99 (0.72–1.36)	0.9456
Placental abruption	1.02	0.94	1.12 (0.90–1.41)	0.3137
Intrapartum complications				
Cesarean delivery	42.18	60.11	0.44 (0.42–0.47)	<.0001
Induction of labor	60.89	51.34	1.69 (1.62–1.77)	<.0001
Assisted vaginal delivery	2.14	2.58	0.78 (0.66–0.91)	0.0022
Postpartum complications				
Postpartum hemorrhage	1.40	2.97	0.47 (0.39–0.57)	<.0001
Blood transfusion	1.85	1.25	1.53 (1.28–1.82)	<.0001
Postpartum infection	1.07	2.31	0.69 (0.56–0.85)	0.0006
Wound complications	0.60	0.70	0.80 (0.60–1.08)	0.141
Venous thromboembolism	1.04	0.55	1.76 (1.40–2.21)	<.0001
Length of hospital stay >=6 Days	3.47	5.89	0.78 (0.69–0.89)	0.0001
Maternal death	0.02	0.01	0.90 (0.11–7.47)	0.925

Abenhaim HA et al., J Mat Fetal Neonat Med 2016

G après CB

The Long-Term Risk of Venous Thromboembolism Following Bariatric Surgery

Methods A private insurance claims database was used to identify 17,434 patients who underwent bariatric surgery. Longitudinal data were available for each patient for up to 12 months post-surgery. We used logistic regression to identify independent predictors for VTE events.

	Months post-surgery			
	During index surgery admission *n* (%)	1 month *n* (%)	6 months *n* (%)	12 months[a] *n* (%)
VTE (DVT and PE)	153 (0.88%)	379 (3.17%)	522 (2.99%)	579 (3.42%)
PE	62 (0.36%)	144 (0.83%)	198 (1.14%)	209 (1.23%)

1/3 seulement dans le premier mois post-CB
Risque se prolonge au moins jusqu'à 1 an post-CB
FdR : antécédent PEP (X 8), Tabac, Durée séjour CB > 5j, Age > 55 ans, Sexe M,

Steele KE et al., Obes Surg 2011

G après CB : Type de Chirurgie Bariatrique

Outcome	Mixture of procedures[1]	Restrictive procedures[2]	RYGB[3]	Malabsorptive procedures[4]
Mean birthweight	3.275 (3.195–3.398)	3.276 (2.11–3.86)	2.938 (2.727–3.205)	2.926 (2.151–3.5)
GDM	4.3 (0–9.4)	4.3 (0–16)	2.4 (0–5.3)	0
PIH	7.7 (0–17.9)	5.2 (0–10)	3.5 (0–9.0)	0.7
PET	2.9 (0–5.7)	2.1 (0–7.7)	3.8 (0–7.7)	9.0
PTD	10.4	2.3 (0–7.7)	14.0 (4.8–26.9)	14.7 (13.6–15.3)
CS	20.3 (0–35.7)	18.3 (0–28.6)	44.3 (25.0–61.5)	24.9 (10.5–44.0)
GWG	NA	9.0 (3.7–15.6)	11.1 (1.8–15.4)	5.6 (1.5–9.1)
Neonatal deaths	0.1 (0–0.3)	1.3 (0–7.7)	0.7 (0–3.5)	2.0 (1.3–2.6)

Data are presented as mean (min–max). If only one study reported on the variable, no range is available.
CS, Caesarean section; GDM, gestational diabetes mellitus; GWG, gestational weight gain; NA, not available; PET, pre-eclampsia; PIH, pregnancy-induced hypertension; PTD, preterm delivery; RYGB, Roux-en-Y gastric bypass.

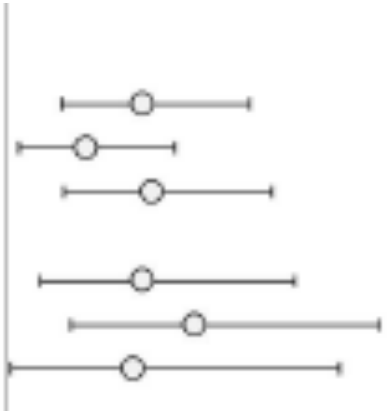
DG, HTA gravidique, Pré-eclampsie, prise de poids per G : non différent

SGA, Prématurité, Césarienne : GBP > Restriction pure

Guelinckx I et al., Hum Reprod 2009

G après CB : Type de Chirurgie Bariatrique

Procedure Type						
Preterm	Bypass	822	4061	81 (9.9%)	240 (5.9%)	P=0.28
	VBG	934	4636	75 (8.0%)	283 (6.1%)	
	Banding	691	3357	79 (11.4%)	210 (6.3%)	
Small for Gestational Age	Bypass	821	4051	48 (5.8%)	138 (3.4%)	P=0.51
	VBG	932	4621	51 (5.5%)	121 (2.6%)	
	Banding	690	3342	30 (4.3%)	93 (2.8%)	



Roos and al. BMJ 2013;347:f6460

Mais études scandinaves avec suivis vitaminiques et nutritionnels peut-être plus rigoureux qu'ailleurs ?

G après CB : Influence du délai

Time Since Surgery						
Preterm	<2y	474	2340	50 (10.5%)	118 (5.0%)	P=0.16
	2-5y	980	4888	96 (9.8%)	292 (6.0%)	
	>5y	1 057	5151	97 (9.2%)	340 (6.6%)	
Small for Gestational Age	<2y	473	2337	27 (5.7%)	70 (3.0%)	P=0.48
	2-5y	979	4870	56 (5.7%)	148 (3.0%)	
	>5y	1 055	5131	48 (4.5%)	151 (2.9%)	

= > Pas de différence notable mais conseils consensuels d'attendre 12 à 18 mois avant de démarrer une grossesse

Roos and al. BMJ 2013;347:f6460

G après CB : Influence du délai

B Years from Surgery to Delivery

Subgroup and Years	Bariatric-Surgery Cohort (no. of cases/total no. (%))	Control Cohort (no. of cases/total no. (%))	Odds Ratio (95% CI)	P Value
Gestational diabetes				0.18
<1.8	7/292 (2.4)	70/1148 (6.1)		
≥1.8	4/286 (1.4)	87/1146 (7.6)		
LGA				0.41
<1.8	30/296 (10.1)	276/1168 (23.6)		
≥1.8	21/294 (7.1)	247/1168 (21.1)		
SGA				0.02
<1.8	40/296 (13.5)	100/1168 (8.6)		
≥1.8	52/294 (17.7)	78/1168 (6.7)		
Preterm birth				0.77
<1.8	28/296 (9.5)	86/1173 (7.3)		
≥1.8	31/294 (10.5)	90/1171 (7.7)		
Malformations				0.10
<1.8	5/296 (1.7)	48/1173 (4.1)		
≥1.8	9/294 (3.1)	35/1171 (3.0)		

Risque de SGA associé au délai par rapport à la chirurgie

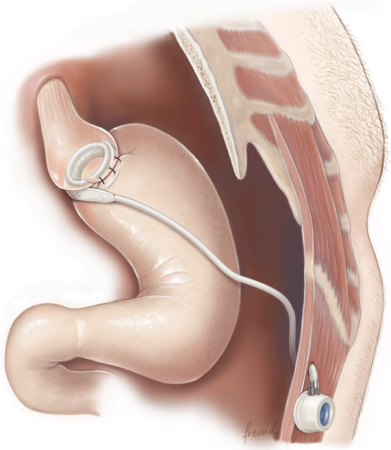
Effet non montré dans d'autres études

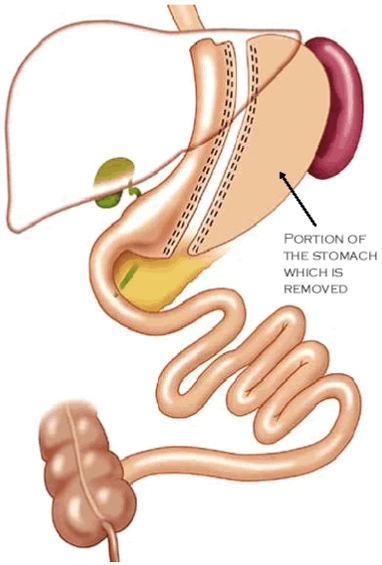
Johansson K et al, NEJM 2015; 372: 814-24

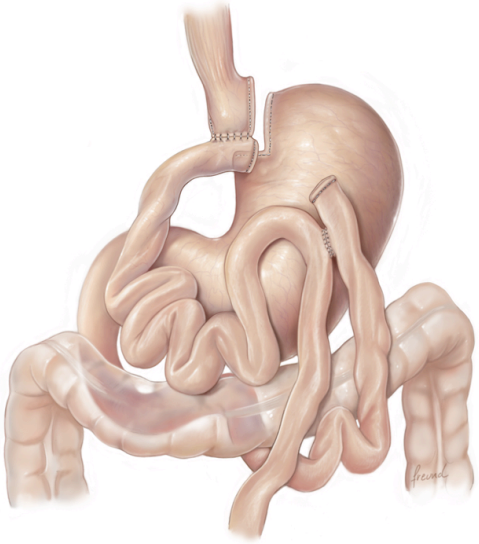
Agenda

- Un défi pour aujourd'hui et demain
- Quid des G après CB
- **Risques nutritionnels et métaboliques**
- Risques abdominaux spécifiques
- En pratique

Conséquences nutritionnelles de la CB







AGA

Sleeve

GBP

Conséquences nutritionnelles de la CB

Estomac : pH, FI, protéases

Sécrétions Biliaires et pancréatiques : protéases, sels biliaires

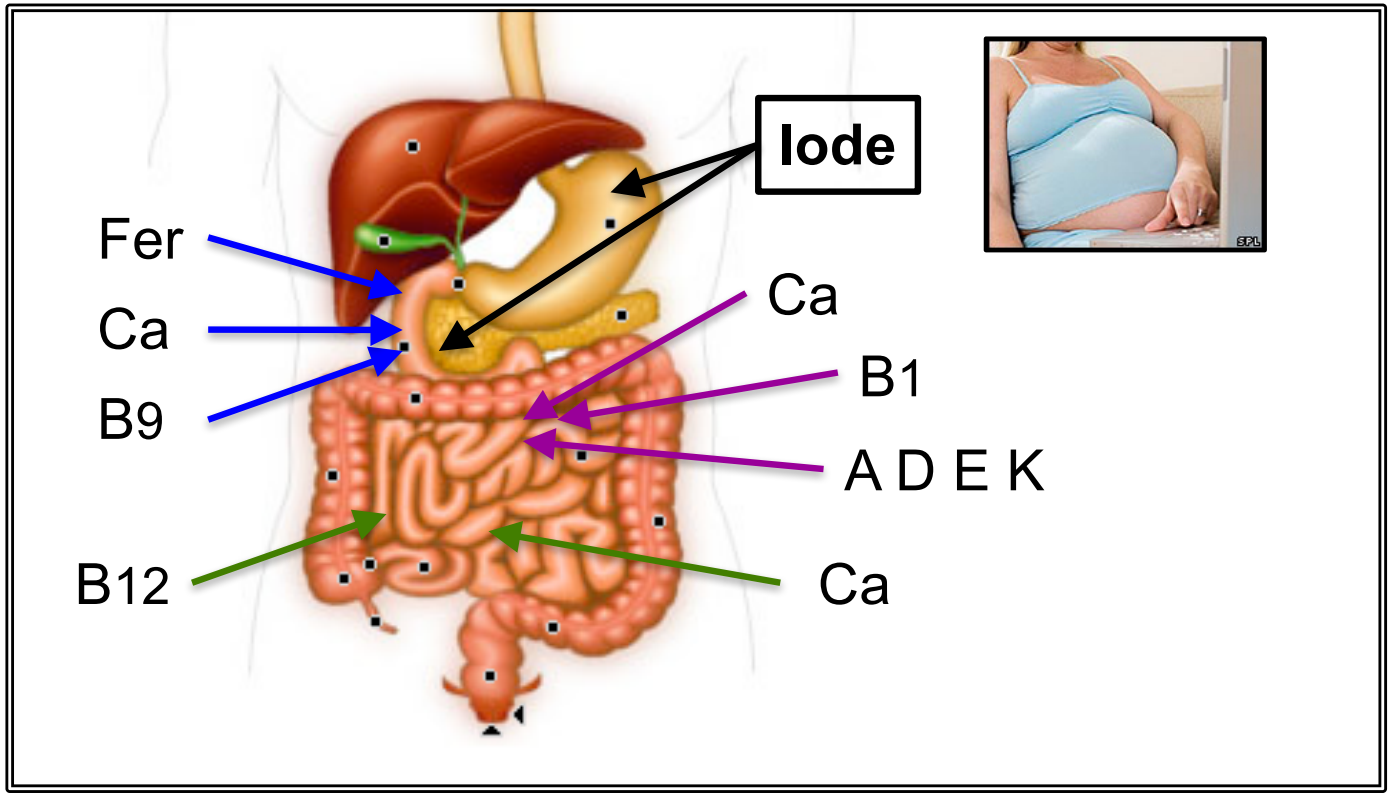
Surface entérocytaire

Apports

Vomissements

Diarrhées

Cofacteurs : VitD

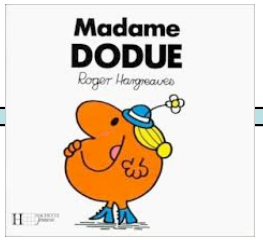


Risque nutritionnels

Dénutrition – Hypoglycémies

- Cas rares, sous-déclaration ?
- DBP >> GBP

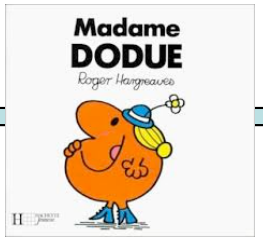
Déficits



	Before Surgery, N = 144	At 1 yr, N = 144	≥3 yr, N = 115
Percentage of subjects with parameters < normal value			
Albumin <34 g/L	8	6	7
Serum calcium <2.12 mmol/L	5	6	1
Hemoglobin <11.5 g/dL	6	12	13*
Tranferrin saturation <20%	42	34†	50‡
Vitamin B_1 <126 nmol/L	22	16*	27‡
Vitamin B_6 <20 nmol/L	24	17†	17†
Vitamin B_9 <3 μg/L	2	4	1
Vitamin B_{12} <190 ng/L	5	16*	11*
Vitamin C < 5 mg/L	33	14§	11§
Vitamin A < 1.5 μmol/L	10	19	14
Vitamin E < 21 μmol/L	15	23	26*
Vitamin 25OHD <30 μg/L	92	86†	71†‡
Total no. of deficiencies (n)	3.2 ± 2.3	3.4 ± 2.0	3.5 ± 23

Ledoux S et al, Ann Surg 2014

Déficits



Groups	NCS, N = 32	CS, N = 66
Percentage of subjects with Parameters < normal value		
Albumin <34 g/L	6	5
Serum calcium <2.12 mmol/L	6	9
Hemoglobin <11.5 g/dL	16	8
Tranferrin saturation <20%	56	46
Vitamin B_1 <126 nmol/L	41	15*
Vitamin B_6 <20 nmol/L	16	15
Vitamin B_9 <3 μg/L	0	2
Vitamin B_{12} <190 ng/L	19	6†
Vitamin C <5 mg/L	9	12
Vitamin A <1.5 μmol/L	34	23
Vitamin E <21 μmol/L	22	9
Vitamin 25OHD <30 μg/L	94	59*
Total no. of deficiencies (n)	4.2 ± 1.9	2.9 ± 2.0*
Subjects with ≥5 deficiencies (%)	44	15*
Time from last visit (mo)	34.1 ± 8.3	11.9 ± 1.5†

Ledoux S et al, Ann Surg 2014

Risques nutritionnels : carences

Fer

Fer et anémie ferriprive : préma, Dim PN, SGA, troubles cognitifs

Folates

Déficit folates : AFTN, diminution du poids de naissance, SGA

B12

Déficit B12 : diminution masse maigre, augmentation masse grasse, Insulino résistance, Troubles Neurodévelopementaux

Mère : fatigue, pré-éclampsie, DPP, infections

Risques Nutritionnels : Anémie ferriprive

A Time Interval of More Than 18 Months Between a Pregnancy and a Roux-en-Y Gastric Bypass Increases the Risk of Iron Deficiency and Anaemia in Pregnancy

Time interval	<18 months	≥18 months	[N]	p
Number of women	40	113		
Vitamin B_{12} (pmol/L)	337 (144–868)	319 (119–1481)	37/103	0.487
vitamin B_{12} <200 pmol/L	3 (8.1)	12 (11.7)		0.550
Ferritin (µg/L)	15 (4–210)	10 (2–160)	37/103	0.079
Ferritin <12 µg/L	14 (37.8)	63 (61.2)		0.014
Haemoglobin (mmol/L[a])	7.1 (6.3–7.8)	6.9 (4.8–8.9)	38/109	0.244
Anaemia (Hgb <6.5 mmol/L)	5 (13.2)	36 (33.0)		0.019
Iron deficiency anaemia[b]	3 (8.1)	30 (29.1)	37/103	0.010
Zinc (µmol/L)	8 (6–13)	8 (6–13)	34/102	0.226
Zinc <7 µmol/L	3 (8.8)	11 (10.8)		0.745
25-OH-vitamin D2 + D3 (nmol/L)	65 (19–145)	66 (17–132)	37/103	0.737
vitamin D <50 nmol/L	8 (21.6)	26 (25.2)		0.660
HbA1c (IFCC, mmol/mol)	31 (25–38)	33 (24–41)	33/92	0.020[c]
HbA1c ≥38 mmol/mol	1 (3.0)	11 (12.0)		0.135

Crusell M, et al., Obes Surg, 2016

Risques Nutritionnels ?

Risk of low birth weight and micronutrient deficiencies in neonates from mothers after gastric bypass: a case control study

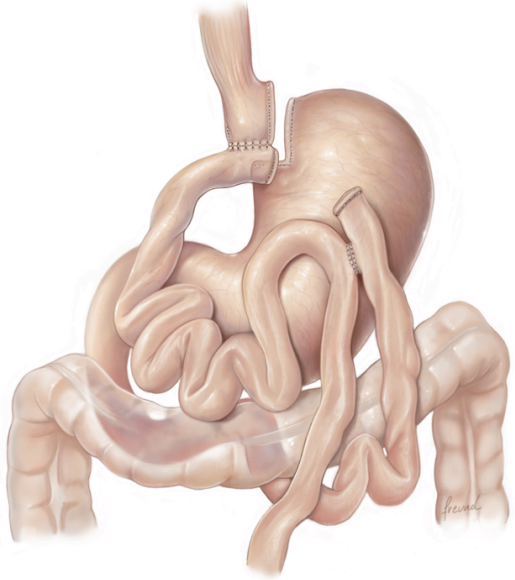
	RYGB	Controls	
BMI 6 months before pregnancy (kg/m^2)	32.5 ± 8.5	NA	
BMI at pregnancy onset (kg/m^2)	30.1 ± 6.0	22.3 ± 4.0	<.01
Time between surgery and pregnancy (mo)	32 ± 14	NA	
Weight gain during pregnancy (kg)*	11.0 (2.0; 16.0)	13.0 (10.0; 16.0)	.08
Cesarean section (%)			
Neonates	n = 56	n = 56	
Gestational age (wk)*	39 (38–40)	39 (38.3–40)	NS
M/F	24/32	29/27	NS
Birth weight (kg)	3.00 ± .57	3.35 ± .43	<.01
Birth weight percentile	37 ± 27	54 ± 27	<.01
Birth length (cm)	48.4 ± 3.2	49.8 ± 1.9	<.05
Head circumference (cm)	33.8 ± 2	34.3 ± 1.3	NS
Apgar score*	10 (10; 10)	10 (10; 10)	NS
	SGA 23 %	SGA 3.6 %	

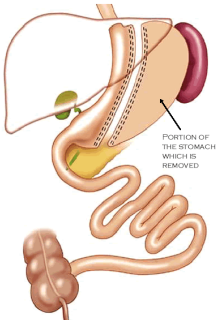
Gascoin G, et al. SORD 2017

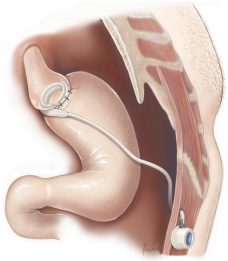
	RYGB n = 56	Controls n = 56	*P*
Hb (g/dL)	16.9 ± 2.0	16.1 ± 1.5	NS
Prothrombin ratio (%)	107 ± 11	109 ± 13	NS
Activated pTT ratio (U)	1.39 ± .25	1.35 ± .20	NS
Calcium (mg/L)	102 ± 7	105 ± 6	.01
<2.5 percentile (%)	19	2	<.05
Phosphorus (mg/L)	55.5 ± 10.8	55.7 ± 6.8	NS
Iron (µg/dL)	127.9 ± 50.2	141.9 ± 47.5	NS
<2.5 percentile (%)	19	2	<.05
Magnesium (mg/L)	19.4 ± 2.0	18.1 ± 1.4	<.01
>97.5 percentile (%)	13	3	<.05
Zinc (mg/L)*	.77 (.72–.90)	.86 (.80–.92)	<.05
<2.5 percentile (%)	13	3	<.05
25-hydroxy-vitamin D (ng/mL)	24.7 ± 8.2	17.5 ± 20.5	<.01
>97.5 percentile (%)	13	2	<.05
Vitamin E (mg/L)*	4.5 (3.7–5.7)	3.5 (2.8–4.2)	<.01
>97.5 percentile (%)	16	3	<.05
Vitamin A (µg/L)	185.8 ± 63.2	226.5 ± 59.9	<.01
<2.5 percentile (%)	13	3	<.05
Folic acid (µg/L)*	18.3 (15.5–21)	16.1 (15.4–18.6)	NS
Vitamin B12, (ng/mL)	569 ± 266	442 ± 264	<.05
>97.5 percentile (%)	14	2	<.05
IGF-1 (µg/L)	56.5 ± 37	74.0 ± 31.2	<.01
Insulin (µU/mL)*	4.2 (2.1; 6.1)	3.4 (1.9; 5.4)	NS
Osteocalcin (ng/mL)	42.6 ± 26.1	42.9 ± 17.8	NS
Leptin (ng/mL)*	5.7 (3.1–8.8)	8.3 (5.4–12.1)	.02

Gascoin G, et al. SORD 2017

Risques Métaboliques : Dumping $







50-70 %

< 5 %

< 5 %

Année 1

Année 2

Année 3

Risques Métaboliques : Dumping $

DS Précoce : 15-30 min → DS Tardif : 1-3 heures

Dumping Syndrome Précoce			**Dumping Syndrome Tardif**
Survenue 10 à 30 minutes après le début du repas			Survenue 1-3 heures après le début du repas
Symptômes abdominaux	**Symptômes vasomoteurs**		**Symptômes**
Sensation de plénitude gastrique	Bouffées vasomotrices		Faim - Hypoglycémie
Nausées	Sueurs		Faiblesse
Vomissements	Pâleur		Tremblements
Douleurs abdominales	Palpitations		Palpitations
Borborygmes	Accès de fatigue		Confusion
Météorisme	Hypotension		Syncope
Diarrhée	Syncope		

Risques Métaboliques : Dumping $

Petite poche gastrique
Anastomose Gastro-Jéjunale

Arrivée rapide et massive des nutriments dans le jéjunum puis l'iléon

Appel d'eau par le contenu Hypersosmolaire du jéjunum

Absorption rapide du glucose

• Sécrétion agents vaso-actifs (Neurotensine, VIP, Sérotonine…)
• **Sécrétion d'incrétines (GIP, GLP1)**

Sécrétion d'insuline Rapide, Massive Inappropriée ?

Symptômes Dumping Précoce
$ Vaso-moteurs
$ Gastro-intestinaux

Symptômes Dumping Tardif
Hypoglycémie
$ généraux

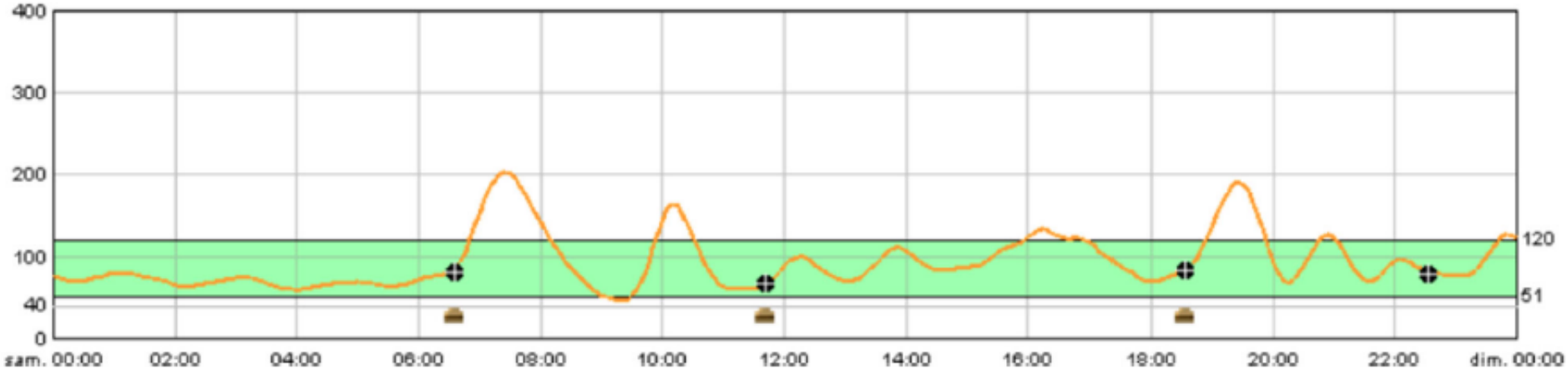
D'après Tack J et al, 2009.

G après CB : Diagnostic de DG

Glucose Profiles in Pregnant Women After a Gastric Bypass

Findings from Continuous Glucose Monitoring

Methods CGM was performed in 35 consecutive pregnant women after RYGB at 26.2 ± 5 weeks of gestation.



Bonis C, et al., Obes Surg, 2016

G après CB : Diagnostic de DG

Pregnancy after bariatric surgery: screening for gestational diabetes

Safer alternatives are needed to traditional test

We know of no guidelines for screening for gestational diabetes in women who have had bariatric surgery. Wide variations in glucose excursions in pregnant women after bariatric surgery make diagnosis difficult.[8 9] Intriguingly, a survey of midwives in the UK found that most are using oral glucose tolerance tests.[10] However, test induced dumping syndrome can lead to inaccurate results and pose significant risk: studies have reported reactive hypoglycaemia in 55%[8] and adverse events (including hypoglycaemia) in 65% of women.[11]

HbA1c tôt : DT2 qui réapparait, ou méconnu
Glycémies capillaires dès la 14-15ème SA
Glycémies capillaires à partir 24-28ème SA
Monitoring glycémie interstitielle 24-28ème SA

GAJ > 0,9 g/l
GPP H1 > 1,26 g/l
GPP H2 > 1,1 G/l

Adam S, et al., BMJ, 2017

Agenda

- Un défi pour aujourd'hui et demain
- Quid des G après CB
- Risques nutritionnels et métaboliques
- Risques abdominaux spécifiques
- En pratique

Risques maternels spécifiques après CB ?

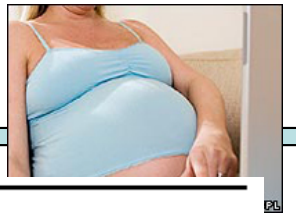
Risk of Abdominal Surgery in Pregnancy Among Women Who Have Undergone Bariatric Surgery

1,5 % vs 0,02 %

RESULTS: During the first pregnancy after bariatric surgery, the rate of surgery for intestinal obstruction was 1.5% (39/2,543; 95% confidence interval [CI] 1.1–2.0%) in women in the case group compared with 0.02% (4/21,909; 95% CI 0.0–0.04%) among women in the control group (adjusted odds ratio [OR] 34.3, 95% CI 11.9–98.7). Similarly, the rate of diagnostic laparoscopy or laparotomy was 1.5% (37/2,542; 95% CI 1.0–1.9%) among women in the case group compared with 0.1% (18/21,909; 95% CI 0.0–0.1%) among women in the control group (adjusted OR 11.3, 95% CI 6.9–18.5).

Stuart A, et al. Obstetr Gynecol 2017

Risques maternels spécifiques après CB ?



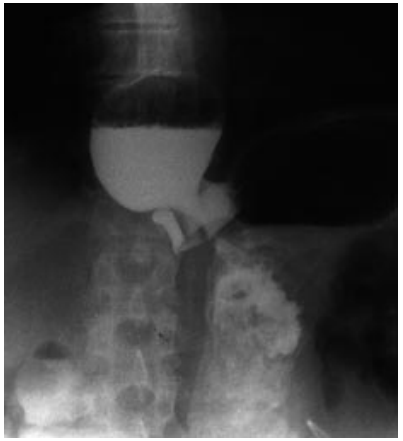
	Women in the Case Group	Women in the Control Group	Adjusted OR (95% CI)*
Pregnancy 1	n=2,543	n=21,909	
Outcome category 1: intestinal obstruction			
Surgical procedure code	39 (1.5)	4 (0.0)	34.3 (11.9–98.7)
Diagnosis code only	25 (1.0)	10 (0.0)	19.7 (9.5–42.1)
Surgical procedure or diagnosis code	64 (2.5)	14 (0.1)	23.3 (12.5–43.4)
Outcome category 2: appendicitis			
Surgical procedure code	2 (0.1)	2 (0.0)	—
Diagnosis code only	4 (0.2)	12 (0.1)	
Surgical procedure or diagnosis code	6 (0.2)	14 (0.1)	
Outcome category 3: hernia			
Surgical procedure code	11 (0.4)	6 (0.0)	—
Diagnosis code only	7 (0.3)	6 (0.0)	
Surgical procedure or diagnosis code	18 (0.7)	12 (0.1)	8.3 (3.7–18.3)
Outcome category 4: gallbladder disease			
Surgical procedure code	13 (0.5)	23 (0.1)	1.5 (0.8–2.8)
Diagnosis code only	19 (0.7)	58 (0.3)	2.0 (1.3–3.2)
Surgical procedure or diagnosis code	32 (1.3)	81 (0.4)	1.8 (1.2–2.7)
Outcome category 5: laparotomy or laparoscopy‡	37 (1.5)	18 (0.1)	11.3 (6.9–18.5)
Any surgical procedure code§	101 (4.0)	53 (0.2)	6.2 (4.7–8.2)
Any surgical procedure or diagnosis code§	150 (5.9)	137 (0.6)	5.2 (4.2–6.4)

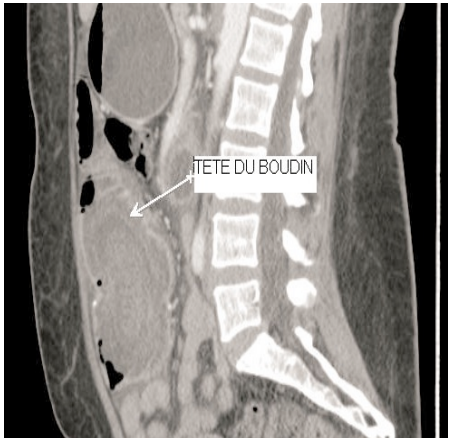
Stuart A, et al. Obstetr Gynecol 2017

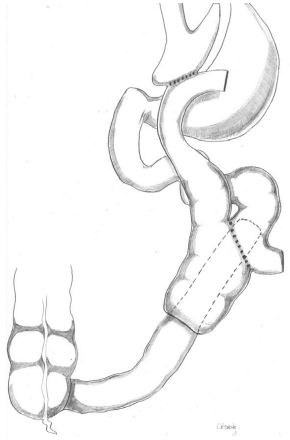
Risques maternels spécifiques après CB ?

Mécaniques

- Rares, cas isolés
- Dilatation, blocage au dessus AGA, GVC
- Hémorragie/Perforation sur ulcère gastrique
- Volvulus gastrique, intestinal, hernie interne



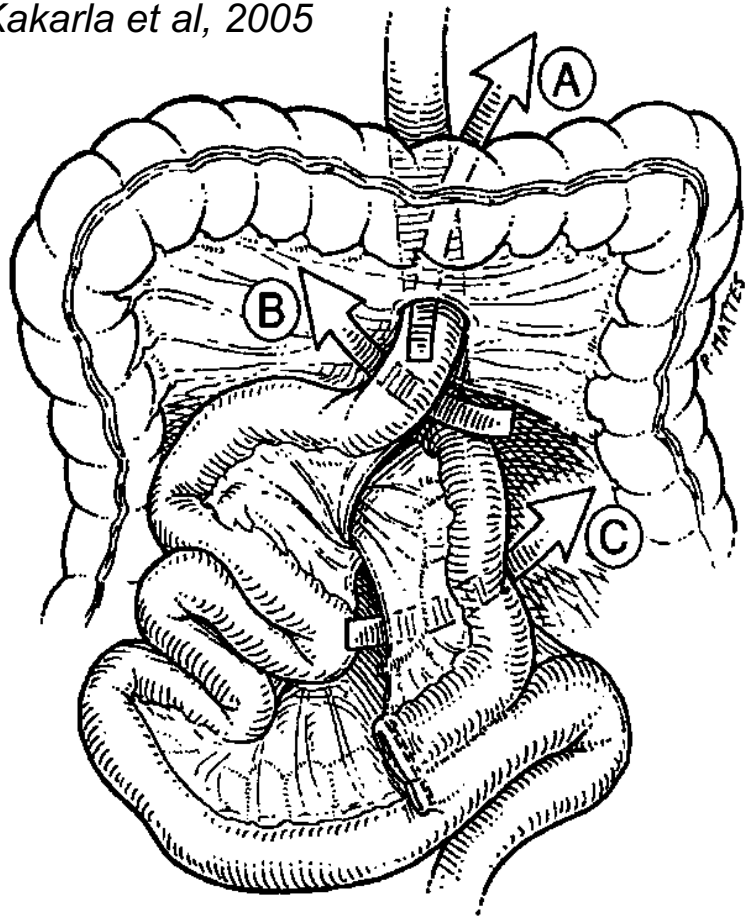


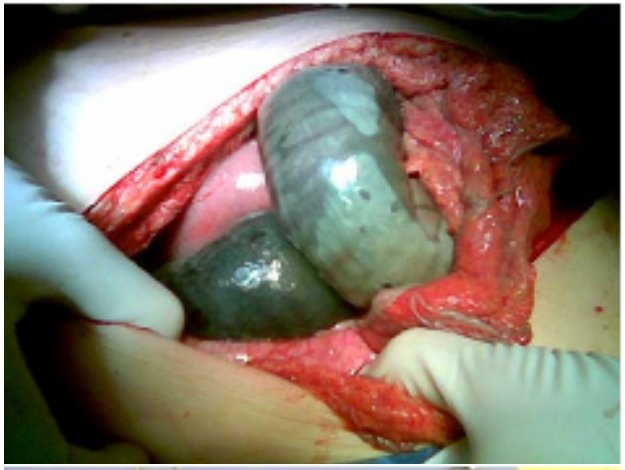


Risques maternels spécifiques après CB ?

Hernies internes

Kakarla et al, 2005



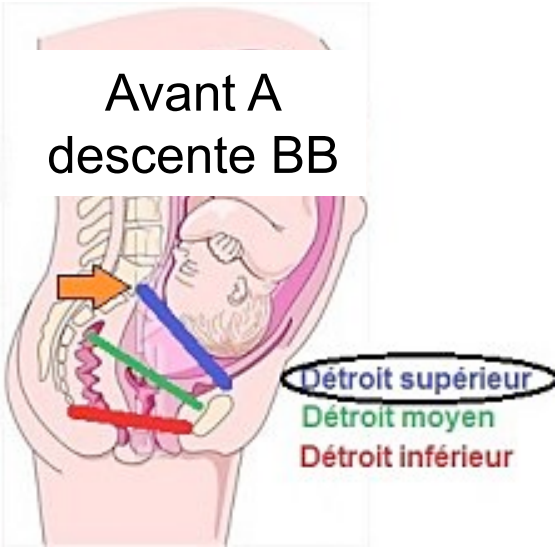


Gazalle et al, 2009

Hernies internes

Mi-grossesse
passage utérus
en intra-abdominal

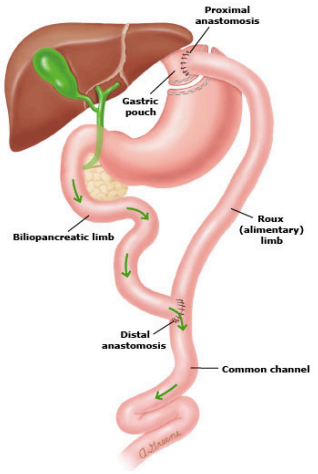
Avant A
descente BB

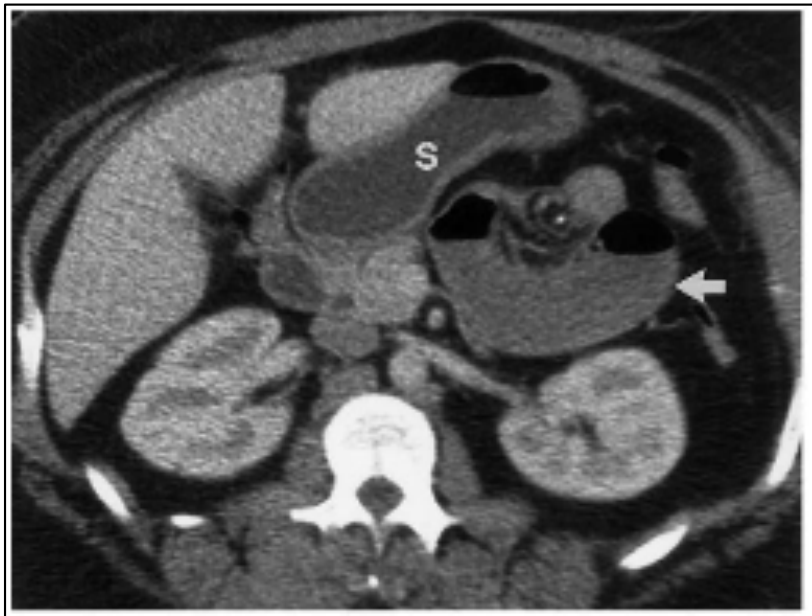


Après A
Utérus se rétracte

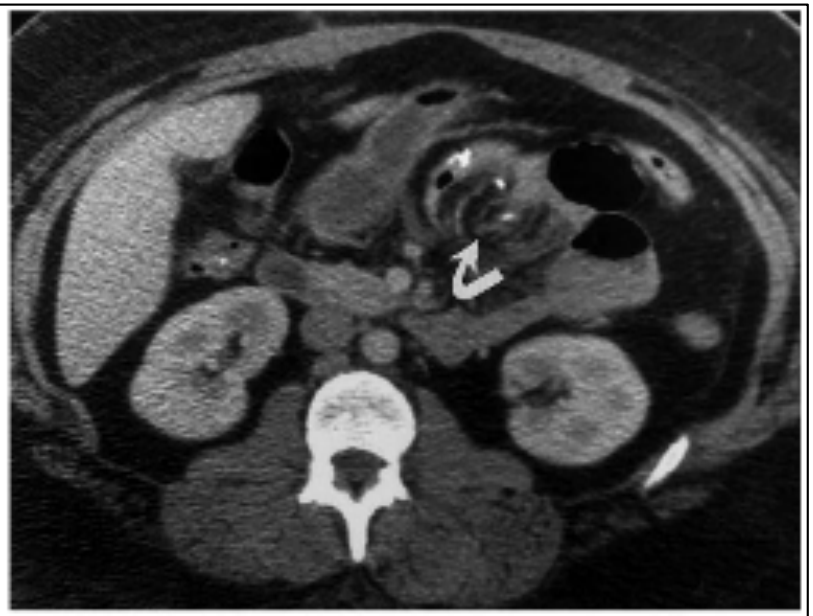
- **Douleurs**, peu intenses au début, puis violentes
- **Vomissements absents 2 fois sur 3**
- Contraste avec **clinique pauvre** (Occlusion à ventre plat)
- ASP : **aucun signe** classique occlusion
- 25 % Faux Négatifs en TDM ou IRM
- Si doute → Laparoscopie exploratrice
- Retard au diagnostic → résection grêle, DC F ou M

Hernies Internes





Anses intestinales dilatées en arrière de l'estomac



Zone de torsion du pédicule mésentérique de l'anse herniée

Blachar A, et al., RSNA, 2002

- Y penser : TDM ou IRM **et** chirurgien expert en CB
- Diagnostic difficile +++
- Y penser, Eduquer Patientes et Médecins

Agenda

- Un défi pour aujourd'hui et demain
- Quid des G après CB
- Risques nutritionnels et métaboliques
- Risques abdominaux spécifiques
- En pratique

Pratique clinique spécifique

Avant la CB : Eduquez…

Attendre 12/18 mois avant G

Contraception adaptée

Pratique clinique spécifique

Avant la CB : Eduquez…

Attendre 12/18 mois avant G

Contraception adaptée

Avant la G : Préparer et programmer

- **Renforcer ETP** : Programmation, dangers de la non observance, intérêt du suivi
- **Bilan pré-Grossesse**
  - NFS , Fer sérique , CST , Ferritine
  - Glycémie à jeun, HbA1c
  - Ca^{++} , $PO4^{--}$, 25 OH Vitamine D3, Magnésium
  - Albumine, TP
  - Vitamines A, B1, B6, B12, E, K
  - Zn et Sélénium
- **Si AGA : TOGD**

Pratique clinique spécifique

Avant la CB : Eduquez…

Attendre 12/18 mois avant G

Contraception adaptée

Avant la G : Préparer et programmer

- **Renforcer ETP** : Programmation, dangers de la non observance, intérêt du suivi
- **Bilan pré-Grossesse**
  - NFS , Fer sérique , CST , Ferritine
  - Glycémie à jeun, HbA1c
  - Ca^{++} , $PO4^{--}$, 25 OH Vitamine D3, Magnésium
  - Albumine, TP
  - Vitamines A, B1, B6, B12, E, K
  - Zn et Sélénium
- **Si AGA : TOGD**

- **CORRIGER les CARENCES ; OPTIMISER la SUPPLEMENTATION**

Pratique clinique spécifique

Tableau III : Apports en vitamines et minéraux après Chirurgie Bariatrique (CB) en cas de grossesse

lorsque aucune carence n'a été identifiée

Multivitamines :	A choisir pour avoir une adéquation la moins imparfaite avec les ANC de la femme enceinte
Vitamine B9 :	Les ANC dès la période pré-conceptionnelle de 0,4 mg/j sont peut-être insuffisants après CB Un apport de 5 mg est peut être à considérer comme en cas d'antécédent d'AFTN.
Vitamine B12 :	Un apport beaucoup plus important que les ANC pour une femme ayant une absorption parfaite est conseillé : 300 µg/j per os ou 1000 µg/par mois en IM
Vitamine D :	400-800 UI/j ou 100 000 UI/3 mois
Calcium :	1 200 à 2 000 mg / j selon les apports alimentaires, de préférence sous forme de citrate de calcium, et à prendre en dehors des repas et des prises médicamenteuses
Fer / Zinc	50 - 65 mg de Fer élément / 15 mg de Zinc
	Toutes les formulations de multivitamines sont sous dosées pour une femme enceinte

Pratique clinique spécifique

Avant la CB : Eduquez…

Attendre 12/18 mois avant G

Contraception adaptée

Avant la G : Préparer et programmer

- Renforcer ETP : Programmation, dangers de la non observance, intérêt du suivi
- Bilan pré-Grossesse
- Corriger carences – Optimiser la supplémentation

Durant la G : Surveiller et évaluer au diagnostic et à chaque T

- **Poids** : trop peu (AGA trop serré, Pb mécanique), trop (Pb diététique)
- **Signes digestifs** : Pb Mécanique (Hernie interne), calibrage nécessaire
- **Prises médicamenteuses** : B9, Fer, Vitamines, autres médicaments (LT4)
- **TA, BU, Glycémies capillaires**
- Croissance fœtale / Malformations : **Echographie**
- Si DS-DBP : vision nocturne (Vitamine A)

MERCI

DE VOTRE ATTENTION

Gestion AGA

- TOGD avant grossesse
- Calibrage
  - ✓ Non systématique
  - ✓ T_1 si vomissements +++, dysphagie, douleur forte et inhabituelle
  - ✓ T_2 et T_3 si vomissements
  - ✓ T_3 avant accouchement

Risques Nutritionnels : Déficit Vitamine A

Influence of Roux-en-Y Gastric Bypass on the Nutritional Status of Vitamin A in Pregnant Women: a Comparative Study

Variables	G1 (n=80)			G2 (n=40)			p value
	Mean	SD	Inadequacy prevalence (%)	Mean	SD	Inadequacy prevalence (%)	
Retinol (µmol/L)	1.76	0.89	45.0	0.99	0.39	72.5	<0.001*
β-carotene (µg/dL)	87.37	62.19	55.0	22.70	18.0	90.0	<0.001*

F sans GBP

F avec GBP

Macha SM, et al., Obes Surg, 2016

Risques Nutritionnels : Déficit Vitamine A

Carence vitamine A

- Après DS-DBP, 2 % baisse de la vision nocturne
- Malformations : microphtalmie, hypoplasie NerfO, opacités cornée

Vitamine A

T1 : Rétinol tératogène, béta carotène

T2 : Poursuite supplémentation

Crusell M, et al., Obes Surg, 2016

Risques Nutritionnels : Déficit Vitamine K

Maternal bariatric surgery: adverse outcomes in neonates

Eur J Ped, 2008

A. Eerdekens · A. Debeer · G. Van Hoey · C. De Borger · V. Sachar · I. Guelinckx · R. Devlieger · M. Hanssens · C. Vanhole

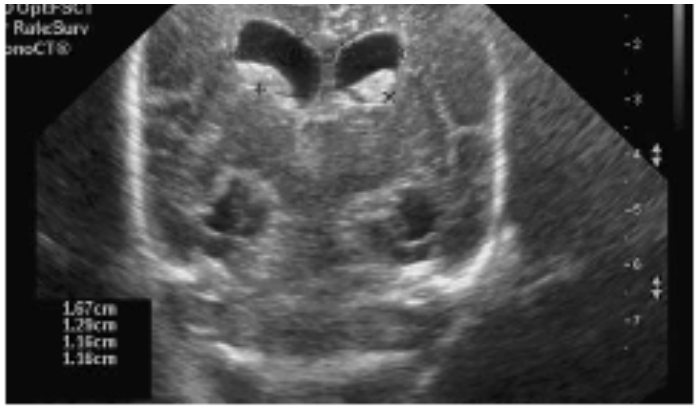


Fig. 1 Cerebral ultrasonography of patient 2 shows bilateral intraventricular bleeding with extravasation to the third and fourth ventricle and ventricular dilatation

Vitamine K

Carence vitamine K

- 3 AGA (1 Kop 2 ans)
- 1 DS, 1 DBP
- Vomissements et chute poids +++
- Hémorragie IV
- 3 « chondrodysplasie ponctuée » (comparable foetopathie AVK)
- 3 décès
- 2 retard mental sévère

Chirurgie Bariatrique et Grossesse

Fertilité : meilleure

Moins de risques maternels

Mais suivi spécifique indispensable

Pratique clinique spécifique

Weight management before, during and after pregnancy

NICE National Institute for Health and Care Excellence

- Advise that moderate-intensity physical activity will not harm her or her unborn child. At least 30 minutes per day of moderate intensity activity is recommended.
- Give specific and practical advice about being physically active during pregnancy:
  - recreational exercise such as swimming or brisk walking and strength conditioning exercise is safe and beneficial

NICE, 2010. www.nice.org.uk/guidance/

What characteristics of nutrition and physical activity interventions are key to effectively reducing weight gain in obese or overweight pregnant women? A systematic review and meta-analysis

Yeo SE, et al., Obes Rev, 2017

AURORA: bariatric surgery registration in women of reproductive age - a multicenter prospective cohort study

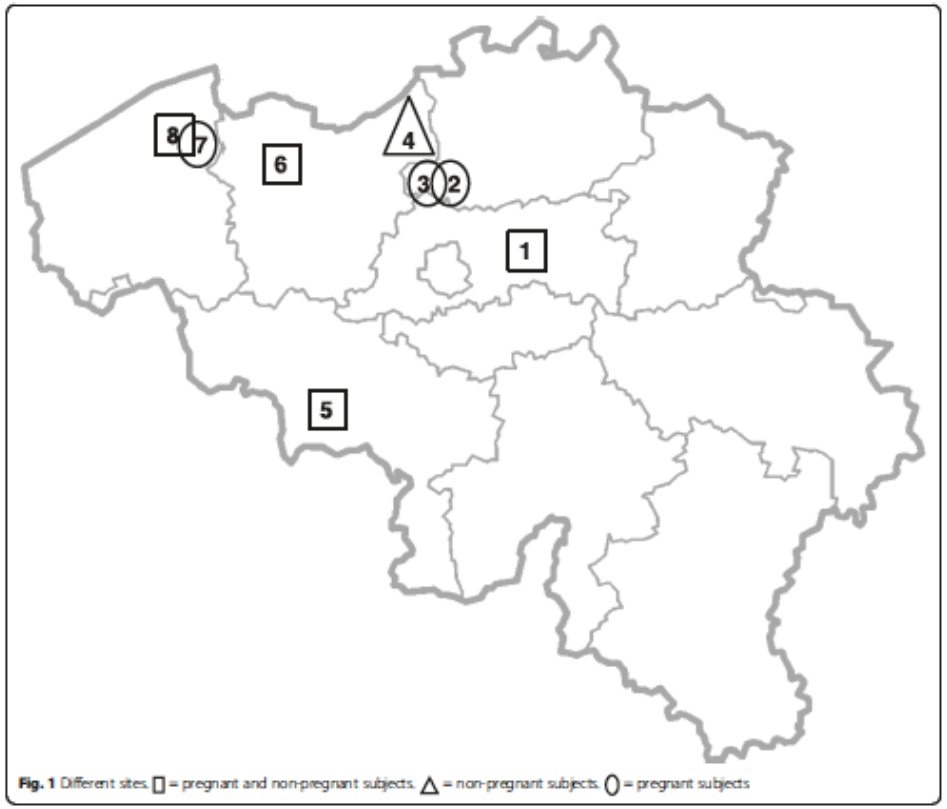


Fig. 1 Different sites. □ = pregnant and non-pregnant subjects. △ = non-pregnant subjects. ○ = pregnant subjects

Jans G, et al., BMC Pregancy and Childbearth, 2016

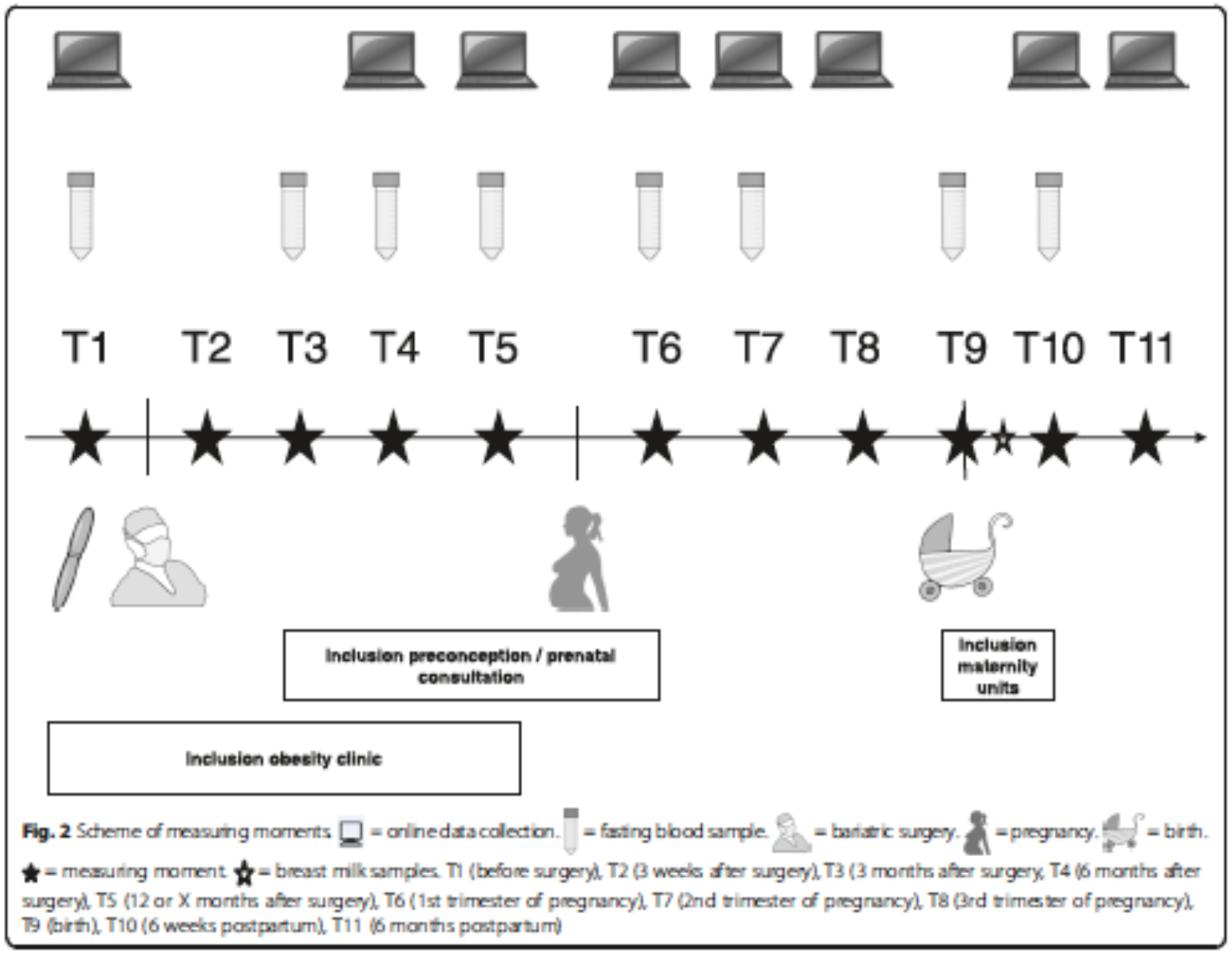
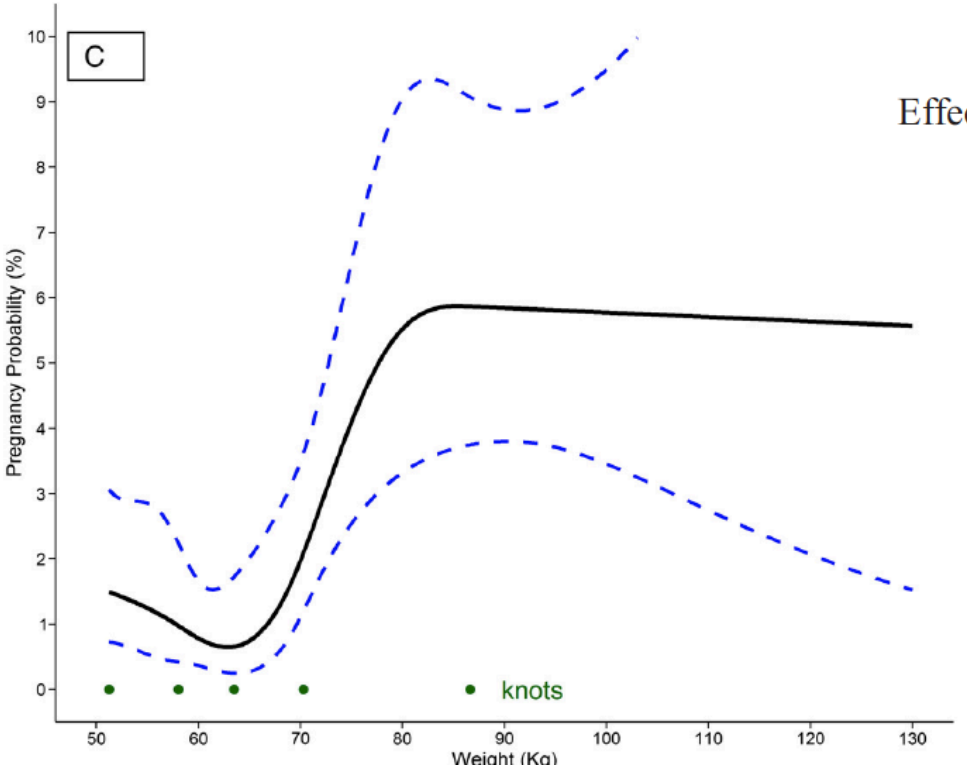


Fig. 2 Scheme of measuring moments. = online data collection. = fasting blood sample. = bariatric surgery. = pregnancy. = birth. = measuring moment. = breast milk samples. T1 (before surgery), T2 (3 weeks after surgery), T3 (3 months after surgery, T4 (6 months after surgery), T5 (12 or X months after surgery), T6 (1st trimester of pregnancy), T7 (2nd trimester of pregnancy), T8 (3rd trimester of pregnancy), T9 (birth), T10 (6 weeks postpartum), T11 (6 months postpartum)

Jans G, et al., BMC Pregancy and Childbearth, 2016

Contraception du lendemain et obésité



Effect of body weight and BMI on the efficacy of levonorgestrel emergency contraception☆,☆☆

Nathalie Kapp*, Jean Louis Abitbol, Henri Mathé, Bruno Scherrer, Hélène Guillard, Erin Gainer, André Ulmann

Pregnancy rate following LNG EC according to BMI categories.

	BMI (kg/m^2)				
	<20	20–25	25–30	30–35	≥35
N total	249	873	367	149	93
N pregnancies	4	11	9	10	4
Pregnancy rate	1.61%	1.26%	2.45%	6.71%	4.30%
95% CI[a]	0.44%–4.06%	0.63%–2.24%	1.12%–4.60%	3.26%–11.99%	1.18%–10.64%

Contraception 91 (2015) 97–104

Contraception du lendemain et obésité

Results from pooled Phase III studies of ulipristal acetate for emergency contraception

Caroline Moreau[a,b,c,d,*] and James Trussell[d,e]

	All women in the efficacy population (n=2173)[a]					Women who did not report further acts of UPI (n=2044)			
		Observed PR, % (95% CI)	p	Adjusted OR[b]	p	Observed PR, % (95% CI)	p	Adjusted OR[b]	p
Age (years)	<25	1.9% (1.3–2.8)	.87			1.8% (1.1–2.6)	.59	1	
	25–34	1.8% (1.0–3.0)				1.4% (0.7–2.5)			
BMI (kg/m^2)	<30	1.6% (1.1–2.3)	.08	1	.04	1.3% (0.9–2.0)	.05	1	.04
	>30	3.1% (1.6–5.5)		2.1 (1.0–4.3)		3.0% (1.4–5.4)		2.2 (1.1–4.7)	
Weight	≤85 kg (187 lbs)	1.6% (1.1–2.3)	.06	1	.03	1.4% (0.9–2.0)	.04	1	.03
	>85 kg (187 lbs)	3.4% (1.6–6.1)		2.2 (1.1–4.6)		3.1% (1.4–5.9)		2.3 (1.1–5.1)	

Contraception. 2012 December ; 86(6): 673–680.

Risques Nutritionnels : Anémie ferriprive

A Time Interval of More Than 18 Months Between a Pregnancy and a Roux-en-Y Gastric Bypass Increases the Risk of Iron Deficiency and Anaemia in Pregnancy

Time interval	<18 months	≥18 months	[N]	p
Number of women	40	113		
PIH or PE	2 (5.4)	13 (12.7)	37/102	0.218
Gestational weight gain (kg)	9.4 (−2.0–21.6)	10.1 (−0.3–35.1)	30/90	0.316
Induced labour	10[a] (32.6)	31[a] (35.2)	31/88[a]	0.765
Caesarean section	17 (42.5)	43 (38.1)	40/113	0.621
Elective CS	9 (52.9)	24 (55.8)	17/43	0.840
Maternal request CS	6 (66.7)	9 (41.7)	17/43	0.201
Preterm delivery	7 (17.5)	14 (12.4)	40/113	0.420
Birth weight (gram)	3064 (2056–4178)	3258 (1025–4500)	39/112	0.071
Gestational age (days)	272 (226–292)	272 (219–294)	40/113	0.627
Small for GA	9 (23.1)	17 (15.2)	39/112	0.261
Birth weight ≥4000 g	2 (5.1)	11 (9.8)	39/112	0.368
Birth weight ≤2500 g	4 (10.3)	12 (10.7)	39/112	0.936
Large for GA	1 (2.6)	1 (0.9)	39/112	0.432

Crusell M, et al., Obes Surg, 2016

Pratique clinique spécifique

Institute of Medicine Recommendations for weight gain in pregnancy

Pre-pregnancy BMI	Total weight gain Range in kg	Rates of weight gain 2nd and 3rd trimester Mean (range) in kg/week
Underweight (<18.5 kg/m^2)	12.5–18	0.51 (0.44–0.58)
Normal weight (18.5–24.9 kg/m^2)	11.5–16	0.42 (0.35–0.50)
Overweight (25.0–29.9 kg/m^2)	7–11.5	0.28 (0.23–0.33)
Obese (≥30.0 kg/m^2)	5–9	0.22 (0.17–0.27)

Risque de dénutrition

- DBP surtout
- Cas peu nombreux
- Petites séries
- Pas de séries prospectives

Guelinckx I, et al., Hum Reprod Upd 2009

Pratique clinique spécifique

Pregnancy After Bariatric Surgery: Implications for Mother and Newborn

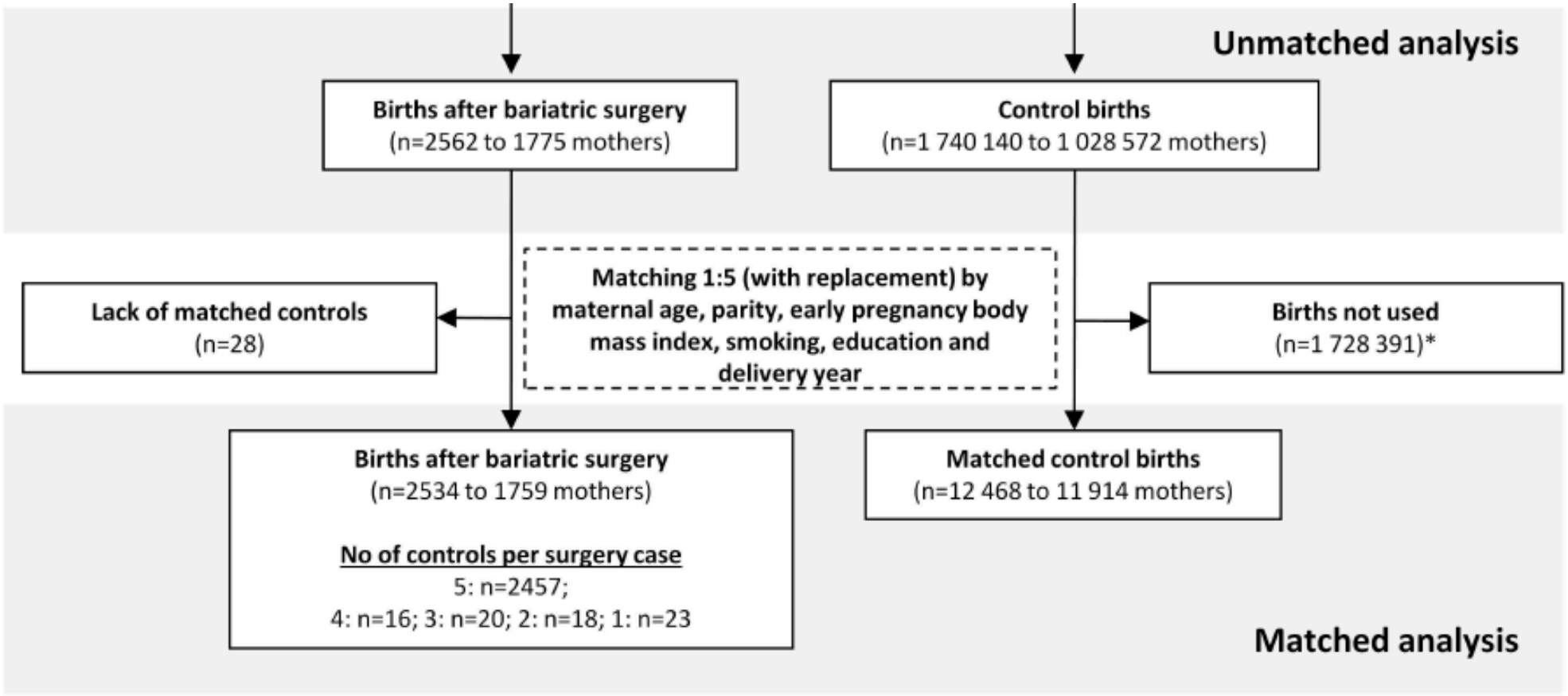
OBES SURG (2011)

Cátia Millene Dell'Agnolo ·
Maria Dalva de Barros Carvalho ·
Sandra Marisa Pelloso

Comorbidities	Before surgery				After surgery			
	No	%	Yes	%	No	%	Yes	%
Diabetes mellitus	31	96.77	1	3.23	32	100.00	–	–
Hypertension	23	71.88	9	28.13	31	96.88	1	3.13
Osteoarticular diseases	27	84.38	5	15.63	31	96.88	1	3.13
Hypercholesterolemia	31	96.88	1	3.13	32	100.00	–	–
Anemia	29	90.63	3	9.38	12	37.50	20	62.50
Neuropsychiatric diseases	32	100.00	–	–	30	93.75	2	6.25
Hypothyroidism	30	93.75	2	6.25	30	93.75	2	6.25

Risques enfant à naître après CB

Perinatal outcomes after bariatric surgery: nationwide population based matched cohort study



Roos N, et al., BMJ 2013

Risques enfant à naître après CB

Outcome	No (%) of cases†		Bariatric surgery *v* matched controls		P value
	Bariatric surgery	Matched controls	Risk difference (95% CI)	Conditional odds ratio (95% CI)‡	
Preterm birth (<37 weeks)	243 (9.7)	750 (6.1)	3.6 (2.4 to 4.9)	1.7 (1.4 to 2.0)	P<0.001
Medically indicated preterm birth	113 (4.5)	309 (2.5)	2.0 (1.2 to 2.9)	1.8 (1.4 to 2.3)	P<0.001
Spontaneous preterm birth	130 (5.2)	441 (3.6)	1.6 (0.7 to 2.5)	1.5 (1.2 to 1.9)	P<0.001
Moderately preterm (32-36 weeks)	188 (7.7)	621 (5.1)	2.6 (1.5 to 3.7)	1.6 (1.3 to 1.9)	P<0.001
Very preterm (<32 weeks)	55 (2.2)	129 (1.0)	1.2 (0.6 to 1.8)	2.0 (1.4 to 2.9)	P<0.001

Roos N, et al., BMJ 2013

Risques maternels spécifiques après CB ?

Box 1. Differential Diagnosis for Abdominal Pain in Roux-en-Y Gastric Bypass Patients

Surgical emergencies
- Acute appendicitis
- Bowel obstruction
- Gastric rupture
- Perforated gastric-duodenal ulcer

Pregnancy complications
- Intra-amniotic infection
- Labor or preterm labor
- Hepatitis during pregnancy
  - Severe preeclampsia
  - Hemolysis, elevated liver enzymes, and low platelet count syndrome
  - Acute fatty liver
- Placental abruption
- Uterine rupture

Complications From Roux-en-Y Gastric Bypass Mistaken for Medical Complications in Gravid Patients

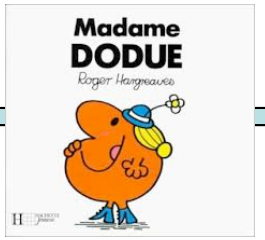
Medical disorders
- Cholelithasis
- Diverticulitis
- Gastroesphogeal reflux
- Heptatis
- Inflammatory bowel disease
- Marginal ulcer
- Nephrolithasis
- Ovarian cyst or torsion
- Pancreatitis

Caranta DG, et al., Obstet Gynecol 2014

Pratique clinique spécifique

Vitamine ou Composants	Unité	Femibion Grossesse 1 ®		Gestarelle G ®		Juvamine Fizz ®		ANC* F enceinte
Bétacarotène	mg	0	/	0	/	0	/	/
A	µg	0	0	0	0	800	100	700
B1	mg	1,2	86	1,4	100	1,4	100	1,8
B2	mg	1,6	100	1,6	100	1,6	100	1,6
B3 (PP)	mg	15	93	0	0	0	0	16
B5	mg	0	0	6	100	6	100	5
B6	mg	1,9	95	2	100	2	100	2
B8	µg	60	40	150	100	0	0	50
B9	µg	400	200	200	100	200	100	400
B12	µg	3	300	0	0	1	100	2,6
C	mg	110	183	60	100	60	100	120
D	UI	0	0	0	0	200	100	400
E	mg	13	130	10	100	10	100	12
H	µg	0	0	0	0	0	0	/
K	µg	0	0	0	0	0	0	/
Calcium	mg	0	0	0	0	120	15	1000
Chrome	µg	0	0	0	0	25	100	60
Cuivre	µg	0	0	500	25	0	0	2000
Fer	mg	0	0	14	100	0	0	30
Iode	µg	150	60	120	48	150	60	250
Magnésium	mg	0	0	50	17	45	15	400
Manganèse	mg	0	0	0	0	3,6	102	/
Molybdène	µg	0	0	0	0	150	100	/
Potassium	mg	0	0	0	0	0	0	/
Sélénium	µg	0	0	30	60	0	0	60
Zinc	mg	0	0	10	66	15	100	14
CoEnzyme Q	mg	0	/	0	/	0	/	/
DHA	mg	0	/	35	/	0	/	/

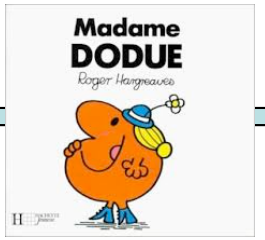
Déficits



Water-soluble vitamins			
Thiamine (vitamin B1)	Beriberi	Neuropsychiatric: aggression, hallucinations, confusion, ataxia, nystagmus, paralysis of the motor nerves of the eye Neurologic or 'dry' beriberi: convulsions, numbness, muscle weakness and/or pain of lower and upper extremities, brisk tendon reflexes High-output cardiac or 'wet' beriberi: tachycardia or bradycardia, lactic acidosis, dyspnoea, leg oedema, right ventricular dilatation Gastroenterologic: slow gastric emptying, nausea, vomiting, jejunal dilatation or megacolon, constipation	100 mg twice daily In patients with Wernicke encephalopathy or acute psychosis: 250 mg for 3–5 days, intramuscularly or intravenously
Riboflavin (vitamin B2)	Ariboflavinosis	Anaemia, dermatitis, stomatitis, glossitis	5–10 mg
Niacin (vitamin B3)	Pellagra	Diarrhoea, confusion, dermatitis, ataxia	100–500 mg thrice daily
Pantothenic acid (vitamin B5)	Pantothenic acid deficiency	Depression, infections, orthostatic hypotension, paraesthesias, foot drop, gait disorder	2–4 g
Pyridoxine (vitamin B6)	Pyridoxine deficiency	Dermatitis, neuropathy, confusion	30 mg
Folic acid (vitamin B9)	Folate deficiency	Weakness, weight loss, anorexia	1–5 mg
Cobalamin (vitamin B12)	Pernicious anaemia	Depression, malaise, ataxia, paraesthesias	0.5–2.0 mg orally; 1,000 µg intramuscularly monthly or 500 µg sublingually daily
Ascorbic acid (vitamin C)	Scurvy	Malaise, myalgias, gum disease, petechia	200 mg
Biotin (vitamin B7)	Biotin deficiency	Loss of taste, seizures, hypotonia, ataxia, dermatitis, hair loss	20 mg

Bal BS et al., Nat Rev Endocrinol 2012

Déficits



Fat-soluble vitamins			
Vitamin A	Vitamin A deficiency	Night blindness, itching, dry hair	10,000 IU
Vitamin D	Osteomalacia (in adults) Rickets (in children)	Arthralgias, depression, fasciculations, myalgias	Ergocalciferol 50,000 IU once weekly over 12 weeks, then switch to daily cholecalciferol 1,000–4,000 IU
Vitamin E	Vitamin E deficiency	Anaemia, ataxia, motor speech disorder, muscle weakness	800–1,200 IU
Vitamin K	Vitamin K deficiency	Bleeding disorder	2.5–25.0 mg
Minerals			
Calcium	Osteoporosis	Usually absent	1.2–2.0 g
Iron	Iron-deficiency anaemia	Fatigue, shortness of breath, chest pain	Ferrous sulfate 325 mg or ferrous fumarate 200 mg plus vitamin C 125 mg up to four times daily
Trace elements			
Zinc	Hypozincaemia	Skin lesions, nail dystrophy, alopecia, glossitis	Zinc sulfate 220 mg or zinc gluconate 30–50 mg every other day
Copper	Hypocupraemia	Usually absent	Copper gluconate (2–4 mg) every other day
Selenium	Keshan disease	Dyspnea, fatigue, leg swelling	100 µg sodium selenite

Bal BS et al., Nat Rev Endocrinol 2012

G après CB

Outcomes	Bariatric surgery *N*=9587(%)	Morbid obesity *N*=221580(%)	Crude OR (95% CI)	Adjusted OR* (95% CI)	Adjusted *p* values
Preterm birth	7.97	8.66	0.91 (0.85–0.98)	0.96 (0.88–1.04)	0.3174
Intrauterine fetal death	0.57	0.68	0.85 (0.65–1.11)	0.79 (0.59–1.07)	0.1211
Congenital anomalies	0.49	0.54	0.90 (0.67–1.21)	0.74 (0.52–1.04)	0.0824
Intrauterine growth restriction	3.73	1.93	1.97 (1.76–2.20)	2.27 (2.00–2.58)	<0.0001
Macrosomia	1.96	6.86	0.27 (0.24–0.31)	0.24 (0.21–0.29)	<0.0001

*Adjusted for age, race, income, insurance type, hospital type, hypertension, cardiovascular disease, diabetes, pulmonary disease, renal disease

Abenhaim HA et al., J Mat Fetal Neonat Med 2016

G après CB

Obstetric complications in women exposed/unexposed to bariatric surgery

Maternal/neonatal complications	Exposed n = 339	Unexposed n = 1277	AOR (95% CI)[a]	*P* value
GDM	8.9% (30)	7.1% (91)	1.26 (0.81–1.95)	.30
Preeclampsia	3.0% (10)	5.2% (67)	0.56 (0.28–1.11)	.10
Labor induction	27.7% (94)	26.3% (336)	1.05 (0.80–1.38)	.73
Cesarean section	32.7% (111)	28.7% (366)	1.13 (0.87–1.47)	.38
Postpartum hemorrhage (>500 mL)	7.4% (25)	7.9% (101)	0.97 (0.61–1.53)	.88
Apgar score (5 min) <7	0.9% (3)	1.6% (20)	0.53 (0.15–1.80)	.31
NICU	13.0% (44)	10.9% (139)	1.11 (0.76–1.62)	.60
Perinatal death	0.3% (1)	0.5% (7)	0.52 (0.06–4.28)	.54

Kjaer MM, et al., AJOG, 2013