

Contents

Introduction — vii

Contributing authors — xix

Section I: Planning for pregnancy

1 Epidemiology of obesity — 3

1.1 Introduction — 3

1.2 Definitions of obesity – advantages and disadvantages of using body mass index — 3

1.3 Prevalence of obesity — 5

1.4 Epidemiology of obesity in pregnancy — 8

Bibliography — 11

2 How useful are the guidelines for weight gain in pregnancy? — 15

2.1 Introduction — 15

2.2 Accuracy and limits of weight gain estimations — 16

2.3 The recommended weight gain during pregnancy — 17

2.4 Weight gain in “real life” as compared with the IOM recommendations — 17

2.5 BMI category and weight gain according to the IOM recommendations — 18

2.6 Appropriate weight gain and maternal outcomes — 19

2.7 Appropriate weight gain and fetal outcomes — 20

2.8 How useful is weight gain management in pregnancy? — 22

2.9 The risk of weight gain management in pregnancy — 22

2.10 Epilogue — 23

Bibliography — 23

3 The endangered intrauterine milieu: the effect of diabetes, obesity, or both — 27

3.1 Introduction — 27

3.2 Pathophysiology of diabetes and obesity — 27

3.3 Diabetes in pregnancy and maternal complications — 28

3.3.1 Hypertension in pregnancy — 28

3.3.2 Preterm birth — 30

3.3.3 Cesarean delivery — 31

3.4 Diabetes in pregnancy and fetal and neonatal complications — 32

3.4.1	Stillbirth — 32
3.4.2	Macrosomia — 33
3.4.3	Childhood obesity — 34
3.4.4	<i>In utero</i> programming of chronic disease — 34
3.5	Diabetes in pregnancy and modifiable factors — 35
3.5.1	Glycemic control — 35
3.5.2	Gestational weight gain — 35
3.6	Summary — 36
	Bibliography — 37
4	Adipokines and pathophysiology of pregnancy complications — 43
4.1	Introduction — 43
4.1.1	Leptin — 43
4.1.2	Adiponectin — 43
4.2	Maternal circulating leptin and adiponectin in complications of pregnancy — 44
4.2.1	Maternal circulating leptin and complications of pregnancy — 44
4.2.2	Maternal circulating adiponectin and complications of pregnancy — 47
4.3	Summary — 53
	Bibliography — 54
5	Perinatal outcomes following bariatric surgery — 61
5.1	Introduction — 61
5.2	Bariatric surgery overview — 61
5.2.1	Roux-en-Y gastric bypass — 61
5.2.2	Sleeve gastrectomy — 62
5.2.3	Adjustable gastric banding — 63
5.3	Outcomes — 64
5.3.1	Fertility — 64
5.3.2	Contraception — 64
5.3.3	Time-to-conception interval — 65
5.3.4	Miscarriage — 66
5.3.5	Preterm labor — 66
5.3.6	Cesarean section — 66
5.3.7	Hypertensive disorders of pregnancy — 67
5.3.8	Gestational diabetes mellitus — 68
5.3.9	Birth weight — 68
5.3.10	Fetal malformations — 69
5.3.11	Postpartum and fetal outcomes — 69
5.4	Summary — 70
	Bibliography — 70

6 Conception and obesity — 75

- 6.1 Introduction — 75
- 6.2 Natural fertility — 75
- 6.3 Pathophysiology — 75
- 6.4 Artificial reproductive technologies — 76
- 6.5 Effects of obesity on conception — 77
- 6.6 Weight loss — 78
- 6.7 Bariatric surgery — 79
- Bibliography — 80

7 Obesity and contraception — 85

- 7.1 Introduction — 85
- 7.2 Combined hormonal contraceptives — 85
 - 7.2.1 Physiological differences in obese patients — 86
 - 7.2.2 Efficacy — 86
 - 7.2.3 Risks and safety profile — 88
- 7.3 Progestin-only contraception — 89
 - 7.3.1 Progestin-only pill — 89
 - 7.3.2 Progestin implant — 89
 - 7.3.3 Progestin injectables — 90
- 7.3.4 Progestin-containing intrauterine contraceptives — 91
- 7.4 Emergency contraception — 91
- 7.5 Contraceptive use after bariatric surgery — 91
- 7.6 Sterilization — 92
- 7.7 Summary — 92
- Bibliography — 93

8 Obesity in pregnancy: a review of international guidelines — 97

- 8.1 Definition of obesity — 97
- 8.2 Preconception counseling — 98
- 8.3 Antenatal care — 100
- 8.4 Intrapartum — 104
- 8.5 Postpartum — 104
- 8.6 Conclusions — 105
- Bibliography — 106

9 Diet and the obese pregnant patient — 111

- 9.1 Introduction — 111
- 9.2 Maternal nutritional needs in pregnancy — 111
- 9.3 Diet and low-grade inflammation in obese pregnancy — 113
 - 9.3.1 Macronutrients, micronutrients, and low-grade inflammation — 114

- 9.3.2 Dietary patterns and low-grade inflammation — 115
- 9.4 Nutritional recommendations in obese pregnancy to improve pregnancy outcomes — 116
- 9.5 Epigenetics in obese pregnancy — 117
- 9.6 Conclusions — 119
- Bibliography — 119

10 Medical and surgical management of obesity prior to planned pregnancy — 123

- 10.1 Introduction — 123
- 10.2 Treatment options for obesity — 123
- 10.3 Pharmacotherapies — 124
 - 10.3.1 Orlistat — 124
 - 10.3.2 Liraglutide 3.0 mg — 124
 - 10.3.3 Options available outside of Canada — 125
- 10.4 Considerations for medication cessation before attempting to become pregnant — 125
- 10.5 Bariatric surgery — 126
 - 10.5.1 Roux-en-Y gastric bypass — 126
 - 10.5.2 Sleeve gastrectomy — 127
 - 10.5.3 Adjustable gastric banding — 127
- 10.6 Considerations post-surgery prior to attempting to become pregnant — 127
- Bibliography — 128

11 Maternal obesity and medical complications — 131

- 11.1 Introduction — 131
- 11.2 Obesity and increased risk of mortality — 131
- 11.3 Increased mortality in obese pregnant women — 132
- 11.4 Obesity and medical complications — 134
 - 11.4.1 Cardiac disease — 134
 - 11.4.2 Respiratory disease — 137
 - 11.4.3 Hepatobiliary disease — 138
- Bibliography — 139

Section II: Pregnancy management

12 Second trimester fetal ultrasonography in the obese pregnant patient — 143

- 12.1 Introduction — 143
- 12.2 Overweight and obesity in pregnancy — 143
- 12.3 Obesity and being overweight and the increased risk of congenital anomalies — 143

12.4	Obesity and being overweight as a significant cause of failed ultrasound examinations — 144
12.5	Technical tips to overcome the challenge — 145
12.6	Conclusion — 148
	Bibliography — 149
13	Fetal anomalies in obese women — 151
13.1	Introduction — 151
13.2	Maternal obesity and incidence of fetal anomalies — 151
13.3	Screening and prenatal diagnosis of fetal anomalies in obese women — 152
13.3.1	Aneuploidy screening — 152
13.3.2	Fetal anomaly screening — 154
13.4	Invasive procedures and fetal therapy in obese women — 156
13.5	Conclusion — 157
	Bibliography — 157
14	The professional responsibility model of obstetrics ethics: implications for the management of obesity during pregnancy — 161
14.1	Introduction — 161
14.2	The professional responsibility model of obstetric ethics — 161
14.2.1	Key concepts from medical ethics — 161
14.2.2	The professional responsibility model — 163
14.3	Implications for the management of pregnancy complicated by obesity — 166
14.4	Conclusion — 167
	Bibliography — 167
15	The obese patient: losing weight in pregnancy — 169
15.1	Scope of the problem — 169
15.2	Gestational weight loss among obese patients — 170
15.3	Gestational weight loss in GDM patients — 172
15.4	Risks of gestational weight loss — 172
15.5	Interventions aimed at reducing weight in pregnancy — 173
15.6	Conclusion — 173
	Bibliography — 174
16	Obesity and hypertension — 177
16.1	Introduction — 177
16.2	Epidemiology — 177
16.3	Pathophysiology — 178
16.4	The effect of obesity and hypertension on pregnant women and their offspring — 179

- 16.5 Management strategies — 180
- 16.5.1 The prepregnancy period — 180
- 16.5.2 Prepregnancy counseling — 182
- 16.5.3 The antepartum period — 182
- 16.5.4 Labor and delivery — 185
- 16.5.5 The postpartum period — 186
- Bibliography — 187

17 Venous thromboembolism in the obese pregnant patient — 189

- 17.1 Background and epidemiology — 189
- 17.2 Pathogenesis of VTE — 190
- 17.3 Prevention of VTE in obese pregnant women — 191
- 17.4 Clinical manifestations of VTE — 191
- 17.5 Diagnostic modalities — 192
- 17.6 Deep vein thrombosis — 192
- 17.7 Pulmonary embolism — 193
- 17.8 Cerebral vein thrombosis — 195
- 17.9 Management of acute VTE — 195
- 17.9.1 Choice of treatment agent — 195
- 17.9.2 Anticoagulation dosage and duration — 196
- 17.9.3 Peripartum management of anticoagulation — 197
- 17.9.4 Re-initiation of anticoagulation postpartum — 197
- Bibliography — 197

18 MicroObesity in pregnancy: the inside story — 201

- 18.1 Introduction — 201
- 18.2 The gut as a gatekeeper of health — 201
- 18.2.1 Contributions of the gut microbiome to obesity onset in the nonpregnant state — 202
- 18.3 Expanding the pregnancy narrative to include the microbiome — 204
- 18.3.1 The gut microbiome and maternal adaptation to pregnancy — 205
- 18.4 MicroObesity in pregnancy — 206
- 18.4.1 Implications of maternal obesity and gut microbial dysbiosis — 208
- 18.5 Conclusions and future perspectives — 209
- Bibliography — 209

19 Obesity and the risk of stillbirth — 215

- 19.1 Introduction — 215
- 19.2 Pathophysiology of stillbirth in pregnancies affected by obesity — 216
- 19.2.1 Increased risk for preeclampsia — 216

- 19.2.2 Increased risk for gestational diabetes mellitus — 217
- 19.2.3 Increased risk of congenital anomalies — 217
- 19.3 Underdetection of congenital anomalies — 218
- 19.4 Limitations of aneuploidy screening — 218
- 19.5 Fetal growth restriction — 219
- 19.6 Summary — 219
- Bibliography — 220

Section III: Intrapartum management

- 20 Induction of labor in the obese patient — 227**
 - 20.1 Induction of labor in obese women — 227
 - 20.2 Higher rate of failure of induction of labor in obese women — 227
 - 20.3 Different labor patterns in obese women — 228
 - 20.4 Different responses to induction agents in obese women — 229
 - 20.5 Induction of labor in specific maternal medical conditions in obese women — 230
 - 20.6 Excessive gestational weight gain in obese women requiring induction of labor — 231
 - 20.7 Conclusion — 231
 - Bibliography — 231
- 21 Analgesia and anesthesia for the obese parturient — 235**
 - 21.1 Introduction — 235
 - 21.2 Definition of obesity — 236
 - 21.3 Physiological changes of pregnancy and their anesthetic implications in the obese parturient — 236
 - 21.3.1 Respiratory system — 237
 - 21.3.2 Cardiovascular system — 238
 - 21.3.3 Gastrointestinal system — 239
 - 21.3.4 Coagulation system — 239
 - 21.3.5 Endocrine system — 239
 - 21.4 Obstructive sleep apnea and the obese parturient — 240
 - 21.5 Anesthesia and perioperative care of the obese parturient — 241
 - 21.6 Labor and vaginal delivery — 241
 - 21.6.1 Ultrasound use for epidural placement — 242
 - 21.6.2 Choice of interspace — 243
 - 21.6.3 Dural puncture — 243
 - 21.7 Cesarean delivery — 244
 - 21.7.1 Positioning — 244
 - 21.7.2 Monitoring — 245
 - 21.7.3 Intravenous access — 246

21.7.4	Aspiration prophylaxis — 246
21.7.5	Regional anesthesia — 246
21.7.6	Single shot spinal — 246
21.7.7	Continuous spinal anesthesia — 247
21.7.8	Epidural — 248
21.7.9	Combined spinal epidural — 248
21.7.10	General anesthesia — 248
21.7.11	Airway — 249
21.7.12	Preoxygenation and apneic oxygenation — 249
21.7.13	Induction and maintenance of anesthesia — 250
21.7.14	Intraoperative ventilation — 250
21.7.15	Extubation — 251
21.7.16	Postoperative analgesia and respiratory monitoring — 251
21.8	Postoperative complications — 252
21.8.1	Postpartum hemorrhage — 252
21.8.2	Thromboprophylaxis — 252
21.8.3	Infection — 252
21.9	Summary — 253
	Bibliography — 253

22 Obstetric nursing and team organization in planning for obese parturient — 257

22.1	Introduction — 257
22.2	Antenatal considerations — 257
22.3	Accessibility — 260
22.4	Intrapartum care planning — 262
22.5	Postpartum care — 264
22.6	Summary — 265
	Bibliography — 267

23 Cesarean delivery in women with obesity — 269

23.1	Introduction — 269
23.2	Prophylactic antibiotics — 269
23.3	Skin incision — 270
23.4	Uterine incision — 271
23.5	Closure of peritoneum — 272
23.6	Closure of the subcutaneous tissue layer and drain placement — 272
23.7	Closure of the skin — 273
23.8	Wound dressing — 273
23.9	Anesthesia for the obese woman undergoing CD — 274
23.10	Venous thromboembolism prophylaxis — 274
23.11	Conclusion — 274
	Bibliography — 275

24	Vaginal delivery in the obese patient — 279
24.1	Introduction — 279
24.2	Altered uterine contractility — 279
24.3	Management of the first stage of labor — 280
24.4	Management of the second stage of labor — 282
24.5	Intrapartum monitoring — 282
24.6	Fetal overgrowth and shoulder dystocia — 283
24.7	Operative vaginal delivery — 285
24.8	Obstetrical trauma — 286
24.9	Post-dates pregnancy — 286
24.10	Induction of labor — 286
24.11	Vaginal birth after cesarean — 288
24.12	Planned cesarean delivery — 288
	Bibliography — 289

Index — 295
