

# **Body Contouring Following Massive Weight Loss**

*Essay*

**Submitted for fulfillment of Master degree  
In General Surgery**

*By*

**Randa Mohamed Essam El Din Moussa Erfan**

*M.B.B.Ch.*

*Cairo University*

*Under Supervision of*

**Prof. Dr. Alaa Abbas Sabry Mostafa**

Professor of General and Bariatric Surgery  
Faculty of Medicine – Ain Shams University

**Assoc.Prof. Dr. Mohamed El-Sayed El-Shinawi**

Associate Professor of General and Breast Surgery  
Faculty of Medicine – Ain Shams University

*Faculty of Medicine*

*Ain Shams University*

**2015**

## **Acknowledgments**

*Thanks to **Allah** first and foremost. I feel always indebted to Allah; the Most Kind and the Most Merciful.*

*I would like to express my gratefulness and respect to **Prof. Dr. Alaa Abbas Sabry Mostafa**, Professor of General and Bariatric Surgery, Faculty of Medicine – Ain Shams University, for his moral and scientific support and for giving me the honor of working under his supervision and valuable guidance.*

*Special thanks and deepest gratitude go to **Assoc. Prof. Dr. Mohamed El-Sayed El-Shinawi**, Associate Professor of General and Breast Surgery, Faculty of Medicine – Ain Shams University, for his constructive and instructive comments, valuable guidance throughout the work and for the efforts and time he has devoted to accomplish this work.*

*Last but not least, I can't forget to thank with all appreciation all members of my Family, especially my Parents, for pushing me forward in every step in the journey of my life.*

 *Randa Mohamed Essam El Din Moussa Erfan*

# Contents

<b>Subject</b>	<b>Page No.</b>
<b>List of Abbreviations .....</b>	<b>i</b>
<b>List of Tables .....</b>	<b>iv</b>
<b>List of Figures .....</b>	<b>vi</b>
<b>Introduction .....</b>	<b>1</b>
<b>Aim of the Work .....</b>	<b>4</b>
<b>Chapter (I): Obesity .....</b>	<b>5</b>
<b>Chapter (II): Bariatric Surgery .....</b>	<b>31</b>
<b>Chapter (III): Massive Weight Loss Patients .....</b>	<b>62</b>
<b>Chapter (IV): Upper Body Contouring for Massive Weight Loss Patients.....</b>	<b>99</b>
<b>Chapter (V): Lower Body Contouring for Massive Weight Loss Patients.....</b>	<b>169</b>
<b>Summary .....</b>	<b>233</b>
<b>Conclusion.....</b>	<b>236</b>
<b>References .....</b>	<b>237</b>
<b>Arabic Summary .....</b>	<b>—</b>

---

## List of Abbreviations

<i>Abbrev.</i>	<i>Full term</i>
<b>AGA</b>	: Autologous Gluteal Augmentation
<b>AGB</b>	: Adjustable gastric banding
<b>ASBS</b>	: American Society for Bariatric Surgery
<b>ATP</b>	: Adult Treatment Panel
<b>BMI</b>	: Body Mass Index
<b>BPD</b>	: Biliopancreatic Diversion
<b>BPD-DS</b>	: Biliopancreatic Diversion with Duodenal switch
<b>CBC</b>	: Complete blood cell count
<b>CBL</b>	: Circumferential body lift
<b>CDC</b>	: Centers for Disease Control and Prevention
<b>CHO</b>	: Carbohydrates
<b>CT</b>	: Computed tomography
<b>DIEAP</b>	: Deep inferior epigastric artery perforator
<b>DS</b>	: Duodenal switch
<b>DVT</b>	: Deep venous thrombosis
<b>EBWL</b>	: Excessive body weight loss
<b>ER</b>	: Extended release
<b>EWL</b>	: Excess weight loss
<b>FPG</b>	: Fasting plasma glucose
<b>GERD</b>	: Gastroesophageal reflux disease
<b>GI</b>	: Gastrointestinal

## **List of Abbreviations** *(Cont.)*

<i>Abbrev.</i>	<i>Full term</i>
<b>GIP</b>	: Gastric inhibitory polypeptide
<b>GLP-1</b>	: Glucagon-like peptide-1
<b>Hc</b>	: Hip circumference
<b>HDL</b>	: High density lipoprotein
<b>HOMA-IR</b>	: Homestasis Model of Assessment – insulin resistance
<b>ICAP</b>	: Intercostal artery perforator
<b>IDF</b>	: International Diabetes Federation
<b>IMF</b>	: Inframammary fold
<b>INR</b>	: International normalized ratio
<b>JI bypass</b>	: Jejunoileal bypass
<b>LAGB</b>	: Laparoscopic adjustable gastric banding
<b>LD</b>	: Latissimus dorsi
<b>LDL</b>	: Low density lipoprotein
<b>LEP</b>	: Leptin deficiency
<b>LEPR</b>	: Leptin receptor deficiency
<b>LICAP</b>	: Lateral intercostal artery perforators
<b>LSG</b>	: Laparoscopic Sleeve Gastrectomy
<b>MC4R</b>	: Melanocortin receptor 4 haploinsufficiency
<b>MetS</b>	: Metabolic syndrome
<b>MPa</b>	: Mega pascal
<b>MRI</b>	: Magnetic resonance imaging
<b>MWL</b>	: Massive weight loss

## **List of Abbreviations** *(Cont.)*

<i>Abbrev.</i>	<i>Full term</i>
<b>NAC</b>	: Nipple-areolar complex
<b>NCEP</b>	: National Cholesterol Education Program
<b>NIH</b>	: National Institutes of Health
<b>OSA</b>	: Obstructive sleep apnea
<b>PAL</b>	: Power-assisted liposuction
<b>POMC</b>	: Pro-opiomelanocotin deficiency
<b>PTH</b>	: Parathyroid hormone
<b>RBC</b>	: Red blood cell
<b>RNYGB</b>	: Roux-en-Y gastric bypass
<b>SD</b>	: Standard deviation
<b>SFS</b>	: Superficial fascial system
<b>SG</b>	: Sleeve Gastrectomy
<b>SILS</b>	: Single-incision laparoscopic surgery
<b>T2DM</b>	: Type 2 diabetes mellitus
<b>TMG</b>	: Transverse Gracilis Musculocutaneous Flap
<b>TRAM</b>	: Transverse rectus abdominus muscle
<b>UTS</b>	: Ultimate tensile strength
<b>UV</b>	: Ultra violet
<b>VBG</b>	: Vertical banded gastroplasty
<b>Wc</b>	: waist circumference
<b>WHO</b>	: World Health Organization
<b>WHR</b>	: Waist to hip ratio

## List of Tables

<b>Table No.</b>	<b>Title</b>	<b>Page No.</b>
<b>Table (1):</b>	B.M.I. Classification scheme .....	7
<b>Table (2):</b>	Genetic syndromes associated with obesity .....	12
<b>Table (3):</b>	Medications That Promote Weight Gain .....	13
<b>Table (4):</b>	Body mass index (BMI) in Egyptian women, 1994 and 1998-99 and BMI in Egyptian men 1998-99 .....	13
<b>Table (5):</b>	Prevalence of overweight .....	14
<b>Table (6):</b>	Anthropometric and metabolic variables preoperatively and 1 year postoperatively. ....	18
<b>Table (7):</b>	Correlation between postoperative fasting GLP-1 and BMI, fasting blood glucose, insulin and HOMA-IR .....	19
<b>Table (8):</b>	Comparison between pre and postoperative fasting serum GLP-1 .....	20
<b>Table (9):</b>	Description of improvement of diabetes among patients with impaired glucose tolerance and patients with type II diabetes mellitus .....	20
<b>Table (10):</b>	Comorbidities associated with obesity .....	21
<b>Table (11):</b>	Liposuction versus Mesotherapy .....	29
<b>Table (12):</b>	Summary of Patient Selection Criteria, 1991 <i>NIH Consensus Statement</i> .....	32
<b>Table (13):</b>	Nutritional deficiencies after bariatric surgery .....	47

## **List of Tables (Cont.)**

<b>Table No.</b>	<b>Title</b>	<b>Page No.</b>
<b>Table (14):</b>	Routine Vitamin and Mineral Supplements Following Bariatric Surgery .....	48
<b>Table (15):</b>	Recommended Long-Term (>1 Year) Biochemical Surveillance of Nutritional Status Following Malabsorptive Bariatric Surgery Procedures.....	48
<b>Table (16):</b>	Advantages and disadvantages of various methods of weight loss .....	49
<b>Table (17):</b>	The Pittsburgh Rating Scale for upper body regions.....	105
<b>Table (18):</b>	Basic components required to address the MWL breast .....	127
<b>Table (19):</b>	According to Pierre Nicolau 2013 patients are classified into four types.....	170
<b>Table (20):</b>	Massive Weight Loss Abdominotorso Classification System .....	215



## List of Figures

<b>Figure No.</b>	<b>Title</b>	<b>Page No.</b>
<b>Figure (1):</b>	CDC's Division of Diabetes Translation National Diabetes Surveillance System.....	5
<b>Figure (2):</b>	Illustration of visceral fat obesity and subcutaneous fat obesity by abdominal CT scanning .....	10
<b>Figure (3):</b>	Illustration of upper body (apple-type) obesity and lower body (pear-type) obesity .....	15
<b>Figure (4):</b>	Lipsuction process .....	27
<b>Figure (5):</b>	Treatment protocol.....	30
<b>Figure (6):</b>	Mini gastric bypass .....	37
<b>Figure (7):</b>	Adjustable gastric banding .....	38
<b>Figure (8):</b>	Sleeve Gastrectomy .....	40
<b>Figure (9):</b>	Jejunioileal bypass .....	41
<b>Figure (10):</b>	Biliopancreatic diversion.....	42
<b>Figure (11):</b>	Biliopancreatic diversion .....	42
<b>Figure (12):</b>	Biliopancreatic diversion with duodenal switch .....	44
<b>Figure (13):</b>	Malabsorptive procedures.....	45
<b>Figure (14):</b>	Jaw wiring.....	46
<b>Figure (15):</b>	Vertical banded gastroplasty .....	47
<b>Figure (16):</b>	Instruments of SILS .....	60
<b>Figure (17):</b>	The DaVinci system working ports .....	61
<b>Figure (18):</b>	Skin redundancy after massive weight loss .....	64
<b>Figure (19):</b>	Extensive skin necrosis following abdominal liposuction.....	89

## List of Figures *(Cont.)*

<b>Figure No.</b>	<b>Title</b>	<b>Page No.</b>
<b>Figure (20):</b>	Seroma following abdominoplasty .....	91
<b>Figure (21):</b>	Penile oedema and scrotal seroma following abdominal liposuction.....	92
<b>Figure (22):</b>	The lamp shade analogy of deflation.....	101
<b>Figure (23):</b>	Diagram of superficial fascial system zones of adherence .....	102
<b>Figure (24):</b>	Anterior and posterior views of arm deformity.....	107
<b>Figure (25):</b>	Arm Pittsburgh Scale.....	108
<b>Figure (26):</b>	Zones of treatment of arm deformity.....	110
<b>Figure (27):</b>	Preoperative marking of brachioplasty.....	111
<b>Figure (28):</b>	The double-ellipse markings in place .....	114
<b>Figure (29):</b>	The double ellipse markings .....	114
<b>Figure (30):</b>	Marking of the outer ellipse .....	115
<b>Figure (31):</b>	Marking the inner ellipse .....	115
<b>Figure (32):</b>	A patient before and after undergoing the double ellipse technique .....	116
<b>Figure (33):</b>	Final scar and Z plasty at axillary crease.....	116
<b>Figure (34):</b>	Preoperative markings for bicipital groove brachioplasty.....	117
<b>Figure (35):</b>	Markings of Bicipital groove brachioplasty .....	117
<b>Figure (36):</b>	Brachioplasty procedure with preliminary liposuction.....	117
<b>Figure (37):</b>	Male excessive weight loss patient after brachioplasty with extension down thorax to inframammary fold .....	118

<b>Figure (38):</b>	Surgical markings of L brachioplasty.....	119
<b>Figure (39):</b>	Marking the L Brachioplasty .....	120
<b>Figure (40):</b>	Final Markings of the L brachioplasty .....	120
<b>Figure (41):</b>	Pinching upwards of the inferior border of the medial arm to the deltopectoral groove .....	121
<b>Figure (42):</b>	L Brachioplasty Surgical technique.....	122
<b>Figure (43):</b>	Breast Pittsburgh Scale.....	125
<b>Figure (44):</b>	Deformity of the breast in the MWL patient ....	125
<b>Figure (45):</b>	Loss of the “S”-like continuum from axilla to lateral breast.....	126
<b>Figure (46):</b>	Breast asymmetry and medial position of the nipples.....	127
<b>Figure (47):</b>	Marking the Deepithializing Dermal Flap.....	129
<b>Figure (48):</b>	The breast parenchyma is degloved by raising a 1-cm-thick flap.....	130
<b>Figure (49):</b>	Securing the central dermal extension to the 2nd rib .....	130
<b>Figure (50):</b>	Plication of the dermal flaps to reshape the breast parenchyma .....	131
<b>Figure (51):</b>	The final shape of the plicated breast .....	131
<b>Figure (52):</b>	Preoperative and postoperative views of dermal suspension mastopexy .....	131
<b>Figure (53):</b>	A, Wise (inverted T) pattern, inferior pedicle; B, Wise pattern, superomedial pedicle; and C, Wise pattern, superior pedicle.....	132
<b>Figure (54):</b>	Inverted-T or Anchor Mastopexy.....	135
<b>Figure (55):</b>	A standard Wise “keyhole” pattern is marked .....	135

<b>Figure (56):</b>	Mastopexy and breast reduction .....	136
<b>Figure (57):</b>	Mastopexy and breast reduction. ....	137
<b>Figure (58):</b>	Mastopexy and breast reduction. L-shaped skin excision pattern. Chiari technique.....	138
<b>Figure (59):</b>	Mastopexy and breast reduction, J-shaped incision.....	139
<b>Figure (60):</b>	A 41-year-old patient after 65 kg weight loss ...	141
<b>Figure (61):</b>	Identification and dissection of the ICA Perforator .....	142
<b>Figure (62):</b>	Marking the ICAP flap as an extension of the Wise pattern .....	142
<b>Figure (63):</b>	ICAP flap with Wise pattern inferior pedicle mastopexy .....	142
<b>Figure (64):</b>	LICAP flap with superior pedicle vertical mastopexy.....	143
<b>Figure (65):</b>	DIEAP flap technique.....	145
<b>Figure (66):</b>	Bilateral DIEAP flaps were based on the preoperative marked perforators (F) The DIEAP flap was anastomosed to the internal mammary vessels through the mastopexy incision.....	146
<b>Figure (67):</b>	Gracilis Musculocutaneous Flap .....	147
<b>Figure (68):</b>	Implant Malposition.....	150
<b>Figure (69):</b>	Preoperative appearance of a 33-year-old woman in preparation for augmentation mastopexy after MWL.....	152
<b>Figure (70):</b>	Grades of pseudogynecomastia .....	154
<b>Figure (71):</b>	Treatment of Grade 1b pseudogynecomastia .	155
<b>Figure (72):</b>	Markings for pedicled reconstruction .....	156

---

<b>Figure (73):</b>	The dermoglandular pedicle .....	156
<b>Figure (74):</b>	Pedicled nipple reconstruction.....	157
<b>Figure (75):</b>	Pre and postoperative views of free nipple grafting.....	158
<b>Figure (76):</b>	Boomerang shaped pattern excision .....	159
<b>Figure (77):</b>	Back Pittsburgh Scale .....	160
<b>Figure (78):</b>	The variety of back rolls after massive weight loss .....	160
<b>Figure (79):</b>	Patients are asked to bring their most revealing swimwear or bra beneath which they would like the final incision line in deformity of back and lateral chest.....	161
<b>Figure (80):</b>	Strong bimanual palpation is used to identify the resection width and to grasp the tissue superior and inferior to the final incision line in deformity of back and lateral chest .....	161
<b>Figure (81):</b>	Transverse upper body lift.....	162
<b>Figure (82):</b>	Preoperative marking and postoperative scar of isolated lateral thoracic lift after previous limited brachioplasty .....	163
<b>Figure (83):</b>	Lateral descent of inframammary fold and correction by lateral thoracic excision.....	163
<b>Figure (84):</b>	Intersection of markings of the brachioplasty and the lateral thoracic and back excisions in males .....	167
<b>Figure (85):</b>	Patient before (left) and after (right) a male- pattern upper body lift. ....	168
<b>Figure (86):</b>	Fat layers, Fascia superficialis and lymphatic vessels .....	169
<b>Figure (87):</b>	Preoperative markings of transverse medial thigh lift .....	174

---

<b>Figure (88):</b>	Closure of the incisions in thighplasty .....	174
<b>Figure (89):</b>	Preoperative and postoperative results of transverse medial thigh lift, showing a significant improvement .....	176
<b>Figure (90):</b>	Preoperative and postoperative showing a good result with transverse medial thigh lift ....	176
<b>Figure (91):</b>	“Pinch” technique utilized by the surgeon to estimate the excess skin and soft tissue to be removed .....	179
<b>Figure (92):</b>	Surgical markings of vertical medial thigh lift with a horizontal component.....	180
<b>Figure (93):</b>	Right thigh, wound closed. Left thigh, surgical dissection .....	180
<b>Figure (94):</b>	Medial thigh lift with a vertical component extending onto leg.....	182
<b>Figure (95):</b>	Surgical marking of a short vertical scar medial thigh lift, Patient standing. Front inner thigh view .....	184
<b>Figure (96):</b>	Surgical marking of a short vertical scar medial thigh lift. Patient standing Oblique inner thigh view .....	184
<b>Figure (97):</b>	Surgical markings of a short vertical scar medial thigh lift .....	184
<b>Figure (98):</b>	Skin Excision of short vertical scar medial thigh lift Excision of skin and superficial fat is limited down by the Scarpa’s fascia .....	185
<b>Figure (99):</b>	The completed wound closure of short vertical scar medial thigh lift–right side .....	185
<b>Figure (100):</b>	“Frog’s leg” position. View of short vertical scar medial thigh lift medial thigh lift scars .....	186

<b>Figure (101):</b>	Left short vertical scar medial thigh lift scar at 3 months postoperative .....	187
<b>Figure (102):</b>	Right medial short vertical scar thigh lift scar at 3 months postoperative .....	187
<b>Figure (103):</b>	Gluteal flattening effect of CBL .....	190
<b>Figure (104):</b>	Fat grafting procedure.....	195
<b>Figure (105):</b>	Island AGA flap design .....	198
<b>Figure (106):</b>	Results of gluteal auto-augmentation with an island flap .....	199
<b>Figure (107):</b>	Moustache flap design .....	202
<b>Figure (108):</b>	Results of gluteal auto-augmentation with an moustache flap .....	203
<b>Figure (109):</b>	Gluteal implant locations for submuscular, intramuscular and subfascial procedures.....	206
<b>Figure (110):</b>	Illustration showing the areas of blood supply of the abdominal wall .....	212
<b>Figure (111):</b>	Abdomen Pittsburgh Scale .....	213
<b>Figure (112):</b>	Flank Pittsburgh Scale .....	213
<b>Figure (113):</b>	Incisional hernia following open bariatric surgery .....	214
<b>Figure (114):</b>	Algorithm for treatment and classification of the abdominotorso region after massive weight loss .....	215
<b>Figure (115):</b>	Preoperatively grasping excess lower tissue and joining the examiner's finger tips .....	217
<b>Figure (116):</b>	Preoperative and 3-week postoperative appearance following a full abdominoplasty ....	218
<b>Figure (117):</b>	Intraoperative view of abdominoplasty with umbilical transection.....	219