

THE IMPACT OF LARGE VOLUME LIPOSUCTION WITH ADRENALINE ONLY ON THE PREGNANCY AND AESTHETIC OUTCOMES OF INFERTILE OBESE WOMEN

By

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ABSTRACT

Background: Obesity dysregulates the hypothalamic-pituitary-ovarian axis resulting in ovulatory dysfunction and subsequent infertility. Tumescant liposuction comprised injection of a large volume of lactated Ringer's solution or normal saline, containing super-diluted epinephrine and lignocaine, in the subcutaneous fat. Even though this procedure accomplished accepted results as a body contouring surgery, the association between large-volume liposuction and infertility outcomes was not examined yet.

Objectives: To reveal the aesthetic and reproductive outcomes of obese infertile female patients with established underlying hormonal irregularities and submitted to large-volume tumescant liposuction with the use of adrenaline only.

Patients and Methods: The present prospective cohort study was conducted at Al-Azhar University Hospitals throughout September 2015 and August 2020. Obese or overweight infertile women within the reproductive age with menstrual irregularities, for at least one year were eligible for inclusion in the present study. These abnormalities were confirmed based on laboratory, and radiological evaluation. The procedure was done under general anesthesia and sterilization with betadine with small stabs in targeted areas. Post-operative pain was assessed using Visual analogue scale (VAS).

Results: A total of 18 female patients with established infertility of more than one-year duration were included in this study. Patients were furtherly assorted based on fulfilling Rotterdam criteria into two groups: Group (A) including 10 patients with polycystic ovarian syndrome (PCOS), and group (B) encompassing eight patients without. Clinically, three cases of secondary infertility get pregnant after the procedure, one case get pregnant after eight months and two of them after one year. Furthermore, two cases of primary infertility with PCOS get pregnant after six months and the other after one year. Seven cases of secondary infertility developed dramatic improvement in hormonal profile preparing them for conception without pregnancy. Patients experienced a statistically significant decline in the body mass index ($P < 0.001$, $t = 61.3$). As for patients' satisfaction, 15 (83.33%) gave a 4 or 5 score to their general appearance. This was reflected in the quality of life in which 13 (72.22%) patients were highly satisfied. No patient complained of uncomfortable postoperative pain.

Conclusion: Large-volume tumescant liposuction with use of adrenaline only was a safe, effective, and promising procedure in amending the negative reproductive and aesthetic repercussions of obesity among infertile obese women. These findings were associated with satisfactory pregnancy and cosmetic outcomes, which reflected on patients' satisfaction. No patient in our cohort experienced discomfort pain despite xylocaine non-use.

Keywords: Large-volume liposuction, tumescant liposuction, adrenaline, obesity, pregnancy, aesthetic.

INTRODUCTION

Obesity and overweight are considered one of the greatest threats to public health status. To date, approximately 1.9 billion and 610 million adults are considered overweight and obese, respectively. This figure represented nearly 39% of the general population (*Hales et al., 2018* and *Wang et al., 2020*). Obesity negatively impacted all physical and mental aspects of the body. As for the reproductive function, it dysregulates the hypothalamic-pituitary-ovarian axis resulting in ovulatory dysfunction and subsequent infertility. Excess weight leads to anovulation along with menstrual irregularities, which in turn arrives in deterioration of the quality of oocyte with immediate effect on the endometrium function (*Bellver et al., 2011*). Obesity increases the time to pregnancy, the tendency to miscarriage, and even gestation occurs it had many adverse maternal and fetal effects (*Mariano et al., 2013*, *Van Gaal & Maggioni, 2014* and *Riaz et al., 2018*).

Infertility is defined by the failure to attain clinical conception after one year of regular unprotected sexual intercourse (*O'Flynn, 2014*). In the Middle East, the estimated prevalence of primary and secondary infertility ranged from 10.6% to 26.7% (*Eldib and Tashani, 2018*). In Egypt, the fertility rate was 3.33 births/women in 2018, with a decline of 0.72% from the previous year (*Radovich et al., 2018*). There are a lot of weight-loss strategies to overcome the negative reproductive effects of obesity. This comprehended lifestyle modifications, medications, and surgical interventions. Hereafter, it included distinct approaches

such as bariatric surgeries, acupuncture, and liposuction (*Albaugh and Abumrad, 2018*). The adipose tissue gained additional importance from just a repository of extra energy to a highly metabolically active tissue that secretes a high quantity of energetic substances called adipocytokines. Despite the mechanical impact of excess adipose tissue, it appeared to have a major hormonal and metabolic impact among obese patients (*Broughton & Moley, 2017* and *Hantoosh et al., 2017*). Of note, adipose tissue is a crucial factor for the normal development of the female reproductive system. It induces estrogen metabolism, changes the concentration of sex hormone-binding globulin (SHBG), and increases hyper-insulinemia and leptin levels, which dramatically altered the function of the female reproductivity (*Souter et al., 2014*).

Tumescent liposuction was described initially by Jeffrey Klein in 1987 (*Lozinski and Huq, 2013*). This procedure comprised injection of a large volume of lactated Ringer's solution or normal saline, containing super-diluted epinephrine and lignocaine, in the subcutaneous fat (*Schmeller et al., 2012*). Even though, this procedure accomplished accepted results as a body contouring surgery (*Goldman et al., 2016*). Identifying the reproductive and cosmetic impact of this innovation help gynecologists and plastic surgeons precisely assort and timely employ the appropriate management of obesity among infertile women to prevent its potential long-term sequences.

The present work aimed to reveal the aesthetic and reproductive outcomes of obese infertile female patients with

established underlying hormonal irregularities and submitted to large-volume tumescent liposuction with the use of adrenaline only.

PATIENTS AND METHODS

The present prospective cohort study was conducted at Al-Azhar University Hospitals, throughout September 2015 and August 2020. The study was carried out based on the ethical recommendations of the Ethics Unit, Faculty of Medicine, Al-Azhar University, Cairo, Egypt. The surgical and clinical approaches were elucidated obviously for all candidates, and the informed consents were assigned prior to study processing. The steps of the current study were implemented along with the guidelines of the Declaration of Helsinki.

Selection criteria: Obese or overweight infertile women within the reproductive age with menstrual irregularities, for at least one year, which confirmed based on laboratory, and radiological evaluation were eligible for inclusion in the present study. Patients with the polycystic ovarian syndrome were diagnosed based on Rotterdam criteria (*Wang and Mol, 2017*). Conversely, patients with congenital malformations of the uterus, psychiatric disorder (severe depression, bulimia nervosa, and overt psychosis), thyroid disorder, prolactin disturbances, diabetes, malignancy, intense hepatic, renal, and cardio-vascular insults were ousted. Additionally, participants who missed follow-up within three months after the surgery were excluded. Overweight patients were identified at BMI > 25kg/m², whilst obese participants were recognized at BMI > 30kg/m².

Pre-operative clinical and laboratory evaluation: All patients were subordinated to pre-operative anthropometric measurements including body weight, height, body mass index (BMI), waist circumference, and evaluation of obesity-related comorbidities (dyslipidemia, hypertension, diabetes, renal dysfunction, liver dysfunction, and cardio-vascular disturbances). Furthermore, pre-operative pregnancy state was laboratory and radiologically evaluated to reveal the underlying hormonal status (day3 FSH and LH, day 21 serum progesterone and Dehydroepiandrosterone sulfate (DHEAS)), potential causes of infertility, history of miscarriage, and previous IVF treatment. To appreciate the capability to anesthesia, all patients were subordinated to routine preoperative clinical examination as well as routine laboratory assessment including complete blood count, coagulation profile, renal functions, and liver functions tests.

Pre-operative counseling: The first sitting included pre-operative counseling for patients and her husbands about the procedure, post-operative instructions, and expected results functionally and aesthetically through interactive discussion with the plastic surgeon and the gynecologist (researcher). After gaining the laboratory results, patients and their husbands were counseled regarding any misconception regarding the condition to realize the exact problem and the expectation with the assignment of the consent for the patient and her husband agreement. Preoperatively, the third set of counseling was performed to assure the patient about the procedure and anesthesia and to calm the relatives. Pre-operative

marking was done in standing position to targeted areas of liposuction. Tumescent solution was prepared using 2ml (1:1000) of epinephrine per 1 liter saline.

Procedure: The procedure was done under general anesthesia, and sterilization with betadine with small stabs in targeted areas (0.5 cm) in the hip region, gluteal region, lower abdomen, flanks, and arms. Infiltration of tumescent solution using Lamis infiltrating cannula in deep, superficial fat plans as much as skin Turgur (super wet technique) before liposuction criss crossing (feathering) was done by 4 and 5mm caliber cannula. Furthermore, liposuction is done keeping the aperture of the cannula downward and guided by skin pinch keeping its elasticity with uniform liposuction to avoid irregularity. The average amounts of lipoaspirated fat were 6-8 liters.

At the end of the procedure, aspiration and squeezing of any remnants of lipoaspirate and tumescent solution were

done properly, followed by application of adhesive pressure bandages to redistribute the skin over underlying tissue giving uniform contour and refine aesthetic outcome of aspirated areas followed by wearing of pressure garments by the surgeon himself before the patient leave the operative theater. The patient herself did the removal of adhesive pressure bandages 1-week post-operative with water and betadine shampoo in the semi-sitting position. After removal of pressure bandages, all patients are warned to keep in this position for at least 20 minutes and stand gradually to avoid postural hypotension or vasovagal attack. The pressure garments should be worn for 1.5 months. Through the first three weeks, the garments could be removed 1or 2 hours /day, and the next three weeks can be removed up to 6 hours divided three times per day (**Figure 1**).



Figure (1): A. Intraoperative positioning of the patient. B. Intraoperative sterilization of the patient with intraoperative infiltration of tumescent solution. C. liposuction of the gluteal region, D. At the end of the procedure.

Post-operative evaluation and follow-up: Within 1-2 hours, all candidates were transferred to the recovery room to ensure their hemodynamic stability. In addition, participants were discharged one day after the surgery and re-examined within two or three days after the operation. The anthropometric parameters in terms of body weight, BMI, and weight circumference were reassessed with each follow-up visit. Post-operative hormonal profile was assessed, including the levels of LH, total testosterone, and serum progesterone. Patients' satisfaction with their general appearance was estimated on a 5-point scale (0=Non satisfied, 5=completely satisfied) and the impact of their new contour on the quality of life (High, moderate, and low satisfaction) after 1.5 months post-operative. Patients

were subjected to monthly assessment visits for 12 months after surgery.

Assessment of post-operative pain: Visual analogue scale (VAS) for assessment of post-operative pain. It consists of a 10-15 cm long line with the left side revealing no pain with a smiling face while the right side reveals the worst pain ever with a frowning look. The patient then marked her pain sensation on the line between the two endpoints.

Statistical analysis: Continuous normally distributed data were reported in the form of mean and standard deviation (SD). Their related groups were compared using independent sample t-test. Non-normally distributed data were compared using Mann-Whitney U test. For paired normally distributed data, the particular groups were compared using paired t-test.

Subsequently, categorical variables were expressed using number and percentage, and its particular groups were compared using Pearson's chi-square test with Fisher's exact test. The overall statistically significant difference was established at p

< 0.05 . Statistical analysis was performed using SPSS software version 25 for Windows (SPSS Inc., Chicago, IL, USA). The figures were renovated using GraphPad Prism (GraphPad Software, Inc, San Diego) software version 7.

RESULTS

Patients' demographic characteristics:

A total of 18 female patients with established infertility of more than one year duration were included in this study. The mean age of the included patients was 32.8 ± 7.91 years, and the mean BMI was 37.1 ± 2.9 Kg/m². Patients were further assorted based on fulfilling Rotterdam criteria into two groups. Group (A), including ten patients with PCOS, and group (B) encompassing eight patients without. Preoperatively, the mean LH

levels were 11.513 ± 2.606 IU/L and 6.740 ± 0.450 IU/L among patients with and without PCOS, respectively ($P < 0.001$). In this respect, the mean levels of serum progesterone among the PCOS group were 2.073 ± 0.967 ng/dl, while it was 1.923 ± 0.336 ng/dl among non-PCOS patients. The mean serum testosterone levels were 86.3 ± 17.2 ng/dl and 51.4 ± 8 ng/dl among patients with and without PCOS, respectively ($P < 0.001$) (**Table1**).

Table (1): Baseline demographic characteristics of the included patients

Variables	Groups	Group A	Group B	P-Value
		Mean +SD/Number (%)	Mean +SD/Number (%)	
Number		10	8	
Age		33.5 ± 4.01	32.9 ± 5.67	0.796
BMI (Kg/m ²)		36.2 ± 6.1	35.7 ± 4.8	0.852
Years of infertility		4.9 ± 1.5	3.8 ± 1.2	0.902
Primary infertility		4 (40%)	5 (62.5%)	0.732
Secondary infertility		6 (60%)	3 (37.5%)	0.45
Irregular menstrual history		8 (80%)	5 (62.5%)	0.180
Baseline Hormonal Profile				
FSH (mIU/mL)		10.5 ± 5.7	7.63 ± 2.74	0.61
LH (IU/L)		11.513 ± 2.606	6.740 ± 0.450	< 0.001
Total Testosterone		86.3 ± 17.2	51.4 ± 8	< 0.001
Serum progesterone		2.073 ± 0.967	1.923 ± 0.336	0.704

BMI=Body mass index, **FSH**=Follicular stimulating hormone, **LH**=Luteinizing hormone

Pregnancy outcomes: Regarding patients with PCOS, the mean levels of LH and total testosterone decreased significantly ($P < 0.001$) after large-volume liposuction, accounting for 7.229 ± 1.044 IU/L and 43.4 ± 8.8 ng/dl, respectively. Conversely,

serum progesterone level increased significantly after large volume liposuction with a mean level of 6.517 ± 0.626 ng/dl, in contrast to 2.073 ± 0.967 ng/dl preoperatively ($P = 0.008$). As for patients without PCOS,

the mean levels of progesterone increased significantly with a level of 6.424 ± 0.802 ng/dl, relative to 1.923 ± 0.336 ng/dl preoperatively. There was a post-operative decline tendency in total testosterone

levels ($P=0.006$) and LH ($P=0.003$) with a mean level of 38.8 ± 7 ng/dl and 4.360 ± 0.538 IU/L, respectively (Figures 2 and 3).

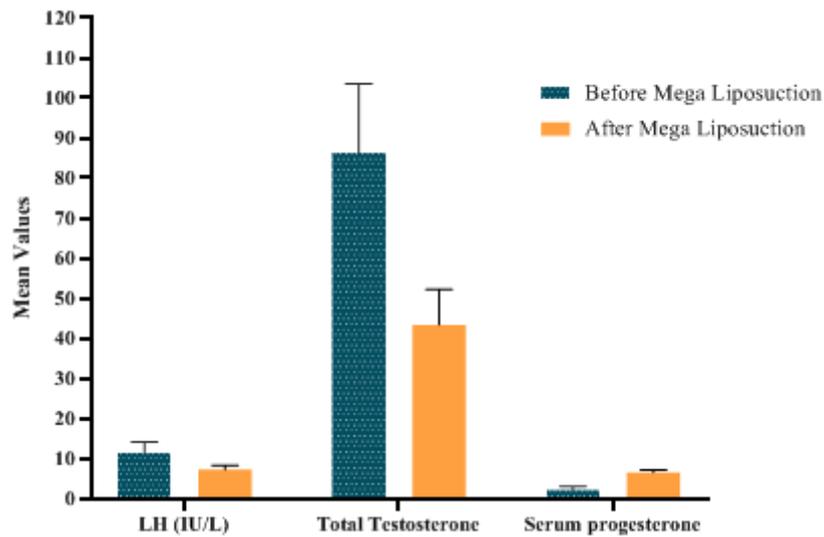


Figure (2): Hormonal profile before and after large-volume liposuction among women with PCOS (Group A)

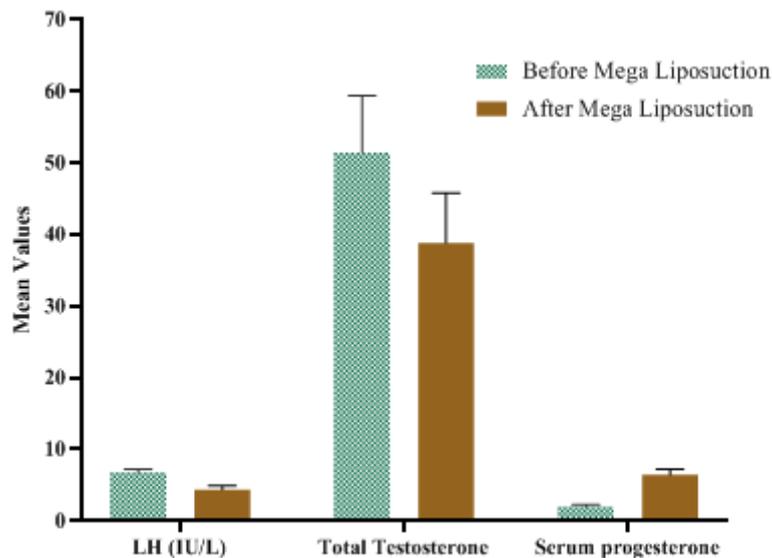


Figure (3): Hormonal profile before and after large-volume liposuction among women without PCOS (Group B)

Patients without PCOS experienced relatively lower LH levels and total testosterone after large-volume liposuction, accounting for 4.360 ± 0.538 and 38.8 ± 7 , respectively. These figures were in contrast to mean levels of 7.229 ± 1.044 and 43.4 ± 8.8 , respectively, among PCOS patients (**Table 2**).

Clinically, three cases of secondary infertility get pregnant after the procedure,

one of them after eight months and two of them after one year. Furthermore, two cases of primary infertility with PCOS get pregnant after six months and the other after one year. Seven cases of secondary infertility developed dramatic improvement in hormonal profile, preparing them for conception without pregnancy.

Table (2): Hormonal Profile of the included patients after large-volume liposuction

Variables	Groups	Group A	Group B	P-Value
		Number =10	Number =8	
		Mean +SD/Number (%)	Mean +SD/Number (%)	
LH (IU/L)		7.229 ± 1.044	4.360 ± 0.538	<0.001
Total Testosterone		43.4 ± 8.8	38.8 ± 7	0.247
Serum progesterone		6.517 ± 0.626	6.424 ± 0.802	0.786

LH=Luteinizing hormone

Aesthetic outcomes: Patients experienced a statistically significant decline in the BMI from 37.1 ± 2.9 Kg/m² preoperatively to 31.1 ± 4.2 Kg/m² ($P<0.001$, $t=61.3$). As for patients' satisfaction, 15 (83.33%) give a 4 or 5 score to their general

appearance. This was reflected in the quality of life in which 13 (72.22%) patients were highly satisfied, and 2 (11.11%) patients were moderately satisfied (**Figures 4 and 5**).

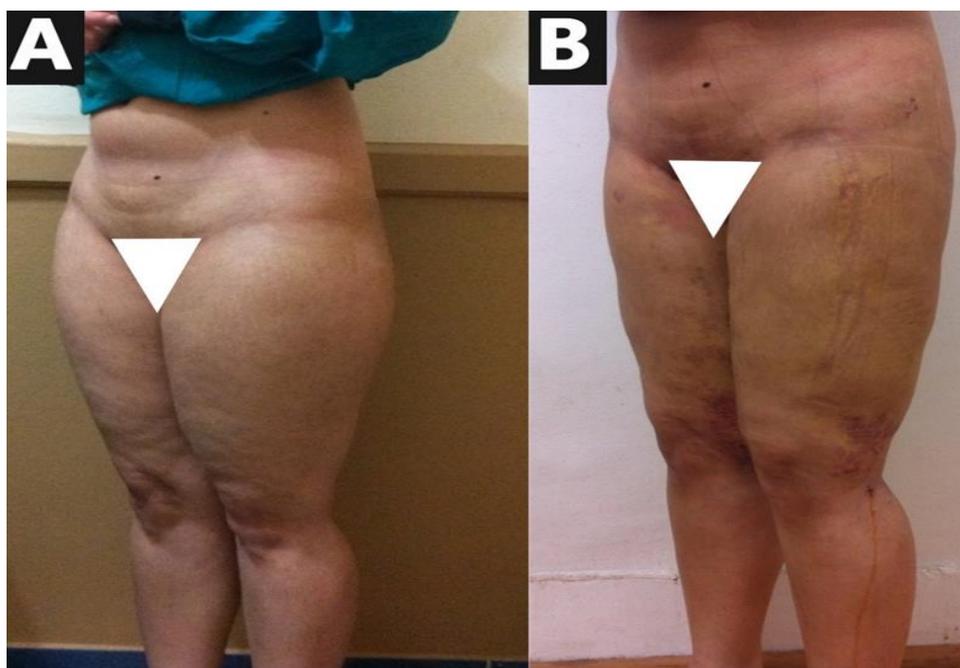


Figure (4): Post-operative results (Case 1)

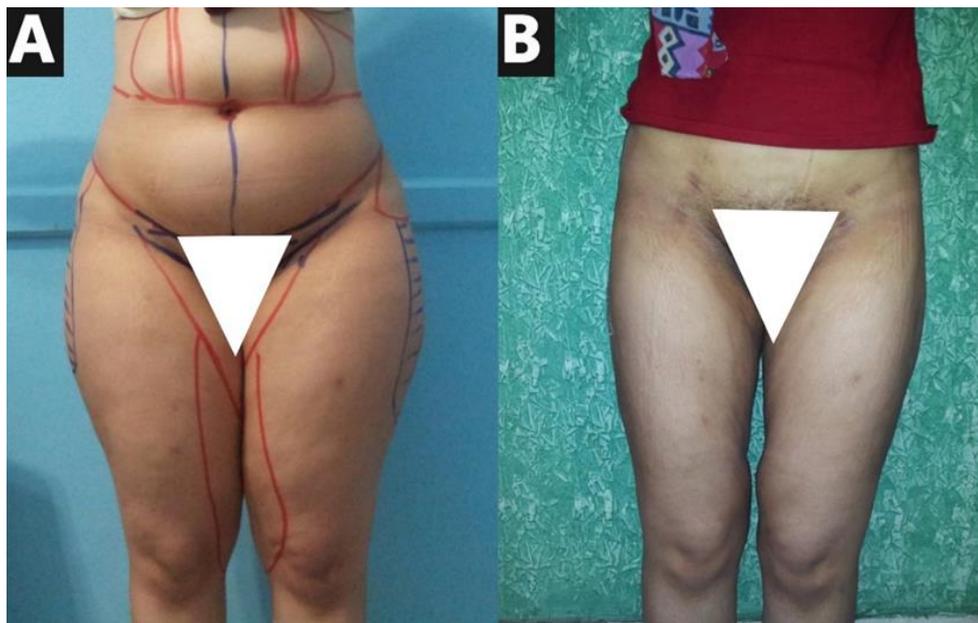


Figure (5): Post-operative results (Case 2)

Regarding post-operative complications, 3 (16.66%) patients experienced hypertrophic scarring at the incision site. They received corticosteroid injection and silicone gel employment and improved. Furthermore, 2 (11.11%) cases developed skin maceration in the inner upper aspect of thigh due to slipping of pressure garment and treated by topical

DISCUSSION

Weight loss surgeries in infertile women are rapidly reevaluating. These surgeries became a successful alternative to non-surgical interventions for obese women. Bariatric surgeries are considered the most popular procedures in obese women and are associated with improving obesity-related complications and improving conception outcomes (*Musella et al., 2012* and *Tan & Carr, 2012*). However, little is known about the impact of large-volume liposuction on the pregnancy and aesthetic outcomes in obese infertile women. Herein, this study was conducted to reveal the short-term

outcomes of large-volume liposuction on the pregnancy and esthetic outcomes.

Post-operative pain: The mean levels of VAS for pain were 32.6 ± 7.92 two hours post-procedure. This level was declined 8 hours after the procedure to 22.6 ± 5.8 and 11.3 ± 2.9 twenty-four hours after the procedure. No patient complained of uncomfortable postoperative pain.

outcomes of large-volume liposuction on the pregnancy and esthetic outcomes.

The evidence obtained in this study showed that large volume liposuction improved the hormonal profile of obese infertile women significantly. Also, there was a significant decline in BMI after surgery. Whereas the mean levels of LH and serum total testosterone decreased, the mean levels of serum progesterone increased. This laboratory improvement was more significant among patients with PCOS. These findings were consistent with *Li et al. (2019)* who reported a substantial decline in the serum total and free testosterone, decreasing abnormal

menstruation frequency after bariatric surgery. However, these improvements were associated with post-operative complications such as anastomotic ulcer, malnutrition, and gastrointestinal bleeding. Parallel to our findings, *Lee et al. (2020)* reported a significant weight loss, improvement of hyper-insulinemia and hyperandrogenism, ovulatory function and menstrual regularity one year after bariatric surgeries.

In this study, the significant improvement in the pregnancy outcomes might be subsequent to weight loss and mechanical removal of the adipose tissue. This tissue releases several bioactive molecules, namely adipokines, which variably interact with multiple molecular pathways of insulin resistance, inflammation, hypertension, cardiovascular risk, coagulation, and oocyte differentiation and maturation. The resulted hyperinsulinemia is the core in the pathogenesis of PCOS. It results in hyperandrogenism by altering the LH pulse amplitude in the pituitary, increasing androgen synthesis in the ovaries and adrenal glands, and inhibiting the synthesis of SHBG in the liver (*Dumesic et al., 2015, Jahan & Wing, 2020* and *Saleh et al., 2020*). In this respect, the mechanical removal of adipose tissue is suggested to the levels of gastrointestinal hormones. This includes the increase of postprandial gastrointestinal hormones such as glucagon-like peptide-1 and peptide YY, along with a decrease of the serum leptin levels. These hormonal changes decrease hyper-insulinemic status, control weight, regulate appetite, inhibit food absorption, and provoke glucose-mediated insulin secretion (*Evans et al., 2012, Zhen et al., 2015* and *Holst et*

al., 2018). Leptin is a protein secreted primarily by adipose tissue. It ensures homeostasis by decreasing food intake and increasing energy expenditure. It has a significant role in regulating development, maintains neuroendocrine and immune functions and reproduction. It increases in patients with PCOS lead to anovulation and infertility. Therefore, after large-volume liposuction, the levels of leptin decreased, improving the reproductive dysfunction and pregnancy outcomes subsequently (*Amjad et al., 2019* and *Salman et al., 2020*). Conversely, further studies are required to confirm the latest hypothesis.

The majority of studies for the effect of large volume liposuction with traditional tumescent formula including xylocaine, NaOH, and adrenaline even under general anesthesia (*Sood et al., 2011* and *Abraham Jebakumar & Sathish Kumar 2019*). The xylocaine is used as a local anesthetic, NaOH for neutralizing xylocaine's acidity, and adrenaline for hemostasis. In this study, we used tumescent formula with adrenaline only for hemostasis with a maximal amount of 7-liter liposuction with postoperative anti-inflammatory analgesia, which gives sufficient postoperative analgesia with no need to use of xylocaine and without the risk of systemic absorption of xylocaine and its cytotoxic effects on a large amount of tumescent liposuction. The risk of xylocaine toxicity is significantly eliminated, especially in amounts 6-8 liters. Some studies stated that the use of xylocaine in tumescent formula help in post-operative analgesia, especially multiple areas of liposuction but in the current study, no patient complained of

uncomfortable postoperative pain (*Liu et al., 2020*).

In this study, the majority of the included patients were highly satisfied with the yielded aesthetic results. This satisfaction was also reflected in their appearance, activity, and subsequent quality of life. These findings were consistent with previous studies. In patients with lipedema who were subjected to tumescent liposuction, *Schmeller et al. (2012)* notified a significant reduction of the subcutaneous fat, improvement of body contour, and restoration of the normal body proportions. Since the 1990s, the introduction of tumescent liposuction with infiltration of a large amount of fluids made liposuction safe and effective with no relevant occurrence of tissue damage (*Mohamed et al., 2018*). However, large-volume liposuction is considered to be a nightmare for plastic surgeons. This is because it is associated with numerous complications due to fluid shifts and imbalance. Therefore, five pillars should have strictly adhered to overcome the disastrous difficulties during large-volume liposuction (*Cárdenas-Camarena et al., 2017*).

The obtained evidence in the current study had some limitations. The limited sample size, which represents only a tiny proportion of the Egyptian patients with relatively similar demographic factors, may restrict the capability to generalize our results. Additionally, the lack of an adequate follow-up period limits the ability to detect long-term pregnancy and aesthetic outcomes. The lack of randomization might lead to unavoidable bias. Further randomized clinical trials

with sufficient sample size and long-term follow-up are required to overcome this study's potential limitations.

CONCLUSION

Large-volume tumescent liposuction with the use of adrenaline only is a safe, effective, and promising procedure in amending the negative reproductive and aesthetic repercussions of obesity among infertile obese women. These findings were associated with satisfactory pregnancy and cosmetic outcomes, which reflected in patients' satisfaction. No patient in our cohort experienced discomfort pain despite xylocaine non-use.

REFERENCES

1. **Abraham Jebakumar, R. and Sathish Kumar, D (2019):** A Study of Application of Tumescent Technique for Liposuction Surgery in Tertiary Care Centre. *International Archives of Integrated Medicine*, 6 (8): 2394-0034
2. **Albaugh, V. L. and Abumrad, N. N. (2018):** Surgical treatment of obesity. *F1000Research*, 7 (1): 617-660
3. **Amjad, S., Baig, M., Zahid, N., Tariq, S. and Rehman, R. (2019):** Association between leptin, obesity, hormonal interplay and male infertility. *Andrologia*, 51: e13147-e13154.
4. **Bellver, J., Martínez-Conejero, J. A., Labarta, E., Alamá, P., Melo, M. A. B., Remohí, J., Pellicer, A. and Horcajadas, J. A. (2011):** Endometrial gene expression in the window of implantation is altered in obese women especially in association with polycystic ovary syndrome. *Fertility and Sterility*, 95: 2335-2341. e8.
5. **Broughton, D. E. and Moley, K. H. (2017):** Obesity and female infertility: potential mediators of obesity's impact. *Fertility and sterility*, 107: 840-847.
6. **Cárdenas-Camarena, L., Gerardo, L.-P. A., Durán, H. and Bayter-Marin, J. E. (2017):**

- Strategies for reducing fatal complications in liposuction. *Plastic and reconstructive surgery Global open*, 5 (10): 15-39.
7. **Dumesic, D. A., Oberfield, S. E., Stener-Victorin, E., Marshall, J. C., Laven, J. S. and Legro, R. S. (2015):** Scientific statement on the diagnostic criteria, epidemiology, pathophysiology, and molecular genetics of polycystic ovary syndrome. *Endocrine reviews*, 36: 487-525.
 8. **Eldib, A. & Tashani, O. A. (2018):** Infertility in the Middle East and North Africa Region: A systematic review with meta-Analysis of prevalence surveys. *Libyan Journal of Medical Sciences*, 2:37-52.
 9. **Evans, S., Pamuklar, Z., Rosko, J., Mahaney, P., Jiang, N., Park, C. & Torquati, A. (2012):** Gastric bypass surgery restores meal stimulation of the anorexigenic gut hormones glucagon-like peptide-1 and peptide YY independently of caloric restriction. *Surgical Endoscopy*, 26:1086-1094.
 10. **Goldman, J. J., Wang, W. Z., Fang, X.-H., Williams, S. J. and Baynosa, R. C. (2016):** Tumescent liposuction without lidocaine. *Plastic and Reconstructive Surgery Global Open*, 4 (8): 82-9.
 11. **Hales, C. M., Fryar, C. D., Carroll, M. D., Freedman, D. S. and Ogden, C. L. (2018):** Trends in obesity and severe obesity prevalence in US youth and adults by sex and age, 2007-2008 to 2015-2016. *JAMA*, 319: 1723-1725.
 12. **Hantoosh, S. F., Zageer, D. S. and Jaber, M. (2017):** Role of Body Fat Distribution, Tan of Skin, Type of Food Intake and Caffeine Intake in Infertility for Polycystic Ovarian Syndrome Women. *Saudi Journal of Medicine*, 2 (7): 2518-3397.
 13. **Holst, J. J., Madsbad, S., Bojsen-Møller, K. N., Svane, M. S., Jørgensen, N. B., Dirksen, C. Martinussen, C. (2018):** Mechanisms in bariatric surgery: gut hormones, diabetes resolution, and weight loss. *Surgery for Obesity and Related Diseases*, 14: 708-714.
 14. **Jahan, Z. and Wing, K. E. (2020):** Polycystic Ovary Syndrome and its Relationship with Infertility and its Management. *Journal of Bangladesh College of Physicians and Surgeons*, 39: 53-58.
 15. **Lee, R., Mathew, C. J., Jose, M. T., Elshaikh, A. O., Shah, L. and Cancarevic, I. (2020):** A Review of the Impact of Bariatric Surgery in Women with Polycystic Ovary Syndrome. *Cureus*, 12 (1):438-442.
 16. **Li, Y.-J., Han, Y. and He, B. (2019):** Effects of bariatric surgery on obese polycystic ovary syndrome: a systematic review and meta-analysis. *Surgery for Obesity and Related Diseases*, 15: 942-950.
 17. **Liu, Y., Lyengar, S., Schmults, C. D., Ruiz, E. S., Besaw, R., Tom, L. K., Vestita, M. G., Kass, J. and Waldman, A. H. J. M. (2020):** Tumescent Local Anesthesia: A Systematic Review of Outcomes. *medRxiv*, 6 (1), 102-115.
 18. **Lozinski, A. and Huq, N. S. (2013):** Tumescent liposuction. *Clinics in Plastic surgery*, 40: 593-613.
 19. **Mariano, M., Monteiro, C. S. and De Paula, M. (2013):** Bariatric surgery: its effects for obese in the workplace. *Rev Gaucha Enferm*, 34: 38-45.
 20. **Mohamed, A. A., Safan, T. F., Hamed, H. F. and Elgendy, M. A. A. (2018):** Tumescent Local Infiltration Anesthesia for Mini Abdominoplasty with Liposuction. *Open Access Macedonian Journal of Medical Sciences*, 6(11): 2073-2078.
 21. **Musella, M., Milone, M., Bellini, M., Fernandez, L. M. S., Leongito, M. and Milone, F. (2012):** Effect of bariatric surgery on obesity-related infertility. *Surgery for Obesity and Related Diseases*, 8: 445-449.
 22. **O'flynn, N. (2014):** Assessment and treatment for people with fertility problems: NICE guideline. *Br J Gen Pract*, 64:50-51.
 23. **Radovich, E., El-Shitany, A., Sholkamy, H. and Benova, L. (2018):** Rising up: Fertility trends in Egypt before and after the revolution. *PLoS One*, 13(1): e0190148
 24. **Riaz, H., Khan, M. S., Siddiqi, T. J., Usman, M. S., Shah, N., Goyal, A., Khan, S. S., Mookadam, F., Krasuski, R. A. and**

- Ahmed, H. (2018):** Association between obesity and cardiovascular outcomes: a systematic review and meta-analysis of Mendelian randomization studies. *JAMA network open*, 1: e183788-e183788.
- 25. Saleh, A. A. E. W., Amin, E. M., Elfallah, A. A. and Hamed, A. M. (2020):** Insulin resistance and idiopathic infertility: A potential possible link. *Andrologia*, 52: e13773.
- 26. Salman, M. A., El-Ghobary, M., Soliman, A., El Sherbiny, M., Abouelregal, T. E., Albitar, A., Abdallah, A., Mikhail, H. M. S., Nafea, M. A. and Sultan, A. (2020):** Long-Term Changes in Leptin, Chemerin, and Ghrelin Levels Following Roux-en-Y Gastric Bypass and Laparoscopic Sleeve Gastrectomy. *Obesity Surgery*, 30: 1052-1060.
- 27. Schmeller, W., Hueppe, M. and Meier-Vollrath, I. (2012):** Tumescant liposuction in lipoedema yields good long-term results. *British Journal of dermatology*, 166: 161-168.
- 28. Sood, J., Jayaraman, L. and Sethi, N. (2011):** Liposuction: Anaesthesia challenges. *Indian journal of anaesthesia*, 55: 220-227.
- 29. Souter, I., Chiu, Y.-H., Afeiche, M., Hauser, R. and Chavarro, J. (2014):** The association of dietary fat intake and antral follicle count (AFC) among women undergoing infertility treatments. *Fertility and Sterility*, 102: e92-94.
- 30. Tan, O. and Carr, B. R. (2012):** The impact of bariatric surgery on obesity-related infertility and in vitro fertilization outcomes. *Seminars in Reproductive Medicine* . 9 (1): 517-528.
- 31. Van Gaal, L. F. and Maggioni, A. P. (2014):** Overweight, obesity, and outcomes: fat mass and beyond. *The Lancet*, 383: 935-936.
- 32. Wang, M., Xu, S., Liu, W., Zhang, C., Zhang, X., Wang, L., Liu, J., Zhu, Z., Hu, J. and Luo, X. (2020):** Prevalence and changes of BMI categories in China and related chronic diseases: Cross-sectional National Health Service Surveys (NHSSs) from 2013 to 2018. *EClinicalMedicine*, 26:100521.
- 33. Wang, R. and Mol, B. W. J. (2017):** The Rotterdam criteria for polycystic ovary syndrome: evidence-based criteria? *Human Reproduction*, 32: 261-264.
- 34. Zhen, C., Wang, Z., Shan, L. and Wang, L. (2015):** Therapeutic effect of glucagon-like peptide-1 analogue-Exenatide on polycystic ovary syndrome rats. *Maternal and Child Health Care of China*, 30:1105-1108.

تأثير شطف كمية كبيرة من الدهون مع الأدرينالين فقط على الحمل والنتائج الجمالية للنساء ذوات الوزن الزائد المصابات بالعقم

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خلفية البحث: يعد مرض السمنة واحداً من أكثر الأمراض شيوعاً والذي يؤثر تأثيراً سلبياً كبيراً على كافة النواحة الصحية للإنسان حيث له آثار سلبية على الحمل ونتائجها. خلال الحقبة الماضية، اكتسب النسيج الدهني أهمية إضافية من مجرد مستودع للطاقة الزائدة إلى نسيج شديد النشاط الأيضي يفرز كمية عالية من المواد النشطة التي تؤثر بشكل ملحوظ على وظائف الجهاز التناسلي للأنثى. حديثاً، تم إدراج شطف كمية كبيرة من الدهون مصاحباً بحقن كمية كبيرة من محلول ملحي عادي، يحتوي على إبينيفرين مخفف للغاية كطريقة لإنقاص الوزن والتخلص من الدهون المتركمة.

الهدف من البحث: الكشف عن النتائج الجمالية والإنجابية للمرضى الإناث المصابات بالعقم والسمنة والذين خضعوا لشطف كمية كبيرة من الدهون باستخدام الأدرينالين فقط. يعتقد أن تساعد تلك النتائج أطباء النساء والتوليد وجراحي التجميل في تصنيف وتحديد التداخلات الجراحية المناسبة للتغلب على الآثار السلبية للسمنة على الجهاز التناسلي.

المرضى وطرق البحث: أجريت تلك الدراسة المستقبلية خلال شهري سبتمبر 2015 وأغسطس 2020 بمستشفيات جامعة الأزهر. النساء البدينات والمصابات بالعقم في سن الإنجاب ويعانين من اضطرابات في الدورة الشهرية، لمدة عام واحد على الأقل تم إدراجهن في هذه الدراسة. تم تأكيد هذه الاضطرابات بناءً على التقييم المختبري والتصويري. تم إجراء العملية تحت التخدير العام والتعقيم بالبيتادين. تم تقييم الألم بعد الجراحة باستخدام المقياس التناظري البصري.

نتائج البحث: تضمنت الدراسة 18 مريضة يعانين من العقم لمدة تزيد عن عام واحد. تم تقسيم المرضى بناءً على استيفاء معايير روتردام إلى مجموعتين.

المجموعة (أ) وتشمل 10 مرضى يعانون من متلازمة تكيس المبايض والمجموعة (ب) وتشمل 8 مرضى لا يعانون منها. ثلاث حالات أثبت حملهن بعد العملية، إحداها بعد 8 أشهر واثنان بعد عام واحد. علاوة على ذلك، فإن حالتين من العقم الأولي مع متلازمة تكيس المبايض أثبت حملهن بعد 6 أشهر والأخرى بعد عام واحد. تحسنت المؤشرات الهرمونية تحسناً ملحوظاً لسبعة مرضى يعانون من العقم الثانوي. تحسنت العوامل الجمالية والشكل العام لجميع الحالات مع تحسن ملحوظ في انخفاض كتلة الجسم والذي انعكس بشكل كبير على معدل رضاهم عن مظهرهن العام. لم يشكو أي مريض من آلام غير مريحة بعد الجراحة.

الإستنتاج: شفط الدهون بكميات كبيرة مع استخدام الأدرينالين فقط هو إجراء آمن وفعال وواعد في التغلب على التدايعات السلبية للسمنة على الحمل والمظهر الخارجى و الشكل الجمالى لدى النساء زائدات الوزن المصابات بالعقم. لم يعاني أي مريض في مجموعتنا من ألم غير مريح على الرغم من عدم استخدام الزيلاكاتين.

الكلمات الدالة: شفط الدهون، ادرينالين، السمنة، الحمل.