"Brazilian Butt Lift" under Local Anesthesia: A Novel Technique Addressing Safety Concerns

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Background: The gluteal lift ("Brazilian butt lift") has improved significantly in technique and in outcomes. Some postulate that fat embolism occurs because of damage to veins superficial to the gluteus muscles and that fat must be injected intramuscularly to achieve satisfactory aesthetic results. The purpose of this article is to present data where gluteal lift is performed under local anesthesia, address safety concerns, and clarify these speculations.

Methods: All patients underwent gluteal lift under local anesthesia using oral medications and tumescent infiltration. Fat was harvested by closed-system liposuction, separated by gravity, injected using a peristaltic pump and reticulating basket cannulas.

Results: Thirty-two female patients with an average age of 38.6 years and a body mass index of 24.8 kg/m^2 underwent 47 gluteal lift operations under local anesthesia over 52 months. The average volume of injected fat was 359 ml per buttock. There were no deaths or complications.

Conclusions: Recent concerns regarding buttock injections have been raised due to death from fat embolism. Despite numerous theories on the mechanism of entry, the fact that venous injury occurs with the introduction of boluses of fat in enough quantities to cause mechanical disruption of the cardiopulmonary circuit is not in dispute. The authors believe this cannot occur in the awake patient without the surgeon being acutely aware of a misguided cannula. These data suggest that buttock fat grafting under local anesthesia is a safe and effective procedure with an excellent safety profile and durable results. (*Plast. Reconstr. Surg.* 142: 1468, 2018.)

CLINICAL QUESTION/LEVEL OF EVIDENCE: Therapeutic, IV.

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THERAPEUTIC

Buttock augmentation with autologous fat grafting, or gluteal lift (currently marketed as the "Brazilian butt lift"), represents one of the most rapidly evolving and increasingly popular operations in aesthetic surgery. In this "dual-benefit" body contouring procedure, fat harvested from unwanted areas to enhance contouring using liposuction is prepared for transplantation into the gluteal region. This not only achieves an increase in volume but also creates an improvement in shape. Initially described in the 1990s by Chajchir and Benzaquen,[1] autologous fat grafting to the buttocks was dismissed as being unscientific and simplistic by leaders in plastic surgery at the time.[1] As a result, fat transfer to the buttock was relegated to a questionable operation performed by fringe practitioners. However, over the past 10 to 15 years, contributors in the field have tried to develop and articulate principles that improve results in both volume and maintenance of the fat transplanted and an improvement in aesthetic outcomes.[2,3]

In recent years, serious safety concerns with autologous fat transplantation to the gluteal region have emerged, the most devastating being fatal intraoperative fat embolism. A recent American Society for Aesthetic Plastic Surgery/Aesthetic Surgery Education and Research Foundation task force and survey involving

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Received for publication August 4, 2017; accepted June 28, 2018.

DOI: 10.1097/PRS.0000000000005067

Disclosure: *The authors have no financial interest to declare in relation to the content of this article.*

American Society for Aesthetic Plastic Surgery members performing gluteal augmentation with fat revealed an approximate one in 3000 risk of mortality from this procedure.[4] This astounding mortality rate is roughly six times the mortality rate for abdominoplasty, the procedure with the next highest mortality rate. That rate is one in 18,000, considering both the procedure and the 2-week postoperative phase. Fat embolism occurs when fat enters the venous circulation; therefore, the cause of this dreaded complication likely involves the introduction of grafted fat lobules into the large and valveless deep pelvic veins. There are those who speculate that (1) fat embolism can occur in the subcutaneous position by damage to superficial subcutaneous veins that lie above the gluteus muscle; (2) one can never be certain that one is actually in the subcutaneous space at all times during gluteal fat grafting (thus advocating for real-time ultrasound guidance during fat transplantation); and (3) intramuscular insertion of fat is necessary to achieve satisfactory aesthetic outcomes. The purpose of this article is to present a novel technique in which a series of patients were treated with gluteal fat transplantation, or gluteal lift, under local anesthesia. In addition, we hope to clarify the above ongoing speculations with regard to the safety and efficacy of this procedure in the awake patient.

PATIENTS AND METHODS

Thirty-four patients underwent a full history and physical examination and were determined to be candidates for gluteal fat transplantation under local anesthesia based on their fat availability, skin elasticity, desire for buttock augmentation, and willingness to undergo an awake procedure. All patients were given oral medications, including an antibiotic, pain medication (5 mg of hydrocodone/300 mg of acetaminophen), and a sedative (10 to 20 mg of diazepam) and were awake and conversant throughout the procedure. All procedures were performed in an American Association for Accreditation of Ambulatory Surgery–accredited, office-based operating room. Appropriate perioperative laboratory testing and medical clearance was obtained when clinically indicated, and all patients provided written informed consent and were photographed preoperatively. Exclusion criteria for this study included active smoking, body mass index greater than 35 kg/m^2, medical contraindications to liposuction or medicines used, objection to an awake procedure, and unrealistic patient expectations.

Description of Technique

After the access insertion sites were initially anesthetized using 1% lidocaine with epinephrine 1:100,000, tumescent solution was instilled with a 14-gauge blunt infiltration cannula into the buttock region first, followed by tumescent infiltration of the planned donor sites. Our preferred tumescent solution was 1000 or 800 mg of lidocaine with 1.5 cc of 1:1000 epinephrine and 12 ml of sodium bicarbonate per liter of lactated Ringer solution. The American Society of Plastic Surgeons' recommended maximum dose of lidocaine of 35 mg/kg body weight was followed. The tumescent injection in both the buttock recipient site and fat donor sites was limited to the deep, intermediate, and superficial subcutaneous adipose layer. The underlying muscles and fascia were not injected. The buttock recipient sites were injected first to allow for the saline volume to subside during the time the fat harvesting portion of the procedure was performed. Access incisions at the natal cleft in the midline buttocks region and infragluteal creases were placed using a 14-gauge needle to accommodate both the tumescent and fat injection cannulas. Autologous fat was then harvested into a sterile, closed-system collection chamber. The aspirate was allowed to settle, and the excess aqueous fraction was removed. Once all donor fat was harvested, fat was transplanted to the gluteal region using a peristaltic pump and using 4- to 5-mm blunt injection cannulas. The first 36 cases were performed with this setup. In the last 11 cases, fat was injected using expansion vibration lipofilling described by Wall and Del Vecchio.[5] All access incisions were closed with sutures and the patients dressed in compression garments postoperatively.

RESULTS

From February of 2012 through June of 2017, 34 women with an average age of 38.6 years and body mass index of 24.8 kg/m^2 underwent 47 (35 by C.T.C. and 12 by S.J.T.) gluteal lift operations under local anesthesia. The average operating time was 2 hours 7 minutes, and an average volume of 2388 ml of tumescent solution was injected. Of the total volume of tumescent injected, an average of 812 ml of anesthetic solution was injected into the buttock recipient sites. Average total aspirate was 1258 ml, with an average injected fat volume

of 359 ml per buttock. Harvested sites included arms, axillae, midback (bra rolls), flanks, abdomen, medial/lateral thighs, knees, and the presacral region. Eleven patients underwent more than one gluteal lift under local anesthesia procedure; one of them underwent three gluteal lift under local anesthesia procedures and one underwent four gluteal lift under local anesthesia operations (Table 1). Among those 11 patients who had multiple procedures, four had gluteal lift under local anesthesia procedures performed on consecutive days (1 day apart). The range of days in between gluteal lift under local anesthesia in multiple procedure patients was 1 to 575 days, with an average of 222 days. Interestingly, five patients in this subgroup had a subsequent gluteal lift under local anesthesia within 30 days of the 1-year anniversary of their prior gluteal lift under local anesthesia procedure. All patients were able to resume normal daily activities such as returning to work within 2 postoperative days. They were instructed to strictly limit sitting or other positions that would result in prolonged pressure on the grafted areas. There were no complications, including fat emboli, seroma, bleeding, or infection.

DISCUSSION

Autologous fat transfer for buttock reshaping is commonly referred to as the "Brazilian" gluteal lift, but the operation did not originate in Brazil. The term was coined by a plastic surgeon in Beverly Hills, California, as a marketing strategy.[6] Gluteal lift is preferred over prosthetic implantation by surgeons and patients because of the increased risks inherent to buttock implant operations.

Table 1. Patient and Operative Data

Characteristic	Value
Study period, mo	64
No. of procedures	47
No. of patients	34
Sex	
Female	34
Male	0
Average age, yr	38.6
Average BMI, kg/m^2	24.8
Tumescent injected, ml	
Total	2388
Per buttock	812
Average total aspirate, ml	1258
Average volume fat injection per buttock, ml	359
Average operative time, min	127
Complications	0
Patients with two procedures	9
Patients with three procedures	1
Patients with four procedures	1

BMI, body mass index.

Complications include malposition, rotation, capsular contracture, seroma, extrusion, and infection, which may require removal and additional surgery.[7] Moreover, implants do not allow for "preferential fill" treatment of specific areas of the buttock and buttock/thigh interface that is easily achieved with fat to accommodate for individual anatomical variations. Because of the versatility of fat and increased consistency in volume maintenance, gluteal lift is a procedure with markedly increased public awareness and popularity, reflected by a rapid growth rate in the number of procedures performed. American Society for Aesthetic Plastic Surgery statistics reported a 58.2 percent increase in buttock augmentation procedures (gluteal lift and buttock implants) from 2012 to 2013 (7286 to 11,527 operations, respectively)[8] and an 86.1 percent increase in cases from 2013 to 21,446 in 2014.[9] As more surgeons adopt this technique, safety must be emphasized.

Fatal fat embolism is the most dreaded complication of gluteal fat grafting. This can occur only when fat is inadvertently introduced into the venous circulation. Two theories for this have been proposed. First is the "direct cannulation" theory, where surgical misadventure results in a cannula tip entering a vein and a bolus of fat being inserted into the vein. If the fat bolus is large enough, it can obstruct the pulmonary circuit and cause electromechanical dissociation, leading to cardiac failure. The second theory, first described by Del Vecchio and Wall, is the "laceration siphon" theory.[10] In this scenario, iatrogenic damage to a large vein under low pressure is followed by the introduction of fat under high pressure. That pressure gradient causes fat to be siphoned into the vein, which is propagated with each ventilating cycle under general anesthesia. We favor the laceration siphon theory as being the most likely theory for fat embolism for two reasons. First, most surgeons do not keep their cannulas stationary and do not administer fat in boluses in volumes large enough to cause electromechanical dissociation. Second, the odds of directly cannulating a vein with a blunt-tipped cannula are very low.

All known reported cases of death during gluteal fat grafting involved general anesthesia. In contrast, liposuction under local anesthesia demonstrates an excellent safety profile where there are no published reports of deaths by fat embolization known to the authors. The "awake" patient acts as his or her own physiologic monitor; if they experience pain during the operation, it is attributable to an anatomical plane being

violated that has not been anesthetized. In particular, the gluteus maximus and minimus muscle fascia is not anesthetized. The large-caliber gluteal veins lie deep to both the fascia and gluteus major and minor muscles. In our experience, although tumescent anesthesia provides dense and complete analgesia in the subcutaneous fat space for liposuction and lipofilling, it is grossly inadequate as an anesthesia technique to numb the fascia, let alone the underlying muscle and deep structures. In fact, any inadvertent contact of the fascia with a cannula even in passing elicits a violent pain response. Presumably, the awake patient (and, consequently, the surgeon) would be exquisitely aware of the muscle being violated well before the veins would be encountered by an errant cannula. To further clarify this important detail, the surgeon would have to sequentially penetrate the fascia, pass the cannula through the richly innervated and unanesthetized muscle, and cannulate the deep vessels while simultaneously injecting fat in repeated and multiple passes. The muscle also involuntarily contracts, which would make further injury and penetration difficult and unlikely. It would be inconceivable that the surgeon would not consider these feedback cues as a sign to modify the procedure or stop it, nor would it be likely that any awake patient would tolerate such pain. This is in contradistinction with deep sedation or general anesthesia, where there is no protective pain response and reactive muscle contraction. The sine qua non of fat embolism is vein injury, and this cannot occur in the awake patient without warning.

Another technical consideration is the need to inject the buttocks with tumescent solution in the awake patient, which is not necessary with a patient under general anesthesia. By first injecting tumescent solution into the buttocks, the lidocaine and epinephrine have sufficient time to achieve maximum analgesia and vasoconstriction, respectively. By the time the liposuction/harvesting portion is completed, a substantial amount of the volume of the saline is reabsorbed and the skin has relaxed almost to its pretumescent state. As a result, there is no significant edema effect causing anatomical distortion at the recipient site at the grafting phase. The volumes of fat transfer that can be achieved with each individual gluteal lift under local anesthesia session is limited by the amount of lidocaine and thus the volume of tumescent that can be safely given to the patient. Lower concentrations of lidocaine in the tumescent solution may allow greater volumes of tumescent solution to be instilled; however, the analgesic effect of more dilute lidocaine concentrations may not be sufficient to perform the surgery under local anesthesia. American Society of Plastic Surgeons guideline recommendations regarding tumescent anesthesia limit the lidocaine load to 35 mg/kg body weight. For a patient who weighs 70 kg, the maximum lidocaine load is 2450 mg. Depending on the concentration of the tumescent solution used, this allows a volume of 2550 to 3060 ml of injection to be safely used. Although the same amount of fat cannot be transferred under local anesthesia as in a case performed under general anesthesia, excellent contour improvement and volume gain can be achieved (Figs. 1 and 2). In addition, the procedure can be staged over several encounters (separate days), where more areas are harvested and the fat layered over time to achieve a final volume comparable or even exceeding what can be done under traditional methods of anesthesia. This can be performed in consecutive days or years apart as shown in 12 patients in this series. For every patient undergoing general anesthesia for gluteal lift, there are likely many more patients who wish their buttocks were more shapely and larger but would never agree to general anesthesia. Gluteal lift under local anesthesia therefore widens the scope of potential patients submitting for gluteal lift. Some patients who may desire buttock enhancement may never consider it solely on the grounds that it is usually performed under traditional anesthesia and are unaware of a local anesthesia option. A second significant demographic are women who do not want an overly dramatic increase in buttock volume alone but wish to improve the firmness, shape, and appearance of the overlying skin with a smaller volume fat transfer. We have noted that, with this technique, patients often have little to no bruising following gluteal lift under local anesthesia, which may be a result of the epinephrine effect of the tumesced recipient site, overall smaller volumes of fat, gentle injection of fat in the awake patient, or some combination of the three when compared to traditional gluteal lift where there is no tumescent injection in the buttocks (Fig. 3).

With regard to the speculations previously described, the numbers in the study are too small for statistical significance or to make any statements regarding subcutaneous injection and the lack of any risk of fatal fat embolism. However, in over 7000 cases of breast fat grafting,[11] with a recipient site that is entirely subcutaneous and rich in venous and arterial perforators, there have been no reported cases of fatal fat embolism in the literature. Furthermore, this study respectfully

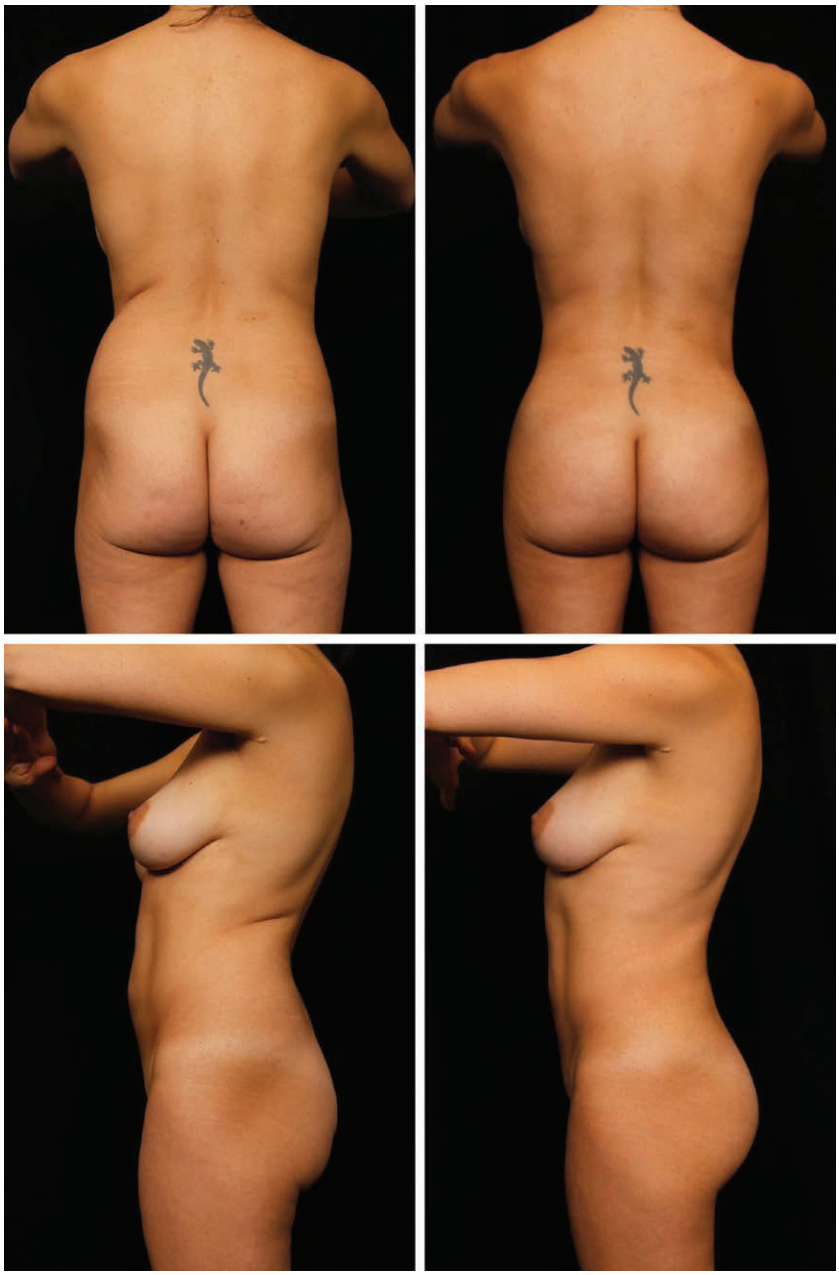

Fig. 1. Posterior and left lateral views of a 38-year-old woman with a body mass index of 21.8 kg/m^2 who underwent gluteal lift under local anesthesia using ultrasound-assisted liposuction at 60 percent power followed by power-assisted liposuction of the flanks and abdomen. Autologous fat (350 ml per buttock) was injected using a closed fat injection system. Postoperative results are noted after a 24-month follow-up.

debunks the assumption by many that it is impossible to stay entirely in the subcutaneous space and that one can never be certain that one is not going to deeper structures. The nature of local anesthesia prohibits any injection beneath the fascia of the gluteus muscle. Therefore, in all of these cases, injection was 100 percent subcutaneous. The satisfactory cosmetic results achieved with gluteal lift under local anesthesia using subcutaneous injection with or without expansion vibration lipofilling demonstrates that intramuscular injection is not mandatory for adequate shape and volume change. In other words, it is our assertion that (1) there is no scientific or aesthetic reason that one should be injecting fat into the muscle, and (2) it is technically possible to stay in the subcutaneous space during gluteal augmentation with fat while the patient is under local anesthesia.

Fig. 2. Posterior and left oblique views of a 19-year-old woman with a body mass index of 24.9 kg/m^2 who underwent gluteal lift under local anesthesia with fat harvested with power-assisted liposuction from the flanks, abdomen, and presacrum. Autologous fat (400 ml per buttock) was injected using a closed fat injection system with the vibration expansion basket cannula method. Postoperative results are noted after a 10-month follow-up.

It has been postulated that it is safe to inject fat into the superficial muscle but not into the deep muscle layer. We believe that once under the fascia, flexibility misguidance, previously described by Del Vecchio and Wall, leads the cannula into deeper and deeper tissue planes, potentially harming deep venous structures. It is not the muscle that causes the misguidance of the cannula but the resistance by the fascia that causes the bend of the cannula and subsequent misdirection. Similar to intraabdominal injury when cannulas in the abdominal subcutaneous plane get stuck under the rectus sheath fascia, perforation and entry through the gluteus fascia acts as a point of resistance, which causes the cannula to drift downward. In the end, it does not matter whether one's intention is to inject superficially or deep in the muscle. Once the cannula is under the fascia, there is the increased

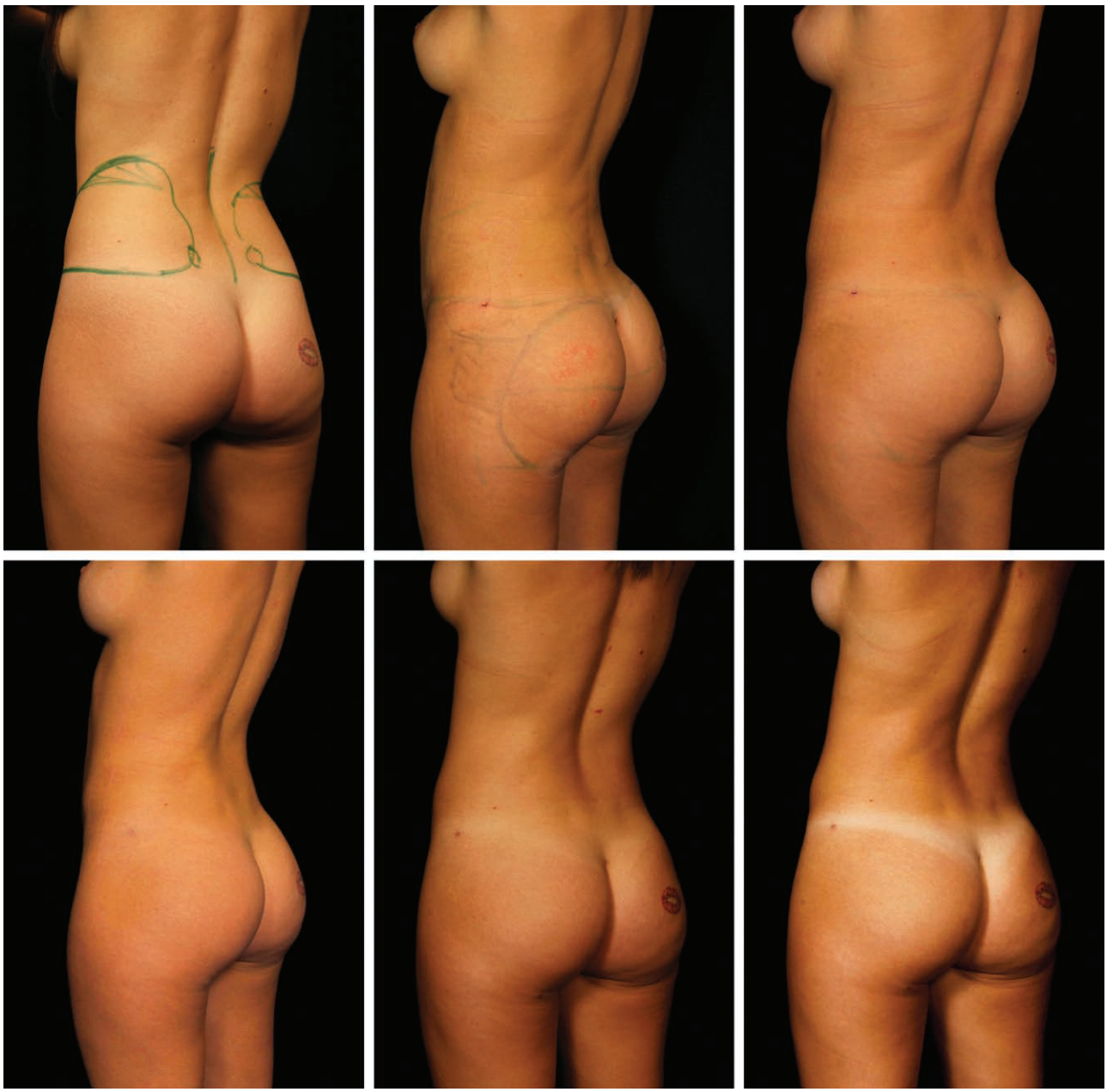

Fig. 3. Left oblique views of 28-year-old woman with a body mass index of 20.4 kg/m^2 who underwent gluteal lift under local anesthesia using ultrasound-assisted liposuction at 60 percent power. Autologous fat grafting of 500 cc per buttock was performed using the expansion vibration lipofilling technique. (*Above*, *left*) Preoperative photograph. (*Above*, *center*) Twenty-four hours postoperatively. (*Above*, *right*) One week postoperatively. (*Below*, *left*) Two weeks postoperatively. (*Below*, *center*) Three months postoperatively. (*Below*, *right*) Follow-up at 6 months shows minimal resorption. Minimal bruising is noted at 24 hours, with complete resolution at 2 weeks.

potential for an unwanted bend. Furthermore, we challenge the idea that it is mandatory to inject fat into the muscle to achieve satisfactory aesthetic results. Aesthetically pleasing buttocks are not necessarily muscular buttocks. Just like reports of body builders injecting synthetic oil directly into their muscles to increase muscular definition,[12] placing fat in muscle just makes for a firmer, muscular appearing buttock. Such strategies to enhance muscular definition have been reported in the triceps and deltoid regions with excellent results.[13] In addition, techniques such as gluteal lift performed under local anesthesia make it possible to achieve excellent buttock reshaping without placing fat in the muscle; therefore, there is no aesthetic or scientific rationale to do so.

CONCLUSIONS

Gluteal lift under local anesthesia demonstrates an effective alternative to gluteal lift performed under general anesthesia and theoretically widens the treatment range to a multitude of potential patients who would prefer an office-based "treatment" over a hospital or same-day surgical procedure. Most importantly, in gluteal lift under local anesthesia, the superficial nature of the recipient site in these cases suggests that it is possible to place fat entirely in the subcutaneous position. In conclusion, satisfactory outcomes can be achieved without injecting fat into the muscle, thereby eliminating the potential for flexibility misguidance, misadventure, and fatal complications.

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PATIENT CONSENT

Patients provided written consent for the use of their images.

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