Body Contouring

Liposuction and Lipofilling for Treatment of Symptomatic Silicone Toxicosis of the Gluteal Region

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Abstract

Background: Silicone injection can cause numerous post-treatment complications—including debilitating pain, cellulitis, abscesses, overlying skin compromise, and siliconomas distorting overlying tissues—that can be difficult to manage.

Objectives: The authors evaluate liposuction as a treatment for patients experiencing complications from silicone injections to the gluteal region, to both preserve aesthetic appearance and minimize further risk of complication from these procedures.

Methods: Eight patients (7 women and 1 man) who presented consecutively to us between 2010 and 2013 with complications from silicone injections to their gluteal region were enrolled in this study. Each patient was evaluated by computed tomography scan and a 0 to 6 visual analog scale for pain. Emergency room (ER) visits, previous hospital admissions, and cellulitis requiring antibiotics in the 12 months prior to treatment were recorded. Patients were treated with ultrasonic and standard liposuction followed by lipotransfer into the gluteal musculature. A Student t test was used for statistical comparison of pre- and postoperative values.

Results: Average patient age was 36 years (range, 25-43 years). All patients initially presented with intense pain as assessed by a visual analog scale; by the 12th week postoperatively, the entire cohort experienced remission in pain. At 1 year postoperatively, no patients had infections (vs 75% preoperatively; \( P = .028 \)), visited the ER (vs 50% preoperatively; \( P = .058 \)), or were hospitalized (vs an average of 1.5 hospitalizations per patient preoperatively; \( P = .066 \)).

Conclusions: Liposuction with immediate intramuscular fat transfer for buttock augmentation appears to be a safe surgical option that preserves aesthetic appearance for patients with gluteal silicone toxicosis.

Level of Evidence: 4

Keywords

body contouring, silicone, silicone, lipotransfer, liposuction, lipofilling, gluteal augmentation, siliconomas, silicone complications, cellulitis, ultrasound-assisted liposuction

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For many years, liquid silicone injections have been used as a quick and low-cost means of achieving improved body contours.\(^1\) silicone was first used for tissue augmentation after World War II, when long-term effects of the substance were still unknown.\(^2,3\) Later discoveries demonstrated silicone is neither as inert nor innocuous as initially presumed.\(^4,5\) Although some physicians still advocate for small volumes of silicone to treat specific problems, injecting massive quantities of silicone oil—particularly industrial or low-grade oil—can lead to devastating long-term outcomes.\(^1,6\)

After silicone injection, a latent period usually follows, during which the patient is asymptomatic. Months or years later, however, chronic inflammation occurs in the affected

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area, followed by local complications, including discolored, thickened, and indurated overlying skin; granuloma formation; skin sloughs; and nodularity.\(^{1,2,7,8}\) In advanced cases, the tissue may atrophy and ulcerate.\(^{8}\) Pain and infection, including abscess formation and cellulitis, are also important complications and can lead to extreme patient discomfort and multiple hospital admissions (Figure 1).\(^{8}\) Silicone can migrate away from the original injection site and into surrounding tissues, leading to disfigurement and local complications in areas distant from the initial injection sites.\(^{3,8}\) Regional lymphadenopathy has also been reported, in addition to compression of surrounding organs and nerves, leading to organ dysfunction and neuropathy.\(^{1}\) Systemic complications of silicone injections include acute and chronic respiratory impairment, collagen vascular diseases, and death.\(^{1,3}\)

Unfortunately, despite these well-documented complications, injections of very large quantities of silicone—often by unqualified “medical” personnel—are still performed illegally. Patients are often subsequently plagued with deformities, infection, and pain, requiring aggressive treatments to improve quality of life and reduce hospital admissions. Various medical and surgical treatments have been recommended to treat patients with these complications, but many of these procedures either yield inadequate symptomatic relief or result in additional disfigurement. Results with medical therapy with systemic corticosteroids to temper inflammation are transient at best and do not result in a cure.\(^{8}\)

Surgical therapies that have been proposed to remove silicone-infested tissue include en bloc excision of all affected tissues, dermolipectomy, liposuction, and, most recently, ultrasound-assisted liposuction (UAL).\(^ {3,6,8}\) Radical excision of all affected tissues, while allowing for the greatest amount of silicone removal, results in further deformity. Loustau et al\(^ {1}\) reported a case in which treatment with dermolipectomy of the thighs and buttocks resulted in substantial silicone removal with good cosmetic results.

Excision is required when skin is affected and the patient is severely debilitated by the disease process. Open procedures may be similarly effective but at the cost of unsightly scarring and increased morbidity. While less mutilating than an en bloc excision, dermolipectomy still leaves large scars across both buttocks and does not address the patient’s original desire for buttock augmentation. Although successful aspiration of a large silicone cyst has been demonstrated, traditional liposuction of more common, widespread, multicystic, silicone-filled tissue has been ineffectual.\(^ {3,6,8}\) However, recent reports have identified UAL as a safe, effective method of removing silicone-infested tissue while avoiding extensive surgical mutilation. Ultrasound-assisted liposuction results in minimal bleeding and tissue softening, as well as less pain than traditional surgical excision.\(^ {6,8}\) As such, UAL and standard liposuction offer better alternatives as a primary modality in these cosmetically driven patients.

In this study, we investigate whether standard liposuction in conjunction with UAL for removal of silicone toxicity, when followed by immediate intramuscular fat graft injections for buttock augmentation, results in decreased pain, as well as reduced hospital admissions and bouts of recurrent cellulitis—all while maintaining favorable

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**Figure 1.** (A, B) This 31-year-old woman presented 8 years after multiple silicone and biopolymer injections into her buttocks and lower extremities. She reported an 8 out of 10 pain on the visual analog scale. Note the varicosities that ensued secondary to initial treatment.
aesthetic results. As the patients in our series initially received silicone injections for aesthetic reasons, our goal was to decrease silicone burden while maintaining the aesthetics of the gluteal region.

**METHODS**

Institutional review board approval was obtained from the Office of Human Subjects at the University of Miami Miller School of Medicine, Miami, Florida. Patients with a diagnosis of silicone toxicosis (International Classification of Diseases, Ninth Revision code: 989.83, toxic effect of silicone) surgically managed at the University of Miami Hospital from January 2010 to March 2013 were identified, and medical records were reviewed.

Patients were included if they had been previously injected with “liquid silicone” or another foreign body such as biopolymer and even—in 1 case—Fix-A-Flat (San Luis Obispo, California) for soft tissue augmentation of the gluteal region. Prior to surgical management, 50% of study patients presented to the emergency room (ER) with a history of debilitating pain, siliconomas, or infection, including cellulitis, abscesses, and overlying skin compromise.

Exclusion criteria included computed tomography (CT) confirmation of siliconomas predominately in the muscular, active infection including cellulitis and/or intragluteal abscesses, and skin changes related to open wounds, redundancy, or vascular compromise requiring resection. Although patients with active infections were excluded from the study, those with previous infections were included.

After inclusion and exclusion criteria were applied, 8 patients were selected for the study (7 women and 1 man). Table 1 shows the demographics and comorbidities of each patient. Once the final study group was identified, demographic data and medical and surgical histories were collected, including both the number of previous silicone gluteal injections and previous hospitalizations for medical management of silicone toxicosis. As a general practice, preoperative CT scan imaging was obtained for all patients to better evaluate the severity of silicone toxicosis, as well as the depth of silicone deposits and foreign body reaction. Imaging confirmed that the silicone was subcutaneous primarily; if severe pain or recurrent infections required resection, an open approach was warranted. If silicone showed as solely intramuscular, patients did not undergo surgery as liposuction within muscle tissue is unsafe due to excessive bleeding.

### Surgical Technique

Preoperatively, the risks, possible benefits, alternatives, and complications of surgery were reviewed with each patient by way of formal informed surgical consent. If the patient was to undergo fat harvest from the abdominal, flank, or saddlebag region, a circumferential, awake, standing prep was performed. All patients received general anesthesia while lying on a bean bag. After intubation, if anterior abdominal fat harvest via liposuction was to be performed, the patients were kept in a supine position. If fat was to be harvested from the flank or hip regions, the patient was placed into the lateral decubitus position on a bean bag for harvest on each side and then finally moved into the prone position for evacuation of the foreign body (silicone toxicosis) and fat intramuscular transfer.

Liposuction from the anterior abdomen, flank/hip region, inner thighs, or lower back was performed in standard fashion to harvest sufficient graft material for gluteal recontouring. In total, 1 mL of tumescent fluid was infiltrated for each 1 mL of fat to be harvested. Fat was harvested into a sterile fat transfer canister. After completion of liposuction, the fat was prepared by filtration through a lap sponge. Luer-Lok plugs were placed at the end of 10-mL syringes with plungers removed. Fat was then transferred into 10-mL syringes. The oil layer (top), separated from the purified fat layer (center) and from the aqueous layer (bottom), was decanted; the Luer-Lok plug was released to drain the bottom aqueous layer. Minimal fat manipulation was performed, as this could have caused further lipolysis and resulted in necrosis of injected fat.

Next, with the patient in the prone position, symmetric, 4-mm skin incisions for port sites were made within the superior gluteal cleft and along the inferior-lateral gluteal fold with a #11 blade. Through these port sites and via a super-wet technique via a 10-inch blunt tumescent infiltration cannula, 1 L of normal saline mixed with 1 ampule of epinephrine (1:1000) was infiltrated into the upper, central, and lower buttocks; 1 mL of tumescent solution was infiltrated for each 1 mL of silicone-fat to be removed. After waiting approximately 15 minutes for adequate infiltration of the tumescent solution, UAL was performed with

<table>
<thead>
<tr>
<th>Patient</th>
<th>Age, y</th>
<th>Sex</th>
<th>Comorbidities</th>
<th>Smoker</th>
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<tr>
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<td>2</td>
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<td>37</td>
<td>F</td>
<td>Depression, anxiety</td>
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</tr>
<tr>
<td>8</td>
<td>43</td>
<td>F</td>
<td>Depression, anemia, GERD</td>
<td>No</td>
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</tbody>
</table>

Abbreviations: GERD, gastroesophageal reflux disease; HIV, human immunodeficiency virus.
a #5 cannula, all while protecting the skin entry site with a protective cover, using caution not to burn the skin at the port site. 

Once UAL was completed, liposuction removal was initiated: both #4 and #5 Mercedes-tip liposuction cannulae aspirated silicone granulomas found primarily within the subcutaneous fat. Liposuction was performed within the gluteal region in a plane superficial to the gluteus maximus muscle and deep to the subcutaneous skin, as silicone was primarily located in this subcutaneous area. The goal of silicone removal was to decrease silicone burden—not to eliminate all regions of previously injected silicone. All lipoaspirated material was photographed and documented and subsequently sent to surgical pathology for confirmation.

After UAL and standard liposuction, the previously harvested fat was injected into the upper, central, and lower buttocks using a 10-inch, blunt, fat-injection cannula; fat was injected intramuscularly using 10-mL Luer-Lok syringes. Lipofilling was performed via a microdroplet technique during withdrawal of the cannula. Small aliquots of fat (1 mL) were distributed with each pass, such that each fat parcel was surrounded by native tissue, with a blood supply to ensure viability. Our lipofilling end point occurred when an adequate degree of recontouring and an aesthetic ideal had been achieved or, simply, when limited by the amount of fat harvested (Table 2). Stab incisions were closed in 2 layers with absorbable sutures, followed by skin glue.

Postoperatively, all patients received an abdominal binder and were placed in a compression garment with the buttocks portion open to air. They were advised not to lie in the prone position for 4 weeks. A doughnut-shaped foam cushion was provided for each patient, to prevent fat necrosis from external pressure caused by sitting down. Because patients lacked both medical indication and postoperative pain, they were not reimaged with CT scans.

### Table 2. Amounts of Harvested Fat

<table>
<thead>
<tr>
<th>Patient</th>
<th>Volume of Foreign Body Suctioned, mL</th>
<th>Volume of Fat Liposuction, mL</th>
<th>Volume of Fat Injected, mL</th>
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<tbody>
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<td>1</td>
<td>400</td>
<td>1380</td>
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<td>3</td>
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<td>880</td>
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<td>5</td>
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<td>None</td>
</tr>
<tr>
<td>6</td>
<td>−†</td>
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</tr>
<tr>
<td>7</td>
<td>400</td>
<td>400</td>
<td>230</td>
</tr>
<tr>
<td>8</td>
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<td>200</td>
<td>150</td>
</tr>
</tbody>
</table>

*Direct excisional procedure.

### RESULTS

The 8 patients included in our study ranged in age from 25 to 43 years (average, 36 years). All presented with multiple and frequent complications arising from gluteal silicone toxicosis. Pain evaluation based on a 0 to 6 scale revealed all patients preoperatively presenting with intense (6 out of 6) pain and all in complete remission by 12 weeks postoperatively.

In evaluating infections involving cellulitis or use of oral antibiotics, we found that our patient cohort reported an average of 2 episodes or more (standard deviation [SD] ± 1 episode) of infection in their preoperative visit. No patients presented with episodes of infection after the procedure ($P = .028$).

Half (50%) of our patients presented with an average of 3 or more (SD, 2.06) appearances in the ER preoperatively. No patients visited the ER postprocedure ($P = .058$). Also, patients had an average of 1.5 (SD, 1.75) preoperative hospitalizations for intravenous (IV) antibiotic therapy, IV fluids, and/or abscess drainage, while no patients were hospitalized postoperatively ($P = .066$).

Pathological specimens were all evaluated by the hospital pathologist, and the diagnosis revealed adipose tissue with focal fat necrosis, fibrosis, and histiocytic infiltrate consistent with reaction to silicone for all specimens. At postoperative follow-ups averaging 1 year, again no patients had developed cellulitis requiring antimicrobial therapy, and none presented to an ER or required hospital admission (Figures 2 and 3).

### DISCUSSION

Liquid silicone is a heterofiller often placed for soft tissue augmentation, despite lacking approval from the US Food and Drug Administration (FDA). Adverse effects from heterofillers depend on particle size. Macrophages can only phagocytize particles up to 15 µm and are therefore unable to eliminate silicone particles, which are 170 µm in size.9-11 The pathophysiology of silicone toxicosis pertains to its particular disruption of both cellular configuration and fibroblast proliferation, which are needed to replace matter removed by macrophages.9-11 Thus, directly injecting silicone has been shown to induce severe pathologic sequelae such as fibrosis, neuropathy from neurovasculature invasion, and skin ulcers.12,13 Granulomatous masses known as siliconomas may also result from the body’s response to isolate and confine the large particles of foreign substance.13 Complications of gluteal silicone injections—including debilitating pain, cellulitis, abscesses, overlying skin compromise, and siliconomas that distort overlying tissues—are frequent and difficult to manage. Our goal in this preliminary investigation was to evaluate UAL and standard liposuction with intramuscular fat transfer for buttock augmentation as a surgical option for these situations.
Figure 2. (A) This 38-year-old woman presented with complaints related to silicone bead and oil injection into her gluteal region by an unlicensed “medical doctor” 8 years prior. In the 12 months prior to presentation, she had been to an emergency room 4 times, was hospitalized 3 times, and could not sit down without experiencing severe pain. (B, C, D) Eighteen months after treatment with standard liposuction, ultrasound-assisted liposuction, and fat transfer to her buttocks. Fat (500 mL) was harvested from the abdomen and hips, and approximately 350 mL in total was injected into the gluteal musculature after preparation. (E, F) These images demonstrate the patient’s preoperative condition through a coronal computed tomography scan (E) and a photograph of the material removed from the patient’s buttocks (F).
Figure 3. (A, C) This 25-year-old woman presented with complaints related to polymethyl methacrylate (commonly known as PMMA) and silicone oil injection into the bilateral gluteal region. The procedure was performed by a “Colombian doctor” at the patient’s house 1 year prior. This patient, who reported a pain level of 6 on the 0 to 6 visual analog scale, was taking methylprednisone daily. She had been to an emergency room (ER) twice in the 12 months prior to presentation and could not sit down due to severe pain. (B, D) Six weeks after treatment with standard liposuction, ultrasound-assisted liposuction, and fat transfer to her buttocks, the patient reported no pain and had not made any visits to the ER. Approximately 400 mL of fat was harvested and 300 mL injected into the gluteal musculature. (E, F) These computed tomography images demonstrate the patient’s preoperative condition.
patients, to minimize complication risks from gluteal silicone injection.

Our study’s results demonstrate that this procedure appears to be a valid surgical option for symptomatic patients with gluteal silicone toxicosis. Recurrence of pain to previously noted levels, hospitalizations, ER visits, and infection requiring antibiotic treatment were evaluated. None of those previous complaints recurred in the patient cohort.

The pathology associated with those complications is present in the tissue even prior to patients becoming symptomatic. Granulomatous responses to silicone injections, or siliconomas, have been demonstrated by radiotracer uptake in patients without any symptoms or clinical evidence of infection.10 Thus, it is possible that UAL and liposuction of the affected area can preventatively treat patients with a history of silicone injections. Such prophylactic measures would preclude unpredictable episodes of pain, infection, ER visits, or hospitalizations in the future. Patients in this study were informed that the procedure’s goal was to decrease their symptoms and restore cosmesis, which we accomplished.

The present study’s limitations—the small sample size and limited follow-up—may reduce the ability to reveal potential complications intra- and postoperatively. For example, although no intraoperative complications arose in our study, Grippaudo et al10 reported a minor burn at the liposuction entrance port. Future investigators should also consider preoperatively incorporating enhanced magnetic resonance imaging (MRI) of the affected area, as this has been documented as the ideal imaging modality for patients with liquid silicone breast injections.11 Enhanced MRI may help surgeons better evaluate the extent of silicone toxicosis and thus provide more accurate treatment for superior outcomes. Magnetic resonance imaging, however, was not obtained in our series, as we felt this procedure would not only be more expensive but also would not provide us with any additional information that would change our therapeutic intervention.

CONCLUSIONS

We simultaneously achieved fewer medical complications and improved cosmesis in patients with gluteal silicone toxicosis through the application of UAL and standard liposuction, followed by intramuscular fat transfer. In all assessed categories—including pain, infection, ER visits, and hospitalizations requiring IV and antibiotic therapy—our patients demonstrated statistically significant improvement. Although not a cure for this disabling problem, our technique may improve patients’ quality of life, helping them avoid extensive surgical resections while maintaining favorable aesthetic results.

Disclosures

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REFERENCES