Lipoplasty Complications

Editor’s Note: My thanks to the moderator, Charles E. Hughes III, MD (board-certified plastic surgeon and ASAPS member, Indianapolis, IN), and to panelists Kristoffer Ning Chang, MD (board-certified plastic surgeon and ASAPS member, San Francisco, CA); Jeffrey M. Kenkel, MD (board-certified plastic surgeon and ASAPS member, Dallas TX); and Richard A. Mladick, MD (board-certified plastic surgeon and ASAPS member, Virginia Beach, VA), for sharing their opinions and clinical experience.

Dr. Hughes: Our first patient is a 54-year-old woman who is an insulin-dependent diabetic. Figure 1 depicts her abdominal wall. Imagine this scenario: The patient had consulted with you 8 months ago to discuss lipoplasty. One week ago she underwent abdominal lipoplasty in another state. Now you are called by the emergency room at your hospital; she has presented there in acute distress and has been evaluated as septic. She still has the drains in place that she came home with. Dr. Mladick, how would you handle this patient?

Dr. Mladick: This is obviously a very serious problem in a critically ill patient. The best case scenario is that she has a very severe subcutaneous wound infection, which, in a diabetic, is a very serious problem in itself. But even more serious is the possibility this may represent an abdominal wall perforation and possible viscus penetration with underlying necrotizing fascitis. I would recommend an immediate radiologic work up to assess free air in the abdomen. I would also order a computed tomographic (CT) scan and other necessary tests. She needs a general surgery consult, an internist to manage her diabetes, and an infectious disease specialist. Patients such as this will die without immediate, extensive debridement. A case like this—and there have been a number of cases across the country of abdominal penetration with these smaller canulas—highlights an important patient safety concern and the need for appropriate preventive measures. The surgeon must keep his or her nondominant hand (the hand that is not directing the cannula) in constant palpation with the underlying cannula and know where that cannula is. For this patient, even if what we are seeing is a subcutaneous wound infection, it is still a severe problem. Infection is frequently caused by contamination of the cannula in the operating room, perhaps from grabbing the shaft with hands that have touched other body parts, such as the perineum, or simply from not using a proper sterile technique, which we certainly need in any patient but especially in patients who are diabetic.

Dr. Hughes: Considering lipoplasty in terms of patient risk, how would you evaluate abdominal lipoplasty?

Dr. Mladick: The abdomen is absolutely the riskiest area for lipoplasty. Even the most highly skilled surgeon can accidentally cause penetration of the abdominal wall.

Dr. Kenkel: Dr. Mladick makes some excellent points. The abdominal area has the potential for the severest complications. The least severe problems are contour irregularities, which most commonly occur on the lateral side where we can recontour. If a patient has a prior surgical scar, then you need to ascertain that there is no herniation of abdominal tissue. I order an ultrasound or CT scan before proceeding with abdominal lipoplasty in these patients. Another area in which the risks are greater is the inferior subcostal margin. As you contour the epi-
gastric area, you will find that some patients have a prominent costal margin, which is another area prone to intraabdominal or intrathoracic perforation, specifically with the fine cannulas that Dr. Mladick mentioned. So, proper patient evaluation is key to performing these operations safely.

Dr. Hughes: Dr. Chang, how do you evaluate this patient?

Dr. Chang: Her lower midline abdominal scar makes me wonder if she had previous abdominal surgery that could produce fibrosis or adhesions and could make the lipoplasty more difficult to execute. Surgery may have eliminated some of the natural plane.

In this photograph, given that there are no reports of abdominal pain or gas, I believe she has a necrotizing soft tissue infection involving the skin and subcutaneous tissue. Further, I would think that after 7 days, if she had abdominal penetration, the manifestation would appear even more serious.

Dr. Kenkel: For me the big question is a more general one: What do we think about operating on diabetic patients who are insulin dependent? First and foremost, I would closely monitor their medical status including preoperative, intraoperative, and postoperative blood glucose levels. I tend to work in stages with these patients. If they need full body contouring, I would execute this in 2 or 3 stages to decrease the amount of stress on the patient and maintain a more normal preoperative blood sugar level.

Dr. Hughes: Involvement of an internist would be a good idea. If the patient is from out of state, I would get a local internist involved. Plastic surgeons are well trained in managing the postoperative patient, but a diabetic patient with an infection is a real challenge and can be extremely difficult. She is going to be taking graduated doses of regular insulin, massive doses of antibiotics, and I think there will be many considerations. If it is simply a very severe subcutaneous infection the outcome can be good with proper debridement and good medical care. If it is a penetration then she is going to go downhill very rapidly without immediate general surgical exploration.

The next patient is a 34-year-old female runner who keeps herself in very good physical condition. Two years ago she had lipoplasty of the lateral thighs and hips. Now she is unhappy with the creasing that is apparent in her lateral thigh (Figure 2). Dr. Kenkel, how would you help this patient?

Dr. Kenkel: This is a very difficult problem to correct. She likely has lost volume at the confluence between the lateral and posterior thigh. In addition, she is quite concave over the adherent area distally on the side. Adherent zones are areas that we need to treat with caution—in which the complication rate is high. The best treatment I could offer would be 2 or 3 autologous fat transfer sessions using...
Lipoplasty Complications

AESTHETIC SURGERY JOURNAL – JANUARY/FEBRUARY 2005

Dr. Hughes: Dr. Chang, how would you treat this problem?

Dr. Chang: The cause of the problem appears to be over-resection of the lateral thigh fat collection. It would appear that the cannula tunneled excessively in that area, leading to groove-type contour irregularities. I agree with Dr. Kenkel that she is a candidate for autologous fat grafting. There are some areas of protuberance around the areas of indentation. There is some relative excess of subcutaneous fat. My surgical plan would be to aspirate the protuberant area surrounding the area of indentation and then carry out autologous fat grafting to the area that is most depressed.

The donor sites would be hip, iliac crest, medial knees, or anterior thighs. It is going to take more than 1 session, and she may need additional touchups to get results as good as possible.

Dr. Hughes: Dr. Mladick, do you think the problem could have been caused by performing the lipoplasty too much from one direction?

Dr. Mladick: In my practice, rather than being overly aggressive from 1 direction, I will cross-tunnel. Approaching from 2 different directions, usually at about 90 degrees, I believe one can achieve a more uniform reduction and also avoid the problem seen in this patient. However, it is unnecessary when the patient has a very small amount of excess fat, amounting to only about a 150 cc reduction; you can easily do that with 1 incision. In a larger patient such as this, I would have approached from 2 different directions, as Dr. Chang pointed out. With a defect such as this, there is a valley. To change the topography, you can either lower the hills around the valley, raise the valley, or do both. I usually do both. I would perform lipoplasty of those 2 bulges and transfer fat into the defect.

Dr. Hughes: If you have only limited donor sites, the patient does not want you to use any other areas, and you have approached it as you describe, how do you prepare the fat for grafting?

Dr. Mladick: I simply let the fat stand in the syringe and allow the fluid to layer off. I use a 20-cc, or larger, syringe. I transfer the fat to a 3-cc syringe. In the face, I use a 1-cc syringe and reinject with an 18-gauge sharp needle. I do not wash the fat routinely. I know of the research that has been done on the benefits of removing the oil. In some cases, I will use saline to rinse the fat, but this usually is not necessary.

Dr. Mladick: I would layer subcutaneously in fine little tracks and avoid depositing a lump in any single area.

You can use multiple directions to achieve multiple tracks to help build up the area. There will not be any evidence of those little 18-gauge needle penetrations.

Dr. Hughes: Dr. Kenkel, do you have anything to add?

Dr. Kenkel: The system I typically use is to centrifuge for 2 minutes, remove the top layer of oil, and then place the fat into 1-cc syringes and inject using the sharper tip cannula. I perform a lot of ultrasound-assisted lipoplasty and was concerned about the size of incisions, and so I typically used one access site to treat multiple areas. However, this technique often may result in over-resection. Now, with newer technology, the incisions are only 3 to 5 mm, even with the skin protector, and so

Figure 2. This 34-year-old woman is a physically healthy runner. Two years ago she had lipoplasty of her lateral thighs and hips. Now she would like the crease in her lateral/posterior thigh corrected.
I think we need to return to the principle of approaching larger reductions from more than 1 site to avoid deformities such as these.

**Dr. Chang:** General anesthesia is helpful in harvesting the fat when the defect is complex because it facilitates obtaining fat without having to infiltrate with a large amount of wetting solution. By using minimal amounts of wetting solution, the harvested fat is as concentrated as possible, requiring very little processing. The most processing necessary would be pouring out the liquid portion. By not infiltrating too much in the operative sites you can better evaluate the fat in the protuberant area and as you inject fat into the over-resected area. The take of the fat may be different in different bodily areas. In the thigh and buttock areas, which have abundant fat and not much fibrous tissue, I believe that the fat takes better.

**Figure 3.** This 51-year-old healthy woman underwent lipoplasty 8 years ago. Although she has a backyard pool, she has not worn a bathing suit for 4 years because she is self-conscious about the “divots” in her legs.

**Dr. Hughes:** The third patient had a similar problem. This 51-year-old woman had lipoplasty 8 years ago on her lateral and anterior thigh. She has kept this area covered for almost 4 years because she has been very self-conscious about the appearance of her legs (Figure 3). Dr. Chang, would you approach this patient in the same way, given her indentations, as you approached the woman in Figure 2, a patient with a large groove?

**Dr. Chang:** This patient has indentation or contour-related sequela including indentation in the lateral and anterior thigh. Further up I see some scarring. There are also skin-related sequela, multicentric and diffuse, that may be due to superficial dermal scarring. In terms of surgical approaches, I would consider filling the contour-related problem with autologous fat in both the lateral and the anterolateral thigh. After that I wonder if some type of dermal lipectomy may offer additional benefits. One of the maneuvers to consider is to raise the skin in the lateral thighs and see if that will improve the quality of the skin. If so, maybe a buttock or a lower body lift could be considered. However, these dermal lipectomies are bigger procedures and patients are frequently reluctant to consider them.

**Figure 3.** This 51-year-old healthy woman underwent lipoplasty 8 years ago. Although she has a backyard pool, she has not worn a bathing suit for 4 years because she is self-conscious about the “divots” in her legs.

**Dr. Hughes:** Dr. Mladick, how could this have been initially prevented?

**Dr. Mladick:** This problem does appear different from that of the previous patient. It looks like dents and divots with the skin adherent to the underlying fascia. Dents and divots are always a result of over-resection. If over-resection is too superficial, there is damage or suctioning of the immediate subdermal fat. In terms of prevention, we must be careful to avoid very superficial lipoplasty. I recommend an intermediate level of lipoplasty, at least .5 or 1 cm below the skin. I think that it is important, in terms of prevention, to keep at least one-half cm of the subdermal fat intact on the underlying skin. One of the best ways to do this is to avoid suctioning with the hole facing up towards the skin. The original teaching was to keep the hole down and away from the subdermal fat, and I still believe this is safest.

It is important that the surgeon constantly observe the return in the tubing to see when it starts showing a tinge of blood. When the tinge test is positive (ie, bloody), the cannula should be lifted up against the skin—not forcefully, but just so you can palpate the cannula under the skin. To avoid being too superficial, palpate the thickness of the fat between the skin and the cannula. If you begin to have lipoplasty problems, go back to the basics: (1) know where the cannula is, (2) keep the hole pointed away from the subdermal fat, and (5) do the tinge test.

**Dr. Hughes:** Dr. Kenkel, do you have some pointers about prevention or correction?

**Dr. Kenkel:** Start with smaller cannulas at an intermediate to deep level until you get sufficient experience. Smaller cannulas potentially have less risk of creating contour irregularities. I may start in the lateral thigh with a 3.7-mm cannula, fairly deep, but quickly switch to 3.0 mm. I make sure to maintain a moderate amount of fat underneath the skin to avoid any irregularities in this highly visible area.

**Dr. Chang:** This type of multicen-
Lipoplasty Complications

Dr. Hughes: Does external ultrasound play any role in your postoperative care? If so, how do you use it and at what point in time?

Dr. Chang: I have not used external ultrasound either as a procedure or for postoperative care. I try to prevent problems that require external ultrasound treatment.

Dr. Hughes: Before performing any secondary surgery, are there any noninvasive or conservative modalities you would attempt? How soon after a procedure would you reoperate?

Dr. Chang: There is a role for some types of physical therapy for the skin. I personally apply manual massage or recommend that patients get a mechanical device to do this. This is useful in the immediate postoperative period when there is a lot of edema, induration, fibrosis, or scarring connecting the deeper fascia to the more superficial fat. I would consider using other nonultrasound techniques that can make a difference over time.

Dr. Hughes: Are you suggesting Endermologie?

Dr. Chang: No, just manual massage and a simple mechanical vibratory device that can be purchased at places like the Sharper Image.

Dr. Kenkel: I routinely use external ultrasound after lipoplasty for 2 indications: (1) treatment of induration in the lower abdomen (usually in men) and medial thighs (in women); (2) improvement and softening of mild irregularities in the early postoperative period. I also encourage patients to get a massage at least twice during the immediate postoperative period.

In terms of noninvasive technologies, I see radiofrequency (RF) as an interesting future possibility. Even some of the currently available laser devices tighten skin and may be able to improve some mild to moderate laxity. I have used some RF to treat very mild to moderate skin laxity and so far am somewhat encouraged, although I think that our experience is still very early.

Dr. Mladick: I sometimes use external ultrasound postoperatively. I find it valuable for the patient who needs some extra attention. For example, I may feel that the patient is doing fine even though the patient has more swelling than we would like to see. In such a case, using ultrasound and providing some personal attention can be reassuring to the patient. Occasionally, it is also helpful in softening the abdominal area, especially the epigastric region. I also find it helpful after lipoplasty in the submental area in which there may be a little more persistent edema.

I'm wondering if there is a role for "pickle-fork" release if these scars are adherent and you cannot inject fat under them. It is helpful in the case of an isolated depression, but this patient’s problem looks so diffuse, I would hesitate to undertake it.

Dr. Hughes: When you do it, do you then add fat afterwards?

Dr. Mladick: You have to release the adhesion with a pickle-fork and then perform your fat injections afterwards; if you inject the fat first, it balloons up all around the dent in the central part. It's like a volcano. The skin is adherent down to the fascia and it needs to be released.

Dr. Kenkel: This would be a good patient in which to give this technique a try. You can undermine that area and then go back in and inject fat. I think that is really the only way you can successfully treat these patients.

Dr. Chang: In one patient, I used the pickle fork to redo an abdomen and a small hematoma developed that resolved on its own. That experience discouraged me from using the pickle-fork.

However, in dealing with a more fibrous area, I have a couple of suggestions. A small blunt cannula without suction may be passed, multiple times, underneath the area of indentation to create some potential spaces for subsequent fat injection. Also, we have heard that both sharp and blunt cannulas have been used. However, I think there may be a role for using sharp needles in dealing with various fibrous areas. I have used either 14- or 16-gauge angiocaths that are suitable in length, especially for some of the larger defects. The sharper needle will allow for more accurate deposition of subcutaneous fat into these fibrous areas. First, you pass a large gauge needle into the area to be fat grafted. Then you pull it out, leaving...
the plastic sleeve behind. You inject the fat as the plastic sleeve is pulled back. If you repeat this process a number of times, you definitely achieve more accurate deposition of fat and tend to avoid placing a lot of fat outside the area of indentation.

One important thing to consider is that you need to accurately assess the results in the operating room. If you are not satisfied with the results, for whatever reason, either over- or under-correction, you need to address the problem at that time. Do not wait until the patient heals to reinject fat into an area. Examine the patient’s contour and if you feel that the patient needs a little fat in an area, inject it at the time of the original operation.

Dr. Hughes: The next patient is a 48-year-old woman who had lipoplasty over her lateral sides and an abdominoplasty 6 years ago (Figure 4). Following the procedure she had a pulmonary embolus and was in intensive care on a ventilator for 40 days. After a 4-month recuperation, she returned to normal activities. She fears recurring pulmonary embolism and her original surgeon stated he would not recommend any more surgery for her. Dr. Mladick, what would you suggest for this patient?

Dr. Mladick: Her previous surgeon was very smart. However, let’s assume that she is able to get medical clearance. The first thing to do is to evaluate this lateral fibrosis. Should it be filled? Is the area collapsed or just loose, sagging skin? If there is a significant step produced by pinch test palpation, then lipoplasty may be effective. If you can be confident of getting a reduction using lipoplasty, you can break that inferior ledge by tunneling under it. Afterwards, you can tape the area or put the patient in a garment to raise the lateral thighs.

But if you examine the patient and discover that the lateral thighs are not fat-filled but sagging, empty, loose skin, then I think you must consider a lateral thigh lift. The best procedure would be a lateral thigh lift performed as part of a circumferential body lift because she really does not need abdominoplasty but appears to need some lipoplasty over her hip roll. This is still a big procedure in a patient who had such a rocky postoperative course. First, you must get some definite medical clearance. I would then discuss with the patient the possibility that she could have a problem and even run the risk of potential pulmonary embolism and death. You also have to consider whether to administer some low-molecular-weight dextran, some low dose heparin, or simply have her use intermittent compression stockings or anti-embolism stockings.

Dr. Hughes: Dr. Mladick, you have brought up some very good safety issues. Considering that this is a large woman, do you think that the surgeon undertook too much initially?
**Dr. Mladick:** I don’t feel that combining abdominoplasty with a moderate amount of lipoplasty in surrounding areas is generally too much for a 48-year-old patient. However, I did not see her original photos. She may have had gigantic saddlebags. I do not know her medical history. But in a healthy 48-year-old, if a pulmonary embolus occurs, I do not feel that you can condemn the surgeon for doing too much.

**Dr. Hughes:** What treatment would you suggest to this patient?

**Dr. Chang:** Treatment would depend on the patient’s goals. I am inclined to think that this patient’s therapeutic goal is to look reasonable in clothes, and certainly those 2 bulges in the lateral thighs will show through her clothes. Therefore I will recommend the simplest procedure that will be effective – a dermolipectomy of those bulges; they are really redundant skin. I sometimes try in vain to eliminate a fold that is there at the time of lipoplasty. Fibrous adhesions have been mentioned earlier but fibrous tissue really does not release. Dermolipoplasty with intravenous sedation will allow the surgeon to fairly easily resect these redundant skin areas without subjecting the patient to general anesthesia and a bigger procedure that could be a problem for her health.

**Dr. Kenkel:** The first thing we need to do is make sure that she does not have a thromboembolic disorder. If she does not, I think we can proceed, and I really agree with what Dr. Chang has said. This woman is a lot like some of the massive weight loss patients that I have seen. It is likely that she just wants to look better in clothing. I will treat these isolated, severe saddlebags that are primarily skin in one of 2 ways. I will try first to do an extension of the cutaneous excision, only on the lateral side, which would create a more horizontal scar across the lateral side. The only thing that I worry about is getting enough skin out to effectively treat these areas. I have, on rare occasions, done a vertical excision, a localized excision to get rid of these sagging abdominal and dermal components. As Dr. Chang has mentioned, it is a fairly easy recovery. The patient does not have to spend a lot of time in the operating room. One of the things that we have learned from patients with massive weight loss is that usually the scars are a secondary concern. Patients just want to look better. They will accept the compromise of the scar to get the contour they want.

**Dr. Hughes:** The next patient has a classic problem that we, fortunately, do not see too often. This 44-year-old, socially prominent woman was referred 18 months after abdominal, medial and lateral thigh, knee, hip, and back lipoplasty using ultrasound-assisted lipoplasty and suction-assisted lipoplasty. She is happy with her results except for the apparent banana deformity (buttock rolls).
can be performed under local or general anesthesia. After suctioning the banana deformity, I would use old-fashioned tape up against the crease to flatten the area, and I would also put the patient in a garment. On rare occasions, when the banana deformity is severe, you cannot achieve skin contraction. However, because this patient is young, I do not believe that this is the case. I think her skin will contract and the results will be satisfactory. But, I am not sure about that very lateral part. I have seen some banana deformities that are so severe that they require an actual open surgical excision along the buttoc

Dr. Hughes: Approaching this technically in the operating room, would you start deep and come up or start at the surface and work down?

Dr. Mladick: There are 2 areas in the body in which I believe you need to do very superficial lipoplasty. One of them is the ankle, where I use it all the time. I am more superficial on the ankles than virtually any other area of the body, and it is safe. The other area is in this banana deformity. I start with the open-ended cannula right under the skin and then shave it down, and work my way down.

Dr. Hughes: Dr. Kenkel, what would you offer this patient?

Dr. Kenkel: Well, I would tell her that she is probably not going to make the charity event. I am not sure I can help her in 3 months. What bothers me more than the posterior thigh is what has happened to her gluteal fold. A masculinization of the buttock has occurred as a result of extending that gluteal fold laterally. The deflation of the lateral thigh with that skin redundancy is really going to be very difficult to treat. I probably would approach the posterior thigh in the way that has already been described. But I think her lateral gluteal fold and lateral thigh are going to require fat grafting, which may not correct it. She may have enough skin excess that it may require dermolipectomy. I would probably do much of what Dr. Mladick described and even consider putting a little bit of fat along that lateral third of the upper gluteal fold to give her a little softening in that area so that she is not quite so masculine.

Dr. Hughes: Dr. Chang, how would you correct this problem?

Dr. Chang: The underlying problem here is over-resection of the soft fat in the lateral thighs and the posterior or upper thigh. As a result, you can see redundant skin in the lateral and posterior thighs. Even though it has some superficial resemblance to the banana roll, a banana roll usually is in the upper posterior thigh. As Dr. Mladick mentioned, the fat is superficial and it requires superficial lipoplasty. In this case there is much soft tissue deficiency; she had lipoplasty in other areas of the body. There may or may not be adequate amounts of fat. If her goal is to make it to the fashion show in a conservative bathing suit, I would recommend a dermolipectomy involving the posterior upper thigh, which then is carried around laterally and curved upwards like a traditional excision. Hopefully, the scar resulting from this dermolipectomy will be adequately hidden in a conservative bathing suit.

Dr. Hughes: Following primary lipoplasty, how long after surgery do you keep your patients in garments or support?

Dr. Chang: I use garments in constantly changing ways. For more localized fat collections, I use them for 3 to 7 days or longer. If it is an extensive lipoplasty, I would use the garment longer, because it would offer comfort and support.

Dr. Hughes: Dr. Kenkel, how long do you ask your patients to wear garments?

Dr. Kenkel: We typically have patients wear them for about 2 to 3 weeks, but most of my patients wear them for 6 to 8 weeks. The reason is that they just feel comfortable in them; it is almost like a security blanket.

Dr. Mladick: I would probably have this patient wear garments for 2 to 3 weeks. I may advise older patients to wear the garment longer. Younger patients in their 20s may take it off before the end of the week, depending on their skin type. So, this varies from 1 to 4 weeks in my practice.

Dr. Hughes: Have you had patients who complained of chronic swelling following lipoplasty and it was determined that there was lymphedema? If so, was there a diagnosis of lymphedema before or after the lipoplasty? Has lymphedema continued as intermittent swelling of their legs, either unilaterally or bilaterally?

Dr. Chang: If I am going to perform lipoplasty involving the calf and the ankle area, I would mention to the patient that chronic swelling is going to be an issue. Dr. Mladick mentions that when he writes about lipoplasty...
of the ankle and calf areas. I prepare patients with stockings of a suitable strength beforehand. If there is any question of preexisting lymphedema, then I would be reluctant to do the surgery in the first place.

**Dr. Kenkel:** I have not seen lymphedema in lipoplasty above the knees. I have seen it below the knees as has been mentioned. I have seen dermolipectomy of the upper extremities with some pretty long-lasting edema of the forearm/hand area, but not just from lipoplasty.

**Dr. Mladick:** I have seen one patient who had edema of the forearm and hand. It persisted for a couple of months and he didn’t require any treatment. As far as the calves and ankles, I used to see lymphedema, but not recently. Now I start patients on the intermittent compression machine, during and after surgery, and I keep all patients overnight at my center. I elevate their legs, start them on intermittent compression immediately, and they use it for at least 1 month. I will not perform their surgery unless they rent the intermittent compression machine. They arrange it for 1 month and some of the patients use it for 2 months. At the end of 2 months the edema has abated in almost all patients who use the machines.

**Bibliography**


Reprint requests: Charles E. Hughes III, MD, 8051 S. Emerson, Suite 450, Indianapolis, IN 46237-8600

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