



Personal Evolution in Thighplasty Techniques for Patients Following Massive Weight Loss

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Abstract

Background: Lockwood described the importance of Colles' fascia anchoring in medial thighplasty to reduce morbidity associated with the procedure. However, this maneuver may still have complications including traumatic dissection, prolonged edema, and potential wound healing ramifications from increased tension. Alternatively, we suggest orienting tension in medial thighplasty for massive weight loss (MWL) patients in the horizontal vector rather than a vertical direction, negating the need for Colles' fascia anchoring.

Objectives: To compare the morbidities, complications, and outcomes between Colles' fascia suture fixation (CFSF) and horizontal vector fixation (HVF) in medial thighplasties in MWL patients.

Methods: A retrospective chart review was conducted on an Institutional Review Board approved database of MWL patients who had medial thighplasty between October 2004 and March 2014. Patient demographics and surgical outcomes were reviewed between those MWL patients with CFSF and HVF.

Results: Of 65 post-MWL patients, 26 (40.0%) patients were in the CFSF group, and 39 (60.0%) patients were in the HVF group. The 2 groups had statistically equivocal preoperative characteristics and comorbidities. Intraoperatively, the HVF group had increased use of barbed suture (92.3% vs 30.6%, $P < 0.0001$) and liposuction (71.8% vs 26.9%, $P < 0.0001$). Postoperatively, the HVF group had decreased incidence of infection (5.1% vs 23.0%, $P = 0.051$) and lymphocele/seroma (10.3% vs 34.6%, $P = 0.0257$). No statistical differences were observed for dehiscence, necrosis, or hematoma.

Conclusions: HVF for medial thighplasty in MWL patients is a safe and effective procedure, with a lower complication profile than CFSF. Furthermore, the incorporation of barbed sutures and/or liposuction may help to achieve optimal results.

Level of Evidence: 3

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Medial thighplasty has undergone significant changes over the course of the last few decades as a result of improved anatomic understanding and surgical technique.¹⁻³ John R. Lewis published the first description of the traditional thigh lift over 50 years ago.¹ With strictly a vertical lift and no soft tissue fixation, this approach had a variety of complications and did not gain wide acceptance. Patients suffered wound migration, widening of scars, lateral traction of the vulva, as well as damage to the lymphatics.¹ Subsequently, Pitanguy described a dermal sling of the superior flap to secure the thigh lift to the periosteum or muscle fascia with variable skin laxity recurrence and skin

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flap necrosis.² Alternatively, Lockwood suggested anchoring the distal dermal tissue of the medial thigh to the rigid Colles' fascia for more stable fixation.⁴⁻⁵ This modification significantly decreased the morbidity associated with this procedure but persistent distal skin laxity remained an issue. Separately, recognizing the lipodystrophic components of the distal thigh, Le Louarn and Pascal advocated circumferential liposuction of the thigh and horizontal skin resection. This approach avoided disruption of the lymphatic and vascular networks to minimize edema but maintained some skin laxity.⁶

Although thighplasty has had significant modifications over the decades to decrease complications, this procedure remains a challenge, specifically for the massive weight loss (MWL) population. These patients have atrophic dermis and inelastic tissue prone to wound breakdown. Additionally, they have skin laxity throughout the thigh, not just the proximal thigh. In our hands, Lockwood's vertical lift does not address the symptomatology and extent of skin laxity of this patient population. Because of the quality of the tissues, the vertical lift in massive weight loss patients has a higher risk of extensive traumatic dissection, prolonged edema, recurrent ptosis, and deformity of the labia.⁷⁻¹¹

Over the years, the senior surgeon (J.M.K.) has evolved his own technique of addressing the skin laxity in the medial thigh in MWL patients. Instead of anchoring the horizontal incision to Colles' fascia, the vertical vectors are oriented horizontally transferring tension from the fascia and surrounding structures to the medial aspect of the thigh, distributing tension along the length of the incision.¹² This technique maintains fascial support along the entire thigh, and thus disperses the tension of closure more evenly. In addition, the technique avoids disrupting Colles' fascia and decreases the risk of injuring the inguinal lymphatics, which may help avoid further morbidity.

In this retrospective review, we study our evolution of techniques comparing the morbidities, complications, and outcomes.

METHODS

Study Design

The Institutional Review Board (IRB) at the University of Texas (UT) Southwestern Medical Center, Dallas, Texas, approved this retrospective study. Consecutive MWL patients, who underwent medial thighplasty between October 2004 and March 2014, were enrolled. MWL patients were defined as those who have lost at least 50 pounds of weight and maintained a stable weight for 3 months.^{13,14} These patients were subdivided into 2 groups, those who had Colles' fascia suture fixation (CFSF) and those who

had horizontal vector fixation (HVF). Patient demographics including age, gender, amount of weight loss, body mass index (BMI), smoking status, and medical comorbidities were reviewed. Intraoperative data including suture (regular or barbed) and liposuction were extrapolated. Complications including hematoma, lymphocele/seroma, erythema, necrosis, dehiscence, and infection were identified. Lymphocele and seroma were grouped in the same category because they were clinically indistinguishable.

Additionally, postoperative aesthetic outcomes were extracted from the clinical charts; of note, photographs and surveys were not available for all patients and thus were not used for comparison.

Statistical Analyses

Statistical analyses were carried out using Fisher's exact test or 2-tailed *t* test. Differences with *P*-values of <0.05 were considered statistically significant.

Development of Operative Technique

Our early surgical experience, before 2009, followed Lockwood's principles using CFSF for treatment of thigh laxity in the MWL population. In this approach, a horizontal crescent of tissue is resected from the proximal medial thigh in the perineal crease and gluteal fold. Subsequently, a vertical extension is indicated for dog-ear excision. After tissue resection, the groin is dissected to identify Colles' fascia. The fasciocutaneous flap of the proximal thigh is undermined and pulled vertically; the superficial fascia is then fixated to Colles' fascia. The remaining tissue is closed in layers.⁴⁻⁷ Figure 1 demonstrates vector of pull of the traditional thigh lift. However, our group and others have observed complications, especially in MWL patients, with this approach; much of the morbidity, such as horizontal thigh laxity, recurrent ptosis, scar migration, and traction deformity of the labia, appears to be related to this pull.¹² Supplemental Figure 1 demonstrates a sample pre- and postoperative patient with CFSF medial thighplasty.

The horizontal laxity seen in the MWL population is unique and difficult to address with the classic vertical pull, especially as it extends to the middle and distal third of the thigh, and often times below the knee. This pattern of lipodystrophy and skin laxity may benefit from a modified approach to address the thigh without any vertical or oblique lifting component. Thus, since 2009, our group focused tension along the medial aspect of the thigh, utilizing a horizontal vector pull, closing the thigh as a cylinder.^{6,12} A horizontal incision can be hidden in the groin crease and is used only to remove excess redundancy that is carried superiorly and medially with the vertical incision. The main advantage of this technique is distributing

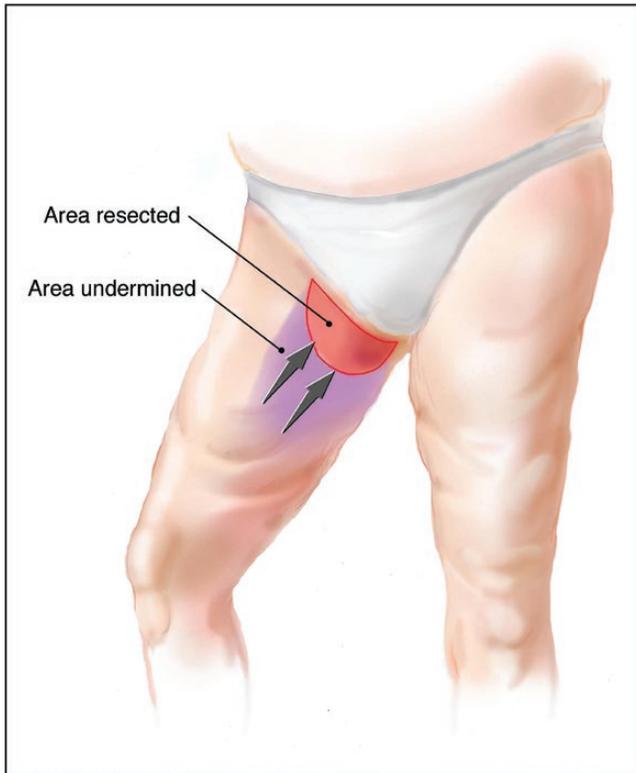


Figure 1. Vector of pull of the traditional Lockwood medial thigh lift, Colles' fascia suture fixation (CFSF).

the tension over the entire vertical medial thigh closure from the knee to the groin as opposed to earlier skin suspension techniques that relied on anchoring soft tissue of the medial thigh to Colles' fascia or mons pubis. **Figure 2** demonstrates the vector of pull of our new technique.

Since our initial description of the technique,¹² a few modifications have been introduced in an effort to achieve even more predictable results. We have found that preoperative marking is best performed in the office the day prior to surgery. The office environment is quiet with minimal interruptions and distractions, which helps put the patient at ease. Equally important, the surgeon is placed in a calm and uninterrupted environment so that he/she is not rushed and can take plenty of time to complete the markings. Given the degree of skin redundancy, the markings may be difficult and time consuming.

Because of the significant tissue displacement with patient markings, photography allows the surgeon to confirm that the marks are in fact in a good place and symmetric outcomes may be achieved. These photographs can be reviewed the evening prior to surgery to confirm the operative plan. Given asymmetries in weight loss patients are noticeable and tough to revise, this preoperative assessment has greatly contributed to a more predictable operative course. Furthermore, accurate photography of preoperative markings allows more critical assessments of

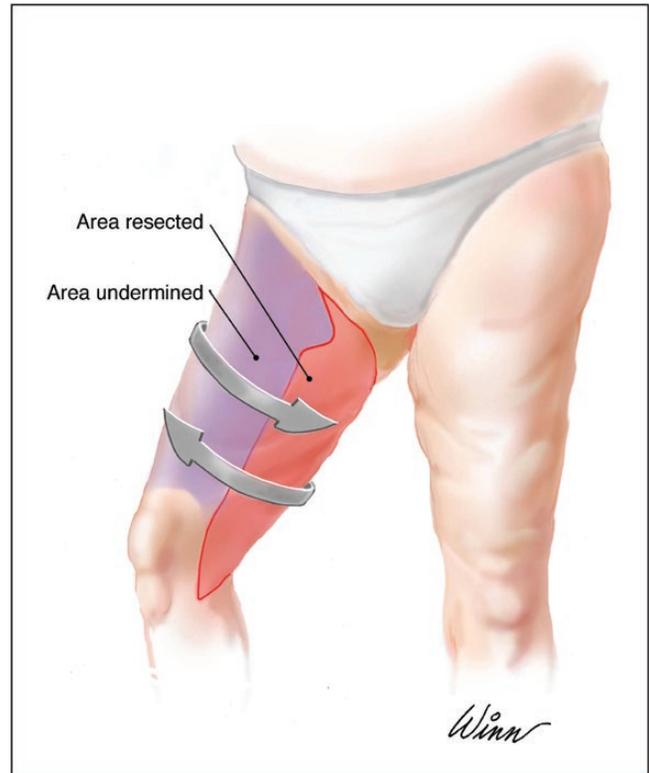


Figure 2. Vector of pull of our new technique, horizontal vector fixation (HVF).

postoperative results and helps delineate ways to improve on technique.

The desired location of the medial thigh incision is marked from the lower aspect of the knee to the medial extension of the groin crease. For very deflated patients with extensive laxity, we have extended the caudal portion of this marking past the knee, and in some instances, to the proximal ankle. The skin is then transposed with mild tension from the anterior thigh toward the posterior thigh to meet the proposed scar. This area of transposition is marked and represents the amount of anterior thigh skin to be resected. The same technique is applied to the posterior thigh.

Once these marks are in place, the final incision lines are drawn. Instead of a true ellipse, the anterior incision is drawn such that a "bottleneck" area of skin is preserved more proximally. Skin proximally is more adherent and less mobile due to fixation along the inguinal ligament and fascial attachments from the pubis and ischium.^{15,16} The bottleneck accounts for this discrepancy and helps prevent anterior migration of the scar and visibility. The posterior line, however, follows the line determined during the initial transposition of the skin. This design allows the thigh to be closed as a cylinder without any tension on the groin. The horizontal vector of pull along the entire length of the thigh eliminates the need to anchor the flaps to the



Figure 3. A 66-year-old female patient positioned in the HVF approach.

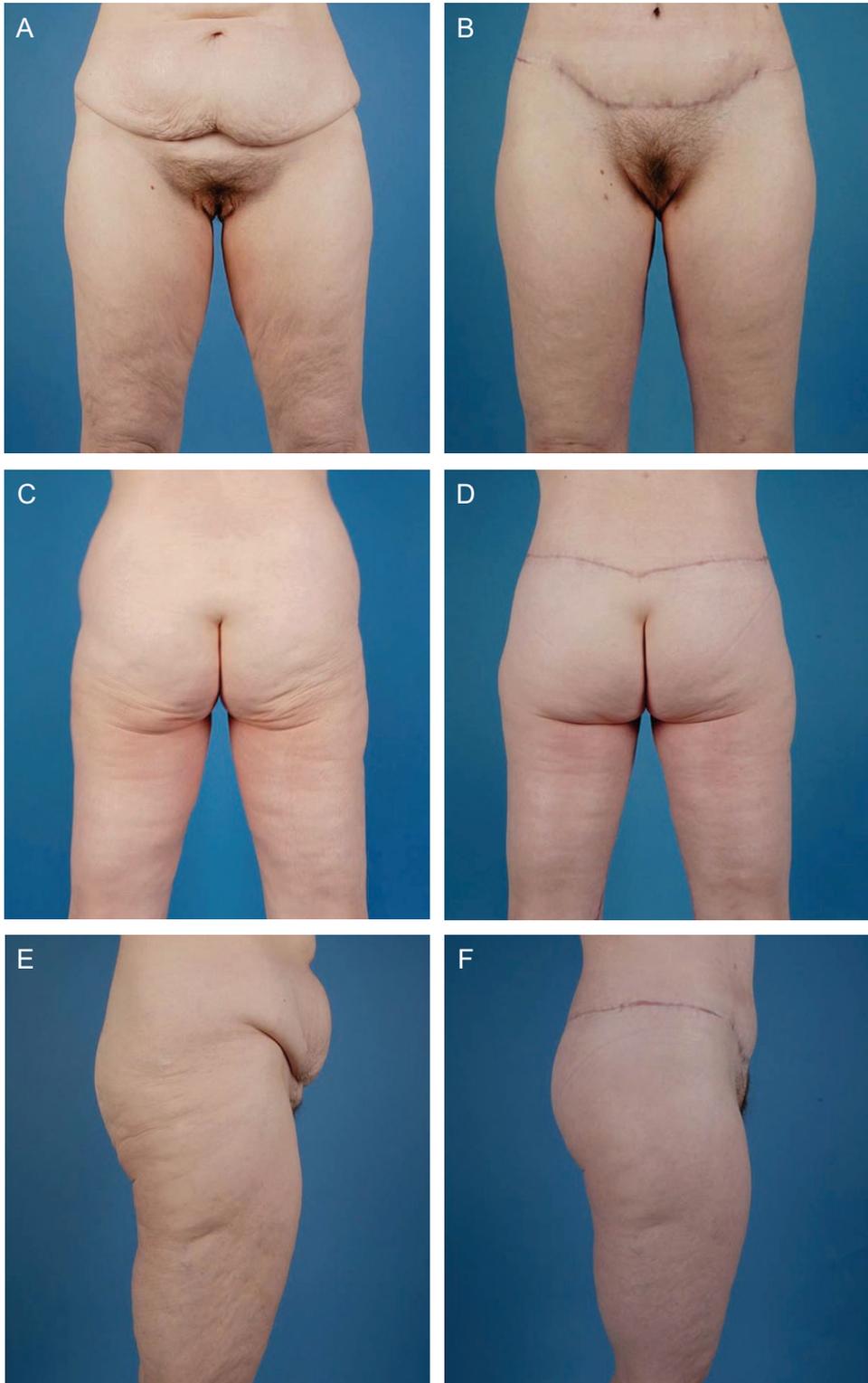
Colles' fascia.¹⁷ Final markings should include any other areas of lipodystrophy to be addressed with liposuction; of note, fat in the knee and proximal posterior-medial thigh tends to be a bit more compact and requires more aggressive liposuction than other areas. These are areas where we have seen persistent "fullness" postoperatively and if addressed aggressively may help to avoid similar results. Supplemental Figure 2 demonstrates a postoperative thighplasty without focused liposuction and areas of persistent lipodystrophy. For very deflated and in some higher BMI patients, we have occasionally marked a transverse ellipse above the knee for direct excision. Video 1 demonstrates sample preoperative markings.

The patient is positioned on the operating room table in the supine position. We have found that the use of spreader bars to hold the legs abducted allows easier access for the surgeon than the lithotomy position; this arrangement is more comfortable for the surgeon as he/she may sit between the legs with an assistant on both sides as needed. The patient should have sequential compression devices, limited to the feet, facilitating treatment of the knee and proximal calf. Patients have a foley catheter inserted and are circumferentially prepped with betadine from the waist to the feet. All pressure points should be well padded to protect the patient; an upper body forced air device helps maintain appropriate temperature.¹⁸ Figure 3 demonstrates our patient positioning.

Before incising the skin, we routinely perform liposuction in almost all cases. The only exception would be a lower BMI patient with very decompressed thighs. Liposuction helps to deflate the thigh and facilitates a nice plane of dissection.⁶ As mentioned previously, the area of the knee and proximal posterior-medial thigh should be aggressively treated with liposuction. Of note, in the past, we routinely staged liposuction of the thighs from the excision;¹² however, we have abandoned this principle because combining the 2 procedures has proven safe and efficacious.^{19,20} Furthermore, staging created unwanted

scarring in the tissue planes, which prohibited appropriate advancement of the flaps. Video 2 demonstrates liposuction in a medial thighplasty.

After liposuction, the anterior incision is made first and carried down through Scarpa's fascia into the plane above the deep fascia; the greater saphenous vein and its branches lie in this plane. To ensure lymphatic preservation, care should be taken to preserve the greater saphenous vein and its surrounding fat-containing lymphatics of the thigh.^{15,16} Often the posterior branch of the saphenous vein is ligated at its origin along with some side branches because of its proximity to the resected flap. A well-defined plane can often be identified and followed because of the initial liposuction of the deep fat compartments. The dissection is then carried to the posterior marks. Skin to be resected is then confirmed. Careful hemostasis is obtained. Excision of the skin commences distally to proximally, approximating the skin with staples. Leaving the future "resected tissue" attached proximally preserves tissue in the unlikely event that one could not close the gap created by the resected tissue. A segmental excision and closure technique assists in proper alignment and minimizes wound closure tension by preventing edema and swelling of surrounding tissue. Of note, after the tailor tacking, a burrow's triangle may need to be removed in the posterior gluteal crease to maximize contour. This resection is a simple skin excision ranging from 3 to 8 cm and is absolutely under no tension; removal of this skin helps eliminate posterior, proximal fullness in some patients. Video 3 demonstrates surgical resection. A15 French Blake drain is then placed through a separate stab incision, and the superficial fascial system is closed with interrupted braided, absorbable suture. The deep dermis is then closed with a running, absorbable barbed suture. Of note, over the years, there has been an increased use of barbed sutures in body contouring procedures for MWL patients;²¹ as such, we have incorporated this new adjunct routinely as our technique evolved. After closure, a dermal adhesive is typically



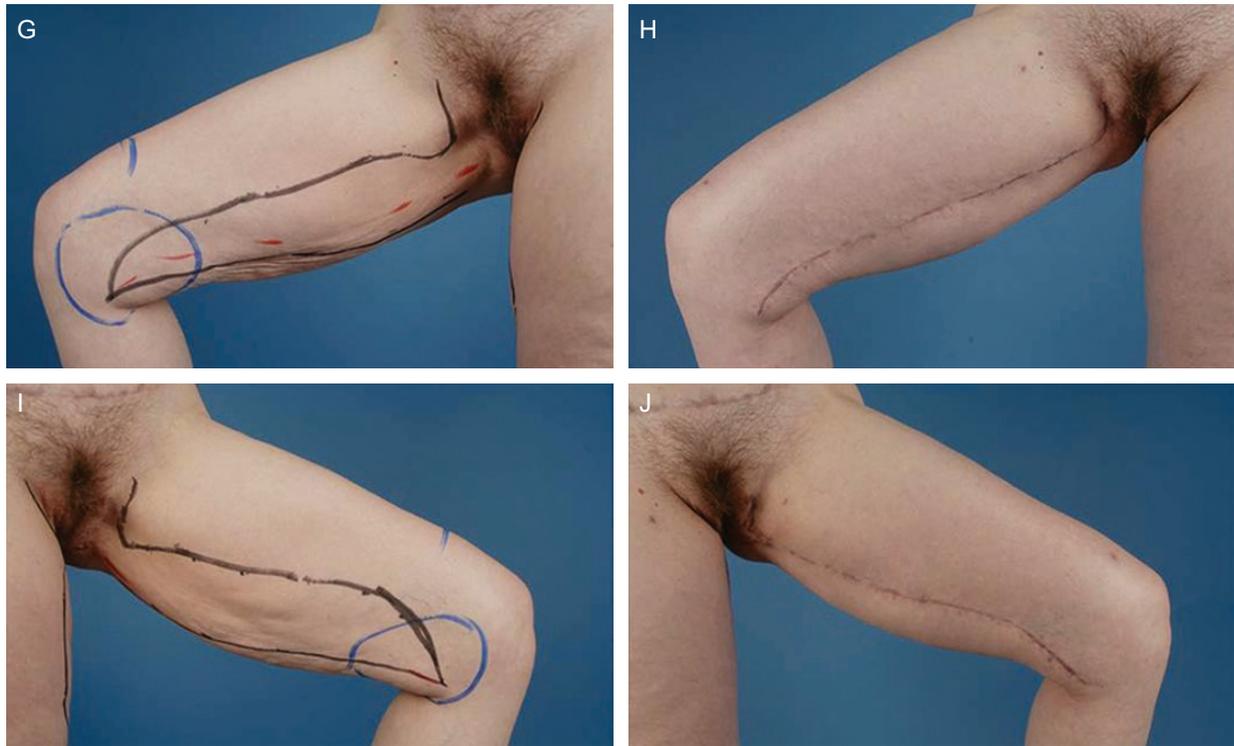


Figure 4. This 54-year-old woman had a circumferential body lift and HVF medial thighplasty with liposuction. (A, C, E, G, I) Preoperative and (B, D, F, H, J) postoperative photographs taken one year after the lower body lift and six months after a medial thighplasty.

applied to the epidermis. Video 4 demonstrates closure and dressing placement.

In the early postoperative course, we recommend compression garments for 2 to 6 weeks to assist with postoperative swelling and edema; the time course is typically limited by patient compliance. Garments must be placed cautiously to avoid any pressure ulcers or asymmetric contouring. Compression should span from the toes to the waist to prevent edema below the area of resection. The drains placed intraoperatively are removed when they drain less than 30 mL in 24 hours, typically 2 to 3 weeks. For patients with prolonged postoperative edema, we have anecdotally administered an oral diuretic (Lasix 20 mg, once daily with a potassium supplement) 2 weeks after the procedure with subjectively improved symptomatology. The medication is continued until resolution of symptoms. Of note, longer studies in a larger patient population are needed to make definitive conclusions about this application.

Our patients stay in an overnight facility for one night following the thighlift. This hotel-style facility has 24 hour nursing care, which encourages early ambulation as well as administers anticoagulation therapy, 40 U of subcutaneous Lovenox 8 hours postprocedure, when indicated.²² This facility also continually serves to educate patients on proper care techniques as well as appropriate

expectations in their recovery.²³ Recently, we have found the use of liposomal bupivacaine as well as 24 hours of intravenous acetaminophen to be very helpful in our patients' acute recovery. Anecdotally, the patients are ambulating earlier and more independently, and recent literature indicates that there may be reduced pain for patients using liposomal bupivacaine.²⁴ Figure 4 and Supplemental Figure 3 demonstrate sample pre- and postoperative patients.

Of note, some of these patients received concomitant procedures during their medial thighplasty; however, operative time was always limited to less than 5 hours.²⁵

RESULTS

In this study, 65 post-MWL patients had medial thighplasties, including 58 females and 7 males. Weight loss spanned from 75 lbs to 400 lbs. Of these patients, 26/65 (40.0%) patients had CFSF with surgery performed between 2004 and 2009, and 39/65 (60.0%) patients had HVF with surgery performed between 2009 and 2014. The average age of the CFSF cohort was 43 years old (range, 18-67 years old) and of the HVF cohort was 46.1 years old (range, 23-65 years old). The 2 groups were statistically equivocal with respect to age, gender,

Table 1. Patient Characteristics

	CFSF (<i>n</i> = 26)	HVF (<i>n</i> = 39)	<i>P</i> value
Mean age (years)	43.0 ± 11.7	46.1 ± 11.4	0.317*
Gender	Female: 24	Female: 34	0.6928*
	Male: 2	Male: 5	
Weight reduction (kg)	66.2 ± 28.7	65.4 ± 35.9	0.9399*
Mean BMI (kg/m ²)	29.3 ± 4.9	28.0 ± 5.3	0.617*
Concomitant disease: case (%)			
Diabetes	1 (3.8)	4 (10.3)	0.6404 [#]
Smoking history	5 (19.2)	5 (12.8)	0.5041 [#]
Hypertension	2 (7.6)	4 (10.3)	0.9999 [#]
Coronary artery disease	0 (0)	0 (0)	0.9999 [#]
Myocardial infarction	0 (0)	0 (0)	0.9999 [#]
Other cardiovascular disease	0 (0)	3 (7.7)	0.2688 [#]
Chronic obstructive pulmonary disease	0 (0)	0 (0)	0.9999 [#]
Other pulmonary disease	0 (0)	2 (5.1)	0.5125 [#]
Renal disease	0 (0)	1 (2.6)	0.9999 [#]
Cancer	0 (0)	2 (5.1)	0.5125 [#]
HIV/AIDS	0 (0)	0 (0)	0.9999 [#]
Deep vein thrombosis/pulmonary embolism	0 (0)	0 (0)	0.9999 [#]

CFSF, colles' fascia suture fixation; HVF, horizontal vector fixation; BMI, body mass index. **t* test *P* value, [#]Fisher's exact *P* value.

average weight reduction, BMI, smoking status, and medical comorbidities including diabetes, hypertension, coronary artery disease, other cardiovascular diseases, chronic obstructive pulmonary disease, other pulmonary diseases, renal disease, cancer, history of deep vein thrombosis or pulmonary embolism, and HIV/AIDS (Table 1).

Intraoperatively, the CFSF group and HVF group were statistically equivocal with respect to operative times (242.6 minutes vs 197.7 minutes, *P* = 0.0858) and number of concurrent procedures (76.9% vs 82.1%, *P* = 0.7535). Of those concurrent procedures, the incidence of lower body excisional surgeries was statistically equivocal as well, 46.2% (12/26) in the CFSF cohort and 59.0% (23/39) in the HVF cohort, *P* = 0.3249. Compared to the CFSF group, the HVF group had increased usage of barbed suture (92.3% vs 30.6%, *P* < 0.0001) and liposuction (71.8% vs 26.9%, *P* < 0.0001).

Postoperatively, the CFSF group had a total complication rate of 46.6% (12/26 patients), and the complication rate of the HVF group was 59.0% (23/39 patients), *P* = 0.3249. The incidence of lymphocele/

Table 2. Postoperative Complications

	CFSF	HVF	<i>P</i> value*
	Case (%)	Case (%)	
Dehiscence	4 (15.4)	7 (17.9)	0.9999
Necrosis	0 (0)	1 (2.6)	0.9999
Hematoma	2 (7.7)	3 (7.7)	0.9999
Lymphocele/seroma	9 (34.6)	4 (10.3)	0.0257
Infection	6 (23.1)	2 (5.1)	0.0510
Erythema	3 (11.5)	16 (41.0)	0.0127
No. of patients with complications	12 (46.2)	23 (59.0)	0.3249

CFSF, colles' fascia suture fixation; HVF, horizontal vector fixation. *Fisher's exact *P* value.

seroma significantly decreased in the HVF group (10.3% vs 34.6%, *P* = 0.0257). In addition, the rate of infection also decreased in the HVF group (5.1% vs 23.0%, *P* = 0.051), but the incidence of erythema increased in the HVF group (41.02% vs 11.5%, *P* = 0.0127). No statistical differences were observed between the 2 groups for dehiscence, necrosis, or hematoma. Table 2 represents the complications between both cohorts. Labial spreading and scar widening were not observed in either group.

In all patients, swelling of the calf and ankle was common for at least 6 months. Swelling persisting longer than one year has been seen in 4 of the 65 patients reviewed (6.2%), 2 in each subset.

Follow-up time ranged from 0.5 to 62 months (mean, 14.6 months). Of note, subjective evaluation by the senior author identified significant aesthetic improvement of the distal third of the thigh in the HVF group and improved patient satisfaction.

All patients will continue to be monitored long term for delayed complications.

Postoperative Complications in MWL Patients With or Without Liposuction

The incidence of lymphocele/seroma decreased, while erythema unexpectedly increased in HVF group compared to CFSF group. We further compared the incidence of complications with or without liposuction in MWL patients. Of note, these 2 groups had statistically equivocal demographics (*P* > 0.05); however, the incidence of erythema significantly increased in the group with liposuction compared to the group without (42.5% vs 8%, *P* = 0.0043). No other complications were statistically significant between the MWL patients with or without liposuction. Table 3 summarizes the complications between the 2 subgroups.

Table 3. Postoperative Complications in MWL Patients With or Without Liposuction

	Liposuction ^a (n = 40)	Nonliposuction ^b (n = 25)	P value [#]
	Case (%)	Case (%)	
Infection	4 (10)	4 (16)	0.7002
Dehiscence	7 (17.5)	4 (16)	0.9999
Erythema	17 (42.5)	2 (8)	0.0043
Necrosis	0 (0)	1 (4)	0.3846
Hematoma	3 (7.5)	1 (4)	0.9999
Lymphocele/seroma	6 (15)	7 (28)	0.2207

MWL, massive weight loss. [#]Fisher's exact P value, ^aliposuction (31 horizontal vector fixation patients and 9 Colles' fascia suture fixation patients), ^bnonliposuction (8 horizontal vector fixation patients and 17 Colles' fascia suture fixation patients).

Postoperative Complications in MWL Patients With or Without Barbed Sutures

We further compared the incidence of complications with or without barbed sutures in MWL patients. Of note, these 2 groups had statistically equivocal demographics ($P > 0.05$). There was no statistically significant difference in postoperative complications between the MWL patients with or without barbed sutures. [Table 4](#) summarizes the complications between the two subgroups.

DISCUSSION

Lockwood's superficial fascia suspension may still have a role in the non-MWL and select MWL patients but should be limited to lipodystrophy or laxity of the proximal third of the thigh. This technique does not adequately address the excessive skin laxity commonly encountered in the MWL patient of the distal two-thirds of the thigh.

This approach minimizes the horizontal wedge excision and the need for vertical lift of the soft tissues; instead, we substitute a vertical incision and horizontally oriented vectors of pull over the entire thigh length. The groin extension of the incision is reserved for superior redundancy; thus, suspension of Colles' fascia is not indicated since there is no tension at the perineal crease. Because our approach avoids the deep perineum, we hypothesized the lymphatic and venous channels would be preserved, and patients would have decreased postoperative lymphoceles/seromas while still achieving adequate thigh contour. More importantly, since there is no tension placed proximally, there is little risk for distortion of the perineal structures and scar migration. Alternative to our approach to address superior thigh laxity, Cram et al advocated directing the vertical incision posteriorly in the gluteal crease in MWL patients as opposed to anteriorly into the inguinal fold.¹¹

Table 4. Postoperative Complications in MWL Patients With or Without Barbed Sutures

	Barbed ^a (n = 44)	Nonbarbed ^b (n = 21)	P value [#]
	Case (%)	Case (%)	
Infection	4 (9.1)	4 (19)	0.4201
Dehiscence	7 (15.9)	4 (19)	0.7366
Erythema	16 (36.4)	3 (14.3)	0.0850
Necrosis	1 (2.3)	0 (0)	0.9999
Hematoma	3 (6.8)	1 (4.8)	0.9999
Lymphocele/seroma	6 (13.6)	7 (33.3)	0.0963

MWL, massive weight loss. [#]Fisher's exact P value, ^aBarbed sutures (36 horizontal vector fixation patients and 8 Colles' fascia suture fixation patients), ^bNonbarbed sutures (3 horizontal vector fixation patients and 18 Colles' fascia suture fixation patients).

This technique may avoid any potential for labial spreading, inguinal lymphatic disruption, or unsightly anterior scarring but is only possible with lithotomy positioning of the patient and results in a scar with increased tension during hip flexion. The supine, abducted position afforded in the technique described above allows excellent exposure to the affected area.

In this study, we examined 65 MWL patients and subdivided them into CFSF and HVF. With both groups being statistically equivocal in terms of demographics, comorbidities, concomitant procedures, and operative time, the HVF group had a significant increase in the use of barbed suture and liposuction intraoperatively and a significant decrease in incidence of lymphocele/seroma and infection postoperatively. Our findings reinforce our theorem: limited dissection of the perineum reduces postoperative sequelae while maintaining equivocal wound dehiscence or necrosis. Furthermore, our extended vertical excision subjectively has improved contour, most likely because of the focused dissection and transposition of the distal thigh. Of note, for broadly deflated MWL patients, we have created an additional transverse suprapatellar incision over the knee (Supplemental Figure 4) and/or extended the incision to the medial ankle ([Figure 5](#)). In our small series of this extended thighlift, we have seen a profound aesthetic improvement without increased morbidity with this dissection, but long-term, larger studies are needed to make any definitive conclusions.

An important finding in this series was the presence of concomitant procedures in both cohorts. The massive weight loss population consistently has multiple regions that require surgical intervention. Therefore, concomitant procedures are routine in these patients; surgical goals include limited opposing forces²⁶ and operative time restricted to 5 hours.²⁵ Both cohorts had a statistically equivalent incidence of concurrent operations; as such,





Figure 5. This 61-year-old woman had an abdominoplasty and HVF medial thighplasty with liposuction with an incision extending beyond the knee to the calf. (A, D, G, J, M) Preoperative, (B, E, H, K, N) preoperative with markings, and (C, F, I, L, O) postoperative photographs taken one year after the medial thighplasty and abdominoplasty.

additional operations had limited influence when comparing the 2 techniques. All interventions were within the desired time frame. Of note, any lower body procedure performed concurrently may have affected lateral thigh ptosis or lipodystrophy but had limited influence on the medial thigh surgical approach or postoperative contour.

Prolonged swelling was equivocal in both cohorts; this sequela may be related to iatrogenic damage to the main saphenous vein or a tributary. Of note, care must be taken to preserve this vasculature during the dissection to optimize outcomes. However, swelling was not debilitating or compromising to daily activities. Two patients required home sequential compression after a year to help resolve edema. As previously discussed, we have introduced Lasix into our armamentarium with subjective success. Additionally, we recommend lymphatic massage preoperatively and postoperatively to all patients. As we begin to see higher BMI patients and apply more extensive techniques below the knee and onto the calf, we may experience an increase in incidence of this complication.

We recognize the predominance of barbed sutures and liposuction in the HVF cohort may have influenced patient outcomes. As such, we aimed to study the utility of these interventions as secondary endpoints between these 2 subsets. However, as previously discussed, these adjuncts were both introduced later in the evolution of our technique; thus, liposuction and barbed sutures had limited exposure in the CFSF cohort and routine use in the HVF cohort. A comparison between these 2 surgical adjuncts in these 2 groups would be biased based on availability, but we have included a comparison of these 2 interventions to document any trends. The data in the subsets were not statistically powered to make any definitive conclusions; however, certain theorems can be elucidated. Barbed suture not only reduces intraoperative timing but also may have an impact on the morbidity of a prolonged operation.²¹ Additionally, thigh liposuction may decrease complications because debulking the thigh removes tension from the incision. Anecdotally, liposuction should increase the seroma risk because of the wetting solution and blind dissection but we see a reduced seroma/lymphocele rate in the HVF cohort presumably because of the preserved lymphatics. Of note, seromas/lymphoceles were treated in the outpatient setting with fine-needle aspiration or marsupialization. We experimented with doxycycline as a sclerosing agent but found its efficacy unpredictable.

An interesting phenomenon is the incidence of increased erythema without infection in the HVF group; we found that this sequela correlated with the use of liposuction. The liposuction cannula can cause local trauma to the tissue and subsequent overlying hyperemia, which

resolved in each situation without further complications. Additionally, the erythema may be reactionary to an increased use of barbed sutures in the HVF population, a phenomenon seen in this cohort, although not statistically significant, and other investigations.²¹

The limitations of this retrospective study are well appreciated. We understand that the assessment is a subjective interpretation of aesthetic success and inherently lacks the capability to provide a purely objective analysis. Even though patient and surgeon satisfaction were higher in the HVF cohort, these outcomes were anecdotal and limited; they lacked objective patient surveys or independent reviews of postoperative outcomes. Furthermore, we appreciate the boundaries of a single surgeon's review; however, comparing 2 techniques of a single surgeon has inherent value because of limited surgical bias. Additionally, the outcomes in this series were time dependent; the deficiencies of the CFSF technique in MWL patients fostered the evolution of the HVF approach. With time, new surgical adjuncts (liposuction and barbed sutures) and the improved technical skills of the senior author may have enhanced outcomes. Additionally, the application of oral diuretics and lymphatic massage may influence our positive results. Longer studies in a larger patient population are needed to make definitive conclusions about Colles' fascia suture fixation. Despite these limitations, there is strong evidence to promote the success of horizontal vector fixation for medial thighplasty in patients with extensive soft tissue laxity and ptosis.

CONCLUSION

Medial thighplasty in the MWL population is a challenging operation often associated with postoperative complications and underwhelming results. The addition of the vertically oriented approach creates a cylindrical vector of pull of the soft tissue with distribution of tension over the entire thigh, decreasing the complications of classic thigh lifting suspension techniques and improving the longevity of the contour improvement. Of note, the application of barbed sutures and liposuction to this procedure may help optimize results.

Supplementary Material

This article contains supplementary material located online at www.aestheticsurgeryjournal.com.

Disclosures

Dr Kenkel is a consultant for Kythera Biopharmaceuticals, an investigator for Solta Medical, and has received honoraria from Merz Aesthetics and ZO Medical. The other authors declared no potential conflicts of interest with respect to the research, authorship, and publication of this article.

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