

Body Contouring

Combination of Lipofilling With Liposuction in the Correction of Pseudo Genu Varus Deformity

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Abstract

Background: The combined use of lipofilling and liposuction has not been reported for the correction of pseudo genu varus deformity.

Objectives: The aim of this study was to evaluate the utility of combined liposuction and lipofilling for a bilateral correction of pseudo genu varus deformity based on a single-center experience over a 13-year period.

Methods: A total of 72 patients with pseudo genu varus deformity treated with combined liposuction and lipofilling were included. Data on postoperative complications, the need for additional rounds of lipofilling, and aesthetic outcomes over an average of 5 years (range, 1–9 years) were recorded.

Results: Fat harvested from the upper medial portion of the knee was sufficient for lipofilling in 12 (16.7%) patients, and additional donor sites were used in 60 (83.3%) patients. A second round of lipofilling (average, 20 mL; range, 15–50 mL) was required in 17 (23.6%) patients within 6 months to 1 year after the operation. The need for additional lipofilling or liposuction was not noted for any other patients. None of the patients developed major complications such as fat necrosis, infections, contour deformities, or medial concavities during knee flexion.

Conclusions: The current findings strongly suggest that the combined use of liposuction and lipofilling for the correction of pseudo genu varus deformity is a feasible, effective, and safe alternative that seems to offer additional benefits compared with fat grafting alone, including a fast recovery, a low risk of complications, and an increased likelihood of a long-lasting correction of the calf contour.

Level of Evidence: 4

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Genu varum is a knee deformity defined by the medial displacement of the mechanical axis of the knee joint, or location of the center of the knee joint, lateral to the mechanical axis of the lower limb.^{1,3} Vitamin D deficiency during childhood, congenital factors, calcium and phosphorus metabolism diseases, trauma, and infection are considered causes of genu varum.^{1,2}

The varus deformity causes an awkward appearance with irregularity, thinness, or curvatures in the legs, which

lead to aesthetic and psychological issues that may cause an individual to refrain from specific actions, such as wearing a skirt or swimming.^{1,3} The deformity may also lead

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to functional problems, including difficulty walking and medial knee pain, and a gradual deterioration of knee joint cartilage as a result of unequal pressure on the medial and distal compartments of the knee.^{1,2,4}

Calf reshaping via augmentation and remodeling has recently become a frequent operation for aesthetic rather than functional purposes as a greater importance has come to be placed on the attractiveness of legs. This procedure has traditionally been carried out with silicone implants, but fat grafting (lipoinjection) has become an increasingly popular alternative and is considered to be a safe and reliable, minimally invasive procedure with minimal scarring, a short recovery period, lasting and natural-looking results, and infrequent long-term complications.^{4,7}

With genu varum, concavity due to a lack of muscle and fat bulk in the lower medial portion of the knee creates a bowlegged appearance. Moreover, this bowlegged appearance becomes more apparent with a concomitant protrusion in the upper medial portion of the knee.

Hence, it seems reasonable to assume that a combined application of liposuction (to harvest fat from the protruding/thicker upper portion) and lipofilling (to reinject the fat harvested from the upper portion to the concave/thin lower portion) may offer better correction of the calf contour by reversing the conditions creating the bowlegged appearance.

Few reports have been published on fat grafting despite its multiple advantages over traditional silicone calf implants,^{4,6} and autologous calf fat grafting has been described as a viable alternative for correcting the aesthetics of pseudo varus deformity.⁶ However, the combined use of lipofilling and liposuction for correction of pseudo genu varus deformity via creating an illusionary effect and targeting the inner medial portion of the knee has not been reported in the literature.

In this study, the utility of combined liposuction and lipofilling for a bilateral correction of pseudo genu varus deformity was investigated based on a single-center experience over a 13-year period.

METHODS

Study Population

A total of 72 patients with pseudo genu varus deformity who were treated with combined liposuction and lipofilling were included in this single-center study conducted between October 2005 and December 2018. The inclusion criteria comprised patients with pseudo genu varus deformity who were admitted to the clinic for aesthetic purposes and patients with additional comorbidities (ie, congenital hip dislocation) who were treated with combined liposuction and lipofilling. Patients who were treated

only with lipofilling due to an insufficient amount of fat for liposuction were excluded from the study. The deformity in our patients was aesthetic pseudo genu varus deformity defined as being bowlegged despite subjectively normal knee joint angles and tibial alignment without a history of leg growth discrepancies.⁶ Accordingly, patients were admitted to our clinic for aesthetic purposes only, and none of them had skeletal deformity, or physical or joint complaints that would otherwise necessitate an orthopedics consultation.

The study was conducted in accordance with the ethical principles stated in the Declaration of Helsinki. Written informed consent was obtained from each subject for the operative procedures and the use of patient data for publication purposes.

Assessments

Data on postoperative complications (allergic reactions, fat necrosis, infections, contour deformities/irregularities in liposuction or lipofilling areas, medial concavities during knee flexion), the need for additional treatments of lipofilling and the aesthetic outcomes over an average of 5 years (range, 1-9 years) were recorded for each patient.

Operative Technique

The operation was performed under local anesthesia without sedation to obtain a sufficient amount of liposuction material from the upper medial knee region. The protruding (thick) and concave (thin) areas of medial knee that were to be used for liposuction and lipofilling were marked in a standing position with the knees at 90 degrees of flexion, and the areas for liposuction were marked in a sitting position to prevent the likelihood of postliposuction depression in the medial knee during flexion. Local anesthesia was applied via tumescent solution (1000 mg/L lidocaine, 0.25-1.5 mg/L epinephrine, 10 mEq/L bicarb) for liposuction and via lidocaine and epinephrine (with 1/10 saline dilution) for lipofilling. Averages of 150 mL (50-300 mL) and 20 mL (10-50 mL) solution were injected into the liposuction and lipofilling regions, respectively. Liposuction and lipofilling were performed through the same cannula, which had a diameter of 3 mm, and the cannula tip was inferiorly rotated after liposuction to apply lipofilling to different suprafascial muscular, fatty and subcutaneous layers. Following liposuction, the syringe was kept in a perpendicular position for 10 minutes to allow the water content to separate (insoluble from soluble). Afterwards, through a cannula with a smaller diameter, lipid injection to different layers was performed by positioning the cannula toward the concavity (Figure 1). Overall, the average amount of fat harvested from the knee was 50 mL (range,

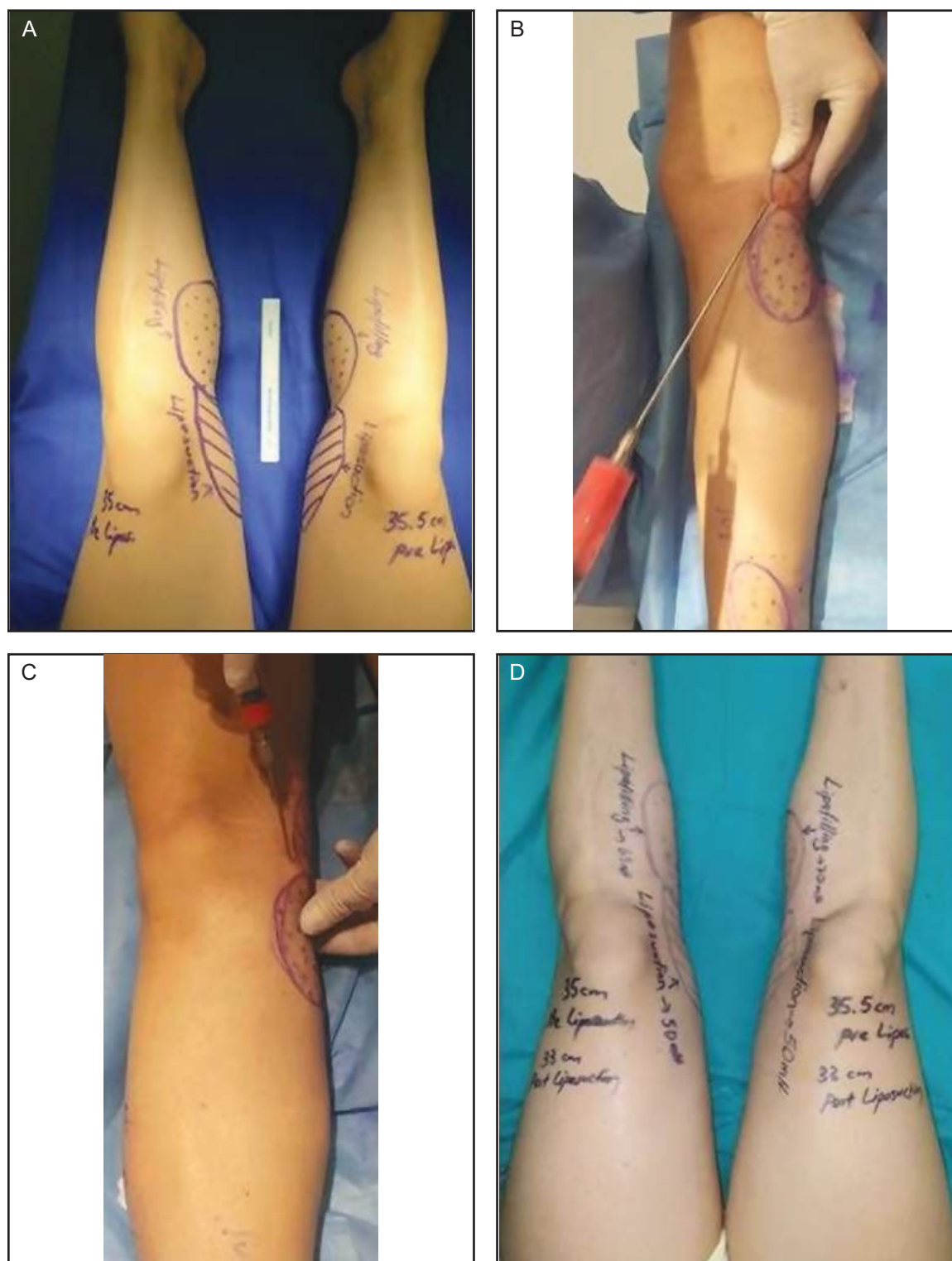


Figure 1. Technique for the combined liposuction and lipofilling operation performed in a 32-year-old female patient. (A) Preoperative marks. (B) Perioperative liposuction. (C) Perioperative lipofilling. (D) Early postoperative marks.

30-90 mL), and an average of 75 mL (range, 30-150 mL) of fat was injected; if needed, other body parts were used for liposuction. In 60 patients, an insufficient amount of

liposuction material was harvested from the knee, and other body parts were used for liposuction, including the ankle, abdomen, and waist. Patients were discharged on



Figure 2. Combined liposuction and lipofilling operation in a 25-year-old female patient. (A) Preoperative appearance of pseudo genu varus deformity. (B) Postoperative 1-year results.

the same day of operation with application of moderate pressure by a compression sleeve extending from the patients' feet to their upper knees. The compression sleeve was applied for 16 hours/day during the first 2 weeks and then removed within 4 days via an incremental reduction at a rate of 4 hours per day.

RESULTS

The mean patient age was 29 years (range, 17-45 years), and the majority of the patients (70 of 72) were females. Overall, 70 patients were admitted for aesthetic purposes with no additional problems, whereas the deformity was related to multiple operations due to congenital hip dislocation in 2 patients.

Fat harvested from the upper medial portion of the knee was sufficient for lipofilling in 12 (16.7%) patients, and additional donor sites were used in 60 (83.3%) patients. No overcorrection procedures were performed. A second round of lipofilling (average, 20 mL; range, 15-50 mL) was required in 17 (23.6%) patients within 6 months to 1 year

after the first operation. In 3 of these 17 patients (4.1%), a third round of lipofilling (average, 10 mL; range, 5-20 mL) was applied for minimal irregularities within 1 to 2 years. The need for additional lipofilling or liposuction was not noted for any other patients. One patient developed a local allergic reaction in the injection site and was successfully treated locally. None of the patients developed major complications, such as fat necrosis, infections, contour deformities, or medial concavities during knee flexion. Ecchymosis in the liposuction or lipofilling area was noted in 7 (9.7%) patients, 11 (15.2%) patients experienced mild stiffness and tenderness upon palpation in the lipofilling area that resolved without treatment within 3 weeks, and 4 (5.5%) patients experienced nonpitting edema in the ankles after excess physical activity that resolved within 5 weeks.

In all patients, the results in the liposuction and lipofilling areas were homogeneous, symmetric, and compatible with the surrounding tissues. By creating a reverse illusion, the combined procedure resulted in an additive effect that seems greater than the impact of each procedure alone (Figures 2-5).

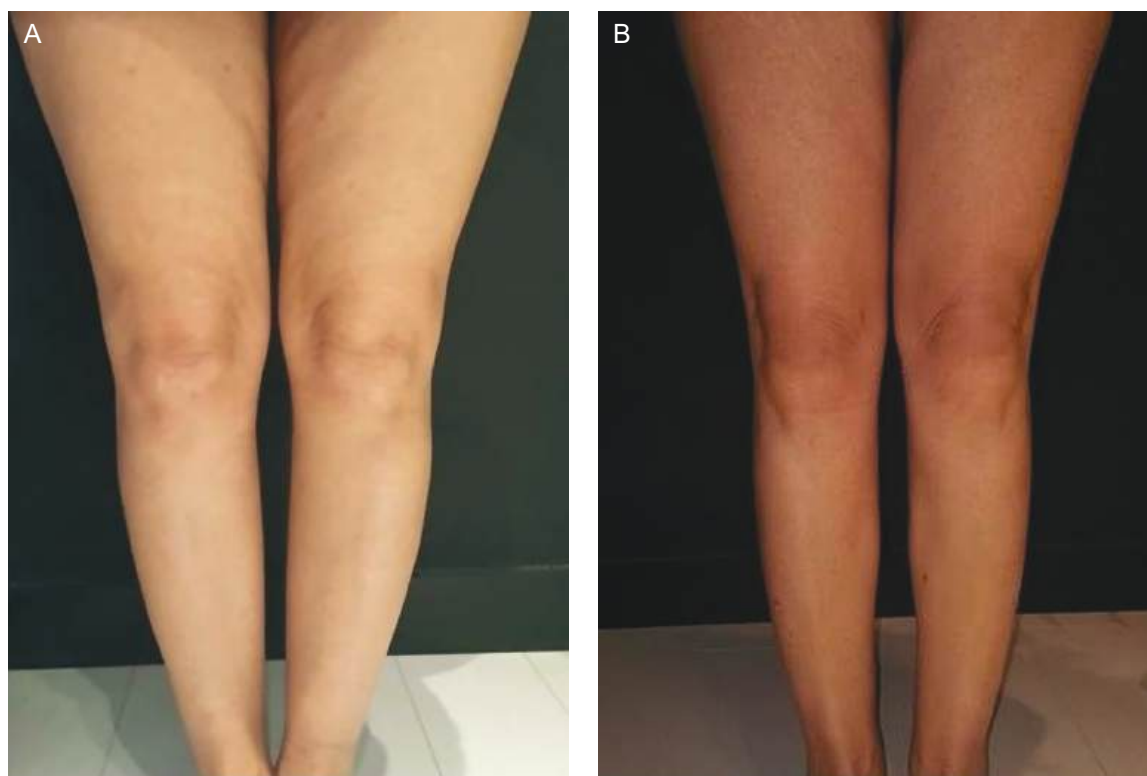


Figure 3. Combined liposuction and lipofilling operation in a 37-year-old female patient. (A) Preoperative appearance of pseudo genu varus deformity. (B) Postoperative 1-year results.

DISCUSSION

Our findings revealed that the use of combined liposuction and lipofilling in the correction of pseudo genu varus deformity was associated with a quick recovery, a low risk of complications, the ability to perform lipofilling with less fat harvested from donor sites (including the upper medial knee), a lesser need for additional injection rounds, and long-lasting improvements in calf contours by an intervention targeting thicker and thinner regions of the medial knee concomitantly.

Liposuction has been suggested as a method to visually camouflage malalignment of the knee under the assumption that the aesthetic impact of a varus or valgus knee can be decreased by concentrating liposuction toward the lipodystrophic areas on the convex side of the leg.^{8,9} Accordingly, the use of liposuction has been reported to be an easy and reproducible method to pseudocorrect the axis of the legs by slenderizing the contour of the lipodystrophic leg and optically aligning the deviations of the curved leg; this conclusion was based on a study in 83 female adult patients with 2 lipodystrophic legs and orthostatic deviations of different grades, including 46 patients with genu varum, 31 patients with genu valgum, and 6 patients with genu recurvatum.¹⁰ The author noted that liposuction resulted

in a correction of the curvature regarding the orthostatic axis of the limb by 16% in patients with genu varum, by 33% in patients with genu valgum, and by 32% in patients with genu recurvatum.¹⁰

Past studies on the utility of lipoinjection for calf augmentations revealed successful long-term (up to 8 years) aesthetic outcomes; thus, lipoinjection has been considered to offer scar-free, durable, long-lasting augmentation and improvements in calf contours with no long-term complications.⁵⁻⁷

The current findings support the efficacy of lipofilling for pseudo genu varus deformity and emphasize several potential advantages of performing lipofilling concomitantly with liposuction over lipofilling alone. A correction of both the thicker (protruding) and thinner (concave) regions of the medial knee via consecutive liposuction and lipofilling seems to more effectively improve calf contours by removing the additive impact of protrusion and a concavity that creates a bowlegged appearance.

In addition, fat grafting requires an injection of at least 120 to 150 mL of fat when applied alone,^{5,6} but the current study indicated concomitant liposuction (50 mL on average) to enable the use of smaller fat volumes (75 mL on average) in lipofilling, given the reduction in thickness of the upper medial portion of the knee. Moreover,



Figure 4. Combined liposuction and lipofilling operation in a 26-year-old female patient. (A) Preoperative appearance of pseudo genu varus deformity. (B) Postoperative 1-year results.



Figure 5. Combined liposuction and lipofilling operation in a 40-year-old female patient. (A) Preoperative appearance of pseudo genu varus deformity. (B) Postoperative 1-year results.

fat harvested from the upper medial portion of the knee was sufficient for lipofilling in 12 patients, and there was no need for extra donor sites. In addition, in those patients who required additional donor sites for liposuction, a considerable amount of fat had already been obtained via liposuction from the knee, which decreased the total amount of fat needed for lipofilling via thinning of the upper medial knee; additional fat harvesting was performed from the ankle or lateral leg, and thinning of these regions also contributed to the improvements in the calf contours.

Thickness in the upper medial knee creates a false perception that there is a marked bowlegged appearance. Hence, reversal of this condition via concomitant liposuction seems important not only for improved calf contours but also for longevity of the outcomes, considering an injection of a smaller amount of fat is associated with a higher likelihood of a long-lasting effect. Accordingly, additional rounds for lipofilling were required only once and twice in 23.6% and 4.1% of patients, respectively. Hence, concomitant liposuction for the thicker regions seems to improve correction of deformity by requiring less fat and prevent the likelihood of a thicker leg after the operation in patients with a markedly thicker upper knee treated with lipofilling only.

Accordingly, based on our findings over a 13-year clinical experience with genu varum, we strongly encourage the involvement of liposuction in fat grafting for the correction of pseudo genu varus deformities. Use of the same cannula inserted at 1 cm distal to the concavity-protrusion juncture enabled a homogeneous liposuction involving the overall protrusion field, as well as a reduced number of entry sites, and the application of liposuction and lipofilling to different layers decreased the risk of backflow. In most cases, the operation was restricted to the leg, and patients returned to normal daily activities immediately after discharge on the same day of the operation. Moreover, none of the patients developed major complications such as fat necrosis, infections, contour deformities, or medial concavities during knee flexion within an average 5 years.

A critical point of the current technique seems to be the need for careful liposuction from the inner medial knee, because when larger amounts of fat are harvested to decrease the concavity more, there is a postoperative risk for appearance of concavity just above the medial condyle during knee flexion. Accordingly, during liposuction operation, the knee should be positioned in flexion frequently to identify whether or not concavity appears in the liposuctioned area, and in cases with positive findings, liposuction should also be applied to the lateral sides to prevent this complication.

A potential limitation of the current study is the lack of data on patient satisfaction; this information would extend the knowledge achieved in the current study.

CONCLUSIONS

Our findings revealed that the combined use of liposuction and lipofilling is a feasible, effective, and safe alternative treatment for the correction of pseudo genu varus deformity. Concomitant liposuction seems to offer additional benefits compared with fat grafting alone in terms of a smaller amount of fat needed for lipofilling, the ability to use smaller donor sites for liposuction, and a lesser need for additional lipofilling rounds. Accordingly, the current findings strongly suggest the combination of liposuction and lipofilling be used for the correction of pseudo genu varus deformities; there are additional advantages to this method, including the reversal of the preoperative bowlegged appearance created by thick and thin regions, a fast recovery, a low risk of complications, and an increased likelihood long-term correction of the calf contour.

Disclosures

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