

### Commentary

# Commentary on: Single Incision Endoscope-Assisted Gastrocnemius Muscle Resection for Calf Hypertrophy: Analysis of 300 Cases

Fahd Benslimane, MD

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Endoscope-assisted gastrocnemius muscle resection for calf hypertrophy is an evolution of its total resection by direct access through 2 incisions, one of which is located in the middle of the calf.<sup>1,2</sup> The goal remains the same: to close the gap between patients' hypertrophic calves and aesthetically pleasing legs.<sup>3</sup> The original technique did not quite achieve the end goal of eliminating or at least alleviating patients' discomfort when they have their legs uncovered during outdoor and social activities. The need for a mid-calf incision is the cause of this limitation. Scars placed in such area are among the "blemishes" classed under the 5 rubrics of Strasser.<sup>4</sup> The utilization of an endoscope with a limited scar in the popliteal fossa represents a definite advance over the direct approach insofar as it avoids the mid-calf scar that may become unsightly.

## AUTHORS TECHNIQUE COMPARED WITH SELECTIVE NEUROTOMY

The authors describe their retrospective study performed on 300 consecutive cases. Calf reduction ranged from 3.0 to 8.1 cm (mean, 5.2 cm), or 8.9% to 19.8% (mean, 14.4%). They correctly state that such a result is not achievable with selective neurotomy of medial gastrocnemium and soleus.<sup>5</sup> Additionally, with selective neurotomy, bowed legs may develop secondary to the recurrence of compensatory lateral gastrocnemium muscle hypertrophy. Selective neurotomies do not target the lateral gastrocnemius because the motor nerve of its lateral head is almost impossible to identify with certainty, and the possibilities of

injuring the nerve branches of other muscles would compromise patient's safety. Therefore, it does not alter the lateral contour of the leg, which is often involved in the bow-legged appearance. The authors correctly pointed out that resection of the lateral gastrocnemius muscle can correct the convexity of the lateral leg and hence significantly improve leg malalignment, which is the first goal when performing a leg sculpture.<sup>3</sup>

## TRANSPOSITION OF SUPERO-MEDIAL HEAD COMPARED WITH MICRO FAT GRAFTING

The author's technique includes a muscular transposition of its supero-medial head to correct marked concavities inferior to the medial knee area. However, optimal control of the muscle's volume relocation medially can be difficult to evaluate: volume variations of transposed stumps are difficult to predict in the medium to long term, and the non-functional stump, although innervated, undergoes some atrophy over time due to its relative inactivity in maintaining standing posture and walking.

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Dr Benslimane is a plastic surgeon in private practice in Casablanca, Morocco.

### Corresponding Author:

Dr Fahd Benslimane, 7 rue Ahmed Annaciri Palmier Maroc, Casablanca 20100, Morocco.  
E-mail: [clinique.benslimane@gmail.com](mailto:clinique.benslimane@gmail.com)

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Asymmetries of the medial concavity of each upper leg pose the same challenge in that the difference in the amount of muscle to be transposed for each side is difficult to assess. On the other hand, in the case where the amount of transposed muscle has been deemed excessive or asymmetrical in relation to the contralateral side, an additional surgical procedure would be necessary to trim muscle excess. For all these limitations, micro fat grafting is a more versatile procedure because it makes it easier to smooth out subsequent abrupt transitions between the concavity of the upper third and the convexity of the middle third at the medial aspect of the leg. Proper execution of micro fat grafting technique allows predictable results, limiting injections to a maximum of 2 sessions. In case of overcorrection, limited micro liposuction can easily correct the excess. As in the present study, there is no impairment to leg function after fat grafting. In my personal experience of regularly injected fat in the calves including inside gastrocnemius muscles, no patient ever reported any negative mid- or long-term adverse effects apart from initial discomfort, which is easily controlled by over-the-counter painkillers such as paracetamol and or nonsteroidal anti-inflammatory drugs, with return to full sports activities after 6 to 10 weeks.

## RADIOFREQUENCY ENERGY DEVICES

The authors correctly pointed out the limitation of the utilization of radiofrequency to reduce legs' hypertrophic muscles. The mechanism of action in most published energy-based medical devices is based on the creation of thermal lesions at different depths. As a consequence, tissue necrosis secondary to targeted coagulation is replaced by fibrosis, resulting in shrinkage of subcutaneous fat and muscle. Contour deformity, possible compartment syndrome, and excessive gastrocnemius fibrosis have been described secondary to the utilization of radiofrequency energy.<sup>6</sup> Lim et al described severe equinus deformity resulting from the utilization of this technology.<sup>7</sup> This is consistent with observations in the face and neck when treated with energy-based medical devices. Facial and cervical tissue retraction can result in volumetric improvement of the neck and double chin.<sup>8</sup> However, these devices are not without risks, which has been well documented in the literature due to surface irregularities secondary to uncontrolled tissue retraction.<sup>9</sup> Facial surgeries I perform on patients in this category are a real challenge. There is a total disappearance of subcutaneous fat and a cardboard effect of the underlying muscles, all replaced by intense fibrosis, which creates an adhesion of the dermis to the underlying tissues. This interferes with the normal course of surgery and does not lead, at least in my hands, to the optimal outcome generally achieved in the category of patients who did not receive any energy-based device treatment.

## MUSCLE FUNCTION: CYBEX

The authors utilized the isokinetic (Cybex) test to measure the maximum strength of the knee joint throughout its available range of motion. The test demonstrated that total resection of the gastrocnemius muscle does not cause decreased leg function and that calf muscle power recovers within 6 months of surgery. This is consistent with the findings of Kim et al, who documented preservation of leg function after partial resection.<sup>10</sup> Such documented findings are important because functional preservation of the leg must always be an essential condition for any proposed aesthetic intervention.

Kim et al initiated endoscopic utilization for gastrocnemium muscle reduction in 2000 through a double incision, 2 cm each, located in the popliteal crease, hence avoiding mid-calf scar.<sup>10</sup> In this method, the approach to muscle resection was partial and tangential to only shave gastrocnemius "excess." This led to calf reduction ranging from 3.0 to 7.0 cm (mean 4 cm).

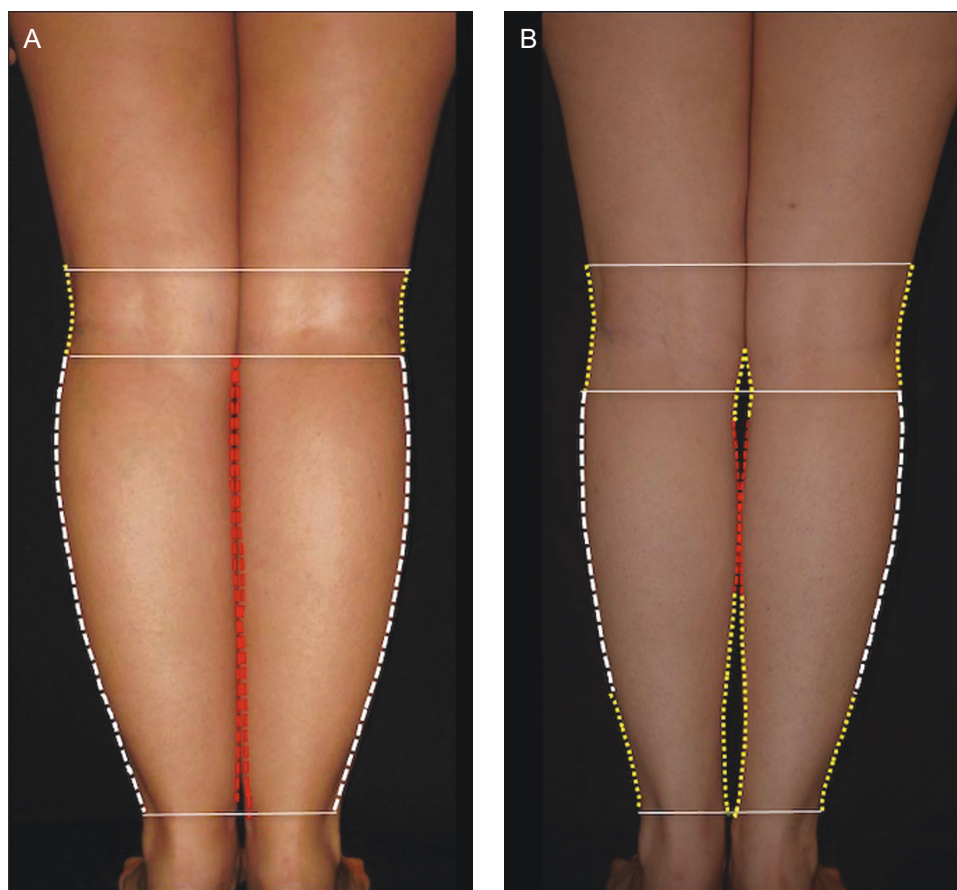
## COMPLICATIONS

The authors report no major complications and a total minor complication rate of 2%, most of which recovered spontaneously or with limited treatment. Seroma and hematoma might have been avoided employing the Auersvald hemostatic net with a 5/0 nylon on a 32- to 39-mm needle.<sup>11</sup> The quality of the results documented by preoperative and postoperative photos and total calf muscle power recovery within 6 months along with the low rate of complications may encourage patients to seek total or subtotal endoscopic muscle resection and increase awareness among surgeons to engage in proper training to master the technique.

## CONCLUDING REMARKS

According to Sir Harold Gillies, one of the most important advances in plastic surgery was the introduction of photography.<sup>12</sup> Standardization of photographs is critical to be able to compare what is comparable. Figure 3A and B on the front view have not been taken in the same photographic perspective. The preoperative photograph was taken of the patient with the legs and feet apart, whereas the postoperative photograph was taken with the patient in the joined feet position. The photographs in Figure 5A and B were taken in such a manner that the distance between the patient's feet and their orientation differ between the preoperative and the postoperative views. Photograph standardization allows to "read" the shape of the void between the upper medial legs, which stands out against a contrasted background as a negative silhouette. Leg contour changes become easier to analyze (Figure 1).

Despite the advocacy for botulinum toxins for the treatment of leg muscle hypertrophy as a simple and safe



**Figure 1.** (A) Preoperative photograph of a 31-year-old female patient who underwent a single session of liposuction to slim down her legs and create aesthetically pleasing curves according to the original artistic drawing of Benslimane.<sup>3</sup> (B) Postoperative photograph 2 years and 9 months later. Two medial concavities located on the superior and inferior limit of a smooth convexity have been created. The upper concavity is short, extending from the lower medial knee to the upper medial calf convexity, and the lower concavity is longer, stretching from the lower limit of the medial calf convexity to the medial malleolus.

technique, the procedure has limitation in efficacy and longevity.<sup>13</sup> The authors are to be congratulated for this study, which presents an evolution of the surgical technique aimed at producing a long-lasting effective outcome. I fully agree that gastrocnemius muscle resection “remains unrivaled in its ability to achieve calf muscular reduction.” Their large series of 300 patients operated in a single center shows that the technique is safe and effective when performed by a trained team. As suggested by the authors, proper training with open method first is suggested before engaging in endoscope-assisted gastrocnemius muscle resection.

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