Calf implant story here

Aesthetic and reconstructive calf surgery is rewarding for patients but seldom performed. ***Dr Igor Niechajev*** *discussses his techniques and innovations, including a calf implant inserter*

Modern western lifestyles increasingly emphasise health, fitness and beauty. Liberal clothing fashions and less-fussy outdoor living habits expose more of the body than was acceptable only a few decades ago. Legs are now seen as an asset of personal beauty and the secondary gender characteristic of women and men.

Calves are a main focal point. Their main shape is determined by the development of the soleus and gastrocnemius muscles, the length and orientation of the crural bones and distribution of subcutaneous fat.

By measuring a large number of German women, Von Szalay determined an attractive range for the largest female calf circumference to be 33–36cm. A much thicker or thinner female calf was considered to be aesthetically unattractive.

Liposuction

Liposuction on the calves is performed on two main indications: thick calves and cylindrically shaped calves without definition. Only vacuum liposuction (SAL) with either manually powered or mechanically reciprocating cannula should be employed. Ultrasound liposuction (UAL) is contraindicated because of the probability of skin burn. Most of the work is done in the subcutaneous plane, on both sides of the Achilles' tendon and on the posterior surface of the gastrocnemius muscles.

Correction

Correction of the calf contures is slowly gaining popularity, but outside Brazil, California and a few experts in Europe, it is a relatively little known operation to most surgeons. Also, genu varus deformity could be optically improved by placing calf implants medially over the gastrocnemius muscle.

Slim legs affect not only young females but also male and female athletes. They have, however, different wishes, which is important to recognise when planning the procedure. Aesthetic patients want a long gentle curve on the medial side of the calf and sometimes on the lateral side. Body builders want to correct the relative bulk discrepancy between their thighs and calves, because calf muscles sometimes have a weaker response in increasing their mass following training. They want specifically to create a well-accentuated, so-called medial peak on the medial gastrocnemius muscle and the more gently curved sweep on the lateral side of the calf.

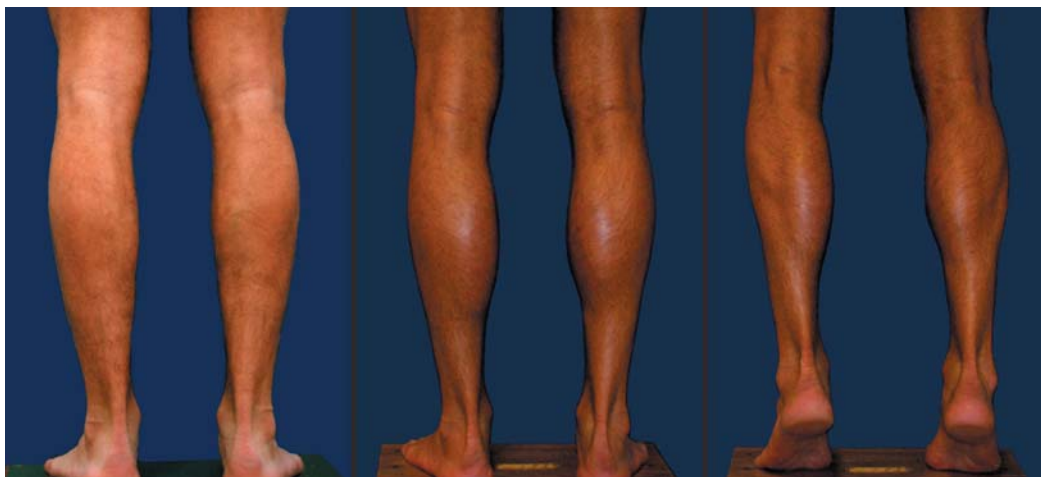
Calf implants may also be beneficial in reconstructing a shrunken lower leg from an injury, illness or birth defect. Poliomyelitis is the single most common aetiology for atrophy of the calf, followed by the muscle, Achilles' tendon, or nerve injury. Poliomyelitis has been eradicated in the western world but is still a plague in some endemic areas in Africa and south-east Asia.

Properties

Calf implants are made of either solid semi-soft silicone elastomer, which can be customised by carving, or they have a thick silicone shell filled with cohesive silicone gel. They are similar in consistency and profile to calf muscles.

Should the implant's shell break, the cohesive silicone will not run out. Solid silicone implants have an advantage of possible adjustment on the operating table by carving.

I use them often in reconstructive surgery. A mould made of clay or plaster of Paris is sometimes made on the defect and serves as a guide for the factory in the production of the customised implant. Standard calf implants are available in symmetric, cigar-like shapes and have been joined in the past



A 22-year-old male athlete was able to enlarge all other muscles in his body by training, but not the calves. Before the operation (right), centre and right, five years following augmentation of medial calf contour with 220cc anatomic implants

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A 35-year-old male with the atrophy of the muscles in his right lower leg following a 10-year-old blunt injury to the spinal cord. Operated on in three stages. Left: before reconstruction. Right: one year after enlargement of the right calf by a 220cc implant on the medial, 90cc on the lateral and 92cc on the antero-lateral side. 200cc of fat was removed during the liposuction (SAL) from the left healthy calf

few years by asymmetric (anatomic) forms, which are wider and bulkier in the upper part. Symmetric implants are suitable in most cases and asymmetric implants are sometimes used by body builders or to fulfil patients' special desires. They can, however, create disturbing bulging in the individuals with very thin legs.

Preoperative

Preoperative photographs and drawings are made with the patient standing on a podium. Several parameters are measured on the calf, the largest circumference being the most important. Incision in the lower popliteal crease, future location of the implant, and the lower borders of gastrocnemius muscles are marked. After the standard preparation, the calf is covered with the protective film Op-Site (3M). Talc-free gloves are used, which changed just before the insertion of implants.

The choice of anaesthesia is a personal preference. I prefer spinal block because of the mobility of patients during the procedure. The skin, subcutis and popliteal fascia are transsected. The popliteal fascia **over goes???** distally into the deep investing fascia of the crus. This fascia, with its attachments to the medial and lateral edge of the tibial bone, is almost circular and encases all muscle compartments in the calf.

The dissection is done bluntly using the Reynolds instrument (Padgett) in the plane between the investing fascia and the gastrocnemius muscle on the medial and, sometimes, on the lateral side of the lower leg. One or two implants are inserted depending on the deficiency.

Inserter

One of the most cumbersome sequences in calf augmentation is always the insertion of the implant and, in particular, reaching the most distal part of the pocket. My calf implant inserter, in combination with lubrication of implant and cavity with Xylocaine gel (AstraZeneca), allows for the implant to be smoothly introduced and the placing better controlled.

Wound closure is completed in layers, using a 3.0 Vicryl running suture for the fascia and subcutaneous fat because of its softness. For the skin I use 3.0 unifilament slowly resorbable Monocryl (Ethicon). I perform totally buried intracutaneous running in the mid-dermis level suture. There are no stitches left on the wound surface requiring removal. Surgical glue (Nobecutan) and the transparent polyethylene film OpSite (Smith & Nephew) further enforce the closure.

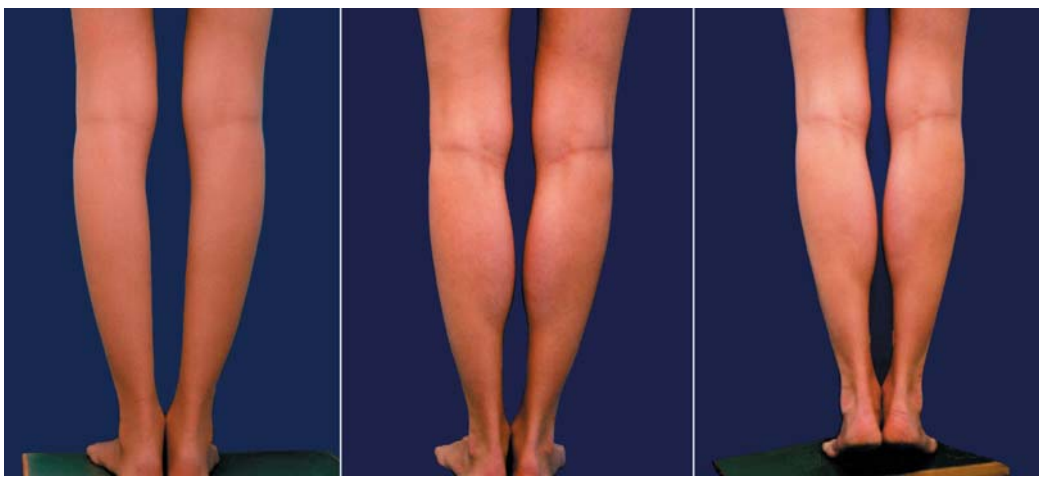
Sometimes calf augmentation is combined with semi-circumferencial liposuction above the ankles. Patients stay in bed for 12 hours with their legs elevated. They are released the next day to go home with crutches.

Standing up without assistance is achieved gradually during the next day or two. Moderate compressions are applied for one week and anti-embolic stockings an additional six weeks. Afterwards, there are no restrictions for physical activities.

Innovations

Innovations in the field of breast surgery have been applied for augmentation and reconstruction of the calves. These are the OpSite barrier for preventing contact between the implant and the skin, which eliminates the need for antibiotic cover, and liposuction, which can be used for creating aesthetically pleasing calves.

The latest innovation I have added is augmentation of the anterior tibo-fibular compartment of the calf. In a patient with post-traumatic, neurogenic muscular hypoplastia of the right calf, I performed reconstruction in three stages. After restoring the bulk of the superficial posterior compartment and liposuction of the left healthy leg for symmetry, the volume of



A tall 25-year-old female before the procedure (right) and three years after (centre and far right). Calf augmentation was made with 220cc symmetric implants placed medially, resulting in inconspicuous scars, excellent appearance and function

Far left: *calf implants filled with cohesive silicone gel. A symmetric, cigar-shaped, implant is on the left and, right, an asymmetric type, also called anatomic, with the wider upper part (Eurosilicone).* **Centre:** *Reynolds dissector (left). The length of the shaft is 25cm (Padgett Instruments). Inserter for the calf implants (right) of own design (Bröderna Persson, Lidingö, Sweden).*

the anterior tibio-fibular compartment was restored. With the guidance of a mould, a custom-made, semi-solid 92cc implant was placed under the investing **???** fascia—resituating the lost bulk of the tibialis anterior and extensor digitorum longus muscles.

My latest innovation is the flushing of the subfascial pocket with long-acting local anaesthetic ropivacaine just before the insertion of implants. I use Narop (AstraZeneca), or Chirocaine (Abbott) in 10mg/ml, diluted with normal saline 1:4, and use 25ml per site. An epidural catheter is introduced into the implant cavity, along with a Microvac drain. Additional increments, 10cc per leg, of the diluted Narop solution are given every three to six hours during the patient's stay in the clinic.

Ropivacaine shield decreased required amount of analgesic medication. **???**

My conclusions are based on more than 30 calf operations performed on 28 patients from 1991–2004. Patients operated with liposuction in this region had prolonged recovery, but the long-term results were good. Calf augmentation, or reconstruction with silicone implants filled with cohesive gel, has evolved to be effective, safe and aesthetically pleasing with few side-effects.

Patients generally felt better after their aesthetic improvement. Proper implant selection and positioning produced a natural appearance of the augmented, restored calves. ●

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