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Ultrasound guided gastrocnemius recession: A new ultra-minimally invasive surgical technique

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Introduction: Gastrocnemius equinus is defined as ankle dorsiflexion <10° with the knee extended. The equinus deformity alters foot biomechanics, predisposing to conditions such as Achilles tendinosis, flatfoot, diabetic foot ulcer, metatarsalgia, plantar fasciitis, midfoot arthritis and nerve entrapment. In children, the deformity has been associated with equinus foot, spasticity and cerebral palsy. Therefore, gastrocnemius recession has many well documented indications. We present an ultrasound guided ultra-minimally invasive technique for gastrocnemius recession.

Materials & Methods: In 22 cadavers we checked the technique was effective and safe. Then we performed gastrocnemius recession in 23 patients (25 cases), 18 males and 5 females on an outpatient regimen. Mean age was 42 years (13-61). In 11 cases the indication for the procedure was non-insertional Achilles tendinopathy. In 5 patients, the indication was gastrocnemius retraction in the presence of plantar fasciitis. US guided Achilles tenotomy, release of the paratenon or selective plantar fasciotomy were combined with gastrocnemius recession. The age range of patients with Achilles tendinopathy or plantar fasciitis was 37-51 years. In 3 patients (4 cases) the indication was equinus foot. The ages were 13, 14 and 15 years. Ultrasound guided plantar fasciotomy was performed at the same time. In 5 patients (50-61 years) the indication was metatarsalgia and forefoot overloading with no hammertoe or any other forefoot condition. All patients had at least 6 months of failed conservative management prior to surgery.

Surgical Technique: The instrument set included long needles (a 16 gauge, 1.7 mm diameter Abbocath), a V-shaped straight curette, a blunt dissector, a hook knife (Aesculap 2, 3 mm) and an ultrasound device (Alpinion ECube15) with a 10-17 MHz linear transducer and the Needle Vision Plus™ software package. The patient is placed prone, under local anesthesia plus sedation without lower limb ischemia. Recession is performed via one or two incisions (1-2-mm each) positioning the instruments beneath the sural nerve. No stitches are required, just adhesive strips and elastic bandage. Active dorsiflexion and plantar flexion of the ankle are encouraged immediately after surgery. Partial weight bearing is allowed the day of surgery, aided with crutches.

Results: In the clinical series, pain, function and ankle dorsiflexion increased significantly for every patient in the study (mean, 14°; STD 3°). VAS score improved from 7 (6-9) to 0 (0-1) and AOFAS score improved from a mean of 30 (20-40) to 93 (85-100), at 6 months. All athletes returned to their previous sports after 6 months. Superficial hematomas were common in the series and some patients developed internal hematomas (observed by ultrasound) at the areas of the tendon and muscle surrounding the recession until the third month. There were no instances of over lengthening or Achilles tendon rupture, infections, wound or nerve complications.

Discussion: Open or endoscopic gastrocnemius lengthening require epidural anesthesia, lower limb ischemia and stitches. Ultrasound guided ultra-minimally invasive gastrocnemius recession allows continuous visualization of nerves and vessels without ischemia. It can be combined with other US guided ultra-minimally invasive techniques (plantar fasciotomy, Achilles tenotomies) to ensure minimal pain with excellent outcomes and no significant morbidity.

Biography

Manuel Villanueva MD, PhD, is Medical Director of Avanfi Institute in Madrid, President of AECE (Spanish Association of Ecoguided Surgery) and Director of Unit for Ultrasound-guided surgery of Hospital Beata Maria, Madrid. Dr. Villanueva is the first Spanish orthopedic surgeon awarded by the AAOS (American Association of Orthopedic Surgeons) for surgical techniques (currently awarded in four times, including several Certificate of Merit). Author of eight surgical techniques included in the Educational Media Program of the AAOS, the most prestigious institution in the field of orthopedics and many international conferences and publications. Dr. Villanueva is the first surgeon in the world awarded by the AAOS for Ultrasound-guided ultraminimally invasive surgery. He is involved in research and teaching of these techniques and currently performs more than 20 surgical procedures guided by ultrasound.

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