Gluteus Maximus Muscle Transfer to the Insertion of the Gluteus Medius: Description of a Surgical Technique.

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Introduction

Irreparable rupture of the insertion of the gluteus medius and/or minimus or injury to the inferior gluteal nerve that provides motor innervation to these muscles, affects hip stability and negatively impacts gait. In cases of massive ruptures, as well as in complete denervation of the muscle, reinsertion into the greater trochanter (GT) is not an optimal treatment option. This article proposes the partial transfer of the upper portion of the gluteus maximus to the GT to simulate the insertion into the gluteus medius, through a conventional posterolateral approach, making it reproducible for most hip surgeons. Although this approach allows for restoration of the abductor mechanism and pain relief, it should be considered a salvage surgery due to the high probability of residual Trendelenburg gait.

Description of the Surgical Technique

Before surgery, the type of gluteus medius insufficiency should be determined by magnetic resonance imaging (MRI), which can be due to mechanical cause (evidence of edema), detachment of the gluteus medius, or neurological alteration (evidence of fatty infiltration of the muscle body).

With the patient in a supine position with hip supports and protection of bony prominences, the posterolateral Kocher-Langenbeck approach is demarcated, going straight from the posterior superior iliac spine (PSIS) to the apex of the GT. Subsequently, this line is joined to a second one originating from the GT parallel to the axis of the femoral diaphysis towards the knee, with a total length of 10-12 cm. During draping with the surgical fields, it is important to leave the limb free and have ample workspace for active-assisted maneuvers during the procedure.

A first incision is made from the PSIS towards the GT until reaching the iliotibial band (ITB) tract with the limb in extension, using the tip of the GT as an anatomical reference. The second incision is made parallel to the femoral metaphysis and diaphysis over the fascia lata until reaching the intersection with the gluteus maximus muscle. Subsequently, the degree and exact size of the flap to be taken from the upper third of the muscle are planned. With the affected area exposed and using the bald area of the GT as a reference, a central T-shaped incision is made at its distal end to relax the muscle belly and expose the GT's recipient area. At this point, the sciatic nerve must be protected, as adhesions and scar tissue are often found, without placing retractors in the subgluteal space.

A full-thickness flap from the upper third of the muscle belly is continued in the direction of the gluteus maximus muscle fibers, performing careful blunt dissection to avoid injuring the superior gluteal artery, as it will provide the major percentage of irrigation. In rotating the flap, its length must allow it to reach the footprint of the gluteus medius insertion

without excessive tension to allow proper functioning and/or avoid necrosis of the flap. Non-absorbable high-strength sutures using the Krakow technique are used to improve tensile strength during the plasty to the GT.

The GT is prepared with decortication of the bald area to eliminate any scar tissue, leaving a clean, bleeding bone bed as a footprint for muscle transfer. Tunnels are made with 3.5 mm drills in both the anterior and posterior cortex. It is recommended to make 3 anterior and 3 posterior tunnels to avoid weakening the resistance of the GT. Then, 3 high-density polyethylene sutures (FiberWire No. 2) are placed through the flap at the anterior and posterior edges. A traction suture is placed to facilitate manipulation and maintain the proper position of the transfer. The definitive polyethylene sutures are introduced into the tunnels for a total of 6 knots with cardinal points around the GT. At this time, it is important to maintain the traction force of the flap and the leg in an abduction position to avoid over-rotation of the flap. During the procedure, it is important to try to repair any hint of muscle fibers of the gluteus medius before transferring the segment of the gluteus maximus. If necessary, a second flap may be considered for reconstructing the insertion of the gluteus minimus. Dynamic maneuvers of abduction (10º to 20°) and flexion (30º to 40°) of the hip are suggested to verify tensile strength.

Then, the flap belly is closed to the vastus lateralis as reinforcement of the plasty using Ethibond No. 2 thread. Care should be taken not to close the proximal end to not compromise the rotation of the muscle flap. Finally, evaluate, according to hemostasis,

the placement of a negative pressure drainage system and start closing by layers with caution not to leave third spaces that could cause residual hematoma accumulations. The postoperative protocol includes protected walking with external assistance until the 4th week, no active abductions until the 8th week, and initiation of strengthening exercises.

Results

The case of a 60-year-old patient with a history of hip fracture is presented. As a result of multiple surgical procedures, he suffers an irreparable rupture of the insertion of the gluteus medius, manifesting severe pain and restricted function. Physical examination identified Trendelenburg gait and decreased hip abduction. Radiographs and MRI showed complete damage to the GT with absence of gluteus medius insertion. Finally, the procedure described above was performed without complications. After two years of follow-up, the patient is pain-free with 60º abduction. Although gait improved, the Trendelenburg sign persists without compromising functionality.

Discussion

The transfer of a portion of the gluteus maximus to the insertion of the gluteus medius for the restoration of hip abductor action offers pain improvement and stability during gait, especially in the context of failed repairs as a salvage option. Unlike the proposal by Inclan et al., biomechanical stability of the flap is achieved through bone tunnels and sutures in the GT without the need for anchors. Additionally, open exposure allows for dynamic maneuvers to obtain adequate tension of the muscle transfer. It is important to carry out

standardized planning to avoid possible complications such as GT fracture, residual pain due to over-tension, or Trendelenburg gait.

References

1. Nazal MR, Abraham PF, Conaway WK, et al. Endoscopic Repair of Full-Thickness Gluteus Medius and Minimus Tears—Prospective Study With a Minimum 2-Year Follow-Up. Arthroscopy: The Journal of Arthroscopic & Related Surgery. 2020;36(8):2160-2169. doi:10.1016/j.arthro.2020.04.025

2. Inclan PM, Schwabe MT, Song BM, et al. Gluteus Maximus Transfer for Hip Abductor Deficiency. Arthrosc Tech. 2023;12(5):e671-e676. doi:10.1016/j.eats.2023.01.002

3. Whiteside LA. Surgical Technique: Transfer of the Anterior Portion of the Gluteus Maximus Muscle for Abductor Deficiency of the Hip. Clin Orthop Relat Res. 2012;470(2):503-510. doi:10.1007/s11999-011-1975-y