Femoral Nerve Decompression To Restore Quadriceps Function

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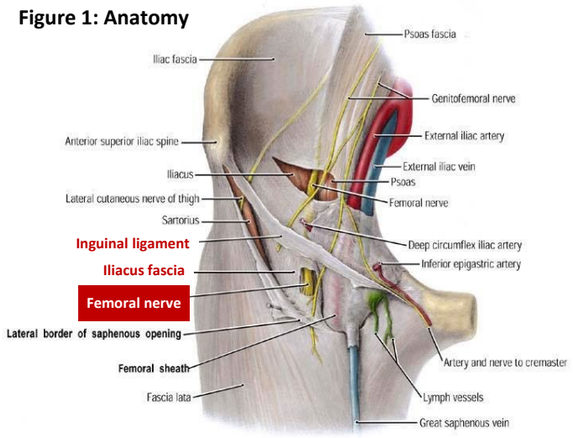
Introduction

The **femoral nerve** can become **entrapped** as it travels from its origin at the L2-L4 nerve roots beneath **the iliacus fascia** to emerge in the anterior thigh under the **inguinal ligament** (Figure 1).

Figure 1: Anatomy



While femoral nerve entrapment remains a **rare condition**, it can result in significant:

- **weakness in hip flexion and knee extension**
- **gait disturbance**
- **dysesthesias**
- **pain in the antero-medial thigh and medial leg**

The benefits of **surgical decompression** of the femoral nerve for management of femoral nerve entrapment are **under-recognized**.

Here we present a series of **3 patients** with femoral nerve entrapment who underwent decompression with **immediate improvement in motor strength**.

Methods

Surgical Technique

The patient is positioned **supine** on the operating table with the **hip in partial external rotation**. **An 8 cm longitudinal incision** is marked **just below the inguinal crease** and **lateral to the palpable femoral artery** (Figure 2). This corresponds to a point about two-thirds of the distance from the pubic tubercle to the anterior superior iliac spine (ASIS).

Decompression of the femoral nerve **requires release of three layers** of investing fascia:

1. the **superficial fascia**
2. the fascia of the **sartorius muscle** (Figure 3A)
3. the **femoral sheath** (Figure 3N)

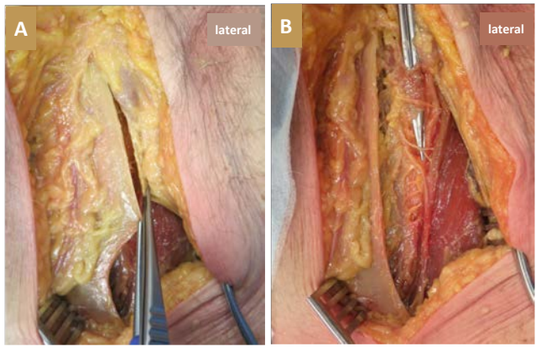
Figure 2: Incision

After incising through the superficial fascia within the subcutaneous fat, dissection continues to the **muscular fascia of the sartorius muscle**, which is **incised over the medial border** (Figure 3A). The sartorius muscle is then **retracted laterally** and its **motor nerves** can be seen entering the muscle on the **deep surface** of its medial border. These nerve branches are superficial relative to the quadriceps nerve branches.

The **femoral sheath** is then incised **overlying the femoral neurovascular bundle**, distal to the inguinal ligament and lateral to the palpable vessels (Figure 3B). The **sartorius branches** are traced proximally to the femoral nerve trunk.

Methods (cont'd)

Figure 3: A. Fascia overlying the sartorius muscle. B: Femoral sheath.



Exposure and **dissection of the femoral vessels** should be **avoided** as this may **disrupt lymphatic drainage**.

Once the femoral nerve trunk is identified, the **fascia overlying the nerve branches** is released **proximally** and **distally** along the nerve, **freeing it from any scar tissue**.

The **inguinal ligament** is identified and retracted. Complete decompression is achieved when it is possible to **guide a finger over the femoral nerve into the retroperitoneal space**. Release of the inguinal ligament is not required for a complete decompression.

The **femoral nerve branches** are then **neurolysed distally to their insertions**. They are **individually stimulated** with a **hand-held nerve stimulator** (Checkpoint Surgical, Inc. Cleveland, OH) to confirm presence of function.

Post-operatively, **weight bearing** is allowed **as tolerated**.

Results

Three patients with femoral nerve weakness underwent femoral nerve decompression with immediate improvement (within 3 days of surgery) in function post-operatively.

Case 1: 65yo F with **femoral nerve palsy following hip arthroplasty** underwent femoral nerve decompression and end-to-side obturator to femoral nerve transfers 6.5 months after injury, and had **immediate improvement (POD#1)** in quadriceps function from **MRC 2-/5 to 4/5**.

Case 2: 26yo M with **femoral nerve palsy** following a **gun shot injury** underwent femoral nerve decompression and end-to-side sartorius to femoral nerve transfers 15 months after injury, and had **immediate improvement (POD#1)** in quadriceps function from **MRC 3-/5 to 4/5.**

Case 3: A 16-year old male with **femoral nerve palsy** following **acute flaccid myelitis** underwent femoral nerve decompression and end-to-side sartorius to femoral nerve transfers 8 months after injury, and had **immediate improvement (POD#1)** in quadriceps function from **MRC 1/5 to 4/5**.

Conclusion

Femoral nerve decompression can **restore quadriceps function** in patients with femoral nerve entrapment neuropathy. The **immediate improvement of motor function** days after surgery suggests a role for decompression in **ischemic conduction block**.

Early referral to a nerve surgeon for nerve palsies is warranted.