

## Case Report

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## Femoral Neuropathy after Pelvic Surgery

Postoperative femoral neuropathy is an uncommon complication occurring after pelvic surgery. Inappropriate stretching and prolonged compression of the nerve are 2 major mechanisms of the neuropathy. Here we report 2 cases of femoral neuropathy immediately following pelvic surgery. Both cases had neither previous vascular nor peripheral nerve disease. They suffered from weakness of left hip flexion and knee extension and sensory impairment over the left lower limb after surgery. Electromyography and nerve conduction studies confirmed left femoral neuropathy. Both of the patients received physical therapy and had nearly total neurological recovery within 3 months. We report this unusual complication that followed major pelvic surgery and also review the literature and discuss the possible etiology for prevention of this injury.

### Key Words

femoral neuropathy;  
pelvis;  
postoperative complications;  
surgery

Iatrogenic femoral nerve injury is infrequent in patients undergoing pelvic surgery. It has been documented in the obstetrics/gynecology and urologic literature in association with both abdominal hysterectomy<sup>1,2</sup> and urologic abdominopelvic procedure.<sup>3,4</sup> This injury has also been reported following colorectal surgery.<sup>5,6</sup> The mechanism of nerve injury is often multifactorial; it may be related to direct compression of the nerve by surgical procedure,<sup>7</sup> central-axis anesthetic techniques,<sup>8</sup> or patients positioning,<sup>9-11</sup> and most of the cases appear to result from direct compression of the nerve with the placement of self-retaining retractors. Although most of the nerve injury is transient and nearly all of the patients had total neurological recovery without any sequelae, this complication could be eliminated completely if the anatomy and etiology of femoral neuropathy were fully understood.

### CASE REPORTS

#### Case 1

A 77-year-old thin male was a patient of rectal can-

cer. He had no smoking history. His physical fitness had been well earlier, with no underlying disease such as hypertension, diabetes mellitus, or vascular or peripheral neuropathy. He underwent abdominoperineal resection for a rectal adenocarcinoma. During the operation, he was placed in a lithotomy position with his legs resting on knee supports. Duration of the surgery was 4.5 hours and operation course was smooth. Unfortunately, the patient developed left thigh numbness and left lower leg weakness within several hours of discontinuation of anesthesia. Physical examination revealed decreased pinprick and light touch sensation over the medial aspect of the left thigh. Manual muscle testing showed decreased muscle power to 4/5 over the left hip flexors and 4<sup>+</sup>/5 over the left knee extensors. Electrodiagnostic testing was first performed 3 weeks after surgery. Nerve conduction velocity study (NCV) of medial femoral cutaneous nerve showed reduction of sensory action potential amplitude on the left side. Needle electromyography (EMG) showed several positive sharp waves and fibrillations, with increased polyphasic potentials on the left

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vastus medialis and iliopsoas muscles. The patient received aggressive physiotherapy including muscle strengthening exercise and ambulation training. Three months after surgery, neurological examination showed slight decrease of pinprick sensation on the left medial thigh. The muscle power of the left hip flexors and knee extensors were normal. Follow-up EMG showed increase of large-amplitude, long-duration polyphasic potentials over the left vastus medialis and iliopsoas. There was no electrodiagnostic evidence of active denervation. The patient could walk with normal gait except for complaint of mild paresthesia over the left thigh.

## Case 2

A 33-year-old male was a case of familial adenomatous polyposis with malignant transformation. He had no smoking history and no underlying comorbidity. He underwent subtotal colectomy with ileorectal anastomosis. Total operation time was approximately 5 hours. Postoperatively, he complained of left thigh numbness and left leg weakness. Neurological examination showed decreased pinprick sensation over the medial aspect of the left thigh and knee. Manual muscle testing revealed decreased muscle power to 3<sup>+</sup>/5 on left hip flexors and 4<sup>+</sup>/5 on knee extensors. Two weeks after operation, NCV study showed absent response to stimulation on the left medial femoral cutaneous nerve. Needle EMG revealed reduced maximal motor unit recruitments over the left vastus medialis and iliopsoas muscles. There was no evidence of active denervation. He started physical therapy immediately after diagnosis and had muscle power recovered within 1 month after injury. Follow-up EMG was not performed due to good clinical recovery. The patient had neurological function totally recovered 3 months after operation.

## DISCUSSION

The femoral nerve,<sup>12</sup> the largest branch of the lumbar plexus, is derived from the dorsal branches of the second to fourth lumbar ventral rami. It descends obliquely behind the psoas major muscle, and then passes in the groove between psoas and iliacus, then deep to the iliacus fascia from where it descends into the thigh be-

neath the inguinal ligament. The motor branches of the femoral nerve innervate to the quadriceps femoris, pectineus and sartorius, whereas the sensory branches supply to the anterior and medial aspect of the thigh. The nerve receives its blood supply directly from the iliolumbar artery in the pelvis; the extrapelvic portion of the femoral nerve is supplied from lateral and deep circumflex iliac arteries. In anatomic studies, the right side of the deep circumflex iliac artery gives many more branches to the nerve than does the left, which is why there is more risk of left-side nerve injuries than right-side if a susceptibility of the nerve injury caused by ischemia has been inferred.

The pathophysiology of nerve injury is often multifactorial. This injury is most often attributed to the use of a self-retaining retractor directly compressing the nerve against the pelvic sidewall in the region of the psoas muscle near the inguinal ligament.<sup>3-5,7</sup> It is particularly likely to occur in slender patients, in whom the retractor blades may extend beyond the abdominal fat and rectus muscles, and impinge upon the psoas muscles.<sup>4</sup> The injury may also result from the patients being in the unphysiological lithotomy position, resulting in exaggerated abduction and external rotation at the hip, leading to kinking and twisting of the femoral nerve beneath the tough inguinal ligament and thus producing ischemia of the nerve trunk followed by loss of function.<sup>9-11</sup> Kell and colleagues<sup>13</sup> described a patient suffering from femoral nerve neuropraxia after abdominoperineal resection. They first pointed out that direct compressing of femoral nerve at the level of the inguinal ligament may result in compression injury of the nerve against the posterior pubic ramus. Tracing back to our surgical procedure, we sometimes put a folded towel under the ring of the Bookwalter<sup>TM</sup> retractor, making it slightly tilt to exposing operation field, and this may caused direct compression of femoral nerve at the level of the inguinal ligament and result in subsequent femoral nerve injury.

Comorbid conditions and smoking history may predispose patients to nerve injuries. Patients with previous peripheral neuropathies, diabetes, or alcohol abuse are likely to aggravate it in postoperative neuropathy. Prolonged lithotomy position and thin body habitus have also been proposed as contributing factors in this injury. It was reported that the frequency of neuropathy increased mark-

edly after 2 hours of lithotomy positioning.<sup>10</sup>

The clinical symptoms of femoral neuropathy are weakness of ipsilateral hip flexion, knee extension, and numbness over the anteromedial aspect of the thigh as well as hyperesthesia and pain. The classic presentation of femoral neuropathy is the patient falling from bed when ambulation is attempted postoperatively. Diagnosis is made by physical and neurological examination and should be confirmed by electromyographic studies. Electrodiagnostic testing performed 3 weeks after injury is invaluable in diagnosing, locating the injury, and assessing the severity of the lesion.<sup>14</sup> Recently, high-resolution sonography has shown high accuracy for localization, extent and the cause of peripheral nerve lesions by direct visualization of the nerve and surrounding tissues.<sup>15</sup>

Treatment needs aggressive physiotherapy immediately after diagnosis to prevent muscle atrophy and decrease the risk of thromboembolic complications associated with prolonged bed rest. Adequate pain control with nonnarcotic agents is also suggested.<sup>4</sup> Prognosis is generally regarded as good. Almost all patients had neurological full recovery; permanent deficiency more commonly consisted of paresthesia or numbness.<sup>1,5,7</sup>

In conclusion, postoperative femoral neuropathy is an uncommon complication associated with abdominal surgery. All surgeons who perform pelvic surgery should be aware of this potential morbidity. Careful checking of the position of the retractor and palpation of the femoral pulsation after retractor placement, appropriate patient positioning by limiting exaggerated abduction and external rotation of the lower extremity in the lithotomy position, and prevention of direct compression over the inguinal area during operation may eliminate the risk of this complication.

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