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□ Case Report □

Sciatic neuropathy following robot-assisted laparoscopic myomectomy under lithotomy position

— A case report —

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Sciatic neuropathy is a rare complication of gynecologic procedures with lithotomy position. Anesthesiologists should be aware of the possible causes and take extreme care to prevent nerve injuries. We report a case of postoperative sciatic neuropathy after a robot-assisted laparoscopic myomectomy, despite following recommended guidelines regarding appropriate positioning. Compressive neuropathy following a prolonged operation should be considered. **(Korean J Anesthesiol 2009; 57: 113～6)**

Key Words: Complication, Neuropathy, Robotic surgery, Sciatic nerve.

Postoperative sciatic neuropathies are rarely reported following non-orthopedic surgery. According to the previous report, the incidence of sciatic nerve injury during abdominal procedures is approximately 0.05% [1]. The mechanism of perioperative neuropathies is multi-etiological, although improper positioning is often a potential cause. An accurate neurological evaluation is needed to localize the site of the lesion.

We present a case of postoperative sciatic neuropathy after prolonged and complicated robot-assisted laparoscopic myomectomy and review relevant literatures on the cause, prevention, and management of this condition.

CASE REPORT

A 45-year-old, 158 cm, 48 kg nulligravid woman with symptomatic multiple uterine myomas was underwent a robot-assisted laparoscopic myomectomy (da Vinci® Surgical System; Intuitive Surgical, Sunnyvale, CA, USA). Preoperative investigations were unremarkable, with the exception of a history of ultrasound-directed transvaginal myolysis. She strongly desired uterine conservation and was offered a minimally invasive surgical option using the da Vinci® Surgical System.

After premedication with intramuscular 2 mg midazolam, anesthesia was induced with intravenous propofol 100 mg, alfentanil 500 μg, and vecuronium 6 mg. Standard monitoring was applied throughout the procedure. Anesthesia was maintained with a continuous infusions with an effective-site concentration of 2－5 μg/kg propofol and 0.4 μg/kg/min alfentanil with 50% oxygen in air. Vecuronium was administered as a bolus when needed. The tidal volume and respiratory rate were adjusted to maintain an end-expiratory carbon dioxide tension of 32－42 mmHg and an airway pressure of 15－20 cmH_2O. The patient was placed in the low dorsal lithotomy position with a boot support leg holder. Both hips were flexed and abducted of 30° with little external rotation of the legs. Her arms were padded and tucked at their sides. The shoulder braces were placed over both shoulders to prevent cephalad sliding during Trendelenburg position. Sufficient foam padding was applied around the pressure points. After creating pneumoperitoneum, three trocars for the da Vinci® Surgical System and one for the laparoscopic instruments were placed. Then, the patient was tilted in a 35° Trendelenburg position during surgery. The pneumoperitoneum pressure was kept at ＜15 mmHg throughout the procedure. The surgery was difficult owing to adhesions in the pelvic cavity and the scarring between the large

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bowel and entire uterine body. Extensive electrosurgical dissection was necessary to remove the myomas, and the operation lasted 430 min. The total blood loss was 1,200 ml and she was transfused with two units of packed red cells. The immediate postoperative course was uneventful. On awakening, her physical examination was normal and she was taken to a general ward.

Three hours later, she complained of pain and tenderness below her right knee with decreased sensation over the dorsum of the right foot. She also complained of numbness in the anterolateral aspect of the right lower leg. A progressive increase in allodynia, pinprick hyperalgesia, and a mild weakness in elevating the foot were observed on day 2. A neurological examination revealed weakness of the muscles innervated by the peroneal nerve, inability to walk on the right heel, allodynic paresthesia on the lateral aspect of the right calf and foot, and a negative straight leg raising sign. The dorsalis pedis and posterior tibial artery pulses were intact bilaterally. Other physical examinations, laboratory findings, and ultrasound findings for abdomen and pelvic cavity were normal. No electrophysiological evidence of peripheral neuropathy was detected. The initial neurology opinion agreed that the findings were clinically consistent with right peroneal nerve involvement. She was managed conservatively, and treated pharmacologically with intravenous dexamethasone 5 mg every 12 hours, intravenous pethidine 25 mg as needed, oral amitriptyline 10 mg once a day, oral tramadol 37.5 mg/acetaminophen 325 mg every 8 hours, oral celecoxib 200 mg once a day, and bed rest. However, she showed little response.

Two weeks after the initial evaluation, the neurologist reassessed the patient. Physical examination showed moderate atrophy, weakness, and allodynic paresthesia of the right leg. The nerve conduction study and electromyography (EMG) showed signs of denervation, such as fibrillations, a positive sharp wave, and the absence of compound motor action potentials in the short head of the biceps femoris, tibialis anterior, medial gastrocnemius, and peroneus longus muscles on the right. A diagnosis of a right sciatic neuropathy at or above the level of innervation to the biceps femoris muscle, in which the predominant damage was to the peroneal division, was made. She was fitted with a foot drop brace and instructed in a physiotherapy program. In addition, she was prescribed oral gabapentin 300 mg every 8 hours, and oral vitamin B complex (BEECOM®, Yuhan, Korea) 1 tablet once a day. The leg pain and weakness resolved slowly beginning 3 weeks after surgery. Two months after injury, the dosage of oral gabapentin was tapered without recrudescence of the patient's pain. At 118 days after surgery, she was discharged from the hospital, when she gradually became ambulatory without assistance. However, a bothersome paresthesia remained and she refused the outpatient follow-up.

DISCUSSION

Robot-assisted surgery has increased rapidly since the Food and Drug Administration approved the da Vinci® Surgical System for gynecologic surgery in 2005. The gynecologic literature contains reports on robot-assisted laparoscopic surgery for myomectomy, hysterectomy, and tubal reanastmosis [2]. This robot system translates the surgeon's hand movements from a remote console to robotically manipulate "wrist-like" instruments in the surgical field. It provides excellent visualization of the operative field and intuitive movement of instruments, especially enhancing the ability to preserve the neurovascular bundle in case of radical prostatectomy [3]. Although robotic surgery has significantly greatly improved instrument precision, dexterity, and imaging, some limitations including longer operation time and high costs still exist [2]. In the recent retrospective study, robotic-assisted laparoscopic myomectomy required a significant longer surgical time compared to standard laparoscopic myomectomy due to assembly and disassembly of the robot and instrumentation for the robotic arm [4]. Especially, this case was the first experience of robotic myomectomy of our surgical team and it mainly attributed prolongation of the operation time.

A prolonged pneumoperitoneum with Trendelenburg lithotomy position is associated with decreased pulmonary compliance, hypercapnia, atelectasis, pneumomediastinum, subcutaneous emphysema, pharyngeal swelling, cerebral venous pressure elevation, and compressive neuropathy [5]. Neurological complications following laparoscopic intra-abdominal procedures are rare, and the palsy is usually transient. Generally, most cases of peripheral nerve injury are caused by excessive compression or nerve traction. During surgery, the major causes of nerve injuries are positioning a patient with inadequate padding or placing a patient in an incorrect leg position [6]. In addition, a thin body, obesity, history of smoking, diabetes, and prolonged time in the lithotomy position are predisposing factors [7]. In a previous prospective study of lower extremity neuropathies in 991 patients undergoing general anesthesia, pro-

longed positioning in the lithotomy position, especially for more than 2 h, was a major risk factor in lower extremity neuropathy, regardless of lithotomy type (low, standard, or high), careful padding, and moving the patient during the procedure [6]. Furthermore, the peripheral nerves of very thin patients may be more exposed to compression or trauma owing to the reduction in the protective padding over the nerve.

The sciatic nerve exits the pelvis through the greater sciatic foramen between the bony pelvis and sacrotuberous and sacrospinal ligaments. In the sciatic notch, the sciatic nerve can be injured easily by entrapment or compression of the surrounding structures [8]. The main trunk of the sciatic nerve travels down the posterior compartment of the thigh, where it divides into the common peroneal and tibial nerves just above the knee. The medial trunk, or the tibial nerve, innervates the calf muscles. The lateral trunk, or the common peroneal nerve, innervates the extensor muscles of the ankle and abductor muscles of the foot. It passes superficially lateral to the fibular head and is therefore more liable to damage from trauma over this area than the tibial division [1,9]. Electromyography has been reported to be useful in the differential diagnosis 2－3 weeks after an injury. It also helps to determine the prognosis [10].

Few studies have examined sciatic nerve injury after gynecologic procedures. Batres and Barclay reported transient sciatic nerve injures in two women: one who spent 55 min in the semi-lithotomy position during a diagnostic laparoscopy and the other who spent 85 min in the same position during an exploratory laparotomy [9]. Both injuries were suspected to have resulted from excessive external rotation of the hip joints in vulnerable patients [9].

In the case described here, the sciatic neuropathy was probably caused by a combination of lithotomy position, prolonged operation time due to multiple myomas, extensive intrapelvic adhesions and inexperience with robotic surgery of the surgical team, and a very thin body. The preoperative assessment should have been a clue to a potential nerve compression, prompting a consideration of conversion to open procedure.

According to the literature, the sciatic nerve injury at the buttock or thigh level may recover spontaneously within 9 to 12 months after the injury [11]. The prognosis depends on the amount of pressure and duration of compression [10]. Treatment goals are the restoration of strength, pharmacological pain control, and regular physiotherapy with range-of-motion exercises [11].

In conclusion, surgeons and anesthesiologists need to be aware of this complication, especially for long operations in the lithotomy position. Prevention is achieved by identifying high risk patients for nerve injury through careful preanesthesia history, physical examination, and informed consent. A reduction of time in the lithotomy position may be particularly important for patients with risk factors. We also want to highlight the importance of meticulous patient positioning with careful padding and regular repositioning. In addition, surgeons should reevaluate of risk and benefit of the surgical technique with respect to this neuropathy. As a novel, minimal invasive technique becomes more popular, the anesthesiologists may potentially be confronted with some of the complications. In a prolonged and complicated procedure we can expect preoperatively, open conventional operation can be more appropriate than robotic surgery.

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