

Tethered cord syndrome discovered in preoperative examination

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Abstract

We present an instructive case of a 47-year-old female patient with tethered cord syndrome, discovered before arthroscopy was to be performed under routine spinal anesthesia for right knee arthritis. The patient had no symptoms except for right knee-joint pain, but weakness in the left dorsiflexors and decreased range of motion in the left ankle and toe joints were found on preoperative physical examination. In addition, clawfoot deformity was discovered in the left foot. A small stigma was observed on the skin in the sacral region. A magnetic resonance imaging scan showed the spinal cord tethered to an intrathecal mass in the sacral region. Therefore, we avoided spinal anesthesia. The arthroscopy proceeded uneventfully with the patient under general anesthesia.

Key words Tethered cord syndrome · Dysraphism · Physical examination · Spinal anesthesia · Epidural anesthesia

Introduction

We experienced a patient with tethered cord syndrome (TCS) that was discovered in a preoperative examination for arthroscopy. TCS refers to a condition in which the lower spinal cord is longitudinally restricted and abnormally stretched. It rarely has a symptomatic onset in adult patients. Therefore, TCS is often overlooked and can cause neurological complications after spinal and/or epidural anesthesia [1–6]. Although the present patient had no subjective symptoms, TCS was found on preoperative examination.

Case report

Arthroscopy to be performed under spinal anesthesia was scheduled for a 47-year-old woman with right knee

arthritis. On preoperative neurological examination, although the patient had no subjective symptoms, weakness in the dorsiflexors and decreased range of motion in the left ankle and toe joints was found. Manual muscle testing on the left side showed grade 3, although the result on the right side was grade 4. Dorsal flexion of the left ankle was -10° while it was $+10^\circ$ on the right side. In addition, clawfoot deformity was observed in the left foot (Fig. 1).

A small stigma was observed on the skin in the sacral region (Fig. 2). Thus, a latent lower spinal disease was suspected. A magnetic resonance imaging (MRI) scan (Fig. 3) revealed the spinal cord tethered to a mass in the sacral canal. The lower end of the mass communicated to a skin dimple, and it continued to the small lump seen on the skin.

The patient had no history of systemic illness, and no abnormalities on preoperative blood examination or chest radiographs. Arthroscopy was performed uneventfully with the patient under general anesthesia, induced with 5 mg midazolam and 0.1 mg fentanyl, and maintained with sevoflurane 1%–3% after laryngeal mask insertion. No neurological change was observed after the arthroscopy.

Discussion

We present a patient with TCS discovered in a preoperative examination conducted for knee arthroscopy. TCS is often associated with dysraphism caused by a tumor or cyst, or with scar tissue resulting from surgical closure of the spine. The most common signs of TCS include loss of function in the legs and/or loss of bowel or bladder control. Lumbosacral cutaneous signs are also good clues to suggest the presence of this syndrome. In adults, however, the exact incidence of TCS is unknown, and it often goes undetected because of poor clinical manifestations [7].

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Received: July 10, 2006 / Accepted: December 6, 2006



Fig. 1. Clawfoot deformity was found in the left foot



Fig. 2. A small fatty lump and a stigma were observed on the skin in the sacral region. However, no abnormality was found in the lumbar area

There are some case reports of TCS being overlooked and causing some complications [1–6]. Although there is a report that TCS was discovered on preoperative examination, the patient had an obvious hairy dimple and a lipoma in the lumbar sacral region [8]. Spinal or epidural anesthesia was performed uneventfully in patients diagnosed with or strongly suspected to have TCS [8–10], including the patient, noted above [8]. Shima et al. [8] commented that spinal and /or epidural anesthesia might be possible for patients with spina bifida with the help of technological advances in imaging; they reported that spinal anesthesia was safely performed in a patient with spina bifida in whom exact anatomical findings were shown by MRI scan. However, there was a case report of a patient with spina bifida occulta in whom hematoma was caused by spinal anesthesia performed below the tethered portion of the cord [3]. In addition, there is a case report of the appearance of muscle weakness and paresthesia after epidural anes-



Fig. 3. Magnetic resonance imaging (MRI) scan shows the spinal cord tethered to a mass, which continued to the lump on the skin

thesia was attempted below the tethered portion of the cord in a patient with TCS [6]. In a patient with tethered cord, even if direct cord injury can be avoided, the injection of an anesthetic agent may increase the subarachnoid pressure and cause structural changes leading indirectly to spinal cord damage. Martin et al. [11] reported a case in which the patient complained of low back pain, which was found to have been caused by an intraspinal tumor, after two separate epidural anesthesia routines had been performed. In addition, if there is dysraphism, epidural anesthesia is difficult and may easily cause dural puncture [12,13]. Therefore, local anesthesia in the lumbosacral region should be avoided in patients with spinal tumor, dysraphism, and /or TCS.

Our patient had no subjective symptoms in the legs, except for arthritic pain in the right knee joint, although weakness of the dorsiflexors and decreased range of motion of the left ankle and toe joints was shown on preoperative examination. On the preoperative physical examination, apart from the muscle weakness found on the left side, clawfoot deformity in the left foot, was noted and a small stigma was seen on the sacral skin. Therefore, latent lower spinal abnormality was suspected and an MRI scan was performed.

Physical examination can evaluate muscle weakness and/or atrophy, in addition to showing small deformities. Evaluation by MRI scan is useful for diagnosis. Although the patient did not complain of any symptoms, the spinal cord tethered to an intradural lipoma was discovered on MRI before surgery.

Patients with TCS sometimes have no symptoms, including lack of skin stigma. Surgery for TCS is beneficial in both adults and children, and, as the success depends on early diagnosis and complete untethering of the spinal cord, it seems reasonable to recommend early surgical treatment for both symptomatic and asymptomatic adults [7,14].

MRI scanning is an expensive tool for a routine preoperative examination. In a patient without physical signs or symptoms, therefore, TCS is very difficult to find. In our patient, if the muscle weakness and some small deformities had been overlooked, spinal anaesthesia might have been performed. If neurological symptoms appear after surgery, we have to start treatment, taking into account the possibility of TCS. In order to avoid such complications, anaesthesiologists should perform intensive neurological examinations and carefully scrutinize patients, especially those who are to undergo spinal and/or epidural anaesthesia.

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