Upsala J Med Sci 108: 221–228, 2003

Gait characteristics of sciatic nerve palsy – A report of four cases

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ABSTRACT

There are few reports concerning the gait characteristics of sciatic nerve palsy. Four cases, one with complete palsy and three with incomplete palsy, are presented. Complete palsy (case 1) was due to sacrifice of the sciatic nerve in a wide excision for chondrosarcoma in the left ischium. Incomplete palsy (cases 2, 3, and 4) was due to contusion incurred in traffic accidents. It is noteworthy that all four patients could walk with or without a short-leg brace. But the patients with complete loss of proprioception distal to the ankle (cases 1 and 2) had to watch their steps while walking to maintain their walking balance. This clinical analysis revealed that proprioceptive impairment of the sciatic nerve caused a walking disability even though the palsy was incomplete.

INTRODUCTION

Sciatic nerve palsy is not an unusual injury nor a rare complication of surgery. Injury at the buttock level is often caused by injection and that at the thigh-level is usually secondary to one of four main causes: 1) gunshot wound, 2) femur fracture, 3) laceration, or 4) contusion [7]. As a complication of surgery, total hip arthroplasty and soft tissue malignancy involving the sciatic nerve are representative. For patients with a malignant tumour who present with neurological deficits amputation is indicated [8, 10], but recently limb-sparing surgery may be considered for the treatment of soft tissue sarcoma even when resection of a major neurovascular bundle is necessary to achieve a satisfactory surgical margin [3, 4, 5]. For both complete and incomplete nerve palsy, the clinical natural course and gait characteristics remain uncertain. We can find only two reports that mentioned functional evaluations after sciatic nerve resection [1, 5]. We report three patients with incomplete

Received 26 May 2003
Accepted 23 June 2003

Key words: Sciatic nerve palsy, Gait, Drop foot.

Fig. 1. Complete sensory loss in case 1.

nerve palsy incurred in traffic accidents and one patient with complete nerve palsy due to sacrifice in the removal of sarcoma.

CASE REPORTS

Case 1: A thirty-four-year old woman underwent surgery with wide excision for chondrosarcoma in the left ischium. The left sciatic nerve was excised at the level of the sciatic notch. There were no postoperative complications. The muscle strength by manual muscle testing (MMT) was 5 for the knee extensors, 2 for the knee flexors, 0 for the ankle and toe extensors and flexors [2]. Sensory loss occurred on the posterior side and distal to the ankle joint of the affected limb (Fig. 1). Proprioception distal to the ankle joint was completely lost. Six months after the operation, she could walk with a short leg brace and two crutches for more than ten minutes. Two years later, she was able to stand, wash her face, brush her teeth and walk on a flat surface without crutches. However, she had to watch her steps while walking. She had neither ulcers nor skin troubles in the foot. After fifteen years' follow up, the state of gait has not changed.

Case 2: A twenty-two-year old woman suffered incomplete right sciatic nerve palsy at the level of the lesser trochanter. When she sat on the front passenger seat, the car started suddenly before she fastened her seatbelt and she fell a distance of approximately one meter. She jumped up and her right buttock hit the hand break

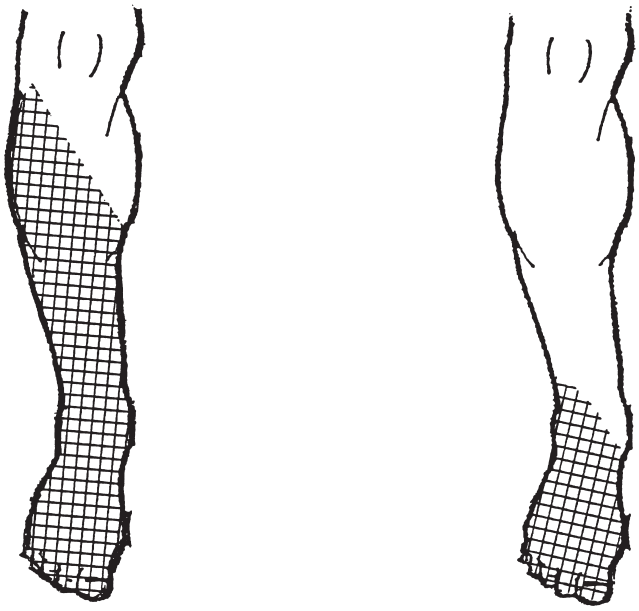

Fig. 2. Sensory disturbance in case 2.
a- 2 weeks after the injury
b- after the operation

strongly. At first she couldn't move her ankle at all and showed anesthesia on the posterior side and the dorsal aspect of the affected limb. The palsy gradually recovered. The muscle strength by MMT was 5 for the knee extensors, 2 for the knee flexors, 2 for the ankle and toe extensors and flexors, and sensory disturbance existed below the knee two weeks after the injury (Fig.2 a). Because of the entire loss of proprioception distal to the ankle joint, she felt as if her right knee touched the ground while walking. An operation was performed because there was no change in the palsy at three and a half months after the accident. The sciatic nerve appeared to be intact and no neuroma was found. However, since it had become narrow and lost glitter at the lesser trochanter level, epineurotomy was performed [9]. Though sensory loss remained distal to the ankle, the muscle strength was restored from 2 to 4 for the knee flexors, and 2 to 4 for the ankle and toe extensors and flexors after the operation (Fig. 2 b). She could walk without a short-leg brace on a flat surface, but could not remain standing without the orthosis (Fig. 3 a, b). It was necessary for her to watch her steps while walking (Fig. 4). Two years after the operation, she could walk on rough surfaces without the brace and the sensory disturbance had recovered almost to normal.

Case 3: A twenty-one-year old man had a pelvic ring fracture with little displacement and incomplete right sciatic nerve palsy. Riding on a motorcycle, he bumped against a truck and his right buttock hit the ground violently. The muscle strength

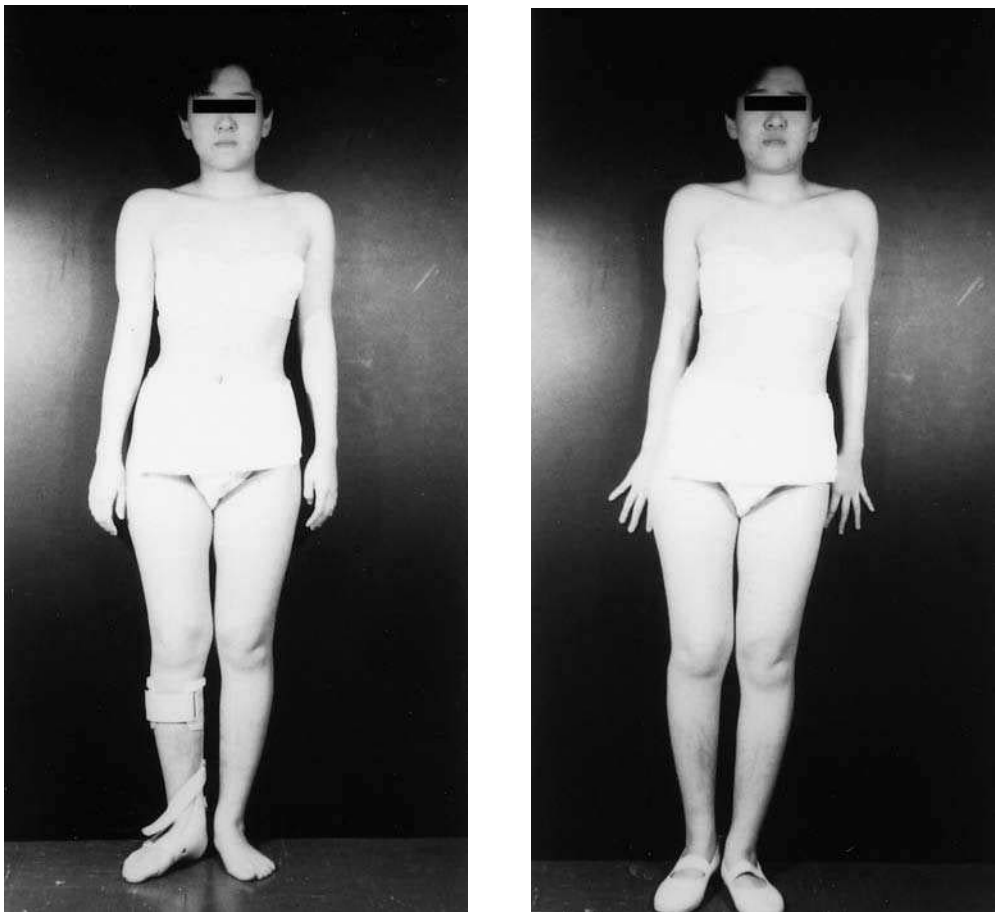

Fig. 3. Standing posture of case 2.
a- stable standing with a short-leg brace
b-showing appearance without the short-leg brace

by MMT was 3 for the ankle extensors, 2 for the ankle flexors, and 2 for toe extensors and flexors. Hypoesthesia existed on the dorsal side and there was anesthesia on the lateral side of the foot (Fig. 5 a, b). Three months later, all muscle strength below the knee was 3. One year later, it became 4. He was able to walk stably on a flat surface for more than two hours, but was unstable on rough surfaces. As proprioception was spared, he did not have to watch his steps.

Case 4: A twenty-six-year old woman had left incomplete sciatic nerve palsy caused by being hit in the left buttock in a collision between a car and the bicycle she was riding. She could not walk for two weeks because of pain and motor loss. After being followed for 10 months by the first doctor, she was referred to our hospital. The muscle strength of the lower leg gradually recovered to 4 during the first 10 months after the accident but small anesthesia area remained unchanged on the

Fig. 4. Confirmation of the right foot position was needed while walking.

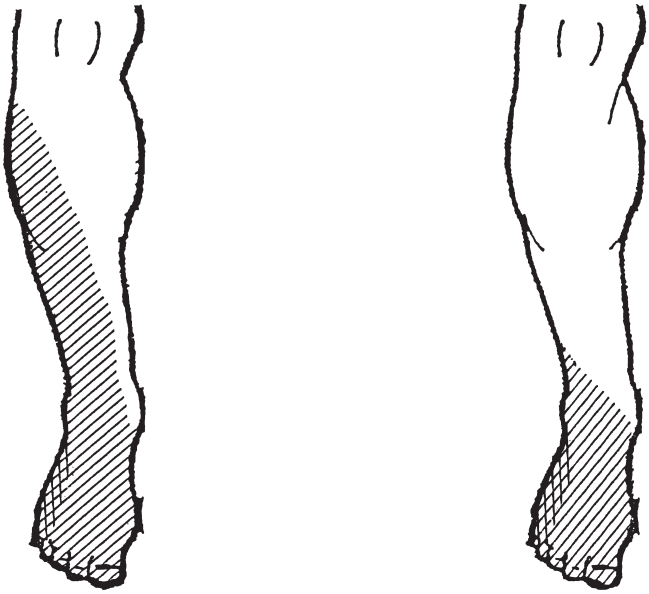

Fig. 5. Sensory disturbance in case 3.
a- just after the accident
b- one year later

Fig. 6. Sensory disturbance in case 4.

big toe (Fig. 6). This symptom did not change during the one-year follow at our hospital.

DISCUSSION

Resection of the sciatic nerve results in sensory loss distal to the knee and motor dysfunction of the knee, foot, and ankle [5]. Though patients with a soft tissue malignancy involving the sciatic nerve who present with neurologic loss had previously been advised to have an amputation, limb-sparing surgery is now widely accepted [1,5]. However, only a few papers have described the dysfunctions of limbs after resection of the sciatic nerve [1,5,6]. Fuchs et al [1], in a report of twenty patients who underwent limb sparing procedures with complete resection of the sciatic nerve as a treatment for malignant tumors, described that walking in the house was not difficult, but walking was compromised as soon as an additional effort was needed. Kawai et al [5] reported two patients with soft-tissue sarcomas who underwent a limb-sparing procedure that included resection of the sciatic nerve. The patients could walk while wearing a plastic ankle-foot orthosis but did not require a cane or crutches. These characteristics after resection of the sciatic nerve are consistent with those of the present case 1.

Incomplete palsy of the sciatic nerve after blunt injury usually shows partial but good spontaneous recovery. Kline et al [7] described that, among patients with partial deficits uncomplicated by severe pain or with significant spontaneous recovery, 23% of injuries at the thigh level and almost 50% of those at the buttock level did not require surgical operation. Consistent with this report, the muscle strength of

cases 3 and 4 improved remarkably in a few years. Yuen et al [11] described that a recordable compound muscle action potential of the extensor digitorum brevis and an initial absence of paralysis of muscles controlling ankle plantar flexion and dorsiflexion predicted an earlier and better recovery. Even though the nerve palsy was incomplete, the outcome of case 2 was worse than those of cases 3 and 4 in terms of the gait.Å@Case 2 had to undergo neurolysis because of the poor recovery. After this operative procedure, the muscle strength recovered but, because the proprioceptive impairment still remained, it was necessary for the patient to watch her steps while walking. Kawai et al [5] described that proprioceptive impairments prevent patients from knowing the position of the leg and the type of contact with the floor, so they are unsure when it is safe to transfer their body weight onto the limb. The muscle power of case 2 had recovered postoperatively but the lack of recovery of deep sensation resulted in the characteristic gait pattern similar to that of case 1 during two years after the operation. In short, a lack of deep sensation can to a large extent account for the characteristic gait of patients with sciatic nerve palsy.

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