Three patients in a Chinese family with hereditary sensory neuropathy mimicking leprosy

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Introduction

Hereditary sensory neuropathy (HSN) is a rare disorder of peripheral sensory neurons. It was also known as hereditary sensory and autonomic neuropathy. It is characterised by a chronic clinical evolution with ulcerations, loss of sensation and destruction of terminal digits of feet and hands. It usually begins in childhood. Symptoms start with inflamed fingers or toes especially around the nails. The loss of sensation in hands and feet often leads to neglect of the wounds and at last leading to amputation in extreme cases. Due to the genetic pattern of inheritance, children in a family are affected by the disease one by one in a cluster pattern. Sometimes, health workers can confuse it with leprosy in the field. We report three patients in one family with hereditary sensory neuropathy which mimicked leprosy.

Case reports

Case 1: A 19 year-old girl was first seen at her home during leprosy suspect survey in May 2007. Leprosy was suspected due to the sensory loss and an ulcer in her left foot for many years. She complained that her hands and feet repeatedly became swollen and deformed for more than 10 years. She was referred with her mother and two young brothers to Wenshan Prefectural Institute for further clinical examination and treatment. The onset of the disease began when she was 7 years old, with erythema and swelling on her left big toe. Gradually, her left big toe nail turned black and thickened and at last fell off. At the same time, her left big toe became inflamed and suppurated. With the slow progress of the disease, there was an
osteomyelitis of her left big toe. In the recent years, both her hands became involved. Her left thumb and right index finger developed swelling and suppuration, due to osteomyelitis. Her left ankle joint became deformed and an ulcer developed on the sole of her left foot. There was no weakness, wasting of muscles or deafness. She did not feel any pain in the wounds of her hands and feet.

Clinical examination showed that her left thumb was swollen and her right index finger was truncated at the distal phalanx. Also there were small scars on the back of hands. Her left foot sole had a deep ulcer (5 × 10 cm). It was purulent and inflamed. The ankle joint was totally deformed. There was complete loss of pinprick sensation on her hands and feet. Because of total of sensory loss at her hands and feet, the temperature and vibration sensation had not been tested. Her peripheral nerves were not thickened. There were no visible skin lesions on the body and skin smear tests were negative at the routine sites (Figures 1 and 2).

The patient’s mother was married to her cousin. The patient’s two young brothers suffered from a similar disease to varying extent.

**Case 2:** This 15 year-old boy was the brother of the first patient (Case 1). He complained that his right big toe had been swollen repeatedly for 5 years without apparent reason.

Clinical examination showed that the right big toe was swollen with a loss to touch and pinprick sensation. Lateral popliteal and posterior tibial nerves were not enlarged. The skin smear tests at the routine sites were also negative (Figure 3).

**Case 3:** This 13 year-old boy was a younger brother of the first two cases. He complained that his right big toe had been swollen for 3 years. A blister at the tip of the toe eroded and developed into an ulcer.

Clinical examination showed that both his big toes were swollen. The tip of his right big toe had an ulcer in an area of 2·0 × 2·0 cm with some oozing. Bone reabsorption had resulted

![Figure 1](image-url)
Figure 2. The left thumb was swollen and the right index finger was truncated at the distal part. Also there were some small scars on the back of hands. There was complete loss of pinprick sensation on the hands (Case 1).

Figure 3. The right big toe was swollen with a loss to touch and pinprick sensation (Case 2).
in the shortening of the toe. Both feet were insensitive to light touch and pinprick sensation. Neither of his lateral popliteal nerves was thickened. There were no visible skin lesions suggestive of leprosy and the skin smear tests were negative at the routine sites (Figure 4).

Discussion

Hicks\(^1\) first reported one of 10 affected individuals with hereditary sensory neuropathy in a family from London in 1922. The cardinal features of the disease were ‘perforating ulcers of the feet, shooting pains on the body and deafness, with clinical signs of dissociated sensory loss and areflexia in the feet’. The onset of the disease usually begins in the second or later decade. Recently a mutation in the SPTCL\(^1\) gene at chromosome 9 had been identified in kindreds in Austria, Canada and the United Kingdom.\(^2\)

The classification of the disease is controversial. Dyck\(^3\) described five types of hereditary sensory and autonomic neuropathies in 1993 with characteristics as below.

<table>
<thead>
<tr>
<th>Types of disease</th>
<th>Main features of disease</th>
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<tbody>
<tr>
<td>Type I</td>
<td>Sensory radicular neuropathy</td>
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<tr>
<td>Type II</td>
<td>Congenital sensory neuropathy</td>
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<tr>
<td>Type III</td>
<td>Familial dysautonomia</td>
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<tr>
<td>Type IV</td>
<td>Congenital insensitivity to pain with anhidrosis</td>
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<tr>
<td>Type V</td>
<td>Congenital indifference to pain</td>
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In this group of diseases, Type I is the most common dominantly inherited disorder which primarily affects sensory neurons. Although some patients with Type I could present characteristics of shooting pains, deafness and onset at the early age, these signs were not required diagnostic criteria. Lindahl et al. reported a patient who was confirmed by the test of gene mutation in SPTLC1 got the late onset of the disease at 68 years old.\(^4\) The numbness of her feet progressed very gradually. She developed mild bilateral deafness at 83 years of age, and developed a painless ulcer on the left foot at the age of 84. The paper by Houlden\(^5\) also showed additional characteristics of the disease, including variability in age of onset and severe motor involvement. Additional entities continue to be described.

Although it is an uncommon recessive neurological disorder, patients with this disease are sometimes encountered by the health worker in the field, who may mistake the condition for leprosy because of the similar patterns of sensory loss and disability resulting from peripheral neuropathy. However, absence of skin lesions and thickened nerves, negative slit skin smears and perhaps a family history suggestive of a hereditary neuropathy, could suggest the correct diagnosis. Although the gene mutation has not been looked at for our patients, we consider the disease could be classified as Type I neuropathy based on a history of early onset, chronic plantar ulceration, painless injuries and gross sensory loss on the extremities.

The pathological mechanism neuropathy of this disease is different from that in leprosy. Denny-Brown\(^6\) reported degeneration in the dorsal root ganglia with secondary involvement of the posterior root, peripheral nerve and posterior columns of the spinal cord in one case. Verpoorten et al.\(^7\) considered that vesicular transportation and axonal trafficking in the nerve seemed an important common pathway leading to degeneration of sensory and autonomic neurons. Murray reported that the nerve biopsy of one patient showed segmental demyelisation and loss of axons in the peripheral nerve system.\(^5\)

A health worker working in leprosy control should be aware of the existence of other peripheral neuropathies in order to avoid misdiagnosing leprosy. There was a report\(^1\) that out of 225 patients with peripheral neuropathies admitted into two large hospitals in eastern India, common causes of neuropathy included Guillain-Barre syndrome, diabetes mellitus, hereditary sensory neuropathy, chronic inflammatory demyelinating neuropathy. Hereditary sensory neuropathy was also seen.

Pain is a protective mechanism for the body in daily living. In the absence of pain, there is always the risk of injury. Our patients all first developed swelling of big toes or thumbs because these digits are especially prone to trauma. The clinical manifestations of the disease are secondary to neuropathy and incidental injuries. Loss of sensation in both hands and feet often leads to neglect of the wounds. This can become serious, even leading to amputation in extreme cases, so the patient with HSN, just like the patient with sensory loss due to leprosy, should be taught how to protect the limbs from danger through self-care, wearing protective footwear and treating existing or new wounds.

References