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*Case Report*

# A 14-year-old girl with an unusual combination of incontinentia pigmenti and conversion disorder

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**Abstract:** Incontinentia pigmenti is a rare X-linked neurological-skin genetic disease. Some studies have shown that about 30~40% of patients with IP have varying symptoms of eye/central nervous system which are the major causes of disability. Conversion disorder is one of the most common mental diseases in children and may exhibit the single or multiple neurological symptoms. In this paper, we will report a child with new and rare incontinentia pigmenti accompanied by conversion disorder and explore the relationship of this rare combination.

**Keywords:** Incontinentia pigmenti, conversion disorder, central nervous system, *X* chromosome-linked dominant genetic disease

## Introduction

Incontinentia pigmenti (IP) is an uncommon *X*-linked multisystem disorder and mainly affects embryonic ectoderm development, causing damage to organs originating from the ectoderm, such as epidermis, hair, teeth and central nervous system (CNS) [1]. The primary disabling cause is attributed to the damage to the eye and nervous system. Herein, we report a rare case of IP without apparent symptoms of the eye/nervous system but with conversion disorder.

## Case report

A 14-year-old female patient was admitted because of sudden onset of paralysis and numbness of the lower extremities without known causes in May 2012. There was no urinary dysfunction. Physical examination showed the muscle strength of the lower extremities was zero, and the superficial and deep sensations below the bilateral hips reduced markedly, the myotasis reflex was absent and the Babinski sign was negative. Other examinations of the nervous system showed no remarkable changes. A systemic review of this patient showed a history of blisters over the vertex of the head and all over the body skin, verrucous proliferation, abnormal tooth shape at birth and absence of eye/nervous system symptoms till now. Her mother had similar changes in the skin and teeth at birth, in addition to mental retardation, seizure, optic atrophy of the right eye and visual loss. Brain MRI of the mother showed right basal ganglia damage and periventricular leukomalacia. (**Figure 1K** and **1L**).

Laboratory examinations showed the routine, biochemistry, oligoclonal band (OCB) and IgG index of cerebrospinal fluid (CSF) were normal. EEG, EMG, brainstem auditory evoked potential (BAEP), visual evoked potential (VEP) and somatosensory evoked potential (SEP) showed no remarkable changes. Cervical and thoracic MRI images (**Figure 1A-D**) were normal. Brain MRI showed multiple abnormal signals along the bilateral lateral ventricles. T2 FLAIR signals were high. No abnormal signal was seen on T1W and diffusion images. No enhancement was seen on the enhanced images. No abnormality was seen in intracranial vessels (**Figure 1I**).

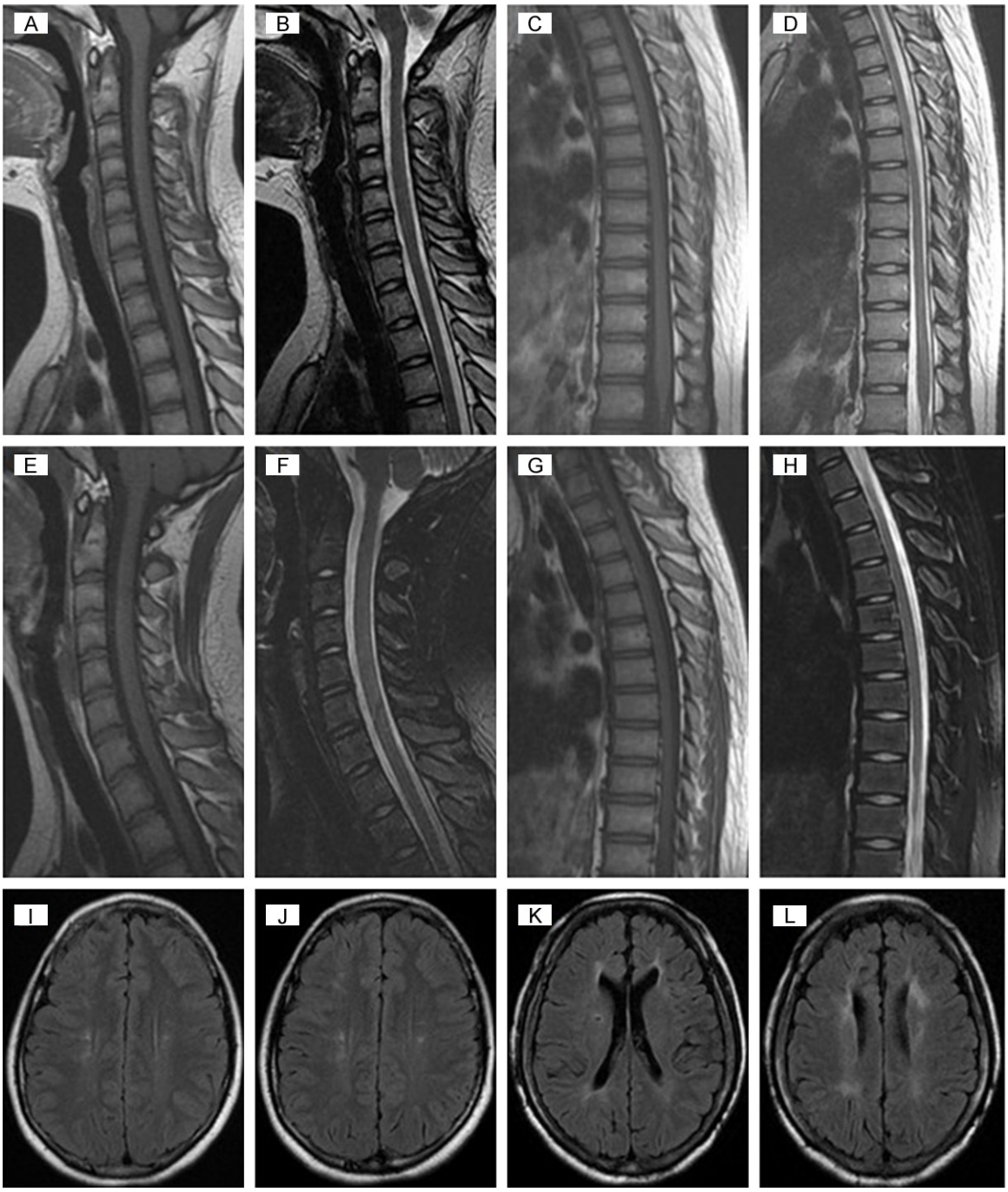


**Figure 1.** Head MRI in May 2012 when the patient experienced the first attack: T2 Flair MRI shows multiple hyperintense signals beside the lateral ventricles (I); cervical and thoracic T1 MRI (A, C) and T2 Flair MRI (B, D) show normal. Head MRI in April 2013 when the patient experienced the second attack: T2 Flair MRI (J) shows no significance change in the hyperintense signals along the lateral ventricles as compared to the previous examinations; cervical and thoracic T1 MRI (E, G) and T2 Flair MRI (F, H) show no abnormalities. Head MRI (K, L) of the patient's mother: basal ganglia malacia is seen on T2 Flair MRI, with multiple hyperintense signals along the lateral ventricles.

This patient recovered and was discharged after physical therapy and suggestive therapy for 2 weeks. No abnormal symptom was observed during the subsequent 3- and 6-month follow up.

In April 2013, this patient experienced paralysis of both lower extremities again without known causes. Other symptoms and signs were the same as in the first attack. CFS and electrophysiologic examinations showed no significant

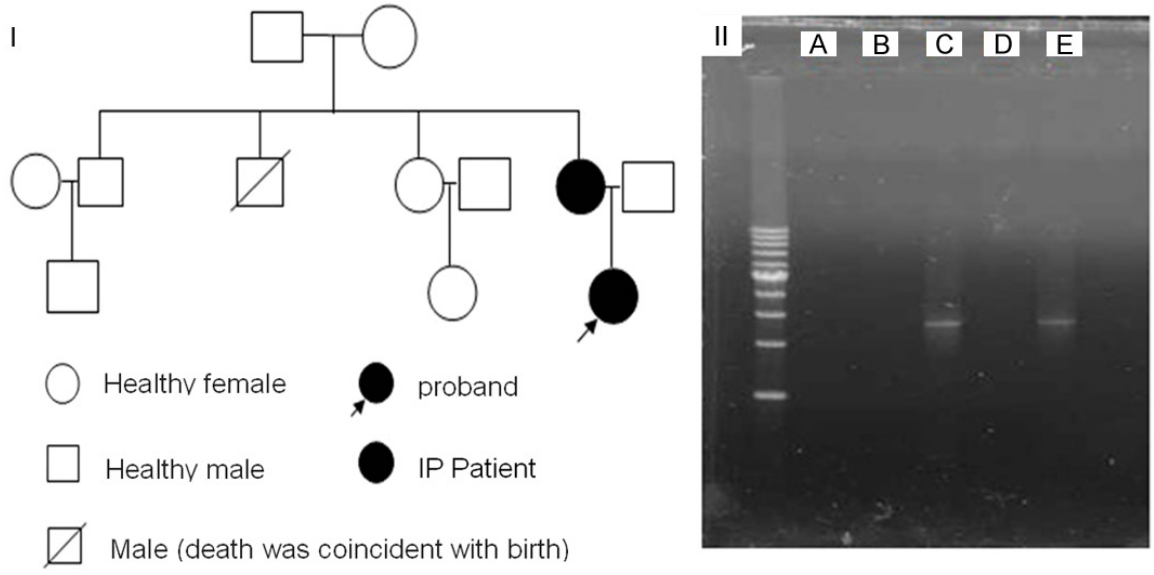


**Figure 2.** I: Familial analysis: Two persons (her mother and daughter) presented with this disease. In addition, a boy (proband's brother) died at birth, but the cause of death was unclear. II: Mutation analysis of pathogenic genes: A: healthy control; B: proband's grandmother; C: proband's mother; D: proband's aunt; E: proband. *PCR product is 2.6 kb in length. The positive result indicates the presence of *NEMOΔ4-10* defects in the *MEMO* gene of this patient.

abnormalities. Brain MRI and MRA showed no abnormalities as compared to findings in previous examinations (**Figure 1J**). Cervical and thoracic MRI showed normal (**Figure 1E-H**). Physical therapy and suggestive therapy were applied as before. Then, this patient was able to walk freely and the muscle strength restored to normal within a week.

Consultation from a psychiatrist showed she was conscious and cooperative, with stable speech and without pathological hallucination and delusion. Following scales were used to evaluate this patient: (1) Symptom Checklist 90 (SCL-90) showed mild somatization (dizziness, head discomfort, occasional gastric upset, palpitation and sensation of fatigue); mild sleeping problems (hard to fall asleep, shallow sleeping and waking up early). (2) Eysenck Personality Questionnaire showed this subject obviously intended to hide problems and her responses lacked authenticity. She was unwilling to share her inner experience, or intended to hide it. (3) Self-rating anxiety scale (SAS) showed a normal score of 24. (4) Self-rating depression scale (SDS) showed a normal score of 23. Thus, a diagnosis of version disorder was made.

Family history reviewing and genetic analysis [2] showed this disease occurred in two persons (her mother and daughter). Gene mutation analysis showed NEMO Δ4-10 sequence defects on Xq28 of NEMO gene (**Figure 2I** and **2II**).

## Discussion

Studies have demonstrated that the familial pathogenic gene of IP is mapped to Xq28, and about 90% of IP cases have NEMO Δ4-10 defects [3]. Clinically, IP mainly presents with manifestations of the organs and tissues originating from the ectoderm, including the skin in 95% of cases, teeth in 90% of cases, and eye/CNS in 30-40% of cases. The symptoms of nervous system include epilepsy, mental retardation, enlarged brain ventricles, congenital hydrocephalus, and encephalomyelitis. Ocular symptoms include optic atrophy, vitreous hemorrhage and retinal detachment [4]. NEMO Δ4-10 defects were confirmed in our patient and her mother, but this patient had no obvious eye/CNS complications.

This patient met the diagnostic criteria for incontinentia pigmenti. She did not experience symptoms of the eye/neurological system after birth, and exhibited paroxysmal paralysis of both lower extremities twice nearly one year. No significant abnormalities were found by associated laboratory tests, and a dramatic recovery appeared after the physical therapy.

Although brain MRI findings showed the demyelinating changes in periventricular white matter, no obvious changes were observed after the comparison of the two brain MRIs of the focus, and the normal conditions were found through MRI of the neck, chest and lumbar vertebra. It is considered that the lesions of the white matter surrounding the lateral ventricle may be the congenital damage to the white matter of the brain caused by NEMO/IKKγ gene dysfunction. After consultation with a psychiatrist, a diagnosis of conversion disorder was made finally.

Conversion disorder is a common mental health condition with single or multiple symptoms and signs of nervous system such as paralysis, visual loss and somatic convulsion. Organic pathological changes should be excluded before the diagnosis of conversion disorder is made [5].

Factors related to conversion disorder include biological, psychological, environmental and social causes. Biologically, some studies show that organic injury to the nervous system may trigger the dissociation (conversion) disorder, such as multiple sclerosis (MS), focal lesions of the temporal lobe, sporadic encephalitis and brain trauma [6-9]. Demyelinating damage to the white matter was noted in this patient, but there is no convincing evidence to confirm whether this organic pathological change is a risk factor of conversion disorder.

Currently, there is no report about conversion disorder in IP patients. Our experience suggests that conversion disorder may be considered in IP patients who experience repeated limb paralysis and other atypical nervous system symptoms without known causes. An assessment by psychologists is important for the diagnosis of conversion disorder. Appropriate physical and suggestive therapies are effective for the treatment of conversion disorder. Further investigation is required to confirm whether white matter damage arising from IP is a potential risk factor of conversion disorder.

## Disclosure of conflict of interest

None.

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