

CASE REPORT

Portal cavernomatous transformation leading to variceal hemorrhage in Sturge–Webber syndrome. A rare, but possible association

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Abstract

Sturge–Weber syndrome is a rare disorder consisting of a port-wine nevus in the distribution of the ophthalmic branch of the trigeminal nerve and central nervous system malformations. Facial cutaneous vascular malformation, seizures, and glaucoma are among the most common symptoms and signs. The syndrome results from malformation of the cerebral vasculature located within the pia mater, most commonly over the occipital region. These malformations led to venous hypertension and subsequent hypoperfusion on the underlying cortex, causing chronic cerebral ischemia, atrophy, calcification and neurological deterioration. We describe 18-years-old young girl hospitalized for upper digestive hemorrhage that revealed a cavernomatous transformation of portal vein. At the same time, she presents extensive congenital, bilateral port wine stains on the face, epilepsy and glaucoma of the right eye. Computer tomography showed intracranial vascular abnormalities with calcifications, particularly in the right occipital lobe. The clinical presentation and imagistic assessment confirmed the diagnosis of Sturge–Weber syndrome associated with upper non-cirrhotic portal hypertension generated by a malformation of portal vein. *Conclusions.* Upper digestive hemorrhage is a quite rare eventuality in the Sturge–Weber syndrome. Moreover, portal tract malformations with cavernomatous transformation are exceptionally cited in the literature. Despite this rare association, abdominal investigation, as well as computed cranial tomography should be performed in all cases of children that present a facial cutaneous vascular malformation.

Keywords: portal cavernomatous transformation, variceal hemorrhage, Sturge–Weber syndrome.

☐ Introduction

Neurocutaneous syndromes or phakomatoses are congenital disorders characterized by abnormal growth of ectodermic tissue, producing distinctive skin lesions and malformations or tumors of the nervous system. More than 20 syndromes have been described, the most important being type 1 and 2 neurofibromatosis, tuberous sclerosis and Sturge–Weber syndrome [1].

Described in 1879, Sturge–Weber Syndrome (SWS) is a neurocutaneous syndrome characterized by leptomenigeal angiomas and facial nevus that is usually unilateral [2], rarely bilateral [3]. Other clinical findings associated with SWS are seizures, glaucoma, headache, transient stroke like neurological deficits and behavior problems. Haemiparesis, hemiatrophy and hemianopsia may occur contralateral to the cortical abnormality [4]. Association with intestinal hemorrhage is also possible [5]. Sturge–Weber syndrome is a rare condition that occurs with a frequency of approximately one per 50 000, although experts believe many more people have the disorder but have not yet been identified [4].

Due to the rarity of the syndrome, in many cases the diagnosis is delayed [6] until other complications occur (mainly neuro-ophthalmic).

The diagnosis of Sturge–Weber syndrome requires in all instances of facial vascular nevus an intracranial evaluation by CT and/or MRI examination.

We present the case of an 18 years old female patient in which the diagnosis was made only after an upper digestive hemorrhage, although the vascular malformation was present from birth.

☐ Patient and methods

The 18 years old female patient was admitted in the hospital for upper digestive hemorrhage with moderate hematemesis and melena two days prior to admission. Clinical examination revealed moderate-to-severe anemic syndrome, with low hemoglobin, microcytosis, low serum iron and ferritin, elevated total iron binding capacity, and thrombocytosis. There was no history of peptic ulcer and/or anti-inflammatory drug intake, as well as any evident hepatic and coagulation disorder.

Apart this, the patient presented a cutaneous facial vascular malformation, suggesting the presence of SWS. History revealed the presence at birth of a bilaterally extended facial vascular nevus. At the age of 4, she presented seizures, and at the age of 14 the debut of migraine, which became more frequent and severe in time. A comprehensive evaluation and diagnosis of the condition was not performed to date but ophthalmologic examination revealed right eye glaucoma at the age of 17.

Results

Physical examination also revealed an extensive, bilateral, plane angioma. The vascular lesions originated in the right frontal and left fronto-temporal region, extending on the chin and neck, but respecting the median region and covering all the way down to the inferior lip, which appeared enlarged (Figure 1).

Except anemia, biologic evaluation at admission was normal, with no hepatic, metabolic or coagulation disorder. Upper digestive endoscopy performed at admission showed grade II esophageal varices (Figure 2) with stigmata of hemorrhage, as well as moderate portal-hypertensive gastropathy and gastric varices of the fundus.

Doppler echography showed a huge portal venous malformation with cavernomatous transformation of portal vein, in the absence of any other abdominal abnormality (Figure 3).

Abdominal CT-scan confirmed echographic examination, with a large portal cavernoma, while cranial CT showed internal capture of the contrast substance at leptomeninges, calcifications both in the left parietal-occipital cerebral parenchyma and in the choroid plexus, and posterior right parietal cortical atrophy (Figure 4).

Discussions

SWS, also known as encephalotrigeminal angiomas, is a rare congenital disorder that results from malformation of the cerebral vasculature located within pia mater, most commonly over the occipital region [7].

This syndrome affects males and females equally. The main clinical features of this syndrome are [5]: venous angiomas of the leptomeninges of the cerebral cortex, usually unilateral; ipsilateral facial angiomas that often follows in outline the distribution of the trigeminal nerve; ipsilateral gyriform calcification of the cerebral cortex; epileptic convulsions or other seizures; ocular defects (choroidal angioma, glaucoma, hemianopsia; mental retardation; contralateral hemiplegia; obesity; oral, mucosal and gingival involvement.

Clinical aspects

The key diagnostic feature, leptomeningeal angiomas, is the primary abnormality in SWS, all other features of the syndrome probably being secondary to this. When a child is born with a facial cutaneous vascular malformation covering a portion of

the upper or the lower eyelids, imaging should be performed to screen for intracranial leptomeningeal angiomas.

Leptomeningeal angiomas may not be apparent early on in the infancy, but longitudinal studies have not yet been undertaken to define the optimal age of screening with magnetic resonance imaging [4].

The cutaneous angioma is usually present at birth and involves one side of the face, in the distribution area of the trigeminal nerve (mainly the ophthalmic division). Occasionally, it spreads beyond the midline and may involve the head, neck and trunk. The typical lesion is usually of the port-wine flammeus type, although nodular thickenings may be present within it [8].

However, it is important to observe that most children with a facial cutaneous vascular malformation do not have SWS. When the cutaneous malformation is unilateral or bilateral and includes the ophthalmic division of the trigeminal nerve, the likelihood of SWS increases [4]. Rarely, some children with SWS, lack a facial cutaneous vascular malformation but have the neurological or ophthalmologic components associated with intracranial leptomeningeal angiomas [4].

Gyriform or serpentine calcification, as revealed by CT-scan is a characteristic finding [9]. Calcifications are observed in meningeal arteries and in cortical and subcortical veins underlying the leptomeningeal angiomas, occurring in 80% of patients [3]. Calcification of the cortex is a poorly understood phenomenon that may result from stasis of blood in the angioma, associated with altered local metabolism [10].

Imaging studies can indicate the degree and amount of cerebral calcification, atrophy, neuronal loss and gliosis. Computed cranial tomography provides adequate evaluation of brain calcifications. However, calcifications may be absent or minimal in neonate and infant. Therefore, magnetic resonance imaging with contrast is the preferred imaging modality for evaluation of the leptomeningeal angiomas [4].

Epilepsy is the main manifestation of intracranial involvement and, as well as other neurological seizures and mental retardation is probably secondary to the cortical calcification [5]. This usually appears early infancy or childhood. Seventy-five to 90% of children with SWS develop partial seizures by 3 years of age [4]. The attacks are usually focal and often jacksonian, having variable frequency and severity [11].

The seizures may become refractory to anticonvulsants and are associated with a slowly progressive hemiparesis in many cases [12]. As seizures increase in frequency and severity, mental functions and behavior often regress, probably as a result of increasing cerebral atrophy secondary to hypoxia and use of various anticonvulsants [12–13]. Occasionally, seizures may not appear despite meningeal involvement [14–15]. However, there is no clear evidence to support any correlation between early onset of seizures and poor prognosis so far. Headache may affect 30–45% of patients with SWS. The temporal relationship between headaches, seizures, and stroke-like episodes is related to the pathogenesis of SWS [4–16].



Figure 1 – Extensive, bilateral, plane angioma of the face, extending through the neck but sparing the median region



Figure 2 – Grade 2 esophageal varices with stigmata of recent variceal hemorrhage

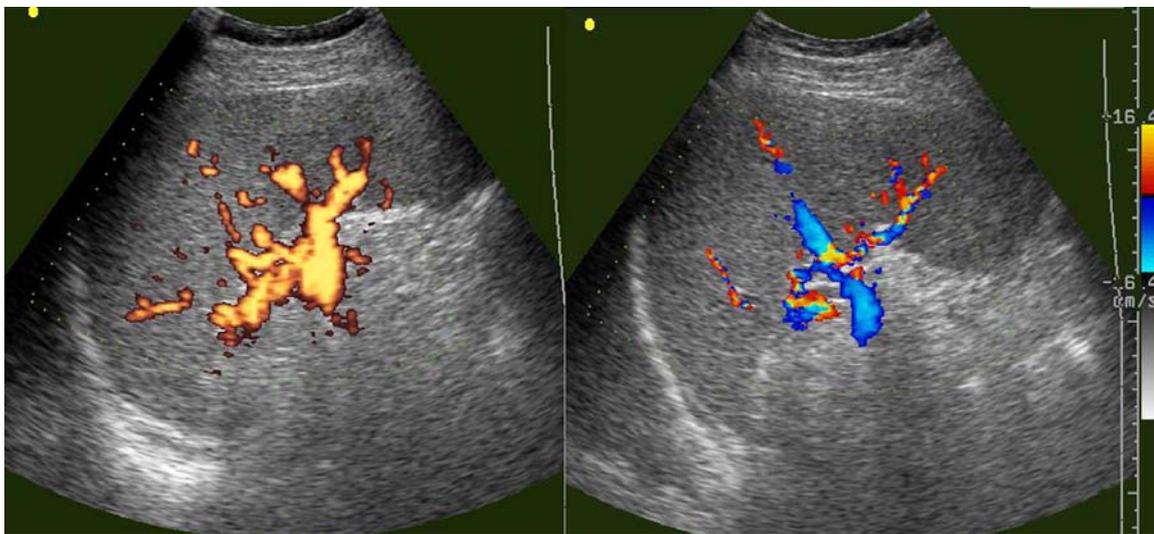


Figure 3 – Power Doppler and color Doppler echography showing venous malformation of portal vein with cavernomatous transformation

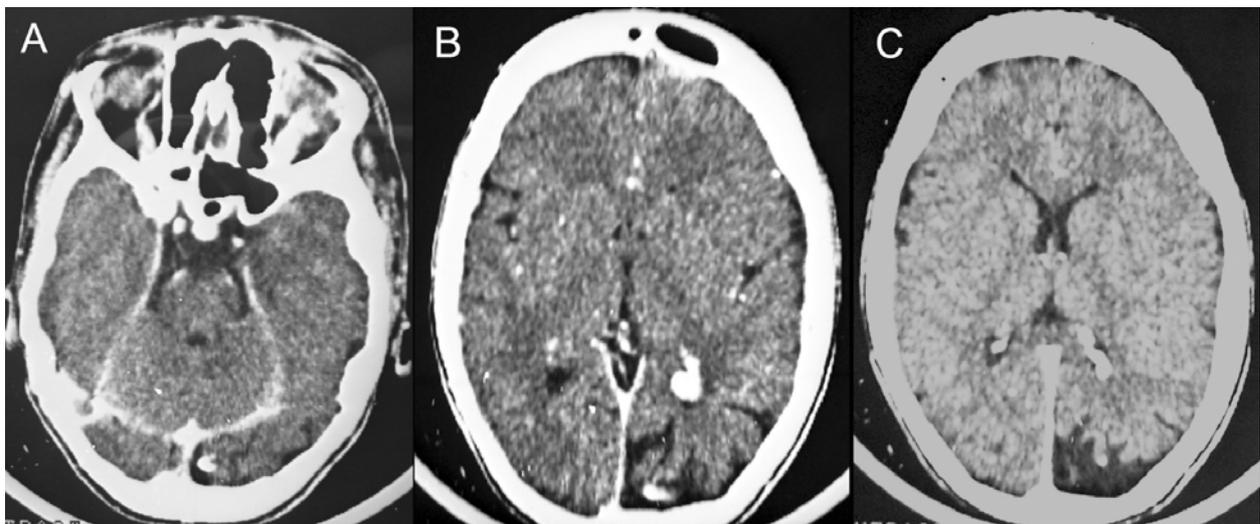


Figure 4 – Cranium native and post contrast CT scan showing cerebral calcifications. Note a 5 mm right occipital calcification (A), right choroidal calcification and right parenchymatous parieto-occipital 15 mm calcification (B) and cortical posterior parietal atrophy with bilateral calcifications of choroidal plexuses (C)

Glaucoma is the most common ophthalmic complication, occurring in 60% of patients [10]. Presentation of glaucoma is bimodal: 60% develop glaucoma in infancy when the eye is susceptible to increased intraocular pressure while 40% develop glaucoma in childhood or early adulthood.

Early-onset glaucoma causes infants to develop enlarged corneal diameters and myopia. Late onset glaucoma prompts little to no eye enlargement [4]. Choroidal angioma and hemianopsia are other ocular defects.

Contralateral hemiplegia with sudden or gradual onset develops in many cases.

Approximately 50–60% of patients with SWS will have developmental delay, mental retardation, or both [11–17]. Some reports suggest that mental retardation may be more common in children whose seizures begin before the age of 2 years, or who have seizures that are not controlled by antiepileptic drugs [4].

The oral tissues underlying the affected facial tissues are invariably also angiomatous and as a result may be considerably enlarged. Alterations in eruption of teeth have also been noticed [5].

Other less typical features are association with hypomelanosis of Itto; leptomenigeal angioma (contralateral to the facial nerves; leptomenigeal angioma without facial vascular nevus; association with gastrointestinal hemorrhage; paranasal sinus enlargement).

Associated anomalies beyond the encephalofacial territory are very rare, but possible. As in our case, a Spanish group reported a patient presenting repeated bleeds from extensive gastric varices of the fundus secondary to a splenic venous malformation [18]. They considered that their observation was the first report on this association.

Our patient presented a similar venous malformation leading to portal hypertension with gastrointestinal bleeding, demonstrating that this association, although rare, is possible even it cannot be ruled out the result of pure hazard.

Recently, SWS was subdivided into type I (facial and leptomenigeal angioma with possible glaucoma); type II (facial angioma without evident endocranial involvement), and type III (exclusive leptomenigeal angioma) [19]. Occasionally, SWS and Klippel Trénaunay Weber syndrome, a rare congenital mesodermal phacomatosis characterized by cutaneous hemangiomas, venous varicosities and soft tissue or bone hypertrophy of the affected extremities, may coexist [20, 21].

Pathology and pathophysiology

SWS is an apparently hamartomatous disorder determined by the persistence of a primitive embryonic vascular plexus. During the sixth week of intrauterine life, this plexus develops around the cephalic position of the neural tube and under the ectoderm in the region determined to become facial skin.

In SWS, the vascular plexus fails to normally regress during the ninth week, resulting in angiomatosis

of the related tissues. Variation in the degree of persistence or regression of the vascular plexus accounts for unilaterality or bilaterality of involvement, and for an incomplete syndrome in which the leptomeninges, but not the facial tissues are affected [5].

Inheritance is suspected to be autosomal dominant, although there is no clear evidence of heredity [8]. By comparison of the chromosomes from cells of affected and unaffected regions in patients with SWS, pericentric inversion of 4q chromosome was identified in 40% of the cultured cells from leptomenigeal angiomatosis, but not in the cultured cells from blood in one patient of four [22].

In another case, about 50% of the cells from the cutaneous angioma presented 10 trisomy, whereas the anomaly was absent in the blood and the normal skin [22]. The hypothesis of a somatic mutation in SWS is suggested by the occurrence of reproducible differences between the expression of the fibronectine gene in fibroblasts emerged from skin lesions and from the normal skin [23].

Treatment

Surgical treatment of the intracranial lesion is only occasionally successful. Neurosurgical advice should be sought as soon as the diagnosis has been established and before the onset of epilepsy. Regular supervision by an ophthalmic surgeon and goniotomy under gonioscopic control may preserve vision [11].

Laser therapy for facial cutaneous vascular malformations should begin soon after diagnosis for best results [4]. A vascular specific pulsed dye laser can improve the aspect of the facial cutaneous vascular malformation, typically within 10 treatments [24].

The location of the facial cutaneous vascular malformation predicts the response to laser therapy. Central facial lesions are poorly responsive to this therapy [25].

The clinical manifestations of the presented case suggest the diagnosis of Sturge–Weber syndrome, but the confirmation came only from the CT imaging. This case draws attention for at least three aspects:

- Portal venous malformations generating portal hypertension and gastrointestinal bleeding, although rare, can be associated with SWS.
- Bilateral disposition of the cutaneous vascular nevus is a rare, although possible situation.
- Finally, delaying the diagnosis can impeach appropriate monitoring and follow-up to prevent the occurrence of life-threatening complications.

Conclusions

Portal vein malformations can be associated with SWS leading to non-cirrhotic portal hypertension and upper digestive bleeding.

Cranial CT is of utmost importance in the diagnosis of the Sturge–Weber syndrome.

Complete evaluation must be performed early in childhood in all patients presenting facial vascular nevus in order to assess the leptomenigeal angiomatosis and its consequences.

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