Sturge-Weber syndrome: a report of 14 cases

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Abstract

Sturge-Weber-Krabe syndrome (SWS), also known as encephalotrigeminalangiomatosis and named *the forthfacomatosis*, recall the names of the authors who first describedit in its basic clinical, radiological andanatomopathological aspects. We report here 14 cases of Sturge-Weber disease. In 6 of these, despite what had been previously described in literature, an extension of the angioma has been noted in other parts of the body. The study of these subjects stresses not only the need for a pharmacological/neuropsychomotor intervention, but alsothe need of a psychotherapeutic approach, for the emotional and affective implications thatcould derive from this syndrome. The reported cases are similar to those presented in literature for their main features. In particular, two elements are interesting: i) the exceptional diffusion of the red nevousto the whole hemicorpo; and ii) the evaluation of the way the patients *live* the disease, which has not beenpreviously considered in literature. We can conclude that SWS is a multisystem disorder that requires the neurologist to be aware of the possible endocrine, psychiatric, ophthalmological, and other medical issues that can arise and impact on the neurological status of the patients.

Introduction

Sturge-Weber-Krabe syndrome (SWS), also known as encephalotrigeminalangiomatosis and named *the forthfacomatosis*, recall the names of the authors who first described it in its basic clinical,[1] radiological,[2] and anatomopathologicalaspects.[3]

Sturge-Weber Syndrome is a neurocutaneoussyndrome, characterized by the association between facial port-wine hemangiomas in the trigeminal nerve distribution area and vascular malformation(s) of the brain (leptomeningealangioma) with or without glaucoma.[4-10] Although SWS is a congenital disorder, which usually presents in infancy, occasionally neurological symptoms first present in adulthood. Most affected individuals do survive into adulthood with varying degrees of neurological impairment, including epilepsy, hemiparesis, visual field deficits, and cognitive impairments ranging from mild learning disabilities to severe deficits.[4,7-10] SWS is a multisystem disorder that requires the neurologist to be aware of the possible endocrine, psychiatric, ophthalmological, and other medical issues that can arise and impact the neurological status of these patients. Seizures, stroke-like episodes, glaucoma, headache, and developmental delay are frequent associated features.[11]

Some of these clinical features have only recently been described.[4,8-10]

This study describes 14 subjects with SWS who express various characteristics of the clinical spectrum of the syndrome.

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Case Report

Our study reports 14 cases of Sturge-Weber disease, 6 male and 8 female patients, studied in follow up. We observed 10 cases since they presented seizures, and 4 cases for the presence of a severe picture of psychomotorial retardation. In 5 of 10 cases, the seizures started within the first year of life. Some cases (n=3) present an extension of the angioma in other body parts, and, particularly in one case, the nevus extends itself on the whole left lower lateral aspect up to the foot, in another case it extends itself on the breech and on both lower limbs, in 2 other cases it extends itself on the dorsum and in the omphalic area. In Table 1 we report the main features of the syndrome both described in literature and those observed and/or detected also by neurodiagnostic exams in our cases, *i.e.* brain computed axial tomography (CAT) and nuclear magnetic resonance (NMR) in our cases. Each case with epilepsy has reached a good level of control of the crises without using any invasive therapy, and this has certainly slowed down the progressive course of the syndrome. None of the patients presents alterations of the infundibulumhypophyseal. The cognitive deficit, present in each case, has a variable degree. Of course in these cases it is necessary, on the basis of the long survival of patients, to first give pharmacological and neuropsychomotor therapies, but also a psychotherapeutic support to patients. It should be noted that the literature does not take psychotherapeutic support into consideration.

In most cases,relationship difficultiesare highlightedon the basisofalow self-esteemthat can be related to anexperience of illnessthattends toisolatethesesubjects.

Facialangiomacertainly hasled tothe emergence of aself-image characterized by depressive elements with features of self-depreciation that interfere also in one patient's work at school.

Discussion

Sturge Weber Syndrome (SWS), also called encephalotrigeminalangiomatosis, is a sporadically occurring neurocutaneoussyndrome, characterized by vascular malformation with capillary venous angiomas that involve face, choroid of eye and leptomeninges with resulting neurological and orbital manifestations.[8]

Genetic studies have stressed only some rare case of familial comnnection. As far as the nature of angiopathy is concerned, the vascular alterations is not an angioblastoma.[5-12] The prevalent orientation is to consider the alteration as a malformation that starts prematurely during intrauterine life.[7] The subarachnoid and choroid angiodysplasia, like the cutaneous one, is made by mature vessels, without any note of endothelial proliferation; that explains why it is so resistant to the ionogetic radiation treatments with antiblastic chemotherapies, withglycoactive steroids.[10-12]

The syndrome starts in infancy with epilepsy, mental retardation and hemiparesis.[5,13] The nevus of the face, evident already at the birth, has the color of port-wine, it is located in the orbital area, extending itself generally in the frontal area and also on the cheek in a distribution corresponding to the first and the second branch of trigeminus, exceptionally to the whole hemicorpo. It can also be located in the oral

cavum, in the pharynx, in the throat, in the tongue, inside the nose, on the eyelid conjunctiva, in the episclera, in the retrobulbar orbit causing proctosis with hipomobility of the bulb and through the orbital fissures; and it can have endocranial development in the extradural site.[5,14-16] It is usually unilateral and rarely bilateral. At first the lesion is flat, just palpable and it decolorizes onvitropression. Over the years, a progressive development of the anomalous vascularity has been noted and the nevus becomes prominent, thicker, darker, mamelonated, and sometimes hypertrophic.[12-18]

The leptomeningealangiomatosis is located mainly in the occipital areas and in occipital parietal areas of a cerebral hemisphere.[8,12,16-24]

Its structural and developing characteristics recall those of the red nevus (it is also a progressive developing ectasiant capillary venous angiodysplasy).[5,12,21] Under the vascular mass the cerebral tissue meets a gradual process of atrophy with a dilatation of the homolateral-ventriculum and increase insubarachnoid spaces. The subintimal calcification of meningeal arteries is associated to the cerebral atrophy; it extends gradually at the intima and at the media giving to the vessels the appearance of petrified tubes. The calcification process takes place mainly in the intravascular parenchyma with accumulation, in the external layers of the cortex, of pulverized granules of calcium salts that form heaps which progressively increase and replace the cerebral tissue.[4-5,12,17-19]

The calcium accumulations, absent at birth and exceptional in the newborn, are formed later. They translate themselves into a peculiar radiological picture of the syndrome: the ring-shape calcifications, appearing with parallel spires, are 2-3 mm apart.[12,23]

Severe calcification in the affected hemisphere is related to severely decreased perfusion in underlying white matter and is associated with more severe epilepsy in SWS patients.[19]

The presence of cerebral calcifications, evident at CAT and at MR has a negative prognostic meaning since it stresses the unavoidable and irreversible deterioration of the child's condition.[5,10-20] The direct visualization of the leptomeningealangioma is very inconstant with tomodensitometry or with arteriography; the encephalon NMR reveals an atrophy and involvement of white mass and of the deep venous dilatations on sequences in T2. Recently sequences have also been used in T1 after an injection of gadolinium in order to visualize the leptomeningeal angioma.[5,11,16-19]

A congenital and hypsilateralangioma of the choroid can be present: this angioma can determine a light blue staining of the iris (even in the case of the dark color of the other eye). It is usually located at the posterior pole in the inter papillary macular area where a diskshapeunpigmented white-gray stain turns to red.[5,17,21] The structural and evolutive characteristics of this vascular anomaly recall those of the letangiectatic nevus the area of which is related to it.[5,21]

The glaucoma is the secondary effect often evident directly afterbirth. In its pathogenesis, the dilatation and congestion of episcleral vessels seem to have a relevant role. The hypertension, acting in a phase of the development in which the structures of containment of the globe (sclera and cornea) are more pliable, causes exhaustion and then dilatation.[5,8,19-22] The glaucoma can be present at birth with megophthalmo, megalocornea and other anomalies such as coloboma of iris, deformity of the lens, or it can be revealed later; there is relatively early evidence of the compromisedvisus.[5-9,10,23]

Ninety percent of cases present focal or generalized convulsions that often represent the onset of neurological symptoms and quite often these start during the first year of life.[17,22] The seizures, which at first can be of the Jacksonian type, controlateral and later generalized, later become more and more frequent, and show little sensitivity to pharmacological treatment.[19-25]

The seizures are associated to controlateral hemiparesis. The first attacks are temporybut later become persistent with spastic alterations, disturbances of sensibility, deficit of limb growth of the hemiparetic side. Moreover, they are associated to homonymous hemianopsia, a consequence of the angiomatosis location of the occipital lobe.[21,25]

The outcome of hemispherectomy in pediatric patients is good for those with refractory epilepsies, such as West syndrome, Lennox-Gastaut syndrome, epileptic encephalopathy with continuous spikes and waves during slow sleep, and startle epilepsy arising from a hemispheric lesion associated with hemiplegia.[24-27] The aphasia is frequent and follows the seizural symptomatology revealing itself just the first one of them.[16-22]

There are varying degrees of mental retardation and this is often serious. It has been noted in 80% of cases, sometimes in early infancy, other times after normal psychological development after the early infancy; for this reason it has been called nevus amentia.[18-25]

The deterioration generally takes place simultaneously to the beginning and the repetition of seizures.

A significant quadratic relationship was found between IQ and extent of severe (but not total) hypometabolism.[25] Seizure variables also contributed significant variance to cognitive functions. Results suggest that intermediate size of severe hemispheric hypometabolism is associated with the worst cognitive outcomes, and small or absent lesions, with the best cognitive outcomes; children in whom a very large extent of the hemisphere is severely affected are likely to have relatively preserved cognitive function.[23,25]

White matter (WM) loss is associated with cognitive impairment in SWS.[25] Nevertheless cognitive and fine motor functions are related to diffusion abnormalities in specific ipsilateral, mostly frontal, WM regions.[28]

Quaintness in behavior, hyperactivity, irritability, muddle, suicide and homicidal trends are frequent.[5,17,24]

The most frequent diagnoses were mood disorder (31%), disruptive behavior disorder (25%), and adjustment disorder (25%). A substance-related disorder was the most frequent in adults (67%).[29] A significant association was found between disruptive behavior disorder not otherwise specified and more left frontal and left parietal involvement.[30] A trend toward significant association of having a seizure in the past three months with disruptive behavior disorder not otherwise specified

Table 1. Main clinical characteristics of the described cases.

Main clinical features	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Facial angioma	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Cortical calcification	-	+	+	+	+	+	+	-	-	+	-	+	+	+
Chorioid angioma	+	-	-	-	+	-	-	-	-	+	-	-	+	-
Megophthalmos	+	-	-	-	+	-	-	-	-	-	+	-	-	-
Megalocornea	+	-	-	-	-	-	-	-	-	-	-	-	-	-
Epilepsy	+	+	+	+	+	+	+	+	+	-	+	+	+	+
Hemiparesis	+	+	+	+	+	+	-	-	-	-	-	-	-	+
Cranial nerve deficit	+	-	-	-	-	-	+	-	-	-	+	-	-	-
Mental retardation	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Ventricular and subaracnoid space dilatation	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Cranial facial dysmorphies	+	+	-	-	+	-	+	-	+	+	-	-	-	+

was observed. Problems with mood, attention, sleep, learning, and substance use were common.[29] There are also symptoms related to infundibulum-hypophyseal deranged functioning (growth disorder, acromegaly, insipid diabetes, adipositas, genital adipicdystrophia).[12]

Conclusions

Sturge-Weber-Krabe syndrome is a multisystem disorder that requires the neurologist to be aware of the possible endocrine, psychiatric, ophthalmological, and other medical issues that can arise and impact the neurological status of these patients.[5,13]

The characteristics of the reported cases are similar to those presented in literature. Two elements are interesting: the exceptional diffusion to the whole hemicorpo of the red nevous and the evaluation of the living patterns related to the disease that is not considered in literature.

On the contrary, this is an important factor since new pharmacological therapies can obtaina good control of the epilepsy and consequently an extension of life, and less deterioration of the patient's condition.

References

1. Sturge WA. A case of partial epilepsy apparently due to lesion of one of the vasomotor centres of the brain. Clinic Soc Lond Trams 1979;12:162.
2. Weber FP. A note on the association of extensive haemangiotousnaevus of the skin with cerebral (meningeal) haemangioma, especially cases of facial vascular naevous with controlateral hemiplegia. Proc Roy Soc Med Sec Neurol 1929;22:431.
3. Krabbe KH. Recherchesanatomopathologiquessur un cas de Soi-Disantangiomecalcifie des meninges, demontre par radiographie. Rev Neurol 1932;1:1394.
4. Chen L, Wu J, Xu M, et al. Sturge-Weber syndrome. Ann Dermatol 2011;23:551-3.
5. Lo W, Marchuk DA, Ball KL, et al. Updates and future horizons on the understanding, diagnosis, and treatment of Sturge-Weber syndrome brain involvement. Dev Med Child Neurol 2012;54:214-23.
6. Purkait R, Samanta T, Thakur S, Dhar S. Neurocutaneous syndrome: a prospective study. Indian J Dermatol 2011;56:375-9.
7. Colletti F, Diederichs G, Gebauer B, Poellinger A. Sturge-Weber syndrome. Pediatr Neurosurg 2011;47:80.
8. Chaudhary SC, Sonkar SK, Kumar V, Golchha S. Sturge Weber syndrome. J Assoc Physicians India 2011;59:327-9.
9. Parisi L, Di Filippo T, Roccella M. Hypomelanosis of Ito: neurological and psychiatric pictures in developmental age. Minerva Pediatrica 2012;64:65-70.
10. Comi AM. Presentation, diagnosis, pathophysiology, and treatment of the neurological features of Sturge-Weber syndrome. Neurologist 2011;17:179-84.
11. Roccella M. Hypomelanosis of Ito. Report of three cases and review of the literature. Giornale di Neuropsichiatria dell'Età Evolutiva 1998;18:221-8.
12. Roccella M. Sturge-Weber-Krabbe syndrome. Giornale di Neuropsichiatria dell'Età Evolutiva 1996;16:234-9.
13. Bay MJ, Kossoff EH, Lehmann CU, et al. Survey of aspirn use in Sturge-Weber syndrome. J Child Neurol 2011;26:692-702.
14. La Grutta S, Lo Baido R, Schiera G, et al. Symbolic function explored in children with epilepsy and headache. Minerva Pediatr 2007;59:745-75.
15. Dulac O, Larregue M, Roger J. Maladie de Sturge-Weber. Interet de l'analysetopographique de l'angiomecutane pour la diagnostic d'angiomeassocie. Arch Fr Pediatr 1982;39:155-8.
16. Mastroiacovo P, Dallapiccola B, Andrai G. La sindrome di Sturge-Weber. In: Difetti congeniti e sindromi malformative. Milano: McGrawhill; 1990. p 470.
17. Morrow SA, Campbell C. The cutaneous angioma of Sturge-weber syndrome. Can J Neurol Sci 2008;35:506-7.
18. Zhou J, Li NY, Zhou XJ, et al. Sturge-Weber syndrome: a case report and review of literatures. Clin Med J (Engl) 2010;123:117-21.
19. Montalbano R, Roccella M. The quality of life of children with pervasive developmental disorders. Minerva Pediatr 2009;61:361-70.
20. Wu J, Tarabishy B, Hu J, et al. Cortical calcification in sturge-Weber syndrome on MRI-SWI: relation to brain perfusion status and seizure severity. J Mgn Reson Imaging 2011;34:791-8.
21. Reesman J, Gray R, Suskauer SJ, et al. Hemiparesis is a clinical correlate of general adaptative dysfunction in children and adolescents with Sturge-Weber syndrome. J Child Neurol 2009;24:701-8.
22. Terdjman P, Aicardi J, Sainte-Rose C. Neurological findings in the Sturge-Weber Syndrome (SWS) and isolated pialangiomatosis. Neuropediatrics 1991;22:115-20.
23. Morrow SA, Campbell C. The cutaneous angioma of sturge-Weber syndrome. Can J Neurol Sci 2008;35:506-7.
24. Carotenuto M, Esposito M, D'Aniello A, et al.Polysomnographic findings in Rett syndrome: a case-control study. Sleep Breath 2013;17:93-8.
25. Pascual-Castroviejo I, Diaz-Conzales C, Garcia-melian RM. Sturge-Weber Syndrome: study of 40 patients. Pediatr Neurol 1993;9:283-8.
26. Zabel TA, Reesman J, Wodka EL, et al. Neuropsychological features and risk factors in children with Sturge-Weber syndrome: four case reports. Clin Neuropychol 2012;24:841-59.
27. Caraballo R, Bartuluchi M, Ceròsimo R, et al. Hemispherectomy in pediatric patients with epilepsy: a study of 45 cases with special emphasis on epileptic syndrome. Childs NervSyst 2011;27:2131-6.
28. Behen ME, Juhasz C, Wolfe-Christensen C, et al. Brain damage and IQ in unilateral Sturge-Weber syndrome: a support for a fresh starthypotesis. Epilepsy Behav 2011;22:352-7.
29. Turin E, Grados MA, Tierney E, et al. Behavioral and psychiatric features of Sturge-Weber syndrome. J Nerv Ment Dis 2010;198:905-13.
30. Alkonyi B, Govindan RM, Chugani HT, et al. Focal white matter abnormalities related to neurocognitive dysfunction: an objective diffusion tensor imaging study of children with Sturge-Weber syndrome. Pediatr Res 2011;69:74-9.