Diagnosis and management of idiopathic facial palsy in children

Diagnostic et prise en charge des paralysies faciales idiopathiques de l'enfant

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RÉSUMÉ

La paralysie faciale idiopathique ou paralysie de Bell est une atteinte périphérique aigue du nerf facial. L'affection est rare avant l'âge de 10 ans. Parmi les hypothèses soulevées, les plus incriminées étant l'ischémie neuronale et les atteintes vasculaires. Nous rapportons dans ce travail cinq enfant atteints d'une paralysie de Bell afin d'en analyser les données épidémiologiques diagnostiques et thérapeutiques. L'évolution a été jugée essentiellement sur l'amélioration de la motricité faciale. Le bilan de thrombophilie chez ces enfants suggère l'implication probable de certaines mutations du facteur V, du facteur MTHFR et du facteur XIII dans l'étiopathogénie.

Mots-clés

Paralysie de Bell, enfant, motricité faciale, thrombophilie.

SUMMARY

Idiopathic or Bell's palsy is an acute peripheral-nerve palsy involving the facial nerve. The disorder is quite infrequent under the age of 10 years. The proposed etiologies of Bell's palsy include ischemic neuropathy and vascular diseases. This case series presents five children with Bell's palsy. The epidemiologic, diagnostic and therapeutic measures were summarized. The evolution regarding especially the facial motricity was detailed. The results about the role of some thrombophilic polymorphisms suggest a probable involvement of factor V haplotype, MTHFR and factor XIII in the etiology of Bell's palsy in five Tunisian children.

Key-words

Bell's palsy, Children, Facial motricity, Thrombophilic polymorphisms.

Facial nerve palsy is a rare pediatric disease that may be congenital or acquired. The causal etiology often remains unclear despite extensive investigation. Many hypotheses for idiopathic facial nerve dysfunction termed Bell's palsy have been reported in the literature (1,2). The implication of immunogenic factors (3), neurological disorders, and vascular diseases (4) have been discussed. The current case series will develop the clinical investigations regarding Bell's palsy in children including thrombophilic mutations in addition to the therapeutic approaches and the outcomes.

METHODS

Our study was carried out in association between the Oto-rhino-laryngology department and the Hematology department for the mutation analysis and molecular modeling of thrombophilic polymorphism. We included all the cases of Bell's palsy diagnosed and treated during the period between January 2014 and June 2015. During this period, five children were admitted for peripheral facial nerve palsy. The epidemiological data, clinical symptoms, paraclinical explorations, therapeutic protocols, and the evolution of the disease were analyzed. Additionally, thrombophilic polymorphisms were investigated using a multiplex amplification with the biotinylated primers technique. The polymerase chain reaction products then underwent a reverse hybridization and permit the molecular genetics characterization of the polymorphisms.

RESULTS

Five children were included in our study. The mean age was 5 years ± 3.53 SD (2 to 11 years). No past medical history was reported in any of the cases. The first clinical presentation was usually unilateral facial asymmetry noted by the parents. It was the first episode in all the cases. The clinical examination noted various degrees of peripheral facial palsy. The otoscopic and neurologic examinations were normal in all the cases. Routine laboratory tests: blood cell count, sedimentation rate, C-reactive protein, prothrombin time, activated partial thromboplastin time and fibrinogen analysis did not reveal any abnormalities. The table I summarizes the epidemiologic data (age, sex), clinical signs (affected side, physical examination, muscle testing) and the results of routine laboratory tests. Besides, brain imaging has been performed in 4 cases: computed tomography scanning (CT-scan) in one case and magnetic resonance imaging (MRI) in 3 cases. The radiologic explorations were normal in all the cases.

Additionally, we searched for mutations of thrombophilic factors using a multiplex amplification with the biotinylated primers technique. The thrombophilic polymorphisms studied were factor V Leiden, factor V HR2 haplotype, prothrombin G20210A (factor II), methyl-tetra-hydro-folate reductase (MTHFR), factor XIII, and plasminogen activator inhibitor 1 (PAI-1).

Table 1 : Epidemiologic and clinical features of patients

Feature	Child n° 1	Child n° 2	Child n° 3	Child n° 4	Child n° 5
Age, Sex	2 years, ♂	3 years,♀	4 years, ♀	5 years, ♀	11 years,♂
Evolving during	48 hours	24 hours	1 Week	1 Week	24 hours
Facial side of palsy	Right	Right	Right	Left	Right
Muscle testing	-	-	14/30	17/30	12/30
Physical examination	Pharyngitis	Normal	Normal	Pharyngitis	Normal
Laboratory testing	Normal	Normal	Normal	Normal	Normal
Brain imaging	MRI (Normal)	MRI (Normal)	CT-scan (Normal)	MRI (Normal)	-

♂: male, ♀: female

Thus, our study suggested a probable involvement of factor V HR2 haplotype, MTHFR C677T and A1298C, factor XIII in the heterozygous state, as well as the PAI-1 4G/5G genotype in the etiology of Bell's palsy in these five Tunisian children (table II).

Table 2 : Results for the detection of thrombophilic polymorphisms

Polymorphism	Child n° 1	Child n° 2	Child n° 3	Child n° 4	Child n° 5
FVL	Wild type	Wild type	Wild type	Wild type	Wild type
FII	Wild type	Wild type	Wild type	Wild type	Wild type
FV H1299R	HZG	HZG	HZG	HZG	HZG
MTHFR C677T	HZG	HZG	HZG	HZG	HZG
MTHFR A1298C	HZG	Wild type	HZG	HZG	HZG
FXIII	HZG	HZG	Wild type	HZG	Wild type
PAI-1	4G/5G	4G/5G	4G/5G	4G/5G	4G/5G

The treatment consisted of systemic steroids (hydrocortisone at the dosage of 5 mg/kg daily), antivirals (acyclovir at the dosage of 5 mg/kg per day), and manual physiotherapy of the facial musculature.

The evolution was appreciated through clinical examination: neurological conditions, otoscopy, facial motricity and the evolution of the stapedian reflex. Complete facial recovery was observed in all the cases after 3 to 8 weeks. Neither muscular facial asymmetry nor other sequelae have been noted. The evolution under treatment with regards to the initial clinical evaluation of the facial palsy is detailed in the Table III.

Table 3 : Therapeutic procedures and outcome of patients

Feature	Child n° 1	Child n° 2	Child n° 3	Child n° 4	Child n° 5
Manual muscle testing	-	-	14/30	17/30	12/30
Treatment	Systemic steroids + Antiviral	Systemic steroids + Physical therapy	Systemic steroids + Antiviral + Physical therapy	Systemic steroids + Physical therapy	Systemic steroids + Physical therapy
Evolution	Complete facial recovery (3 weeks)	Complete facial recovery (6 weeks)	Complete facial recovery (4 weeks)	Complete facial recovery (8 weeks)	Complete facial recovery (3 weeks)

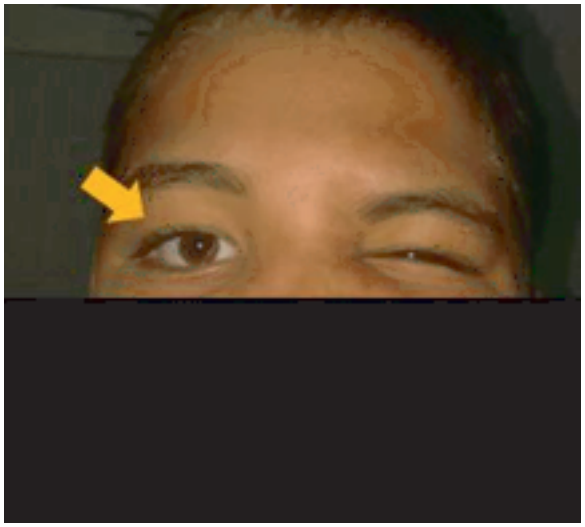

Figure 1: Widening of the right palpebral fissure in an 11-year-old boy with a right Bell's palsy.

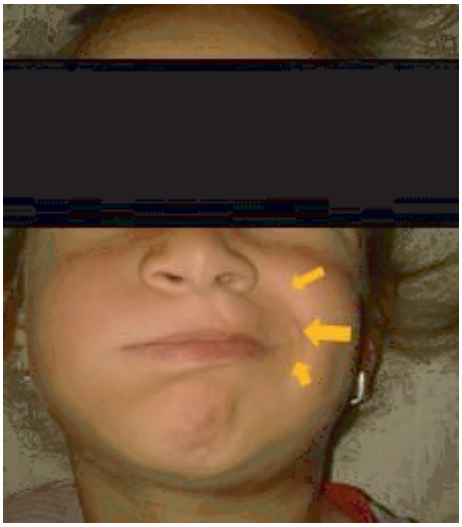

Figure 2: Attraction of the mouth and the nasolabial fold to the left (the normal) side in a 5-year-old girl with a right Bell's palsy.

DISCUSSION

Bell's palsy is an idiopathic, acute peripheral-nerve palsy involving the facial nerve, which supplies all the muscles of facial expression. Its annual incidence is approximately 15 per 100000 people (1). The disorder is quite infrequent under the age of 10 years (5). The cause of the paresis remains unknown. The proposed etiologies of Bell's palsy include inflammatory, autoimmune and viral infections (1,2,4). A probable implication of viral infection in pediatric cases of Bell's palsy has been discussed by many authors since a history of nonspecific upper airway infections has been noticed in some cases (2). Although many studies were conducted about herpes simplex virus, Epstein-Barr virus, cytomegalovirus and Varicella, there is no serologic evidence of the viral implication in Bell's palsy in children (2,4). Nowadays, the most studied hypotheses are the ischemic neuropathy and the vascular disorders since they have been incriminated in many other idiopathic diseases (6).

The diagnostic investigation for those children begins by a careful clinical examination seeking for a cause of facial palsy: temporal bone trauma, otitis media or a neurological disorder (7). In the same order of ideas, some explorations are needed to exclude a specific etiology such as neuro-imaging studies especially when a trauma, a tumor or another cerebral disorder id suspected. In very young children and when the context is unclear, brain imaging is also recommended (8).

Biological investigations include routine exams seeking for a biological inflammatory syndrome: white blood cell count, C-reactive protein and blood sedimentation rate are performed. Besides and in order to explore a possible vascular etiology, the exploration of hemostasis disorders includes the determination of Quick test, partial thromboplastin time test and thrombin time test. The exploration of Von Willebrand factor and platelet functions are optional (9).

Several studies have considered the impact of gene polymorphisms on venous and arterial thrombosis; in particular, factor V Leiden, factor V HR2 haplotype, prothrombin G20210A (FII), methyltetrahydrofolate reductase (MTHFR), factor XIII, and plasminogen activator inhibitor 1 (PAI-1) genes polymorphisms have been widely studied (10). Moreover, studies showed that each of those genetic thrombophilic risk factors has an impact on the early onset of spontaneous cerebrovascular ischemic accidents during infancy and childhood, independently of predisposing diseases (11,12). In our study, we performed an analysis of those possible gene polymorphisms and to our knowledge this is one of the first association studies of the thrombophilic polymorphisms implication in Bell's palsy. Thus, for our patients, an association between Bell's palsy in children and thrombophilic polymorphisms was suspected since all children were heterozygous for the FV HR2 haplotype (FV H1299R), MTHFR C677T, and the 4G/5G variant of the PAI-1 gene. Besides, the majority of children were heterozygous for both MTHFR A1298C (4 of 5 children) and FXIII (3 of 5 children) polymorphisms.

With regard to the therapeutic approaches, hospital recovery is not usually indicated in case of Bell's palsy. The treatment includes various associations of corticosteroids, vasoactive drugs, antivirals and manual physiotherapy for the facial musculature (13,14). It's better to start the medication as early as possible after the onset of symptoms (7). Nevertheless, a meta-analysis of 4 randomized controlled studies suggested a contestable benefit of steroids, combined or no with acyclovir,

concerning complete recovery (8). In his study, Axelsson suggested that Valaciclovir did not add any significant effect to prednisolone regarding recovery rate or synkinesis. However, prednisolone resulted in satisfactory recovery rates and should be considered in all patients regardless of their degree of facial palsy (14).
Physiotherapy seems to be effective especially in severe facial palsy (15).
The overall prognosis of Bell's palsy in children is good and the evolution of the disease is often favorable even without treatment. In fact, Bell's palsy is characterized by an overall high rate of spontaneous recovery (8). Recovery time seems to be shorter in children with Bell's palsy even if the complete resolution of the muscular impairment varies from a patient to another (7,13).

CONCLUSION

Bell's palsy in children must be retained after a thorough diagnostic investigation to exclude a potential specific etiology of facial palsy and to direct treatment. Our study suggested that mutations in thrombophilic genes could be implicated. Therefore studies with large numbers of patients are required to fully appreciate the impact of thrombophilic polymorphism in Bell's palsy.

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