

The prognosis of agenesis of the corpus callosum might mostly be favourable

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Summary

The post-natal development of 6 patients with complete agenesis of the corpus callosum was assessed. The diagnosis of agenesis of the corpus callosum had been suspected prenatally in 3 cases. In the remaining 3 cases diagnostic neuro-imaging was performed because of partial seizures (n = 2) and pendular nystagmus (n = 1). The neurological examination was normal in all patients with the ex-

ception of nystagmus in one. The neuro-developmental outcome was found to be normal in all 6 patients. In conclusion, these data suggest that good outcome is predominant in agenesis of the corpus callosum.

Key words: Agenesis of corpus callosum; magnetic resonance imaging; epileptic seizures

Introduction

Normally, the corpus callosum begins to develop at about 12 weeks of gestation and can be sonographically appreciated by 18 to 20 weeks of gestation [1]. Since agenesis of the corpus callosum (ACC) usually occurs in combination with other malformations, children with ACC mostly present with intellectual retardation, seizures, hydrocephalus, and cerebral palsy. Isolated ACC mostly

results in pleiotropic, rather mild clinical manifestations that are mostly recognised at school age but is rarely entirely asymptomatic [2, 3].

We present a consecutive series of individuals with complete ACC and a rather long follow up encountered in a single paediatric neurology practice to further the clinical profile of this malformation.

Case report

Our experience includes 6 patients (2 female and 4 male subjects) currently aged 2 to 27 years with complete ACC (table 1). In these patients the family history was negative with respect to ACC. The patients were born at term after an uneventful pregnancy with the exception of patient 1, who was delivered by caesarian section at 34 weeks. Neonatal weight, height and head circumference were appropriate for gestational age and the clinical examination normal in the 6 patients.

The diagnosis of ACC had been suspected prenatally in 3 cases (patient 1, 2 and 3) by means of a routine mid-gestation sonography revealing a bilateral ventricular enlargement [4, 5]. In these patients soon after birth magnetic resonance imaging yielded the characteristic abnormalities of complete ACC [6].

Findings consistent with pendular nystagmus were noted in patient 4 at the age of 4 weeks. Fundoscopy and electroretinography were normal. At the age of 8 months

magnetic resonance imaging disclosed complete ACC. Patients 5 and 6 presented with a history of partial complex seizures at the age of 3 and 11 years respectively. Electroencephalography disclosed some interhemispheric asynchronism and a focus of delta-theta waves in the temporo-occipital region on the right (patient 5) and the left side (patient 6), but no epileptic discharges. In patient 5 medical treatment with carbamazepine was instituted and withdrawn after two years without seizures. In patient 6 control of seizures was achieved combining carbamazepine with valproic acid. In both patients magnetic resonance imaging disclosed complete ACC without any associated abnormalities.

The development of the 6 patients was very recently assessed (table 1). The neurological examination including cranial nerve examination, motor and sensory examinations and evaluation of coordination was normal in all patients with the exception of nystagmus in patient 4. The

Table 1

Clinical features in 6 consecutive patients with complete agenesis of the corpus callosum.

Number	Gender	Age at diagnosis	Presenting clinical features	Current age (years)	Neuro-developmental assessment test	Result
1	Female	28th gestational week	None	10	Wechsler ^a	102
2	Male	26th gestational week	None	2	Griffith ^b	Normal
3	Male	24th gestational week	None	2	Griffith ^b	Normal
4	Male	8 months	Pendular nystagmus	11	Kaufmann ^c	116
5	Male	13 years	Partial seizures (3 years of age)	25	Raven ^d	110
6	Female	3 years	Partial seizures (11 years of age)	9	Kaufmann ^c	97

^a Wechsler Intelligence Scale for Children-Revised; ^b Griffith Scales of Mental Development;

^c Kaufmann Assessment Battery for Children; ^d Raven Standard Progressive Matrices.

Wechsler Intelligence Scale for Children-Revised (patient 1), the Griffiths Scales of Mental Development (patients 2 and 3), the Kaufmann Assessment Battery for Children

(patients 4 and 6), or the Raven Standard Progressive Matrices (patient 5) were used to assess the neuro-developmental outcome, which was found to be normal in all cases.

Discussion

The estimated prevalence of ACC is 0.3–0.5% in the general population and 2.3% in developmentally disabled individuals [7]. It is usually assumed that, although a normal asymptomatic outcome of ACC can occur, it is the exception rather than the rule [2, 3]. The present data suggest that good outcome is predominant in isolated ACC, as indicated by the fact that no dysfunction was disclosed in 3 patients and a mild dysfunction, including partial, rather benign epilepsy or nystagmus, in the remaining 3 patients.

The discrepancy between the traditional assumption of poor outcome and our experience relates to the fact that in the past ACC was demonstrated by neuroimaging in infants with a clinically relevant nervous system dysfunction. Routine midgestation sonography has changed things [4, 5]: nowadays isolated ACC is rather commonly demonstrated during foetal life. Studies dealing with prenatally detected ACC report that isolated ACC has an excellent prognosis with an up to 85% chance of a normal outcome [8, 9]. However, duration of follow-up in these studies is often short, suggesting that late onset neurological signs may

be missed. It has been suggested that the corpus callosum is important for tactuo-motor learning and bimanual coordination [10, 11]. It is therefore tempting to assume that some subtle but practically irrelevant abnormalities in tactuo-motor learning and bimanual coordination is likely to be present in our patients with ACC, who were mainly studied using global scales.

The outcome is obviously less favourable in children with ACC in the context of a recognised, extensive cerebral dysgenesis syndrome [2, 3].

In conclusion our obviously preliminary data demonstrate that isolated ACC could have a favourable outcome. However, a long follow-up is advised to diagnose minor abnormalities.

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References

- 1 Gelot A, Esperandieu O, Pompidou A. Histogénèse du corps calleux. *Neurochirurgie* 1998;44(Suppl 1):61–73.
- 2 Parrish ML, Roessmann U, Levinsohn MW. Agenesis of the corpus callosum: a study of the frequency of associated malformations. *Ann Neurol* 1979;6:349–54.
- 3 Lacey DJ. Agenesis of the corpus callosum. Clinical features in 40 children. *Am J Dis Child* 1985;139:953–5.
- 4 Pilu G, Sandri F, Perolo A, Pittalis MC, Grisolia G, Cocchi G, et al. Sonography of fetal agenesis of the corpus callosum: a survey of 35 cases. *Ultrasound Obstet Gynecol* 1993;3:318–29.
- 5 Vergani P, Ghidini A, Strobelt N, Locatelli A, Mariani S, Bertalero C, Cavallone M. Prognostic indicators in the prenatal diagnosis of agenesis of corpus callosum. *Am J Obstet Gynecol* 1994;170:753–8.
- 6 Davidson HD, Abraham R, Steiner RE. Agenesis of the corpus callosum: magnetic resonance imaging. *Radiology* 1985;155:371–3.
- 7 Jeret JS, Serur D, Wisniewski K, Fisch C. Frequency of agenesis of the corpus callosum in the developmentally disabled population as determined by computerized tomography. *Pediatr Neurosci* 1985–86;12:101–3.
- 8 Goodyear PW, Bannister CM, Russell S, Rimmer S. Outcome in prenatally diagnosed fetal agenesis of the corpus callosum. *Fetal Diagn Ther* 2001;16:139–45.
- 9 Moutard ML, Kieffer V, Feingold J, Kieffer F, Lewin F, Adamsbaum C, et al. Agenesis of corpus callosum: prenatal diagnosis and prognosis. *Childs Nerv Syst* 2003;19:471–6.
- 10 Sauerwein HC, Lassonde M. Cognitive and sensori-motor functioning in the absence of the corpus callosum: neuropsychological studies in callosal agenesis and callosotomized patients. *Behav Brain Res* 1994;64:229–40.
- 11 Finlay DC, Peto T, Payling J, Hunter M, Fulham WR, Wilkinson I. A study of three cases of familial related agenesis of the corpus callosum. *J Clin Exp Neuropsychol* 2000;22:731–42.

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