

## Neuropsychological Changes After Callosotomy in Drug-resistant Epilepsy: a Study of the Short-term Evolution \*

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### Summary

With the increasing interest in callosotomy as treatment for intractable epilepsy, it seems to be important to define the neuropsychological consequences of the related surgical operation. 8 patients suffering from drug-resistant seizures underwent section of the corpus callosum, 6 in the anterior part only and 2 undergoing complete two-stage commissurotomy including the posterior part. Before the callosotomy the patients were studied using a cognitive, affective and behavioural battery which was repeated 15 and 90–100 days after the operation. The patients with sufficient I.Q. were described in more detail using the cognitive parameters; the social and motor behaviour of Lennox-Gastaut subjects are accurately reported.

No disconnection syndrome was ever observed after the partial commissurotomy while it occurred in one of the two complete callosotomies. The patients showed longer reaction times and a mild impairment of linguistic, praxic, memory and motor functions in the former evaluation (15 days), but there was consistent improvement in the latter check up. At the 90–100 day follow-up the Lennox-Gastaut patients responded more readily to the environmental stimulations and their postural, motor and behavioural functions were unchanged or improved, with respect to presurgical performances. The social and emotional behaviour of all the patients had always improved by the time the long-term evaluation (90 days) was performed. Finally, by limiting the callosotomy to the anterior part only, the neurological and psychological consequences seem to be limited. The post-operative disorders in the short-term follow-up are often related to the surgical procedure and complications arising during the operations, while the neuropsychological improvement is also related to more satisfactory seizure control and/or the reduction in treatment.

**Keywords:** Callosotomy; neuropsychology; intractable epilepsy; disconnection syndrome.

### Introduction

Since 1940, when Van Wagenen and Herren first carried out callosotomy<sup>25</sup> as treatment for drug-resis-

tant epilepsy, many neurological and neuropsychological investigations have been carried out, revealing an increasing interest in the functional changes of split-brain patients. In fact, although current opinion is that the callosotomy is followed by little physical or mental disability in daily living, the dichotomy between the behavioural impairment revealed by neuropsychological investigation in split brain patients and the favourable clinical follow-up in callosotomized epileptics, should still be underlined.

The preliminary studies by Gazzaniga<sup>12–15</sup> on split brain patients reported an impairment in intellectual functions and severe personality alterations; furthermore, Zaidel and Sperry<sup>29</sup> showed that memory functions were markedly damaged in the long-term follow-up.

Nevertheless, when studies have compared the neuropsychological performances of a given patient both before and a few months after the callosotomy, the results indicate that the cognitive changes occurring in these patients are unimportant<sup>2, 10, 17</sup>. Moreover, while following up a commissurectomized patient for 4 years or more after surgery, Bogen and Vogel<sup>3</sup> found that his daily behaviour and social relations were normal.

Actually, it is very important for clinical purposes to check the patient's neuropsychological functions after the surgical procedure in order to detect whether the disconnection syndrome occurs and how great the neurological and the psychological "costs" of the therapy are. Current neuropsychological tests and neurological evaluations, as already adopted in recent research<sup>2, 10, 24</sup>, may be used to reach such a goal.

The aim of this study is to evaluate the short-term complications and evolution of cognitive, motor and

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Table 1. *Patients and Type of Epilepsy*

Number -Name	Age	Sex	Handedness	I.Q.	School attendance years	Epileptic syndrome	Aetiology of epilepsy	Neurological impairment	CT features	Clinical evaluation (according to Wilson 1982)
I - M.M.	32	f	r	86	8	partial and generalized seizures	perinatal anoxia	none	mild ventricular enlargement	excellent
II - G.S.	26	f	r	99	5	partial and generalized seizures	perinatal anoxia	none	central atrophy asymmetrical skull for right hypoplasia	excellent
III - S.M.	37	m	r	87	8	partial and generalized seizures	traumatic	none	normal	excellent
IV - I.C.	33	m	l	78	8	partial and generalized seizures	traumatic	mild left hemiparesis	central atrophy	good (after the complete callosotomy)
V - G.S.	22	m	l	less than 70	none	Lennox-Gastaut	birth asphyxia	mild right hemiparesis	mild ventricular enlargement	excellent (after the complete callosotomy)
VI - R.M.	21	m	r	less than 70	none	Lennox-Gastaut	prolonged febrile convulsions	severe mental retardation	normal	poor
VII - M.B.	14	m	r	less than 70	none	Lennox-Gastaut	intracranial birth injury	mental retardation	diffuse atrophy prevailing in right hemisphere	poor
VIII - P.B.	29	f	r	less than 70	none	Lennox-Gastaut	encephalitis	severe mental retardation	normal	good