In pediatric patients, one should consider early surgical intervention to control seizures and prevent neuronal deterioration. After Dandy performed the first callosotomy during a brain tumor operation in 1922, Van Wagenen and Herren were the first to undertake callosotomy for generalized epilepsy in 1940. The surgical outcomes were relatively good, but the operative morbidity and mortality were so severe that physicians hesitated to use this operation for generalized epilepsy. The first microsurgical callosotomy was conducted, without complication, by Wilson in 1975. After this successful surgery, microsurgical callosotomy was widely used to control epilepsy. The common indications for using callosotomy are medically refractory and generalized or partial seizures with rapid secondarily generalized patterns and without localized lesions. Total callosotomy is particularly effective for treating drop attacks, life-threatening primary or secondary generalized seizures, and medically refractory mixed seizure types such as Lennox–Gastaut syndrome and has been considered most helpful in patients sustaining frequent injuries due to epileptic falls, especially falls resulting from atonic seizures. Subsequent reports have confirmed the efficacy of the operation in decreasing the frequency and severity of drop attacks or myoclonic seizures. In addition to seizure frequency reduction, the authors of recent reports have noted improved behavior and parental satisfaction as important measures for evaluating the success of this surgical intervention.

Abbreviation used in this paper: EEG = electroencephalography.
sy was controlled. If the seizure continued, the remaining callosum was sectioned. Therefore, in actuality, the result of this methodology approximated a 2-stage total callosotomy. Contrary to our expectations or concerns, patients who have undergone total callosotomy did not exhibit any severe complications, such as acute disconnection syndrome or split-brain syndrome. This result was similar to the results published in other papers. Therefore, we hypothesized that the 1-stage total callosotomy would be better and safer than the 2-stage total callosotomy or partial callosotomy. Under these assumptions, we tried to identify the effect of 1-stage total callosotomy on intractable generalized seizures and other seizure types. We analyzed the results of 1-stage total callosotomy performed at a single institute.

**Methods**

**Patient Population**

We retrospectively analyzed the records obtained in 34 patients who underwent total callosotomy at Yonsei University Medical Center between March 2003 and December 2006. The patients were all followed for at least 12 months. There were 22 male and 12 female patients who ranged in age from birth to 10 years (mean 2.5 years) at the onset of seizures and from 1 to 19 years (mean 8.7 years) at the time of surgery. The mean follow-up duration was 2.58 years (range 1.08–5 years), and the seizures occurred over a period ranging from 0.5 to 17 years (mean 6 years). In our patients there were diverse causes of epilepsy, including neonatal complications, infantile spasms, cortical dysplasia, viral encephalitis, head trauma, and Down syndrome. Additionally, in several patients Lennox–Gastaut syndrome was diagnosed secondary to various causative factors. The indications for performing a total callosotomy were as follows: 1) medical seizure intractability (intractable seizures occurring over a period of 2 years despite the attempted use of all standard anticonvulsant medications); 2) types of seizures that were potentially amenable to callosotomy (particularly generalized atonic, tonic, or tonic–clonic seizures); 3) no identified single epileptiform focus; and 4) seizures that could possibly be localized to 1 hemisphere or single foci after the callosotomy. For the preoperative workup, both continuous EEG and video monitoring were performed to characterize the seizure type in each patient. Brain MR imaging and EEG were performed pre- and postoperatively. Twenty-three patients underwent neuropsychological testing to evaluate their IQ scores and cognitive deficits pre- and postoperatively with the Korean Wechsler Intelligence Scale for Children. Other preoperative evaluations included interictal SPECT in 11 patients and PET in 27 patients. The completeness of the callosal section was confirmed intraoperatively in all cases. Postoperative MR images were obtained in all patients to confirm the completeness of the callosal section (Fig. 1). Because we tried to confirm the completeness of the section, we also performed tractography from the diffusion tensor image (Fig. 2). We found no evidence of contusional hemorrhage or ischemic changes in the brain around the surgical site in any of the cases.

**Seizure Types and Surgical Outcomes**

Seizures were classified into 5 types: generalized tonic–clonic, complex partial, absence, myoclonic, and drop attack seizures. The last category included all atonic, akinetic, tonic, or tonic–atomic seizures associated with abrupt falls. Seizure outcomes for each seizure type were evaluated according to the Wyler Classification (Table 1). Patients were followed for at least 6 months before their seizures were classified as improved or resolved. The treatment was considered a failure if no improvement was documented in the first 3 months of surgery. A significant improvement was defined as Class 1 or 2.

All patients experienced either drop attacks or mixed seizures. Of the 26 patients with mixed seizures, 1 had 4 seizure types, 3 had 3 seizure types, and 22 had 2 seizure types. The seizure types that were represented in the mixed group included generalized tonic–clonic seizures in 18 cases, complex partial in 9, absence in 1, generalized tonic in 2, and myoclonic in 8. The frequency of seizures varied from 1/day to 150/day. During chronic video-EEG monitoring, the most common type of drop attack was a tonic seizure.

**TABLE 1**

<table>
<thead>
<tr>
<th>Seizure outcome stratified by Wyler Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
</tbody>
</table>
Daily Function and Satisfaction

Changes in daily function and parental satisfaction with surgical outcome were determined during follow-up admission, outpatient evaluation, and consultation. Daily function was assessed in terms of changes in attention, emotional well-being, daily activity, and hyperactivity. Changes in overall daily function were categorized as improved, unchanged, or impaired. Parental satisfaction was rated as excellent, moderate, or poor. In addition, parents were interviewed to ascertain changes in daily function in their children and their satisfaction.

Results

Seizure Outcome

After callosotomy, 12 patients (35%) became seizure free; these patients had previously suffered from the following: drop attack seizures in 8 patients, generalized tonic seizures in 2, complex partial seizures in 1, and absence seizures in 1. Seizures in 4 of 34 patients remained unchanged; these 4 patients had previously suffered from the following: generalized tonic–clonic seizures in 2, complex partial seizures in 1, and myoclonic seizures 1. After at least 6 postoperative months, the results of the total callosotomy were evaluated. Significant improvement was defined as Class 1 or 2, and this was documented in 26 (76.4%) of the 34 patients. Overall outcomes were as follows: Class 1 in 12 patients, Class 2 in 14, and Class 3 in 8 (Table 2). The surgical outcomes varied according to seizure type. The frequency of drop attacks dramatically improved after total callosotomy. Among 34 patients with drop attacks, 25 patients were Class 1, 6 were Class 2, and 3 were Class 3. Significant improvements occurred in 91.2% of the patients with drop attack (Class 1 in 25 patients and Class 2 in 6 patients) (Table 2). However, significant improvements in

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**TABLE 2**

Outcome after callosotomy according to seizure type in 34 patients*

<table>
<thead>
<tr>
<th>Type of Seizure</th>
<th>Class 1</th>
<th>Class 2</th>
<th>Class 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>drop attack</td>
<td>25</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>GTC</td>
<td>12</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>CPS</td>
<td>5</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>absence</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>myoclonic</td>
<td>3</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>GT</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>total†</td>
<td>12</td>
<td>14</td>
<td>8</td>
</tr>
</tbody>
</table>

* CPS = complex partial seizure; GT = generalized tonic seizure; GTC = generalized tonic–clonic seizure.
† Total indicates overall outcome.
complex partial seizures and myoclonic seizures occurred in many fewer patients than drop attacks or generalized tonic–clonic seizures (Table 2). One patient with Class 3 status after total callosotomy underwent a hemispherotomy as a second step to control intractable seizures originating from a unilateral hemispheric lesion. After the second operation, the patient’s seizures became Engel Class II. After a total callosotomy, 1 patient developed a new type of seizure (generalized tonic–clonic) that exhibited a localized focal spike. With respect to operative complications, disconnection syndrome was suspected in 2 patients who underwent total callosotomy, but the syndrome gradually improved and ceased to be problematic within 2 or 4 weeks. One patient experienced 3 weeks of ataxic hemiparesis, which then completely resolved. Additionally we found no signs of significant and persistent neurological deficits in any of the cases.

Changes in Daily Function and Satisfaction

Parents reported that the overall daily function in their children was improved in 22 (64.7%) of the 34 patients and was impaired in 5 (14.7%) of the patients (Table 3). Parents of 19 (55.9%) of the patients reported being satisfied with the results of total callosotomy (Table 4). Postoperative changes in daily function included alterations in attention, emotional well-being, daily activity, and hyperactivity. Improvement most often occurred in attention and emotional well-being, but, as expected, parents complained of their children’s hyperactivity and slight stammering.

Electroencephalography Findings

Preoperatively, the predominant interictal patterns in the patients were bilateral synchronous spikes and waves, as determined by scalp EEG and video-EEG monitoring. Other EEG findings included diffuse slow spikes and wave complexes, polyspikes and waves, or multifocal spikes and slow waves. Typically, the EEG findings from the drop attacks caused by tonic seizures were either generalized irregular theta/delta bursts or diffuse background suppressions that preceded low-amplitude fasting activity with rhythmic activity (4–6 Hz). Postoperative EEG monitoring revealed that bilateral synchronous polyspikes and waves were completely abolished in 18 patients. Among these, Class 1 seizures were present in only 9 patients, Class 2 in 8 patients, and Class 3 in 1 patient. Bilateral synchronous polyspikes and waves were diminished by ≥ 75% in 14 patients and remained unchanged in 2 (Table 5). Of the 14 cases with bilateral synchronous polyspikes and waves that were diminished by ≥ 75%, seizure status was Class 1 in 3 cases, Class 2 in 6 cases, and Class 3 in 5 cases. Due to the insufficient interval between pre- and postoperative EEG monitoring, any changes identified on the postoperative electroencephalograms could not be reliable. Furthermore, we found that the secondarily activated focus would not be sufficiently diminished. Therefore, longer EEG monitoring follow-up periods will be needed. A reduction in the number of spike and wave complexes and the persistence of occasional bursts of synchronous discharges were observed in all patients in whom significant improvement was documented.

Functional Outcome and Prognostic Factors

We compared the surgical outcomes of 23 patients aged ≤ 10 years with those in 11 preadolescent and adolescent patients (age > 11 years). Of the 23 patients ≤ 10 years of age, seizure outcome was Class 1 in 9 patients, Class 2 in 8, and Class 3 in 6. In contrast, in the 11 preadolescent/adolescent patients, seizure outcome was Class 1 in 3 patients, Class 2 in 6, and Class 3 in 2. These results suggest that age factors might influence the surgical outcome. In addition, younger age was a factor that enabled the prediction of improvements in overall daily function. In terms of the parent satisfaction with overall daily function, superior outcomes were reported by parents of younger patients. Finally, we suggest that the superior postoperative satisfaction associated with the younger patients may have been due to their significantly better functional outcome. Twenty-three patients underwent pre- and postoperative neuropsychological assessment (Table 6). Mild mental retardation (IQ score 55–70) was noted in 4 patients, severe mental retardation (IQ score 40–55) in 14, and profound mental retardation (IQ score < 40) in 4; 1 patient was classified as subnormal/normal (IQ > 70). In our series, children with mental retardation experienced a good outcome. Significant improvement occurred in 3 (75%) of the 4 patients with mild mental retardation, and 3 (75%) of the 4 patients with profound mental retardation. Intelligence quotients and cognitive deficits were not correlated with outcome. Generally, mental retardation can be a manifestation of pervasive cortical dysfunction. These patients may have a lower threshold for epileptogenesis and have poor prognoses. Therefore, we did not consider mental retardation to be a contraindication to total callosotomy.

### Table 3

Assessment of overall daily function stratified by age group

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Overall Daily Function</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Improved</td>
</tr>
<tr>
<td>infant (0–10 yrs)</td>
<td>17</td>
</tr>
<tr>
<td>adolescent (11–19 yrs)</td>
<td>5</td>
</tr>
<tr>
<td>total</td>
<td>22</td>
</tr>
</tbody>
</table>

### Table 4

Parental satisfaction with outcome of their child’s surgery

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Excellent</th>
<th>Moderate</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>infant (0–10 yrs)</td>
<td>16</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>adolescent (11–19 yrs)</td>
<td>3</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>total</td>
<td>19</td>
<td>6</td>
<td>9</td>
</tr>
</tbody>
</table>

### Table 5

Seizure control and changes in EEG pattern after callosotomy in 34 patients

<table>
<thead>
<tr>
<th>Synchronous Spike Wave</th>
<th>No. of Cases</th>
<th>Class 1</th>
<th>Class 2</th>
<th>Class 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>totally abolished</td>
<td>18</td>
<td>9</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>marked decreased (≥75%)</td>
<td>14</td>
<td>3</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>unchanged</td>
<td>2</td>
<td>3</td>
<td>6</td>
<td>2</td>
</tr>
</tbody>
</table>

*In all patients preoperative bilateral synchronous spike waves were shown on scalp EEG and video-EEG monitoring.*
Children with medically intractable seizures often have medically refractory and generalized or partial seizures with rare episodes of seizures activity, particularly in secondarily generalized seizures. The callosotomy can disrupt interictal bilateral synchronous seizures and wave activity in cats and humans. The corpus callosum may exert a tonic influence on seizure focus by inhibiting kindled seizures in rhesus monkeys but facilitate the same process in the Papio papio baboon.

The common indications for the use of callosotomy are medically refractory and generalized or partial seizures with rapid secondary generalized patterns and without localized lesions. No universal agreement exists on indications for using callosotomy. Many reports support the idea that callosotomy would benefit patients with intractable seizures, especially those who suffer epileptic falls due to generalized seizures, such as tonic, tonic–clonic, clonic, and atomic seizures. In some reports, satisfactory outcomes occur when seizures have been reduced by > 50% in patients with generalized tonic–clonic seizures (38–86%), generalized tonic seizures (43–60%), atomic seizures (60–83%), and complex partial seizures (50–51%). Our results indicate that a 1-stage total callosotomy is associated with greater seizure control and fewer complications than other callosotomies. In our experience, the best outcome was achieved in patients with drop attacks (91.2%), generalized tonic–clonic seizures (83.3%), and complex partial seizures (71.4%).

### Magnetic Resonance Imaging Findings and Seizure Outcomes

Magnetic resonance imaging revealed no specific abnormalities in 11 cases. In the other 23 patients, there were various MR imaging abnormalities such as localized atrophy (3 patients), cortical dysplasia (5 patients), diffuse atrophy (6 patients), encephalitis (1 patient), hemiatrophy (3 patients), ischemic injury (3 patients), leukomalacia (1 patient), and mesial temporal sclerosis (1 patient). The seizure outcomes in patients with no MR imaging abnormalities were as follows: Class 1 in 3 patients, Class 2 in 4, and Class 3 in 4. The seizure outcomes in patients with MR imaging abnormalities were as follows: Class 1 in 9 patients, Class 2 in 10 patients, and Class 3 in 4 patients. Statistical differences between the 2 groups were difficult to determine because of the small sample size. Even though we could see the tendency of some more favorable outcomes in patients with abnormal MR imaging findings, outcomes in 19 (82.6%) of 23 patients were Wyler Classes 1 or 2. In contrast, in patients with normal MR imaging findings, outcome in 7 (63.6%) of 11 patients was Wyler Class 1 or 2.

Diffusion tensor imaging and tractography confirmed the completeness of total callosal sectioning in all patients.

### Age at Seizure Onset and Seizure Outcomes

The age of patients at the time of seizure onset ranged from birth to 10 years (mean 2.5 years). Of the 24 patients whose first seizure occurred when they were < 3 years of age, seizures were Class 1 in 10 patients, Class 2 in 8, and Class 3 in 6. Ten patients had seizures that commenced when they were > 4 years of age. Of these patients, seizures were Class 1 in 2 patients, Class 2 in 6, and Class 3 in 2. Eighteen (75%) of 24 patients < 3 years of age and 8 (80%) of 10 patients > 4 years of age had received favorable outcomes. These differences were not prominent enough to determine if the outcomes of the patients > 4 years of age were better than outcomes in patients < 3 years of age. Although we observed more favorable outcomes in the older age group, these data could not be analyzed statistically due to the small sample size. The patients ≤ 3 years of age had less favorable outcomes than their older counterparts because they had a tendency to deviate from the number of patients in Wyler Classes 1–3. Patients age ≤ 3 years also had more diffuse abnormalities detected by MR imaging than those > 4 years of age. Therefore, the favorable outcome rate in patients in the ≤ 3 year-old group was low.

### Seizure Duration and Seizure Outcomes

Because our analysis was focused on pediatric patients, there were only 6 patients with a seizure duration of 10 years. The seizure outcomes in this group of 6 patients were as follows: Class 1 in 2 cases, Class 2 in 3 cases, and Class 3 in 1 case. In patients whose seizure duration was ≤ 9 years, seizures were Class 1 in 10 cases, Class 2 in 11, and Class 3 in 7. Five (83.3%) of these 6 patients whose seizure duration was 10 years had favorable outcomes compared with the favorable outcome rate of 75% (21 of 28) in patients whose seizures occurred in a period of ≤ 9 years. We did not have enough cases to determine if there was a statistical difference between these groups. Moreover, we tried to limit the number of 1-stage total callosotomies in patients > 10 years of age.

### Discussion

Total callosotomy has been proposed as an option in patients with severe developmental delays and various seizure types. Children with medically intractable seizures often have severe developmental delays due to brain abnormalities and persistent seizures. Therefore, early surgical intervention is very important because developmental defects can be minimized if the seizures are surgically controlled. The cerebrospinal fluid may exert a tonic influence on seizure foci by inhibiting kindled seizures in rhesus monkeys but facilitate the same process in the Papio papio baboon.
recent study about total callosotomy, Rathore et al. reported findings that support our results. They found that nearly two-thirds of their patients had > 90% reduction in drop attacks and generalized tonic-clonic seizures. In their 1-stage total callosotomy group, 9 (82%) of 11 patients had a favorable outcome, compared with 2 (33%) of the 6 patients who had undergone a partial callosotomy.

The most severe type of seizure is a drop attack, which places a severe burden on both patients and their families. In our series, most patients had daily or weekly drop attacks preoperatively. These patients were at considerable risk of sustaining physiological injury. Their families had to provide continuous care, which can be stressful. Seizure types that responded best to total callosotomy were tonic and tonic, which often result in abrupt and violent falls and are commonly termed “drop attack.” The outcomes associated with drop attacks in patients who underwent total callosotomy were favorable in 91.2% of the cases.

Determining the required extent of resection has been a subject of considerable controversy. Previous studies support the view that total callosotomy can control seizures more effectively than an anterior callosotomy. Spencer et al. concluded that a total callosotomy was twice as effective as the anterior callosotomy in controlling seizures. Furthermore, they also indicated that seizure type, lower verbal IQ scores, and diffuse ictal EEG patterns were significantly more common in cases in which anterior callosotomy failed. Pinard et al. demonstrated that a partial callosotomy for drop attacks was effective only in 3 (27%) of 11 children with West syndrome, whereas, in contrast, a total callosal section was effective in 8 (89%) of 9 children. In our opinion, the anterior callosotomy is not superior to the total callosotomy for the prevention of seizures or complications. However, in contrast to our opinion, Purves et al. have supported the contention that anterior callosotomy may be sufficient in many patients. They reported that anterior callosotomy resulted in an improvement in 75% of their patients. Seven of 24 patients developed a truncated disconnection syndrome marked by mutism and left hemiataxia, but these disturbances resolved over a few days. Murro et al. reported that 17 (68%) of 25 patients experienced a significant reduction in generalized tonic-clonic seizures following anterior callosotomy. In addition, with regard to the extent of the callosal section, these discrepancies in multiple studies can be ascribed to differences in the patient selection and the definition of successful surgery. Callosotomy is usually performed in 2 stages in most epilepsy centers. The reason for 2 callosotomy stages was that the neuropsychological sequelae may be less pronounced. Previously, we conducted a 2-stage callosotomy in patients with medically refractory seizures, but we have shifted to 1-stage total callosotomy for children with drop attacks and intractable generalized tonic-clonic seizures. The change in the surgical procedure was impelled by our experience and the studies of Lassonde and Sauerwein, Lassonde et al., and Macnara and Shimizu. Interhemispheric communication was not impaired in cases in which the corpus callosum was absent early in life, whether for congenital reasons or due to surgery. The most appropriate time for considering surgery in patients with medically intractable seizures has not been clearly defined. However, we advocate performing total callosotomy before puberty because of the greater gains in cognitive function and social adjustment as well as the reduced risk of neuropsychological deficits. The completeness of the callosal connection and bihemispheric functional connection is established at the age of 10 or 11 years. Therefore, one of the possible explanations for the superior functional outcome in children is that the congenital or early functional absence of transcallosal projections may lead to development alterations and/or selective reinforcement of connections that would not have been formed or reinforced under normal circumstances. The use of subcortical pathways, such as the intercollicular or the posterior commissure, have also been invoked to explain the excellent transfer abilities of acallosal and young callosotomy-treated patients. In addition, due to the long-term effect of intractable seizures, language and motor functions could be dominant in both hemispheres. In these cases, the patients will not exhibit a functional loss after undergoing a total callosotomy. Moreover, before puberty, the patients can improve cognitive function and social adjustment. All these factors support our results.

The surgical complications and operation-related problems of callosotomy are relatively more rare than before because of the development of microsurgical techniques and instruments. Previous operative techniques could not cut exactly on the midline between the lateral ventricles; therefore, the outcomes were poor and there were many postoperative complications. Recently, the development of microsurgical techniques and instruments can overcome the difficulties associated with 1-stage total callosotomy.

Acute disconnection syndrome and split-brain syndrome are the most problematic complications after total callosotomy. Some patients, especially children < 10 years of age, experience no such phenomenon after total callosotomy. Nevertheless, many authors have mentioned these serious complications because the patients already had severe mental retardation and brain dysfunction due to generalized epilepsy. The disconnection-related problem could not be detected in these patients. However, the parents of our patients said that they observed seizure control and remarkably improved cognitive function. Most patients exhibited a more concentrated effort on cognitive activity—for example, these patients had a more focused interest in their surroundings. Therefore, we propose that cognitive dysfunction or disconnection syndrome is not a limitation or contraindication to 1-stage total callosotomy, especially in patients < 10 years of age. However, if the patient is > 10 years of age, a 1-stage total callosotomy should be avoided.

In our study, we assessed overall daily function and familial satisfaction. Parents were interviewed to ascertain changes in the patient’s daily function and parental satisfaction with the surgical outcomes. We found that the younger patients had a significantly better outcome in overall daily function, with improvements noted in 73.9% of patients ≤ 10 years of age, whereas overall daily function was impaired in 27.2% of patients aged ≥ 11 years. A report by Claverie and Rougier statistically demonstrated that younger patients undergoing callosotomies had better outcomes in daily life and made better psychosocial adjustments. The improvements in hyperactivity and emotional well-being have already been stressed as additional benefits of callosotomies for children. We found that 25 (73.5%) of 34 parents were satisfied with this surgical procedure in their child. This rate is as high as the rates reported in other recent studies. In addition, our results suggest that the superior
postoperative satisfaction in the parents of younger patients may have been due to the significantly better functional outcome observed in the children. The lowering of neuropsychological function is a relatively rare result of callosotomy; moreover, the side effect of seizure control can improve intellectual function.

The most frequent operative complications of callosotomy include hydrocephalus, aseptic meningitis, sagittal sinus tearing with bleeding, cerebral edema, venous infarction, and epidural hematoma. However, in our 34 cases, none of these complications occurred; callosotomy-related neurological complications developed in only 2 patients in whom the disconnection syndrome was suspected. Nevertheless, those complications could not be differentiated from the transient mutism that was commonly encountered after whatever extent of callosotomy was performed. In addition to the aforementioned chronic sequelae that developed after total callosotomy, acute and transient disconnection syndrome—which is represented by mutism and apraxia in the nondominant limbs—is also independent of whether the callosotomy is complete or partial. One patient who exhibited ataxic hemiparesis recovered completely. The patient did not experience actual extremity weakness, but he could not control his limbs fully. This was not the same as the state of apraxia. Fortunately control of his extremities returned.

Conclusions

We found that 1-stage total callosotomy was a particularly effective treatment for drop attacks that cause physical injuries and impair quality of life in patients with seizure. Therefore, this procedure can be considered the first option in the treatment of drop attacks and secondary generalized epilepsy. In pediatric patients who underwent 1-stage total callosotomy, we observed an improvement in daily function and familial satisfaction.

References


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