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Lesional mesial temporal lobe epilepsy in children: is there a superior surgical approach?

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Epilepsy constitutes the most prevalent chronic neurological disorder in the paediatric population, with a worldwide prevalence of 0.9% [1, 2]. Despite continuous advances in the field of antiepileptic drugs (AEDs), up to 25% of paediatric patients suffer from drug-resistant epilepsy (DRE) [3]. According to surgical series, temporal lobe epilepsy (TLE) forms the most common type of DRE [4, 5]. That specific disorder constitutes 10–20% of all epilepsy cases in the paediatric population [6]. The pathological background of TLE in children is mainly associated with the existence of low-grade gliomas (LGGs), cortical dysplasia (CD), vascular malformations, and, although less frequently than in adults, mesial temporal sclerosis (MTS) [6–8]. Importantly, 80% of TLE originates from the mesial temporal lobe (MTL), and this is known as mesial temporal lobe epilepsy (mTLE). Surgery for drug-resistant TLE remains the most effective therapeutic strategy [9–12]. According to recent reports, after surgical intervention 67–85% of paediatric patients can be free from disabling seizures (Engel class I), while 61–78% of children can achieve complete seizure freedom (Engel class IA) [9, 13, 14].

Surgical strategy for tumour-related mTLE depends on the location of the lesion itself and the coexistence of epileptogenic foci unrelated to the tumour. The quest for less destructive resections has led to more selective approaches to the MTL being adopted, including lesionectomy (where resection is limited to the tumour) and extended lesionectomy (tumour with the peritumoural area) [4, 14–16]. Various surgical corridors have been explored in order to achieve the MTL's desired anatomical location, including the transsylvian, transcortical, and subtemporal approaches [4, 17]. There is no consensus regarding the preferability of the transsylvian or the transcortical approach for lesionectomy in the MTL.

In the transsylvian approach, the MTL structures are approached through the natural corridor, preserving the lateral temporal neocortex. The transcortical technique necessitates dissection of the lateral temporal neocortex. It can be performed through the superior, middle, or inferior temporal gyrus, with the trans-middle temporal gyrus (trans-MTG) approach being used in most instances [18–21].

Kowalczyk et al. [22] reported their experience with the trans-MTG approach to tumours of the MTL. They analyzed 14 children with MTL tumours, achieving gross-total resection (GTR) in all patients. Neurological deficits occurred in 21.4% of patients after surgery, with a concurrent 7.1% rate of visual field deficits. Notably, freedom from disabling seizures was reported to be 92.9%. Similarly, Lee et al. [17] reported that 91% of paediatric patients undergoing lesionectomy through the transsylvian approach were free from disabling seizures. Based on the results of their randomised trial, Lutz et al. [20] concluded that the trans-MTG approach provides better phonemic outcomes than the transsylvian approach, while cognitive outcomes and freedom from seizures were comparable between the two approaches. Based on their laboratory investigation, Bozkurt et al. [25] concluded that the trans-MTG approach may allow better visualisation of MTL structures than the transsylvian approach. Uda et al. [23] concluded that visual field deficits (83% *vs.* 60% respectively) and memory function were comparable between the trans-MTG approach and the transsylvian approach, with a shorter time of surgery for the trans-MTG approach. The typical trans-MTG approach, apart from damaging the lateral temporal neocortex, puts at risk some crucial white matter tracts (WMTs), such as inferior frontooccipital fasciculus (IFOF) and Meyer's loop [24, 25].

On the other hand, it has been suggested that the transsylvian approach may be more selective, allowing for less interruption of WMTs (especially optic radiation fibres) and preservation of the lateral temporal neocortex [25]. It is worth remembering that it has been found that the transsylvian

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approach also interrupts IFOF, uncinate fasciculus (UF), and optic radiation fibres [24]. Moreover, some papers have indicated the presence of gliosis and neuronal loss in the temporal pole following the transsylvian approach [26, 27]. Recently, Shah et al. [24] proposed a modified technique for trans-MTG selective amygdalohippocampectomy that included a safe-entry zone in the anterior part of the lateral wall of the temporal horn. They suggested that a surgical approach focused on entering the temporal horn first, and then performing an en bloc resection of the amygdala, hippocampus, uncus, parahippocampus, and lateral neocortex, respectively, may preserve IFOF and Meyer's loop fibres, making the trans-MTG approach safer. While this technique has been reported in a laboratory setting, further implementation in a clinical setting would be necessary to prove its superiority over the traditional trans-MTG approach.

Given that literature on the surgical strategies for lesional mTLE in children remains sparse, no strong evidence yet supports the superiority of one approach over another. Recent studies have found that both transsylvian and transcortical trough MTG approaches have their advantages and their disadvantages, and no consensus on the optimal surgical approach to MTL tumours exists. Both approaches can be considered equally effective, with comparable safety profiles. Visual field deficits constitute the limitations of both techniques, and these must be considered in the preoperative discussion with the patient's caregivers.

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