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癫痫是全球范围内最常见的中枢神经系统疾患之一,其发生率高居不下。儿童良性Rolandic癫痫(benign rolandic epilepsy, RE)是儿童期最常见的癫痫综合征,多伴有不可逆的认知功能损伤,给家庭和社会带来巨大的压力和沉重的负担。研究表明,癫痫的发作和终止及认知功能均与类淋巴系统(glymphatic system, GS)密切相关。因此,探究RE患儿GS功能改变,有助于深入了解RE发生的病理生理学机制,为后续治疗提供新的思路及方法。既往研究多用鞘内注射对比剂结合多次MR扫描来评估GS功能。但该方法为有创性检查,可能会引起中枢神经系统感染、脑疝,甚至死亡等并发症且需多次MR扫描,极大地限制了临床应用。

随着影像技术的发展,沿血管周围间隙的扩散张量成像(diffusion tensor imaging analysis along the perivascular, DTI-ALPS)分析方法,在评估GS功能方面被广泛应用。通过以非侵入性方法从DTI图像中提取水分子沿血管周围间隙方向的扩散率,从而对GS功能进行客观的量化分析。

本研究通过收集RE组及对照组的影像学资料及相关临床信息,采用卡方检验或独立样本t检验比较组间差异。利用Pearson相关分析患儿组DTI-ALPS index与癫痫发作持续时间、发作频率及认知功能的相关性。结果表明RE组DTI-ALPS index降低。DTI-ALPS index与年龄、总智商及言语智商呈现正相关;与癫痫发作时间、癫痫发作频率呈现负相关。以上提示DTI-ALPS index可用于评估RE患儿GS功能受损情况,在探究疾病状态中具有较高的价值。详见内文第6页。

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Epilepsy is one of the most common brain disease worldwide, with a high incidence. Rolandic epilepsy (RE) is the most prevalent type of childhood epilepsy syndrome. Children with RE always have irreversible cognitive deficits which does harm to families and society. It is reported that the onset and termination of epilepsy and cognitive function are related to glymphatic system (GS). Hence, exploring the GS function in RE is useful to further understand the potential pathophysiological mechanisms and provide new approach for treatment. Previous studies used intrathecal injection of contrast agent gadobutrol with multiple MRI scans to assess GS function. However, this method is an invasive examination, which may lead to central nervous system infection, brain hernia, and even death. What's more, multiple MRI scans is inconvenient for clinical application.

With the development of imaging technology, diffusion tensor imaging analysis along the perivascular (DTI-ALPS) is widely used to evaluate the GS function. The diffusion rate of water molecules along the perivascular space can obtain from DTI by a non-invasive method to assess the GS function.

In this study, imaging data and clinical information of RE group and control group were collected. Differences between groups were compared by chi-square test or independent samples *t*-test. Meanwhile, correlation of DTI-ALPS index with seizure duration, epileptic frequency and cognitive development were respectively explored via Pearson's coefficient (*r*). This study showed that DTI-ALPS index was higher in control group than RE group. In addition, DTI-ALPS index positively correlated with age, full intelligence quotient and verbal intelligence quotient. However, DTI-ALPS index gradually decreased with seizure duration and epileptic frequency. Our research suggested that DTI-ALPS index can be used to evaluated impairment of the GS in RE, which has a good prospect for exploring the state of RE. Please see text page 6.

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