

## 126例肝性脊髓病患者临床特征分析

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**摘要:** **目的** 分析126例肝性脊髓病患者的临床资料,总结其临床表现及预后特征,为临床诊疗提供参考依据。**方法** 收集2016年1月1日—2025年6月30日就诊于兰州大学第一医院的126例肝性脊髓病患者的临床资料,根据入院时肌力检测将患者分为肌力<3级组、肌力3级组和肌力4级组,分析比较3组患者的临床资料,包括病因、症状、临床体征、既往史、个人史、实验室检验、影像学检查、治疗及转归情况。符合正态分布的计量资料多组间比较采用方差分析,进一步两两比较采用LSD-*t*检验;不符合正态分布的计量资料多组间比较采用Kruskal-Wallis *H*检验,进一步两两比较采用Bonferroni校正法。计数资料多组间比较采用 $\chi^2$ 检验。**结果** 126例肝性脊髓病患者均为肝硬化背景,男女比例约为2.7:1,年龄23~73岁,平均(53.9±9.3)岁,中位年龄54岁。肝硬化病因前三位分别为乙型肝炎78例(61.9%)、丙型肝炎9例(7.1%)、酒精性肝炎8例(6.3%)。患者病程中均有双下肢乏力表现,其中9例(7.1%)伴随下肢疼痛及麻木症状。126例患者中肌力0级3例(2.4%)、1级4例(3.2%)、2级9例(7.1%)、3级39例(31.0%)、4级71例(56.3%)。3组不同肌力患者组间比较结果显示,在合并症方面,显性肝性脑病(OHE)( $\chi^2=6.254, P=0.044$ )、腹水( $\chi^2=6.248, P=0.044$ )和肝衰竭( $\chi^2=7.704, P=0.029$ )构成比差异均有统计学意义;实验室指标方面,红细胞(RBC)( $F=5.334, P=0.006$ )、血红蛋白(HGB)( $F=4.627, P=0.012$ )、天冬氨酸氨基转移酶(AST)( $H=6.866, P=0.032$ )、丙氨酸氨基转移酶(H=6.444,  $P=0.040$ )、白蛋白(Alb)( $F=6.331, P=0.002$ )、胆碱酯酶(ChE)( $H=11.064, P=0.004$ )、总胆固醇(TC)( $F=4.843, P=0.009$ )、凝血酶原活动度(PTA)( $F=3.937, P=0.022$ )及国际标准化比值(INR)( $H=6.448, P=0.040$ )比较差异亦均有统计学意义。其中,肌力<3级组患者RBC、HGB和ChE水平显著低于肌力4级组( $P$ 值均<0.05),AST水平显著高于肌力4级组( $P<0.05$ );与肌力3级组比较,肌力<3级组患者Alb、TC和PTA明显降低( $P$ 值均<0.05),INR明显升高( $P<0.05$ )。出院时,好转者27例(21.4%),无效者99例(78.6%),其中死亡2例。**结论** 肝性脊髓病以双下肢对称性、痉挛性截瘫为主要临床表现,好发于男性,病因主要为乙型肝炎、丙型肝炎及酒精性肝炎,该病的肌力强弱与合并OHE、腹水和肝衰竭有关,肌力较弱患者的RBC、HGB、Alb、ChE、TC及PTA水平较低,而AST和INR水平较高,提示上述指标变化与患者肌力减退程度可能存在相关性。肝性脊髓病预后差,目前尚无有效治疗手段。

**关键词:** 肝性脊髓病;肝硬化;体征和症状

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### Clinical features of hepatic myelopathy: An analysis of 126 cases

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**Abstract: Objective** To analyze the clinical data of 126 patients with hepatic myelopathy (HM), to summarize their clinical manifestations and prognostic features, and to provide a reference for clinical diagnosis and treatment. **Methods** Related clinical data were collected from 126 HM patients who attended The First Hospital of Lanzhou University from January 1, 2016 to June 30, 2025, and according to their muscle strength on admission, they were divided into grade<3 group, grade 3 group, and grade

4 group. The three groups were compared in terms of the clinical data including etiology, symptoms, clinical signs, past history, personal history, laboratory test results, imaging findings, treatment, and outcome. An analysis of variance was used for comparison of normally distributed continuous data between multiple groups, and the least significant difference *t*-test was used for further comparison between two groups; the Kruskal-Wallis *H* test was used for comparison of non-normally distributed continuous data between multiple groups, and the Bonferroni correction method was used for further comparison between two groups; the chi-square test was used for comparison of categorical data between multiple groups. **Results** All 126 patients with HM were comorbid with liver cirrhosis, with a male/female ratio of 2.7:1, an age of 23—73 years, a mean age of  $53.9 \pm 9.3$  years, and a median age of 54 years. The top three etiologies of liver cirrhosis were hepatitis B in 78 patients (61.9%), hepatitis C in 9 patients (7.1%), and alcoholic hepatitis in 8 patients (6.3%). During the course of the disease, all 126 patients with HM showed weakness in both lower limbs, among whom 9 patients (7.1%) also had the symptoms of lower limb pain and numbness. Among the 126 patients, 3 (2.4%) had grade 0 muscle strength, 4 (3.2%) had grade 1 muscle strength, 9 (7.1%) had grade 2 muscle strength, 39 (31.0%) had grade 3 muscle strength, and 71 (56.3%) had grade 4 muscle strength. Comparison of related data between the three groups of patients with varying grades of muscle strength showed that as for comorbidities, there were significant differences between the three groups in the constituent ratios of overt hepatic encephalopathy (OHE) ( $\chi^2=6.254$ ,  $P=0.044$ ), ascites ( $\chi^2=6.248$ ,  $P=0.044$ ), and liver failure ( $\chi^2=7.704$ ,  $P=0.029$ ); as for laboratory markers, there were significant differences between the three groups in red blood cell count (RBC) ( $F=5.334$ ,  $P=0.006$ ), hemoglobin (HGB) ( $F=4.627$ ,  $P=0.012$ ), aspartate aminotransferase (AST) ( $H=6.866$ ,  $P=0.032$ ), alanine aminotransferase ( $H=6.444$ ,  $P=0.040$ ), albumin (Alb) ( $F=6.331$ ,  $P=0.002$ ), cholinesterase (ChE) ( $H=11.064$ ,  $P=0.004$ ), total cholesterol (TC) ( $F=4.843$ ,  $P=0.009$ ), prothrombin activity (PTA) ( $F=3.937$ ,  $P=0.022$ ) and international normalized ratio (INR) ( $H=6.448$ ,  $P=0.040$ ). Compared with the grade 4 group, the grade<3 group had significantly lower levels of RBC, HGB, and ChE (all  $P<0.05$ ) and a significantly higher level of AST ( $P<0.05$ ); compared with the grade 3 group, the grade<3 group had significant reductions in Alb, TC, and PTA (all  $P<0.05$ ) and a significant increase in INR ( $P<0.05$ ). At discharge, 27 patients (21.4%) achieved improvement, and 99 patients (78.6%) showed no response, among whom 2 patients died. **Conclusion** HM has the main clinical manifestation of symmetrical spastic paraplegia of both lower limbs, and it is more common in men. The main causes of HM include hepatitis B, hepatitis C, and alcoholic hepatitis. Muscle strength in HM patients is associated with the comorbidity of OHE, ascites, or liver failure, and patients with weak muscle strength tend to have low levels of RBC, HGB, Alb, ChE, TC, and PTA and high levels of AST and INR, suggesting that the changes in these indicators may be correlated with the degree of muscle strength impairment. HM often has a poor prognosis, and there are currently no effective treatment methods.

**Key words:** Hepatic Myelopathy; Liver Cirrhosis; Signs and Symptoms

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肝性脊髓病又称门-腔分流性脊髓病,是一种发生于慢性肝脏疾病终末期少见的神经系统相关并发症<sup>[1]</sup>,其病理改变为脊髓锥体束脱髓鞘,临床表现为双下肢进行性、对称性及痉挛性截瘫,通常不伴有感觉和括约肌功能障碍,目前其发病机制尚未完全明确。研究发现,肝性脊髓病在慢性肝病人群中的发病率为2%~4%<sup>[2]</sup>,在经颈静脉肝内门体分流术(transjugular intrahepatic portosystemic shunt, TIPS)后的人群中发病率为7%~10%<sup>[3]</sup>。近年来,针对肝性脊髓病临床特点的大样本研究相对较少。本研究通过分析肝性脊髓病患者的临床资料,总结其临床特征,以期为临床诊疗提供参考。

## 1 资料与方法

1.1 研究对象 选取2016年1月1日—2025年6月30日就诊于兰州大学第一医院且首次诊断为肝性脊髓病的患者。纳入患者均符合肝性脊髓病临床诊断标准<sup>[4]</sup>,或经多学科会诊后仍考虑诊断为肝性脊髓病。肝性脊髓病临床诊断标准:(1)有肝病病史。(2)临床表现为双下肢进行性、痉挛性截瘫,具体表现为肌张力增高、腱反射亢进及肌力减退,不伴有肌肉萎缩及感觉障碍。(3)脊髓磁共振成像或计算机体层成像检查无异常,无脊髓受压表现;头颅磁共振成像或计算机体层成像检查无异常。(4)脑脊液检查排除脊髓炎性病变。(5)既往有自发或手

术门体分流史,结合上述标准并排除其他神经系统疾病可诊断为肝性脊髓病。

1.2 研究方法 收集肝性脊髓病患者于本院首诊时的临床资料,包括病因、症状、临床体征、既往史、个人史、实验室检验、影像学检查、治疗及转归情况。根据入院查体时的徒手肌力测定结果,将患者分为肌力0级、1级、2级、3级和4级组,并将肌力<3级者合并为一组,进而比较不同肌力组的临床特点。

### 1.3 相关定义

1.3.1 肌力 本研究依据徒手肌力检测量表对肌力进行分级(表1)。

表1 徒手肌力检测量表  
Table 1 Manual muscle testing

| 肌力级别 | 标准               |
|------|------------------|
| 0级   | 肌肉无任何收缩          |
| 1级   | 肌肉有轻微收缩          |
| 2级   | 去除重力可做主动运动       |
| 3级   | 不施加阻力时,可抗重力做主动运动 |
| 4级   | 抗重力及部分阻力做主动运动    |
| 5级   | 正常力量             |

1.3.2 肝性脑病 本研究采用 West Haven 分级标准对肝性脑病进行诊断<sup>[5]</sup>,纳入患者均为显性肝性脑病(overt hepatic encephalopathy, OHE)。

1.3.3 转归 以患者出院作为转归判断截点。转归判断标准如下:患者出院时肌力等级提升至少1级、肝性脊髓病症状减轻或消失,肝功能和血氨水平较基线改善,生命体征平稳,定义为好转;患者出院时肌力、肝性脊髓病症状无改善或加重,肝功能和血氨水平较基线无改善或恶化,生命体征不平稳甚至死亡,定义为无效。

1.3.4 治疗 所有患者均积极治疗原发病、纠正电解质紊乱、改善肝功能、营养神经、润肠通便等对症治疗。

1.4 统计学方法 采用SPSS 26.0软件进行数据统计分析。符合正态分布的计量资料以 $\bar{x} \pm s$ 表示,多组间比较采用方差分析,进一步两两比较采用LSD-*t*检验;不符合正态分布的计量资料以 $M(P_{25} \sim P_{75})$ 表示,多组间比较采用Kruskal-Wallis *H*检验,进一步两两比较采用Bonferroni校正法。计数资料多组间比较采用 $\chi^2$ 检验。 $P < 0.05$ 为差异有统计学意义。

## 2 结果

2.1 一般资料 共纳入126例患者,均为肝硬化合并肝性脊髓病,其中男92例,女34例,男女性别比约为2.7:1,年龄23~73岁,平均 $(53.9 \pm 9.3)$ 岁,中位年龄54岁。肝硬化病因包括乙型肝炎78例(61.9%),丙型肝炎9例(7.1%),酒精性肝炎8例(6.3%),自身免疫性肝炎4例

(3.2%),原发性胆汁性胆管炎3例(2.4%),药物性肝损伤3例(2.4%),胆汁淤积型肝炎3例(2.4%),自身免疫性肝炎重叠原发性胆汁性胆管炎3例(2.4%),乙型肝炎重叠原发性胆汁性胆管炎1例(0.8%),乙型肝炎重叠胆汁淤积型肝炎1例(0.8%),布-加综合征1例(0.8%),原发性硬化性胆管炎1例(0.8%),不明原因11例(8.7%)。既往有糖尿病病史者18例(14.3%),有高血压病史者10例(7.9%),有吸烟史者18例(14.3%),有饮酒史者23例(18.3%)。有脾肾分流者14例(11.1%),有附脐静脉开放者22例(17.5%)。行TIPS者62例(49.2%),术后肝性脊髓病发病时间为0.08~8.00年,中位时间0.58(0.42~1.67)年;行脾切除术者25例(19.8%),术后肝性脊髓病发病时间为1.92~21.00年,中位时间6.0(4.0~10.0)年。

126例肝性脊髓病患者均为缓慢起病,发病过程中均有双下肢乏力表现,其中9例(7.1%)伴随下肢疼痛及麻木症状。合并症情况见表2,主要包括:OHE 101例(80.2%),其中OHE发作 $\geq 3$ 次者53例(42.1%);消化道出血61例(48.4%);腹水54例(42.9%);电解质紊乱52例(41.3%);肝衰竭43例(34.1%);门静脉血栓36例(28.6%);感染28例(22.2%);肝癌18例(14.3%)。

2.2 肌力分级 126例患者中肌力0级3例(2.4%)、1级4例(3.2%)、2级9例(7.1%)、3级39例(31.0%)、4级71例(56.3%)。对肌力<3级组( $n=16$ )、肌力3级组( $n=39$ )和肌力4级组( $n=71$ )进行组间比较,结果显示,3组患者在合并OHE、腹水及肝衰竭方面的占比差异均有统计学意义( $P$ 值均 $<0.05$ )(表2)。

2.3 实验室检测 3组间患者的红细胞(red blood cell, RBC)、血红蛋白(hemoglobin, HGB)、天冬氨酸氨基转移酶(aspartate transferase, AST)、丙氨酸氨基转移酶(alanine amino-transferase, ALT)、白蛋白(albumin, Alb)、胆碱酯酶(cholinesterase, ChE)、总胆固醇(total cholesterol, TC)、凝血酶原活动度(prothrombin activity, PTA)及国际标准化比值(international normalized ratio, INR)比较,差异均有统计学意义( $P$ 值均 $<0.05$ )(表3)。其中,肌力<3级组患者RBC、HGB和ChE水平显著低于肌力4级组( $P$ 值均 $<0.05$ ),AST水平显著高于肌力4级组( $P < 0.05$ );与肌力3级组比较,肌力<3级组患者Alb、TC和PTA明显降低( $P$ 值均 $<0.05$ ),INR明显升高( $P < 0.05$ )。

2.4 影像学检查 126例肝性脊髓病患者中,50例(39.7%)完善了头颅磁共振成像检查,其中检出脱髓鞘改变21例、肝性脑病改变6例、脑白质改变12例;17例(13.5%)完善了电子胃镜检查,其中检出食管胃静脉曲张7例、食管静脉曲张8例。

表2 肝性脊髓病患者一般临床资料  
Table 2 General clinical data of hepatic myelopathy patients

| 项目           | 肌力<3级组(n=16) | 肌力3级组(n=39) | 肌力4级组(n=71) | $\chi^2$ 值 | P值    |
|--------------|--------------|-------------|-------------|------------|-------|
| 男[例(%)]      | 11(68.8)     | 33(84.6)    | 48(67.6)    | 3.866      | 0.145 |
| 肝硬化病因[例(%)]  |              |             |             | 26.652     | 0.170 |
| 乙型肝炎         | 10(62.5)     | 28(71.8)    | 40(56.3)    |            |       |
| 丙型肝炎         | 1(6.3)       | 0(0.0)      | 8(11.3)     |            |       |
| 酒精性肝炎        | 1(6.3)       | 4(10.3)     | 3(4.2)      |            |       |
| 既往史[例(%)]    |              |             |             |            |       |
| 糖尿病          | 0(0.0)       | 8(20.5)     | 10(14.1)    | 3.904      | 0.142 |
| 高血压          | 0(0.0)       | 1(2.6)      | 9(12.7)     | 5.103      | 0.078 |
| 吸烟史          | 1(6.3)       | 8(20.5)     | 9(12.7)     | 2.229      | 0.328 |
| 饮酒史          | 3(18.8)      | 9(23.1)     | 11(15.5)    | 0.973      | 0.615 |
| 脾肾分流[例(%)]   | 0(0.0)       | 3(7.7)      | 11(15.5)    | 3.842      | 0.146 |
| 附脐静脉开放[例(%)] | 2(12.5)      | 6(15.4)     | 14(19.7)    | 0.641      | 0.726 |
| TIPS[例(%)]   | 9(56.3)      | 17(43.6)    | 36(50.7)    | 0.874      | 0.646 |
| 脾切除术[例(%)]   | 4(25.0)      | 7(17.9)     | 14(19.7)    | 0.356      | 0.837 |
| 合并症[例(%)]    |              |             |             |            |       |
| OHE          | 10(62.5)     | 29(74.4)    | 62(87.3)    | 6.254      | 0.044 |
| 腹水           | 11(68.8)     | 18(46.2)    | 25(35.2)    | 6.248      | 0.044 |
| 门静脉血栓        | 2(12.5)      | 13(33.3)    | 21(29.6)    | 2.494      | 0.287 |
| 消化道出血        | 11(68.8)     | 16(41.0)    | 34(47.9)    | 3.510      | 0.173 |
| 感染           | 6(37.5)      | 11(28.2)    | 11(15.5)    | 4.829      | 0.089 |
| 肝癌           | 2(12.5)      | 3(7.7)      | 13(18.3)    | 2.365      | 0.306 |
| 电解质紊乱        | 8(50.0)      | 13(33.3)    | 31(43.7)    | 1.684      | 0.431 |
| 肝衰竭          | 10(62.5)     | 10(25.6)    | 23(32.4)    | 7.704      | 0.029 |

注:TIPS,经颈静脉肝内门体分流术;OHE,显性肝性脑病。

**2.5 治疗及转归情况** 126例肝性脊髓病患者均接受内科治疗,在此基础上,1例行脐带间充质干细胞移植治疗,3例行肝移植治疗,4例行TIPS支架内限流术,6例行脾肾分流封堵术。患者出院时评估结果显示,好转27例,占比21.4%,无效99例,占比78.6%,其中死亡2例,死亡原因分别为感染性休克与多脏器功能衰竭。分层统计显示,1例接受脐带间充质干细胞移植的患者出院时评估为无效;3例接受肝移植的患者中,出院时好转2例;4例接受TIPS支架内限流术的患者中,出院时好转1例;6例接受脾肾分流封堵术的患者中,出院时好转2例。

### 3 讨论

近年来随着TIPS的广泛应用,肝性脊髓病的发病率呈上升趋势。本研究中,肝性脊髓病患者男女比例约为2.7:1,排名前三位的致病原因依次为乙型肝炎、丙型肝炎和酒精性肝炎,其中乙型肝炎占比达61.9%,这与我国肝硬化的主要病因为乙型肝炎的流行病学特征一致<sup>[6]</sup>。

肝性脊髓病的发病机制尚未完全明确,目前主要包括中毒损伤、营养失衡、血流动力学改变、免疫损伤等假说。本研究结果显示,肝性脊髓病患者的肌力分级与血

氨水平无显著关联。虽然血氨是肝性脑病的核心致病因子,但肝性脊髓病通常呈慢性进行性病程,单次检测的血氨水平难以反映患者既往已经发生的脊髓损伤情况。此外,有研究表明血氨水平易受标本采集及送检过程的影响<sup>[7]</sup>。因此,血氨水平是否与肝性脊髓病严重程度有关仍需进一步探究。本研究中,合并OHE、腹水及肝衰竭者在不同肌力分级组间的分布差异均有统计学意义,表明上述合并症与肝性脊髓病患者肌力严重程度具有一定相关性。本研究中42.1%的患者有OHE反复发作病史,与现有研究结果一致<sup>[1]</sup>。OHE反复发作通常提示患者长期处于高血氨状态,肝性脊髓病的中毒损伤假说亦提及血氨蓄积可能诱发肝性脊髓病<sup>[8-9]</sup>,上述证据表明,肝性脊髓病的发生发展是相关因素长期作用的结果。腹水是肝硬化失代偿期门静脉高压的表现之一,有研究发现,肝性脊髓病患者的脊髓病变多见于血流代偿较差的脊髓胸腰段,当失代偿期肝硬化患者出现门静脉高压时,广泛侧支循环的建立及胸腰段脊髓静脉丛的血流淤滞,会导致相应脊髓节段缺血缺氧,最终诱发脊髓脱髓鞘改变<sup>[10]</sup>;肝衰竭时,肝脏功能受损,除代谢功能异常导致毒物蓄积引发全身氧化应激和神经炎症外<sup>[11]</sup>,

表3 肝性脊髓病患者实验室检验结果  
Table 3 Laboratory test data of hepatic myelopathy patients

| 项目                        | 肌力<3级组(n=16)       | 肌力3级组(n=39)                   | 肌力4级组(n=71)                   | 统计值      | P值    |
|---------------------------|--------------------|-------------------------------|-------------------------------|----------|-------|
| 年龄(岁)                     | 53.6±1.9           | 52.7±1.8                      | 54.5±1.0                      | F=0.579  | 0.749 |
| 血氨(μmol/L)                | 45.9(31.8~67.6)    | 47.8(29.0~83.4)               | 36.0(25.8~63.2)               | H=2.540  | 0.281 |
| RBC(×10 <sup>9</sup> /L)  | 3.1±0.1            | 3.5±0.1                       | 3.7±0.1 <sup>1)</sup>         | F=5.334  | 0.006 |
| HGB(g/L)                  | 100.2±3.4          | 108.7±4.6                     | 118.6±2.8 <sup>1)</sup>       | F=4.627  | 0.012 |
| WBC(×10 <sup>12</sup> /L) | 5.3(2.0~7.7)       | 2.6(2.0~4.1)                  | 3.2(1.9~4.2)                  | H=4.387  | 0.112 |
| PLT(×10 <sup>9</sup> /L)  | 61.0(31.5~88.3)    | 50.0(43.0~100.0)              | 63.0(41.0~104.0)              | H=0.536  | 0.765 |
| AST(U/L)                  | 69.1(37.8~99.6)    | 44.0(30.0~70.0)               | 44.0(33.0~57.0) <sup>1)</sup> | H=6.866  | 0.032 |
| ALT(U/L)                  | 44.7(24.5~74.9)    | 27.0(18.0~41.0)               | 26.0(21.0~40.0)               | H=6.444  | 0.040 |
| TBil(μmol/L)              | 46.2(34.2~288.2)   | 41.0(30.2~61.2)               | 51.1(34.5~82.7)               | H=3.259  | 0.196 |
| DBil(μmol/L)              | 15.7(9.5~130.7)    | 12.4(8.5~19.3)                | 14.1(8.0~22.4)                | H=2.061  | 0.357 |
| IBil(μmol/L)              | 30.2(24.9~87.9)    | 28.8(20.9~44.0)               | 36.2(25.9~60.1)               | H=3.084  | 0.214 |
| Alb(g/L)                  | 27.1±1.8           | 31.4±1.1 <sup>1)</sup>        | 32.9±0.6                      | F=6.331  | 0.002 |
| ALP(U/L)                  | 147.8(90.4~198.9)  | 122.4(80.1~159.1)             | 127.4(85.3~156.0)             | H=2.133  | 0.344 |
| ChE(kU/L)                 | 2.2(1.3~3.0)       | 2.9(2.1~3.6)                  | 3.3(2.5~4.2) <sup>1)</sup>    | H=11.064 | 0.004 |
| Urea(mmol/L)              | 6.0(4.2~8.1)       | 5.8(4.1~7.9)                  | 5.4(4.1~6.9)                  | H=1.963  | 0.375 |
| Cr(μmol/L)                | 68.4(60.7~77.9)    | 65.0(57.0~73.7)               | 65.3(56.0~72.1)               | H=1.080  | 0.583 |
| Na <sup>+</sup> (mmol/L)  | 137.2(132.4~142.8) | 139.0(135.3~141.0)            | 138.4(136.0~141.0)            | H=1.306  | 0.521 |
| K <sup>+</sup> (mmol/L)   | 4.0(3.4~4.4)       | 3.9(3.7~4.2)                  | 4.0(3.7~4.5)                  | H=0.871  | 0.647 |
| Ca <sup>2+</sup> (mmol/L) | 1.98±0.05          | 2.03±0.03                     | 2.08±0.02                     | F=2.121  | 0.124 |
| TC(mmol/L)                | 1.93±0.28          | 2.76±0.16 <sup>1)</sup>       | 2.66±0.10                     | F=4.843  | 0.009 |
| TG(mmol/L)                | 0.56(0.39~0.68)    | 0.63(0.46~0.94)               | 0.50(0.40~0.64)               | H=4.428  | 0.109 |
| Glu(mmol/L)               | 5.3(4.7~6.8)       | 5.2(4.6~7.0)                  | 5.1(4.3~6.1)                  | H=2.423  | 0.298 |
| PT(s)                     | 18.9(16.3~22.3)    | 16.5(14.4~18.2)               | 16.4(14.8~18.7)               | H=5.558  | 0.062 |
| PTA(%)                    | 47.9±3.8           | 61.4±3.1 <sup>1)</sup>        | 57.8±1.7                      | F=3.937  | 0.022 |
| INR                       | 1.76(1.43~2.06)    | 1.47(1.25~1.62) <sup>1)</sup> | 1.48(1.34~1.64)               | H=6.448  | 0.040 |
| MELD评分(分)                 | 16.0(13.5~25.1)    | 15.0(13.0~16.0)               | 15.0(12.0~18.0)               | H=3.787  | 0.151 |
| Child-Pugh评分(分)           | 9.6±0.6            | 8.6±0.3                       | 8.6±0.2                       | F=2.210  | 0.114 |

注:与肌力<3级组比较,1)P<0.05。RBC,红细胞;HGB,血红蛋白;WBC,白细胞;PLT,血小板;AST,天冬氨酸氨基转移酶;ALT,丙氨酸氨基转移酶;TBil,总胆红素;DBil,直接胆红素;IBil,间接胆红素;Alb,白蛋白;ALP,碱性磷酸酶;ChE,胆碱酯酶;Urea,尿素;Cr,血肌酐;Na<sup>+</sup>,血清钠离子;K<sup>+</sup>,血清钾离子;Ca<sup>2+</sup>,血清钙离子;TC,总胆固醇;TG,甘油三酯;Glu,血清葡萄糖;PT,凝血酶原时间;PTA,凝血酶原活动度;INR,国际标准化比值;MELD,终末期肝病模型;Child-Pugh评分,蔡尔德-皮尤评分。

合成功能异常还会引起神经营养物质(如B族维生素)缺乏,导致脊髓脱髓鞘损害<sup>[12]</sup>。上述机制均可能直接或间接影响肝性脊髓病患者的肌力强弱。

本研究中,肝性脊髓病患者的肌力分级与多项实验室指标相关,主要包括RBC、HGB、AST、ALT、Alb、ChE、TC、PTA及INR,除ALT外,其余指标在不同肌力组间差异均有统计学意义。ALT整体比较虽有差异(P=0.040),但校正后两两比较未达显著性,这一结果可能与本研究的样本量有限、难以检出较小的组间差异有关。经进一步分析显示,RBC、HGB、Alb、ChE、TC及PTA越低,AST和INR越高,肝性脊髓病患者的肌力越弱,提示患者肝性脊髓病的严重程度与肝损伤密切相关。其可能的机制为:肝硬化时肝脏合成和代谢功能受损,表现为AST升高,而ChE、TC、Alb及凝血因子合成减少<sup>[13]</sup>;

凝血因子合成减少进一步导致凝血功能异常,表现为PTA降低及INR升高;肝硬化时由于门静脉压力增高,脾脏淤血肿大出现脾功能亢进,RBC和HGB被过早破坏和清除,且肝硬化患者常伴有食欲减退及消化吸收障碍,造成患者营养缺乏,上述因素共同作用,导致RBC和HGB水平降低。本研究结果不仅反映了肝功能与肝性脊髓病患者肌力强弱之间的关系,同时也具有一定的临床意义,未来或可通过动态检测上述指标判断患者的预后情况,亦可通过改善上述指标使肝性脊髓病患者获益,但仍需多中心、大样本研究进一步验证。

目前,肝性脊髓病尚无有效的治疗方案。临床上常用的治疗方法包括改善肝功能、营养神经、补充白蛋白、降血氨等对症治疗,但疗效并不理想。肝移植可作为肝性脊髓病的治疗手段之一,早期移植疗效更佳<sup>[14-15]</sup>,晚

期因已出现严重的脊髓损害,无法通过该治疗手段逆转病情。此外,供肝来源少、手术复杂、费用高等问题也限制了肝移植的广泛应用。本研究中3例行肝移植术者出院时好转2例,但因样本量较少且仅随访至出院,结果代表性有限,需大样本研究进一步探索。部分研究发现,中医针灸治疗配合中药可改善肝性脊髓病患者的肌力及临床体征,提示中医治疗或具有一定潜力<sup>[16-17]</sup>。近年来,随着对肠道菌群、肠道内源性毒素及肠-肝-脑轴<sup>[18]</sup>研究的不断深入与认知逐步提升,粪菌移植也成为肝性脊髓病的可选治疗方案之一,但目前该领域相关报道较为有限,其疗效与安全性仍有待进一步研究与验证。

综上所述,本研究结果显示,肝性脊髓病以双下肢对称性、痉挛性截瘫为主要临床表现,好发于男性,病因主要为乙型肝炎、丙型肝炎及酒精性肝炎,患者的肌力强弱与合并OHE、腹水和肝衰竭相关,还与RBC、HGB、AST、ALT、Alb、ChE、TC、PTA和INR存在一定关联。肝性脊髓病预后差,目前尚无有效治疗手段,早诊断及早治疗尤为重要。本研究为回顾性研究,部分分组的样本量相对较小,研究中无统计学意义的指标不能据此判定其与肝性脊髓病严重程度不存在关联。此外,本研究部分检查项目的完善程度不足,例如脑脊液检查、脑电图检查及肌电图检查,尚未能全面评估与肝性脊髓病严重程度相关的其他因素,也未明确部分因素间是否存在交互作用,后续仍需开展大样本、多中心研究进一步探索。

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