

Analysis of Cognitive Function in Patients with Ischemic Cerebrovascular Disease

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ABSTRACT Objective: To investigate the cognitive ability of patient with ischemic cerebrovascular disease. **Method:** 60 patients with ischemic cerebrovascular disease were rated by stroke risk evaluation subscale, 20 patients are in low-risk group, 22 patients are in medium-risk group and 18 patients are in high-risk group; Montreal scale is used to conduct cognitive function assessment. **Result:** (1) There's significant difference in visual space, executive function, attentiveness, calculating ability, abstract generalization ability, naming ability, memory ability, time orientation ability among low-risk group, medium-risk group and high-risk group ($P < 0.05$). (2) Rating of various cognitive function was negatively related with analysis of blood vessel factor, age, TIA, stroke, high blood pressure and various ratings of MOCA. **Conclusion:** Cognitive impairment is more obvious for patients with ischemic cerebrovascular disease along with increasing dangerous factors.

Key words: Ischemic cerebrovascular disease; Vascular factor; Cognitive impairment

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Introduction

Past studies showed that ischemic cerebrovascular injury had serious impact on cognitive function of patients. Patient with ischemic cerebrovascular may have recognition memory impairment while blood dangerous factors may worsen patient's cognitive impairment^[1-3]. This study was to investigate the cognitive ability of patient with ischemic cerebrovascular disease.

1 Materials and Method

1.1 Materials

60 patients are confirmed for ischemic cerebrovascular disease including 36 men and 24 women at the Hospital Attached of the Medical College of Qingdao University between 2009.11 to 2010.7. All patients conform to cerebrovascular disease diagnostic criteria set by The 4th National Cerebrovascular Disease Seminar in 1995 and proved by skull CT and/or MRI examination. All patients have clear mind and stable disease condition without record of mental disease, excessive drinking and drug abusing or any other major disease. 32 patients have transient ischemic attack and 28 patients have ischemic stroke.

Grouping: the patients are divided into 3 groups according to stroke risk rating scale (ESRS). 10 patients are in low-risk group with 1-3 rating, the average age is 62.09 ± 2.433 ; 22 patients are in medium-risk group with 4-6 rating, the average age is 67.79 ± 2.073 ; 18 patients are in high-risk group with 7-9 rating, the average age is 75.42 ± 1.221 .

1.2 Evaluation Method

1.2.1 Cognitive function evaluation Montreal scale (MoCA)

is applied to evaluate cognitive function such as digit alternating test, image drawing, clock drawing test, animal naming test, memorizing digit in correct sequence, memorizing digit in reverse sequence, calculating ability, attentiveness, language repeating, language fluency, abstract thinking, time orientation and location orientation. The visual space, executive function, attentiveness, calculating ability, abstract generalization ability, naming ability, memory ability, time orientation ability are also detected.

1.2.2 Statistic analysis SPSS17.0 statistic software pack is applied for data process. Measurement data is expressed by $\bar{x} \pm s$. Multiple linear regression analysis is applied for relevant analysis, and the difference is significant when $P < 0.05$.

2 Result

2.1 Comparison of Cognitive Function Rating for All Groups

Cognitive ability such as digit alternating test, image drawing, clock drawing test, animal naming test, memorizing digit in correct sequence, memorizing digit in reverse sequence, calculating ability, attentiveness, language repeating, language fluency, abstract thinking, time orientation and location orientation of high-risk group were obviously lower than that in low-risk group ($P < 0.05$); Clock drawing test, animal naming test, calculating ability, language repeating and time orientation of high-risk group were obviously lower than that in medium-risk group ($P < 0.05$); There was significant difference in digit alternating test, image drawing, clock drawing test, animal naming test, memorizing digit in correct sequence, memorizing digit in reverse sequence, calculating ability, attentiveness, language repeating, language fluency, abstract thinking, time orientation and location orientation between high-risk

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sk group and low-risk group (P<0.05). (Table 1)

Table 1 MOCA Score Comparison of Low--medium-high Risk Groups (score, $\bar{x}\pm s$)			
Project	Low-risk Group	Medium--risk Group	High-risk Group
Digit alternating test	0.82± 0.405 ^{△△△}	0.21± 0.426 ^{***}	0± 0
Image drawing	0.82± 0.405 ^{△△△}	0.36± 0.497 ^{**}	0.08± 0.289
Clock drawing test	2.55± 0.688 ^{△△△}	1.57± 0.756 ^{**}	0.83± 0.577 ^{##}
Animal naming test	2.64± 0.674 [△]	2.71± 0.611	2.00± 0.603 ^{##}
Memorizing digit in Correct sequence	1.00± 0.00	0.93± 0.267	0.83± 0.389
Memorizing digit in reverse sequence	0.91± 0.302	0.93± 0.267	0.67± 0.492
attentiveness	0.82± 0.405 ^{△△}	0.43± 0.514 [*]	0.17± 0.389
Calculating ability	2.73± 0.467 ^{△△△}	2.07± 0.829 [*]	1.42± 0.669 [#]
Language repeating	1.73± 0.467 ^{△△△}	1.14± 0.663 [*]	0.58± 0.515 [#]
Language fluency	0.82± 0.405 ^{△△}	0.36± 0.497 [*]	0.17± 0.389
Abstract thinking	0.73± 0.647 [△]	0.21± 0.426 [*]	0.17± 0.389
Memory delaying	3.00± 1.00 ^{△△△}	2.00± 1.04 [*]	1.25± 0.754
Time orientation	3.82± 0.603 ^{△△}	3.64± 0.633	2.75± 0.754 ^{##}
Location orientation	2.00± 0.00	1.93± 0.267	1.92± 0.277
Total score	24.36± 3.99 ^{△△△}	18.5± 5.61 [*]	12.58± 4.81 ^{##}

Comparison between low-risk group and medium-risk group: *P<0.05, **P<0.01, ***P<0.001 ǂComparison between low-risk group and high-risk group:△P<0.05, △△P<0.01, △△△P<0.001 ǂComparison between medium-risk group and high-risk group: # P<0.05, ## P<0.01.

2.2 Various Dangerous Factors of ESRS Stroke Risk Scale and Statistical Result of MOCA Rating

Multiple linear regression and MOCA scale is applied to conduct relevant analysis for various dangerous factors in ESRS

scale and cognitive function of the patients. It is proved that age, TIA stroke, high blood pressure negatively relate to various MOC-A rating. This finding has statistical significance (Table 2).

Table 2 Relationship Regression Coefficient of MOCA Value and Various Dangerous Factors				
Factor	Regression coefficient	Standard deviation	T value	P value
Age	-0.210	0.076	-2.165	0.038
TIA or stroke	-0.498	0.495	-4.287	0.000
High blood pressure	-0.304	0.043	-2.640	0.013
Diabetes mellitus	0.149	0.042	1.822	0.79
Smoking	-0.032	0.040	-0.307	0.761
Past myocardial Infarction	0.036	3.700	-0.284	0.779
Other heart disease	-0.147	3.597	-1.666	0.107
Peripheral arterial Disease	36.220	3.107	1.769	0.088
Intercept	36.220	4.647	7.794	0.000

3 Discussion

Research proved that most stroke patients had certain level of cognitive disorder and 1/3 of patients will have obvious symptoms of dementia^[4-6]. Blood vessel factor has various impacts on cognitive factor^[7,8]. The research conducted rating for patients by ES - RS scale and MOCA scale was used for cognitive function evaluation. The result showed that both of MOCA value and cognitive function decreased significantly with the increasing of dangerous factors. Rating for visual space, executive function, attentiveness, calculating ability, abstract generalization ability and memory ability, time orientation ability of medium-risk group was obviously lower than that in low-risk group.

Rating of visual space, executive function, attentiveness, calculating ability, abstract generalization ability, naming ability, memorizing ability and time orientation of high-risk group were lower. Visual space, naming, calculating ability, language ability, time orientation and other cognitive ability of high-risk group were much higher than medium-risk group reveals volume of cerebrovascular disease dangerous factors had different influence on cognitive ability. This study found that high blood pressure negatively related to rating of cognitive function based on relevant analysis on dangerous factor and various MOCA items. Influence of high blood pressure on cognitive ability improves with time extension. Long-term high blood pressure, convulsions of brain blood vessel, TIA medical history, hyperlipidemia and smoking can cause brain tissue ischemia or even pathological changes such as necrosis, atrophy and leukoariosis that speed up loose of memory ability and cognitive function^[9-14]. Chu X found that more break out of transient ischemic and stroke causes more serious damages^[15]. Repeating break out of transient ischemic and stroke cause accumulation and growth of nidus, worsening brain ischemia and hypoxia increases incidence of mental retardation may be the possible mechanism. Ageing has been approved as one of dangerous factors for vessel cognitive disorder^[16,17]. Growing age will cause more serious level of arteriosclerosis. Brain tissue in hypoperfusion state On another hand, aging of brain auto-regulation, metabolism, blood-brain barrier and autonomic nervous function will prompt cognitive function damages^[18-20]. Schmidi R found that high blood pressure with /without white matter damage has no significant influence on cognitive function for patients in age between 22-49^[21]. It reminds that high blood pressure may cause cognitive function declining by causing protein damages while aging is effecting basis. The study result shows relevance between age and cognitive function which is the same as past report.

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缺血性脑血管病患者认知功能分析*

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摘要 目的 探讨缺血性脑血管病患者认知功能。方法 将 60 例缺血性脑血管病患者依据卒中风险评分量表评分,分为轻危组 20 例、中危组 22 例、高危组 18 例,应用蒙特利尔量表进行认知功能评定。结果:(1) 高危组与低危组在视空间和执行功能、注意力、计算力、抽象概括能力、命名、记忆、时间定向方面有显著性差异($P<0.05$)。中危组与低危组比较在视空间和执行功能、注意力、计算力、抽象概括能力、记忆各方面有显著性差异($P<0.05$)。视空间、命名、计算、语言、时间定向各方面中危组较高危组有显著性差异($P<0.05$)。(2) 各项认知功能评分与血管因素进行相关分析,年龄、TIA 或脑卒中、高血压与 MOCA 各项评分呈负相关。结论:缺血性脑血管病患者随着危险因素增多,其认知功能障碍越显著。

关键词 缺血性脑血管病; 血管因素; 认知功能障碍

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