

论文

剖宫产仔鼠行为认知能力与nNOS表达变化

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摘要:

目的 探讨剖宫产出生仔鼠行为认知能力和脑型一氧化氮合酶(neural nitric oxide synthase,nNOS)表达变化。**方法** 妊娠大鼠随机分为2组:阴道产和剖宫产组;剖宫产组于孕21 d剖宫取仔鼠。对生后30和115 d的仔鼠先行Morris水迷宫行为学测试,并分别于出生7、30和115 d后处死仔鼠,免疫组化检测额叶皮质、海马和纹状体中nNOS表达。**结果** 行为学测试:出生115 d成年鼠的逃避潜伏期阴道产组为(19.36±10.51)s,低于剖宫产组的(30.51±14.11)s ($P<0.05$);免疫组化结果显示:出生30 d幼鼠额叶皮质的nNOS阳性细胞剖宫产组(3.60±2.07)高于阴道产组(1.20±0.45) ($P<0.05$),海马中剖宫产组(5.80±1.79)明显高于阴道产组(1.20±0.45) ($P<0.001$),纹状体中阴道产组(0)明显少于剖宫产组(21.4±9.13) ($P<0.001$);出生115 d成年鼠海马中的nNOS阳性细胞阴道产组(2.00±0.71)低于剖宫产组(3.80±1.48) ($P<0.05$)。**结论** 剖宫产仔鼠幼年皮质、纹状体nNOS表达上调在成年后恢复正常,但在海马中则持续到成年后,并引起行为认知能力异常,提示剖宫产对仔鼠海马区造成影响可能更持久,并使与海马相关的空间记忆和学习能力受到损害。

关键词: 剖宫产 水迷宫 一氧化氮合酶 脑型一氧化氮合酶

Behavioral alterations and changes of nNOS expression in brain of offspring rats born by cesarean section

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Abstract:

Objective To explore the potential behavioral alterations in the Morris water maze test and the changes of neural nitric oxide synthase(nNOS)expression in the brain of offspring rats born by cesarean section.**Methods** The pregnant rats were randomly allocated into vaginal delivery and cesarean section groups.Fetuses were delivered by cesarean section on day 21 of the gestation.Morris water maze tests were performed on postnatal day 30 and 115.Then the offspring rats were sacrificed and their brain tissues were collected on postnatal day 7,30 and 115.Using immunohistochemical staining,the expressions of nNOS in the cortex of frontal lobe,hippocampus and corpora striatum were detected.**Results** Morris water maze results showed that the escape latency of the offspring rats,on postnatal day 115,in vaginal delivery group was significantly shorter than that of cesarean group(19.36±10.51 s vs 30.51±14.11 s, $P<0.05$).Immunohistochemical staining manifested that the density of nNOS positive cells in frontal cortex of 30-day-old offspring rats in cesarean section group(3.60±2.07)was higher than that of vaginal delivery group(1.20±0.45) ($P<0.05$).The density of nNOS positive cells in the hippocampus in vaginal delivery group was significantly fewer than that of cesarean section group(1.20±0.45 vs 5.80±1.79, $P<0.001$).The density of nNOS positive cells within the corpora striatum in vaginal delivery group(0±0) was significantly lower than that of cesarean section group(21.4±9.13) ($P<0.001$).In the offspring rats of 115-day-old, the density of nNOS positive cells in the hippocampus of vaginal delivery group(2.00±0.71)were fewer than that of cesarean group(3.80±1.48) ($P<0.05$).**Conclusion** The upregulated expression of nNOS in the cortex,corpora striatum of offspring rats born by cesarean section might revert to normal in adulthood.The abnormal nNOS expression in hippocampus will remain even in adulthood and results in the abnormality of behavior cognitive ability.The results indicate that cesarean delivery could impact hippocampus region persistently and impair the spatial memory and learning ability related to hippocampus in rats.

Keywords: caesarean section water maze nitric oxide synthase(NOS) neural nitric oxide synthase (nNOS)

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