

論文の内容の要旨

論文題目：

Paraplegia prevention by oral pretreatment with memantine in a rabbit model

(ウサギモデルにおけるメマンチン術前経口投与の対麻痺予防効果)

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Objective:

Spinal cord injury following thoracic and thoracoabdominal aortic surgeries is a dreadful complication.

Its incidence ranges from 2 to 32 % despite the use of various adjunct strategies. Aiming at reducing the

risk of paraplegia after thoracic and thoracoabdominal aortic surgeries, I evaluated the role of memantine

(N-Methyl-D-Aspartate receptor antagonist) pretreatment for prevention of spinal cord ischemia

following infrarenal aortic clamping in a rabbit model.

Methods:

Thirty New Zealand White rabbits were divided into 5 different groups of 6 each. Groups 60-7 and 60-5

received oral memantine 60 mg once daily for 7 and 5 days, respectively, prior to surgery. Groups 30-5

and 30-3 received oral memantine 30 mg once daily for 5 and 3 days, respectively, prior to surgery. Group

C (control) received normal feeds without memantine. Paraplegic model was created by clamping both aorta and inferior vena cava (IVC) at infrarenal and just proximal to their bifurcations for 45 minutes. Intraoperatively, vitals and motor evoked potentials (MEP) were monitored. Serum memantine level was measured by obtaining 5 ml of blood sample at the end of the surgery. Paraplegia was clinically assessed by Modified Tarlov score (0= no movement of lower limbs, 1= slight movement of lower limbs, 2= sits with support, 3= sits alone, 4= weak hop, 5= normal hop) at 6, 24, 48, and 72 hours. At 72 hours, rabbits were sacrificed by intracardiac injection of 10 mEq KCl, lumbar segments of spinal cords were harvested and histopathology was evaluated by using Hematoxylin and Eosin (H &E) stain.

Results:

Mean modified Tarlov scores were 4.2 ± 1.3 , 4.3 ± 1.0 , 4.2 ± 1.3 , 4.3 ± 1.2 , and 0.8 ± 1.6 in group 60-7, 60-5, 30-5, 30-3, and C, respectively at 6, 24, 48, and 72 h ($p < 0.009$ for individual groups vs control; and $p =$ not significant among groups 60-7, 60-5, 30-5, 30-3). Percentage loss of MEP amplitude by the end of surgery compared with baseline amplitude was 29.5 ± 46.3 , 11.9 ± 28.0 , 30.0 ± 46.8 , 16.7 ± 40.8 , and 81.8 ± 40.3 % in 5 groups, respectively ($p = 0.049$). After declamping, MEP reappeared in 83, 100, 83, 83, and 33 % cases in 5 groups, respectively ($p = 0.005$). Serum memantine level was 4.0 ± 2.1 , 6.4 ± 2.5 , 6.8 ± 2.4 , and 7.5 ± 6.3 ng/ml in group 60-7, 60-5, 30-5, and 30-3, respectively ($p = 0.421$). Spinal cords were normal in majority of group 60-7, 60-5, 30-5, and 30-3; but severely ischemic in majority of group C ($p = 0.016$).

Conclusions:

Oral memantine pretreatment is protective against spinal cord ischemia, and can be an additional strategy for prevention of paraplegia during thoracic and thoracoabdominal aortic surgeries.