

## Distribution of Methylene Blue Injected into the Lumbosacral Epidural Space in Rabbits

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This study was performed to determine the effect of injection volume and vertebral anatomy on the spread of methylene blue (MB) injected into the lumbosacral epidural space in rabbits. Forty two rabbits were randomly assigned to two groups and anesthetized with intramuscular administration of tiletamine and zolazepam. Each 0.5 and 1.0 ml/rabbit (0.2 and 0.4 ml/kg of body weight) of 0.12% MB was injected into the lumbosacral epidural space using a dorsal approach in sternal recumbency. After euthanasia by intracardiac injection of KCl solution, laminectomy was performed from cervical to lumbar vertebrae. The extent of cranial migration of dye as indicated by the staining of periosteum and dura mater was measured. There were two types of distribution: epidural and intrathecal distribution. If the same dose of MB solution is injected into the intrathecal space, the solution spread more cranially than the lumbosacral epidural distribution. The mean  $\pm$  SD (range) numbers of stained vertebrae in 1 ml/rabbit group were  $11.5 \pm 1.3$  (T7-T9) vertebrae in epidural space and  $22.3 \pm 6.4$  (brain-T4) vertebrae in intrathecal space, respectively. The epidural distribution was significantly greater than that of in the 0.5 ml/rabbit group ( $5.0 \pm 1.4$  [L1-L4]) ( $P < 0.001$ ), but there was no significant difference in intrathecal distribution ( $20.4 \pm 7.9$  [brain-T7]). Linear regression analysis of epidural distribution showed that the volume injected was correlated significantly with the number of stained vertebrae ( $R^2 = 0.64$ ,  $p < 0.001$ ). The larger the volume of solution injected into the lumbosacral epidural space in rabbits, the greater the spread. This result provides basic determinant for volume of epidural injection. Based on this result, the epidural anesthesia can be used for welfare of experimental rabbits through the analgesia during and after surgical treatment.

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