

Effects of collagen solution on the prevention of acute gastric mucosa injury in rats

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Abstract

AIM: To investigate the effects of collagen solution on the prevention of acute gastric mucosal injury in restricted rats inflicted by cooling in low temperature (4 °C).

METHODS: Thirty healthy Wistar rats were randomly divided into normal (N, $n = 10$), injury (I, $n = 10$) and prevention (P, $n = 10$) groups. The rats were fasted for 48 h but free access to water without restriction and cooling in normal group, fasted for 48 h but free access to water with restriction of rats onto the fixation frame for cooling in 4 °C for 4 h, so to cause stress injury of gastric mucosal membrane in I group and fed with 3 mL of collagen solution 30 min before injury in P group in addition to the procedures in I group. Gastric mucosal potential difference, blood flow volume, content of nitrite (NO₂) and hydrogenion concentration ([H⁺]) in gastric juice were determined under anaesthesia at 48 h after fast in N group and

at 4 h after injury in I and P groups to evaluate the degree of injury (injury index).

RESULTS: Gastric mucosal potential difference was 22.10 ± 5.27 in N group and 11.46 ± 5.25 in I group with obvious difference ($P < 0.01$), but 16.98 ± 4.84 in P group which was remarkably improved when compared to that in I group. Gastric mucosal blood flow volume was 23.65 ± 10.65 in I group and 57.20 ± 11.75 in N group with evident difference ($P < 0.01$), but 37.49 ± 5.87 in P group with sound effects in contrast to that in I group ($P < 0.01$). Gastric injury index was 18.40 ± 8.35 in I group and 7.9 ± 2.13 in P group with significant difference ($P < 0.01$). Hydrogenion concentration in gastric juice was 118.0 ± 41.2 mmol/L in N group, 186.9 ± 74.7 mmol/L in I group and 96.4 ± 57.2 mmol/L in P group with prominent difference ($P < 0.01$) between those in I and P group. Gastric mucosal nitrite concentration was 1.15 ± 0.46 in N group, 0.69 ± 0.15 in I group and 1.04 ± 0.44 in P group with obvious differences between N and I groups ($P < 0.01$) and between I and P group ($P < 0.01$).

CONCLUSION: Ischemic and hypoxic injury of gastric mucosal due to low blood perfusion during restriction and cooling injury at 4 °C was supposed to be an important factor in inducing gastric mucosal stress injury. But collagen solution could maintain the integrity of gastric mucosal barrier, buffer gastric acid, promote thrombocytic agglutination and ameliorate direct injury to gastric mucosa caused by various factors.

Key words: Gastric mucosa; Injury; Stress; Collagen; Acute gastric mucosa injury; Potential difference

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