

Protective effects of antioxidants on hepatic ischemia damage after portacaval shunt in dogs

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Abstract

AIM: To study the role of lipid peroxides reaction on hepatic ischemia damage and the protective effects of antioxidants (TMP, co-Q10).

METHODS: Twenty-four adult dogs were performed portacaval shunt and randomly put into 3 groups: group 1 (control group); 8 dogs with portacaval shunt (PCS group); group 2: 8 dogs with portacaval shunt and only given antioxidants TMP (ligustrazine) (PCS + TMP group); group 3: 8 dogs with portacaval shunt and given antioxidants in combination with co-Q10, TMP and co-Q10 (PCS + TMP + co-Q10 group). Drug usage: TMP, 50 mg/kg/isolation day; coenzyme Q10, 1.5 mg/kg/isolation day; PCS + TMP, given up at the end of 4 wk after operation; and PCS + TMP + co-Q10, given up at the end of 8 wk after operation. The experiment indices: superoxide dismutase (SOD), malondialdehyde (MDA), ALT, AST, AKP were all measured before operation, and 8 wk after operation. The liver tissues were obtained in the 4th week and 8th week respectively after operation and the changes of hepatic structures were observed under light and electronic microscope.

RESULTS: There were obvious increase of MDA and decrease of SOD

in PCS group, which was remarkably different from pre-operation ($P < 0.01$). In PCS + TMP group, there was no difference between pre-operation and within 4 wk after operation ($P > 0.05$). But it was remarkably different from PCS group ($P < 0.01$). Beginning from the 5th week after operation, we stopped TMP (ligustrazine), as a result, the obvious increase of MDA, rapid decrease of SOD were found, but not different from PCS group ($P > 0.05$). In PCS + TMP + co-Q10 group, MDA increased slightly, and SOD decreased, but it was superior to that in PCS and PCS + TMP groups. The data in PCS + TMP + co-Q10 group had statistical significance compared to that in PCS + TMP group ($P < 0.05$) during 4 wk after operation; but from the 5th to 8th week, there was a remarkable difference ($P < 0.01$). The results of ALT, AST and AKP showed remarkable difference between PCS + TMP + co-Q10, PCS group ($P < 0.01$) and PCS + TMP compared to PCS + TMP + co-Q10 ($P < 0.05$). After stopping TMP, PCS + TMP were compared with PCS + TMP + co-Q10 ($P < 0.01$). The changes in liver structures were fatty degeneration, atrophy and necrosis; decrease in rough surfaced endoplasmic reticulum (RER), mitochondrial swelling, partial mitochondria fusion, disappearance of mitochondrial crista, diminution of Golgi body. The structures of liver cells in PCS + TMP and PCS + TMP + co-Q10 groups were superior to that in PCS group; but in the 8th week after operation, the liver structural changes had no difference between PCS + TMP and PCS group. The results of light electronic microscopy in PCS + TMP + co-Q10 were better than that in PCS and PCS + TMP groups.

CONCLUSION: The over-activated lipid peroxides reaction may be one of the important factors of hepatic ischemia damage after portacaval shunt; combined use of the antioxidants can enhance the protection from the hepatic ischemia damage.

Key words: Hepatic ischemia damage; Antioxidants; Portacaval shunt; Lipid peroxides reaction; Malondialdehyde; Superoxide dismutase

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