Effects of the dexmedetomidine, midazolam, butorphanol, and atropine combination on plasma oxidative status and cardiorespiratory parameters in raccoon dogs (Nyctereutes procyonoides)

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Oxidative stress in the body occurs when the production of free radicals overwhelms the antioxidant defence systems. This study aimed to investigate the effects of a combination of dexmedetomidine, midazolam, butorphanol, and atropine (DMBA) as an anaesthetic on plasma oxidative status in twelve raccoon dogs. Baseline measures were recorded prior to anaesthesia, and then the animals were anaesthetised with the combination of dexmedetomidine (25 ug/kg), midazolam (0.45 mg/kg), butorphanol (0.25 mg/kg), and atropine (0.035 mg/kg). Temperature, respiratory rate, haemoglobin saturation by oxygen, pulse rate, systolic arterial pressure, diastolic arterial pressure, and mean arterial pressure were continually monitored. Blood pressure was significantly decreased at 30 to 60 min ($P < 0.05$). Pulse rate ranged from 96 to 123 bpm, without episodes of severe bradycardia or tachycardia. Blood samples were collected from saphenous venipuncture at 0, 0.5, 1, and 24 h before, during, and after anaesthesia. Plasma superoxide dismutase, glutathione peroxidase, and catalase activity, and malondialdehyde concentrations were measured by colorimetry, and plasma vitamin E level was determined by high-performance liquid chromatography. Superoxide dismutase and glutathione peroxidase activities increased significantly ($P < 0.05$) at 0.5 h, and then gradually decreased to baseline values after 1 h. Catalase activity increased significantly ($P < 0.05$) at 0.5 h, 1 h, and then gradually decreased to baseline values after 24 h. There was no significant change in vitamin E level ($P < 0.05$).The concentration of malondialdehyde decreased significantly at 0.5, 1, and 24 h after injection ($P < 0.05$). The results show that the administered dose of dexmedetomidine, midazolam, butorphanol, and atropine has antioxidant effects in raccoon dogs. Our study is the first to demonstrate that dexmedetomidine, midazolam, butorphanol, and atropine exert antioxidant effects, which may be exploited to alleviate the stress of examination and research at veterinary clinics.

Keywords:

anaesthesia; lipid peroxidation; oxidative stress; DMBA

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