CHAPTER V

Discussion

The present study indicate that during intravascular volume expansion, mean arterial blood pressure, heart rate and cardiac output increased. Therefore, it can be argued that the elevation in stroke volume during volume expansion is due to an increase in venous return to the heart. In the experiment, it was found that after venom injection of both groups, mean arterial blood pressure significantly decreased in the initial period. The decrease in blood pressure after venom injection was sustained 15 - 30 minutes and returned to normal level in volume expanded animals. These findings are similar to the previous studies in normal dogs (Chaiyabutr et al., 1984; Tungthanathanich, 1983). The increases in blood pressure, total peripheral resistance and packed cell volume observed in 2 hours after envenomation of volume expanded animals, probably are related to a reflex mechanism that cause systemic vasoconstriction and splenic contraction in response to the initial decrease in mean arterial blood pressure (Corcondilas et al., 1964; Ganong, 1977). It should note in this study that animals with occlusion of intestinal and splenic blood vessels could not compensate enough for the extremely low of blood pressure.

The effect of hypotension after envenomation was previously proposed to be due to a pooling of blood in the hepatosplanchnic bed and this could be prevented by evisceration (Vick et al., 1967). The conclusion might not apply to the present results.

The present study indicates that different mechanisms may participate in the generation of hypotension. Animals with either plasma volume expansion or occlusion of intestinal and splenic blood vessels showed no alteration of plasma volume after envenomation. Tongvongchai (1984) found that the spleen was not the major contributor to the total blood volume shifts caused by the effect of the venom. It is not ascertain from the pressent study that the Russell's viper venom affected the heart directly to decrease cardiac output and blood pressure. There is also some evidences obtained recently by Huang and Lee (1984) that phospholipase A_2 (PLA_2) subfractions of the venom produced hypotensive actions in rat given 0.1 mg/kg intravenously. Huang (1984) suggested that PLA_2 fractions in the venom may release thromboxane A_2(TxA_2), prostacycline (PGI_2) and histamine from the perfused guineapig lungs which might cause vasodilation in the periphery, combined with pulmonary vasoconstriction, restriction of blood return to the heart, leading to a decrease in cardiac output, and induced a greater hypotensive effects.

The present results show that the reduction of renal blood flow might not be distributed solely by a decrease in systemic blood pressure and cardiac output in the initial period since the renal fraction was markedly decreased after envenomation. This evidence indicates local renal vasoconstriction after venom injection. It has been known that renal circulation is regulated by two hormonal systems. Vasoconstriction is mediated by norepinephrine and/or the reninangiotensin system while prostaglandin compounds and the kallikrein-kinin system act as vasodilators.

A possible endogenous mechanism for releasing the hormone induced vasoconstriction after envenomation may be due to the lack of prostaglandins (e.g. PGE_2) and/or overproduction of thromboxane A_2 (TXA_2), a powerful renal vasoconstriction (Gerber et al., 1978). In the present study, whether the observed increase in renal vascular resistance and decrease in renal blood flow of both groups from Russell's viper venom are mediated direct through renin-angiotensin system, or activation of reninangiotensin system are mediated indirectly through the action of catecholamine (Vander, 1965) or prostaglandin (Werning et al., 1971) remain further investigation.

After envenomation, urinary excretion and fractional excretion of sodium and chloride decreased markedly in both groups. This should be attributed to the decrease in glomerular filtration rate since plasma electrolyte concentrations were not altered after envenomation. Urinary potassium concentrations increased after envenomation as compared with the control. This may be due to potassium secretion at distal tubule and collecting duct and additional from haemolysis of red blood cells. These results were similar to the previous report by Tungthanathanich. (1983).

These findings suggest that alterations in renal functions during envenomation are due to changes of both extrarenal and intrarenal fashions. The hypotensive effect after venom injection in volume expanded animals indicates that organ and/or venous vascular bed other than spleen or intestine may play a role in pooling the blood volume shifts.