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Central cardiovascular dynamics of the anaesthetized alligator (*Alligator mississippiensis*)

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The division of the crocodilian heart is unusual in that both the pulmonary (PA) and left aortae (LAo) spring from the thin walled right ventricle (RV). The right aorta (RAo) rises from the more muscular left ventricle (LV). The LAo and RAo are connected by the Foramen of Panizza (FP) just outside the heart and by a large diameter vessel behind the loop of the aortae.

Current views suggest that during air breathing, when pulmonary vascular resistance is low, the thin walled RV only supplies the lungs while the LAo is supplied at high blood pressure from the LV, through the FP. During diving, RV pressure increases to exceed that of the systemic circuit due to pulmonary vasoconstriction and a pulmonary shunt is established by way of the LAo. Consequently, during diving, the left atrium receives diminishing quantities of blood from the lungs. The powerful left side of the heart is thus progressively shut down while the lightly muscled right side pumps more and more of the total cardiac output. This is in stark contrast to the situation in other animals with divided circulations.

We investigated central cardiovascular dynamics by recording pressure and flows in the heart and aortae of artificially ventilated alligators anaesthetized by inhalation of 1% Halothane in a 30% O_2:N_2O mixture. RV pressure was biphasic and only the first phase appeared in the PA, indicating active closure of the pulmonary valve. During systole, LAo flow was retrograde suggesting that the FP was closed by the open RAo valves. A sudden fall in systemic pressure without any change in pulmonary resistance caused the RV to pump into the PA and LAo. These events occurred spontaneously and were not associated with diving. The volume of blood pumped during right to left shunting was small and we believe it is most likely a mechanism to redistribute blood when the volumes of the pulmonary and systemic circuits become uneven.

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