

T400-Series Technical Note

Renovascular Hypertension Model

Introduction

The advantages of this rat model over a genetic model are that one can start the hypertension process at the investigator's convenience. Animal costs are lower and one can produce gradations in hypertension by adjusting clip size.

Materials

Prepare arterial clip from pure (0.999) silver (not sterling). May use silver sheet (0.005 inches thick) or solid silver block.

- 1) For silver sheet, cut into 2 mm wide strips, 8 - 10 mm long
- 2) Bend silver strip across thickness gauge (for example, an automotive feeler gauge) of desired size (0.2 mm is conventional) (Fig. 1).
- 3) Smooth edges.
- 4) Leave one side slightly longer than the other to facilitate implantation

Animal Preparation

Fast animal the night before surgery. Using sterile instruments, prepare animal for aseptic surgery.

Surgical Protocol

Expose renal artery through laparotomy. Dissect from renal vein. Apply clip with open end away from renal vein (Fig. 2). Abdominal pressure catheter may be implanted during same operative procedure. Closure is conventional.

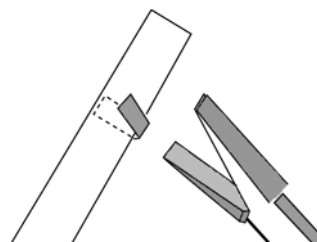


Fig. 1: Clip

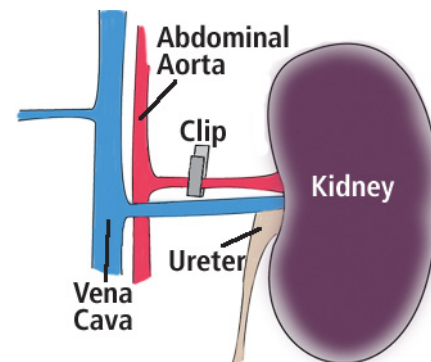


Fig. 2: Renal Hypertension Model: 2 kidneys, 1 clip (2K1C)

1 Kidney, 1 Clip (1K1C)

- Initial increase in plasma renin activity (PRA)
- Returns to normal in established phase
- Blockade of RA system reduces but does not eliminate hypertension
- 4 weeks after clipping, MAP varied with clip size

CLIP SIZE	MAP
0.3 mm	133
0.25 mm	161
0.20 mm	189

Increasing constriction

Results

Hypertension develops over time with severity and speed of onset determined by sodium in diet and degree of renal artery constriction.

2 Kidneys, 1 Clip (2K1C)

- Plasma renin activity (PRA) acutely elevated, some find that it stays elevated, others that it returns to normal
- Chronic converting enzyme inhibitor blocks development of 2K-1C and reverses existing hypertension
- 4 weeks after clipping, MAP varied with clip size

CLIP SIZE	MAP
0.3 mm	123
0.25 mm	129
0.20 mm	172*

* only in 2K1C, 0.2 mm group was PRA increased at 4 wks.

REFERENCE

These techniques were taught by William Murphy at the University of Mississippi.