EVALUATION OF BILE DUCT LIGATION-INDUCED PORTAL VEIN HYPERTENSION IN TELEMETERED RATS
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INTRODUCTION
Portal vein pressure (PVP) measurement is an important parameter for the evaluation of liver pathology as portal vein hypertension is a common consequence of human chronic liver diseases. A classic animal model for studying the effects of chronic liver disease is the rat Bile Duct Ligation (BDL) model. Usually, only terminal measures are performed in BDL studies making it difficult to assess the temporal effects of PVP on pathological endpoints. The aim of this study was to evaluate the use of telemetry for continuous measurement of PVP after BDL in the conscious freely-moving rat to complement more traditional terminal/pathological measures.

MATERIAL & METHODS
• Experimental protocol:
  • Male Rj: Wistar (Han) rats weighing 277–305 g were used (n=6 or 7 per group).
  • On Day 1, rats were anesthetized (sodium pentobarbital 50 mg/kg i.p.) and given 7.5 mg/kg s.c. carprofen (Rimadyl®). Following a midline incision of the abdomen, a Data Sciences International (DSI) TA11PA-C40 implantable telemetric device was introduced into the peritoneal cavity and the catheter of the device was then inserted into the superior mesenteric vein and advanced up to the portal vein.
  • On the same day (Day 1), the bile duct was either ligated (BDL rats) or not (sham-operated rats): after the common bile duct was gently exposed, it was double ligated with silk threads and excised between the ligatures to avoid regeneration. The abdominal and skin incisions were then closed and rats were given 100 mg/kg amoxicillin i.m. and returned individually to their cages on a telemetry receiver (DSI) to record mean PVP.
  • Telemetry recordings were then monitored for up to 3 weeks after BDL, using Dataquest (DSI) software.

RESULTS

Effects of BDL on body weight gain
• Body weight (g) decreased during the first week following BDL (299 ± 8 g in BDL rats versus 317 ± 4 g in sham-operated rats on Day 7, i.e. -6%) and then increased to a level similar to sham-operated rats (albeit lower in magnitude).

Effects of BDL on mean portal vein pressure (PVP)
• BDL induced increases in mean PVP consistently over the entire evaluation period (significantly from Day 8). The mean increase in mean portal pressure reached 7.2 ± 0.4 mmHg compared to sham-operated rats (ranging from +5.1 mmHg to +10.4 mmHg).

Effects of BDL on organ weights (normalized to body weight) in the rat
• Weights of the liver, spleen and kidneys were significantly increased in BDL rats (liver: 5416.7 ± 518.5 versus 4072.1 ± 100.2 mg/100g bwt, i.e. +33%, p < 0.05; spleen: 689.8 ± 84.1 versus 314.1 ± 18.0 mg/100g bwt, i.e. +120%, p < 0.001; left kidney: 412.6 ± 29.9 versus 344.1 ± 9.5 mg/100g bwt, i.e. +20%, p < 0.05; right kidney: 409.8 ± 28.0 versus 352.2 ± 9.8 mg/100g bwt, i.e. +16%, NS) while the weight of the heart was significantly reduced (290.9 ± 7.7 versus 355.0 ± 13.2 mg/100g bwt, i.e. -18%, p < 0.01).

CONCLUSION
These results indicate that telemetry provides a valuable technique for studying the continuous temporal profile of PVP following BDL in rats. Importantly telemetry may have utility in assessing the longitudinal effects of potential drug candidates using the rat BDL-induced portal vein hypertension model.

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