BEST PAPER

BP-1

A MURINE MODEL OF SPONTANEOUS PREECLAMPSIA *Bates, J.N.[1] Davisson, R.L.[2] Hoffmann, D.S.[2] Butz, G.M.[2] Aldape, G.[1] Schlager, G.[3] Merrill, D.C.[4] Sethi, S.[5] Weiss, R.M.[6]* 1. Anesthesia, University of Iowa, Iowa City, IA; 2. Anatomy and Cell Biology, University of Iowa, Iowa City, IA; 3. Biological Sciences, University of Kansas, Lawrence, KS; 4. Obstetrics and Gynecology, Wake Forest School of Medicine, Wake Forest, NC; 5. Pathology, University of Iowa, Iowa City, IA; 6. Internal Medicine, University of Iowa, Iowa City, IA Experimental research in preeclampsia is hindered by a paucity of animal models of the disease. Women with borderline hypertension are at increased risk to develop preeclampsia. BPH5 is a strain of borderline hypertensive mouse with small, underweight litters that was studied for the possible development of pregnancy-induced hypertension and other phenotypes associated with preeclampsia. Non-pregnant female BPH5 and control C57BL/6 mice had radiotelemetric pressure transducers placed in their thoracic aorta and were allowed 7 days recovery. Mean arterial pressure (MAP) was recorded for 5 days prior to strain-matched breeding. Upon detection of a vaginal plug, MAP was recorded continuously during pregnancy (20-21 days) and for 1 week postpartum. In separate mice without telemeters, a similar protocol was used for 24-hour urine collection in metabolic cages, serial ultrasound examinations, and timed sacrifices for histopathology. Prior to pregnancy, BPH5 had elevated baseline MAP compared to C57 (126±3, n=7 vs 105±6, n=8, mmHg $p<.01$) but similar total urinary protein (TUP) (13±1, n=6 vs 11±2, n=5 mcg/g body weight/24hr, p.05). Starting at midgestation, MAP in pregnant BPH5 began to increase, continued to rise to peak levels just prior to delivery (151±7, $p<.01$ vs pregestational), and returned to pre-pregnancy levels (130±4, p.05 vs pregestational) by 2 days postpartum. This was accompanied by increased TUP at 19-20 days in BPH5 (24±2, $p<.05$ vs pregestational). No changes were observed in C57 during pregnancy except a small decrease in MAP at midgestation (94±2 mmHg, $p<.05$ vs pregestational). BPH5 delivered significantly smaller litters than C57 (3.1±0.3 pups, n=15 vs 7.6±0.5 pups, n=18, $p<.01$) despite normal numbers of fetuses until midgestation (8.3±0.6, n=9 vs. 7.8±0.8, n=11, p.05). Histological examination of utero-placental tissue revealed an increased incidence of focal and hemorrhagic placental necrosis, intervillous fibrin and apparent fetal demise in BPH5 mice. Renal tissue showed progressive glomerulosclerosis in BPH5 mice only. Separate in vitro studies showed diminished endothelium-dependent relaxation to acetylcholine in mesenteric resistance arteries of BPH5 vs. C57 (peak 15±5 %, n=7 vs 35±4 %, n=10, $p<.05$). The mouse strain BPH5 shows many features consistent with the human syndrome of preeclampsia and may be a useful animal model to study the pathophysiology, genetics, and therapeutics of this disorder.

BP-2

IN VITRO INVESTIGATION: EPIDURAL CATHETER PENETRATION OF HUMAN DURA *Angle, P.J. Kronberg, J.; Thompson, D. Anesthesia, Sunnybrook & Women's College HSC, Toronto, ON, Canada* Subarachnoid catheter passage is a hazard of epidural placement. This study examined factors contributing to its occurrence. 3 questions were addressed:1)Can either a Portex 20G 3-holed closed end (PC) or an Arrow 19G Flexitip Plus (AC) catheter be passed through intact dura?; 2) What role does dural trauma with the epidural needle play in facilitating catheter passage?; 3)Is it possible to pass either catheter through a single hole made by a 25G Whitacre needle used for combined spinal epidural(CSE)? Human cadaveric dural tissue was mounted on a cylindric human dural sac model and pressurized to physiologic levels.A 17G Hustead needle was mounted at 90degrees to the long axis of the dura for all parts of the study and advanced using a micromanipulator.Question 1:After pressurizing the model to 15cm CSF pressure(left lateral decubitus position)the Hustead needle was advanced into the dura to the point of visible tenting without leak.Attempts were made to pass the Portex(x5) followed by the Arrow(x5) in each of 3 needle bevel orientations(parallel, hole cephalad, hole caudal).The experiment was then repeated at 25cm of pressure.Question 2:Using fresh specimens at 15cm CSF pressure, the Hustead needle was repeatedly advanced into the dura until a partial/early tear(CSF leak around the hub but not through the needle) or a full puncture was achieved(CSF through the hub). Attempts were then made to pass the Portex(up to 5x) followed by the Arrow(up to 5x).For full tears, the needle was withdrawn to the point where CSF leak stopped prior to attempts at catheter passage.Question 3: Using fresh specimens at 15cm pressure, an uncomplicated CSE was performed producing a single dural puncture with a 25G Whitacre spinal needle. Attempts were then made to pass the Portex(x5) followed by the Arrow(x5) in each of 3 bevel orientations.We were unable to pass either catheter through intact dura despite 300 attempts per catheter(600total). We produced partial tears in 3/10specimens and could pass the Portex in 1/3 with a distinct "pop"felt as the catheter passed into the model and CSF was aspirated.The Arrow did not pass in any of these 3 specimens. Passage of catheters through full tears occurred in 6/33 attempts with the Portex and 1/35 attempts with the Arrow. We were unable to pass either catheter through a single hole made by a 25G Whitacre needle as part of a CSE(180 attempts total).We conclude that passage of either of the catheters studied through intact dura is unlikely and that unintentional subarachnoid passage of a catheter suggests occult dural damage with the epidural needle. *Anesth Analg 1995;80:747-753.*