Title: INTRAOPERATIVE FLUID MANAGEMENT OF NEWBORNS WITH BACTERIAL PERITONITIS

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Introduction. Recommendations for the intra operative fluid management of neonates requiring surgical intervention have undergone considerable change over the last 25 years. Since Rickham's initial recommendation that no fluid should be given, various authors have suggested adding dextrose, salt, protein, as well as markedly increasing the quantity of water which is administered. In addition, preoperative deficits as well as ongoing third space losses which occur during the time of operation have been recognized. Our approach to intraoperative fluid management is based on preoperative assessment and invasive and non-invasive intraoperative monitoring. Fluid administration is based upon intra-arterial cannulization with continuous monitoring of systolic and diastolic blood pressure, arterial wave form as it is altered by respiration, and sequential assessment of serum electrolytes, hematocrit and acid-base status determined by interval blood samples. Intraoperative fluid management consisted of a constant infusion of 4cc/kg/hr of $D_5.2NS$. Additional fluid was given if the systolic BP was less than 55 torr or if positive pressure ventilation caused a 10 torr or greater fall in arterial pressure. If either of these criteria were noted and the hct >40, 5-10cc/kg Ringer's Lactate or fresh frozen plasma were given IV push. If the hematocrit was <40, 5cc/kg of whole blood or packed cells were given.

Methods. The charts of eight newborns free of renal, cardiac, and primary pulmonary disease who had diffuse bacterial peritonitis at the time of exploratory laparotomy were reviewed. Weight, gestational age, diagnosis at operation, duration of abdominal symptoms, duration of operation, and total fluids administered were recorded. Blood pressure, heart rate, acid-base status, urine specific gravity, use of lasix or dopamine were compared pre and post operatively. Respiratory status pre and post operatively were compared using physical exam, X-ray and arterial blood gases.

Results. These 8 newborns received 600-1400cc of IV fluid (40=100cc/kg/hr) intraoperatively. Hemodynamic parameters improved with HR falling an average of 29 beats/min, BP rose 16 torr. Three patients who were preoperatively on dopamine for BP <40 torr were weaned off dopamine. Average base excess encoungered preoperatively was -11, and postoperatively was -4. Urine specific gravity did not change significantly, but two patients who did not urinate preoperatively (6 hours preop) did immediately postoperatively. In spite of the massive amounts of fluids administered intra operatively, oxygenation improved. The PO_2/FiO_2 was 264 preoperatively, and improved to 309 post operatively. No X-rays suggested pulmonary edema preoperatively, but 2/8 suggested pulmonary edema or atelectisis postoperatively. Neither pre nor postoperatively physical examination suggested pulmonary edema. All children required mechanical ventilation postoperatively. Postoperative respiratory failure was most often due to increased abdominal pressure and sepsis.

Discussion. Infants with septic peritonitis have massive 3^0 losses of salt, water and protein from the time of initial abdominal insult through the post operative period. Our data suggest that these neonates were hypovolemic upon arrival in the OR. Tachycardia, hypotension, rising hematocrit and high urine specific gravity reflects intravascular dehydration. Postoperative hemodynamic function improved characterized by a rise in BP, fall in HR, and elimination of the need for vasopressors. An improvement in oxygenation ($\uparrow PO_2/FiO_2$) may be secondary to the hemodynamic improvement. Urine specific gravities postoperatively ranged from 1.010 -1.029, even though postoperative fluid administration ranged from 110 to 240cc/kg/day suggesting these patients did not receive an excess of fluid intra operatively. Our data suggests that fluid require ments for neonates with peritonitis are greater than current recommendations in the literature for neonatal surgery. The wide range of fluid require ments (40-100cc/kg/hour) suggest rules and recommendations for intraoperative fluid replacement have little use in the management of a neonate with peritonitis. Invasive monitoring with sequential evaluation of BP, hct and acid-base status are necessary to maintain physiologic integrity. Estimation of what the individual patient needs is best determined by preoperative evaluation and intraoperative monitoring.

	H.R.	B.P.(sys)	B.E.	pO_2/FiO_2
pre op	175+19	48.6+13.9	-11+3.8	269+141
post op	146+23	64.4+11	4.6±3.4	309±78
	p<.05*	p<.05*	p<.01*	N.S*

References.
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*Student T test.