

Experience with laproscopic placement of peritoneal catheter in ventriculoperitoneal shunts at Children's Medical Center, Medical College of Georgia
2007-2011

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MCG story

- All shunts placed using minilaparotomy or split trochar open techniques prior to 2007
- Laproscopy reserved for the "hostile" abdomen
- Previous chairman left December 2008
- Pediatric surgery approached about laproscopically assisting with all distal catheter placement.

Alabama shunt study 2004-2009

- 810 consecutive VP procedures comparing laproscopic procedure to open placement of shunts
- Found no change in failure, but shorter LOS, reduced operative time, and blood loss
- Over course of study it was noted that surgeons began to prefer laproscopic assistance
- This study looked at adult shunt population

Study description

- Obtained IRB from our institution to conduct a retrospective chart review of all ventriculoperitoneal shunts placed with laproscopic assistance at our Children's Medical Center from Jan 2007- Dec 2011
- Study to review outcomes for our method of shunt placement
- Inclusion Criteria – Any operation that included placement with laproscopic assistance of complete proximal, valve and distal catheter system with a proximal terminus in ventricle and distal terminus in peritoneal cavity

Procedure

- Cranial
 - Curvilinear occipital incision on right
 - Burr hole made
 - Distal tunneling performed
 - With possible supraclavicular exit if one pass to abdomen not possible
 - Terminus of distal tunneling determined by laproscopic team over RUQ

Procedure

- Distal
 - Incision and trochar for endoscope placed at umbilicus after insufflation of abdomen
 - Abdominal contents inspected, adhesions taken down with camera, if necessary
 - RUQ palpation visualized to determine entry point
 - Peel-away trochar placed through abdominal incision using Seldinger technique

Procedure

- Joint
 - Distal tubing is passed to abdominal incision site and covered in antibiotic soaked sponge
 - Ventricular catheter is placed with Neuro-pen endoscope for optimal placement
 - Catheter attached to distal system, flow confirmed before placement in abdomen
 - Catheter passed into abdomen under laproscopic visualization and guided above liver where again, flow is confirmed



Patient Characteristics

- 120 Shunt procedures met inclusion criteria in 81 patients
- Sex
 - Female 31 (38.2%)
 - Male 50 (61.7%)
- Race
 - White 31 (38.3%)
 - Black 48 (59.2%)
 - Mixed 2 (2.5%)
- Birth Age
 - Term 27 (33.3%)
 - Preemies 47 (58 %)
 - Unknown 7 (8.6%)
- Gestational Age in Preemies
 - Avg. 28.2 weeks
 - Range 24-36 weeks

Patient Characteristics

- Previous Abdominal surgery 40 (49.4 %)
- Indication for Shunt
 - Congenital Hydrocephalus 71.6 (63.6%)
 - IVH 12 (14.8%)
 - Tumor 6 (7.4%)
 - Trauma 3 (3.7%)
 - Congenital Infection 1 (1.2%)
 - Pseudotumor Cerebri 1 (1.2%)
- ASA Score
 - 1-2 8 (6.6%)
 - 3 86 (71.6%)
 - 4 22 (18.3%)
 - NA 4 (3.3%)
- Blood loss 11.6 cc
- OR time 79.8 min

Our data vs. Other lap VPS series (adult)

	Infection (%)	Prox. Mal. (%)	Dist. Mal. (%)	Total Mal. (%)	Mean Age (yrs)
MCG (n = 120)	13 (10.8%)	26 (21.7%)	3 (2.5%)	52 (43%)	5.0
Naftel et al. Lap(n=475)	39 (8.2%)	35 (7.3%)	11 (2.3%)	85 (17.9%)	52.0
Naftel et al. Open(n=335)	22 (6.6%)	40 (12.0%)	6 (1.8%)	68 (20.2%)	51.1

Infections

- MSSA: 3/13 (23.08%)
- MRSE: 3/13 (23.08%)
- MRSA: 2/13 (15.38%)
- *Enterococcus*: 2/13 (15.38%)
- *E. coli*: 2/13 (15.38%)
- *Pseudomonas*: 1/13 (7.69%)

< 1 year at surgery subpopulation

Birth Age	Infection	Proximal	Distal	Total complications	Total Cases
<30 weeks	4 (14.8%)	11 (40.7%)	2 (7.4%)	17 (63%)	27
30-36 weeks	1 (11.1%)	0	0	1 (11.1%)	9
Term	1 (5.9%)	4 (23.5%)	0	5 (29.4%)	17

- Remaining population infection rate 7/67 (10.4%)

Failure Cause According to Year

Year	Infection	Proximal	Distal	Disconnect	Total Cases
2007	0	1 (33.3%)	1 (33.3%)	0	3
2008	3 (18.7%)	4 (25.0%)	0	1 (6.2%)	16
2009	4 (15.4%)	8 (30.8%)	1 (4%)	0	26
2010	4 (9.5%)	9 (21.4%)	1 (2.3%)	0	42
2011	2 (6.0%)	3 (9.1%)	0	0	33

Our data vs. open VPS in children

	Infection (%)	Prox. Mal. (%)	Dist. Mal. (%)	Total Mal. (%)	Mean Age (yrs)
MCG (n = 120)	13 (10.8%)	26 (21.7%)	3 (2.5%)	52 (43%)	5.0
Ahmed et al. (n = 50)	6 (12%)	7 (14%)	9 (18%)	22 (44%)	Range = 1 day-7 yrs
Casey et al. (n=380)	12%	*	*	53%	0-10 years

* = 41% total mechanical failure rate (Prox, dist, malposition, fracture, etc.), 30% Blockage (Prox or dist)

Distal Malfunctions

- 17 yo AAF former preemie with multiple open VP shunt placements and revisions s/p laparoscopic VP shunt placement at age of 13
- Preemie with infected G-tube that caused distal shunt obstruction. Shunt found walled in by omentum on revision
- 24 wk preemie with NEC who had been managed with subgaleal shunt and EVD until 2 kg. VP shunt attempted and later converted to VA shunt.

Cons

- Reliance on another surgical team for every procedure
- Agreement on procedure methods
- No significant improvement in overall shunt failures

Pros

- Reduced take-backs for misplaced catheters
- Above liver placement protects distal catheter
- Placement of only proximal catheter by neurosurgeon
- Reduced blood loss
- Reduced operative time
- No blind intraperitoneal procedures
- Training benefit for surgery residents at academic institutions

Future direction

- Attempt to compare laproscopic outcomes to open outcomes in the same study period.

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