



# Laparoscopic implantation of distal peritoneal ventriculo-peritoneal shunt catheter - A prospective comparative Study

Or Cohen-Inbar MD; Eric Cochran; Uri Hadelsberg; Michael Krausz; Menashe Zaaroor MD DSc; Ahmad Mahajna

Rambam Health care campus, Technion Institute of technology, Haifa Israel



## Introduction

Ventriculo-peritoneal shunts (VPS) are a common treatment for hydrocephalus. Placement of the distal abdominal catheter can be difficult in the setting of advanced age, previous shunt or abdominal surgeries, obesity, chronic illnesses etc. at our institute, part of the procedures are performed using a multidisciplinary team of a neurosurgeon and a laparoscopic surgeon.

## Objective

We evaluated the influence on prognosis of a laparoscopically assisted VPS placement using a single-port technique as compared to the conventional mini-laparotomy approach.

## Methods

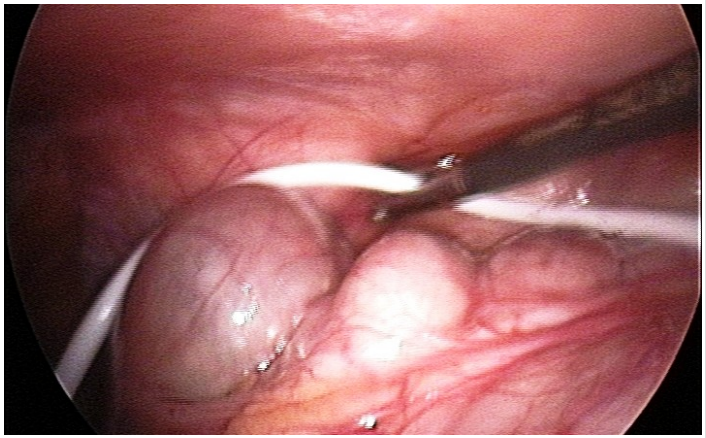
A retrospective review of all patients admitted and operated at our institute for hydrocephalus or shunt dysfunction during 2006-2010 was performed, forming a cohort of 302 patients, 48 with single trocar laparoscopy. Neurosurgeons and laparoscopic surgeons logged the presenting symptoms, past medical history, chronic illnesses and past surgical procedures. Surgical procedure and findings were logged as well. Outcome data was collected at several time points after the surgical intervention.

Patient's Data		
Admission data	Prior shunt operations, prior abdominal operations.	
	Chronic illnesses (Diabetes mellitus, essential hypertension, pulmonary disease) and adequacy of chronic treatment.	
	Obesity, oncological history, other chronic conditions.	
Surgical findings	Surgical approach to the peritoneal cavity, no. of ports / length and position of skin incision, presence of peritoneal adhesions, operating time.	
	Surgical complications (intestinal perforations, bleeding).	
Outcome data	Length of admission (general, nICU*).	
	3 months	Surgical wound infection, bacterial meningitis, distal catheter obstruction, proximal catheter obstruction, need for reoperation, mortality.
	12 months	Need for reoperation
*Neurosurgical intensive care unit		

## Results

Laparoscopic patients group was significantly much older, had more chronic illnesses and had significantly more prior abdominal and shunt operations. And still, this group had the same outcome as the open minilaparotomy group, in independent outcome parameters.

Multivariate prediction model analysis				
		Relative risk increase		P
Surgical wound infection	Prior shunt operations	2	4.61	0.009
		3	5.66	0.005
	Length of admission (risk per day)		1.017	0.025
Distal shunt obstruction	Prior abdominal operation	1	10.36	0.001
		2	18.91	<0.0001
		3	43.74	<0.0001
	Presence of intraperitoneal adhesions		4.57	0.04
Bacterial meningitis	Prior shunt operations	2	6.22	0.008
		3	5.62	0.017
	Length of admission (risk per day)		1.037	<0.0001
Reoperation in three months	Prior shunt operations	2	3.68	0.024
		3	11.86	<0.0001
		4	41.73	<0.0001



## Conclusions

Elderly patients or those suffering less optimally controlled chronic illnesses and obesity, as well as those patients who underwent previous abdominal or shunt operations may benefit from the laparoscopic single port technique for distal catheter placement during VPS procedure. This is shown to reduce the surgical complications and equals the outcome parameters to those of the young, otherwise healthy patients.

Univariate analysis				
		Surgical technique		P
		Laparoscopic	Mini-laparotomy	
Admission parameters				
Age		54.28	37.04	<0.001
Chronic illnesses (% within group)	DM*	27.5	17	0.12
	HTN**	37.5	28	0.26
	Obesity	35	17.7	0.018
Prior abdominal surgeries (% within group)	1	62.5	59.7	NS***
	2	20.0	27.0	NS
	3	10.0	10.1	NS
	≥4	7.5	3.2	0.001
Prior VP-shunt operations (% within group)	1	57.5	46.0	0.065
	2	10.0	30.2	NS
	3	20.0	13.7	NS
	≥4	12.5	10.1	NS
Presence of peritoneal adhesions (% within group)		12.5	3.6	0.031
Length of surgery		45.75	59.24	0.001
Outcome parameters				
Length of Admission (mean, days)		12.37	14.1	0.44
Length of Admission (Median, days)		5	5	
Surgical wound infection (3months) (% within group)		15.0	13.3	0.8
Bacterial meningitis (3 months) (% within group)		10.0	11.3	1.00
Distal catheter obstruction (3 months) (% within group)		15.0	12.9	0.8
Reoperation (3 months) (% within group)		27.5	26.2	0.85
Reoperation (12 months) (% within group)		42.5	33.9	0.29

\* Diabetes mellitus, \*\*Hypertension (essential), \*\*\*Not statistically significant