



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

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## 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 abdominal surgeries, obesity; chronic illnesses etc. at our institute, complex patients are treated using a multidisciplinary team of a neurosurgeon and a laparoscopic surgeon. 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 review of all patients admitted and operated at our institute for hydrocephalus or shunt dysfunction during the period 2006-2010 was performed, forming a cohort of 302 patients. 48 severely debilitated patients were operated on using the 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.

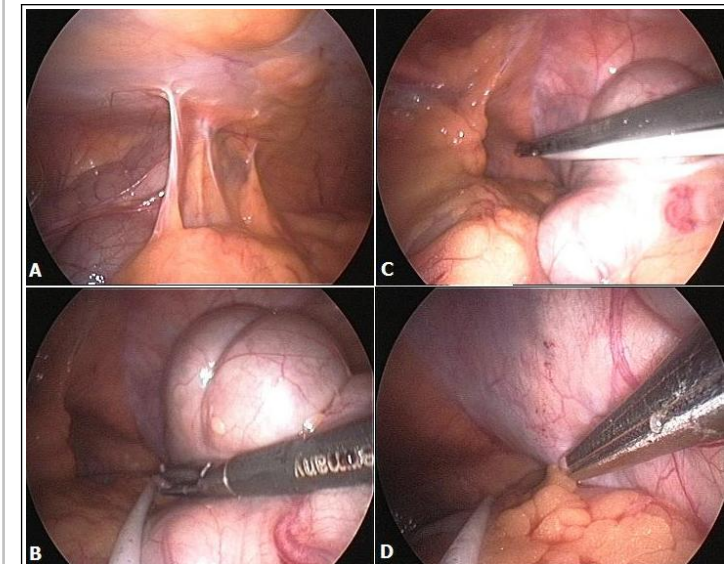
## Conclusions

Elderly patients or those suffering uncontrolled 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 - Laparoscopic vs. open mini-laparotomy approaches				
		Surgical technique		P
		Laparoscopic	Mini-laparotomy	
<b>Admission parameters</b>				
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
<b>Outcome parameters</b>				
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

## Results

The laparoscopic group was significantly much older, had more chronic illnesses and had more prior abdominal and shunt operations. And still, are data shows that this group had the same outcome as the open minilaparotomy group, expressed in several independent outcome parameters.



The single trocar technique for insertion of the distal ventriculo-peritoneal shunt catheter. A, some of the obstacles in positioning, such as adhesions and fibrous bands. B-D, using the endoscopic tools, navigation and positioning of the catheter within the peritoneal cavity.

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

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