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Laparoscopic Surgery in a Patient with a Ventriculoperitoneal Shunt: Management and Care of Peritoneal Catheter of Shunt

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Abstract:
Ventriculoperitoneal Shunt (V.P. Shunt) surgery is a common surgery routinely performed for Hydrocephalus. Patient survival is increasing day by day due to new techniques and better facilities in hospitals. Patients with VP shunt, in the long run, may suffer, from abdominal pathologies like cholecystitis, ovarian cysts, ectopic pregnancy, etc. which require Laparoscopic intervention as a procedure of choice With the advances in surgeries of cerebral shunts and the increased life span associated with them, has made the incidence of patients with VP shunts presenting with an indication for laparoscopy higher.(1,2) A few questions arise to avoid complications associated with VP Shunt.(3) Whether the pneumoperitoneum created during a laparoscopy procedure will cause retrograde diffusion of gases into the ventricles causing increased intracranial pressure and associated complications? There is still controversy regarding the safety of performing laparoscopic surgery in patients with VP shunt and potentially decreased cerebral compliance. This retrospective study is based on observations made with 12 patients operated on in the last five years. Initially, laparoscopic surgeons used to clamp or exteriorize the peritoneal VP Shunt catheter. But currently, there is no evidence to suggest that clamping of the catheter or exteriorization is necessary. So Laparoscopic procedures are not contraindicated in patients with VP Shunt only a cautious approach is required.

Keywords: Safety of VP Shunt, Laparoscopic surgery, Management of peritoneal catheter

Introduction

Ventriculoperitoneal Shunt (V.P. Shunt) surgery is a common surgery routinely performed for Hydrocephalus. Patients with VP Shunt survival are increasing day by day due to new techniques and better facilities in Hospitals. Patients with VP shunt, in the long run, may suffer from abdominal pathologies like cholecystitis, ovarian cysts, ectopic pregnancy, etc. which require Laparoscopic intervention as a procedure of choice. The important aspects that need to be considered when performing laparoscopy on these patients are care and management of the peritoneal catheter to avoid complications. Laparoscopic cholecystectomy is the preferred treatment for gallbladder diseases requiring surgery as it is less invasive, requires a shorter hospital stay, and has lower complication rates. Laparoscopic surgeries can be performed comfortably in VP Shunt patients too by giving due care to the peritoneal catheter. Laparoscopic procedures are not contraindicated in patients having VP Shunt.

Material and methods:

Patients had VP Shunt surgery previously in life for the management of hydrocephalus. Preoperatively patients did not have symptoms of raised ICP and clinically shunt is functioning normally as tested by Shunt Valve Compression and Refilling test. In this retrospective study, 12 patients were included over the period of five years.

Discussion: There is still controversy regarding the safety of performing laparoscopic surgery in patients with VP shunt and potentially decreased cerebral compliance. Ventriculoperitoneal shunts are silicone catheters placed from a lateral brain ventricle, through a subcutaneous tunnel, and into the peritoneal space in order to drain excess cerebrospinal fluid in the ventricular system. They are used to treat hydrocephalus, primarily in children, due to a variety of causes like

subarachnoid hemorrhage, meningitis, or tumor. The advances in surgeries of cerebral shunts and the increased life span associated with them have made the incidence of patients with VP shunts presenting with an indication for laparoscopy higher. A few questions that arise to avoid complications associated with VP Shunt (3):

1. Whether the pneumoperitoneum created during a laparoscopy procedure will cause retrograde diffusion of gases into the ventricles causing increased intracranial pressure and associated complications? However, animal studies have demonstrated that increased intra-abdominal pressure with gas insufflation and Trendelenburg position could induce a linear increase in ICP reaching 150% over control values with intra-abdominal pressures above 16 mm Hg. The main advocated mechanisms for increased ICP in the presence of pneumoperitoneum were increased intrathoracic pressure, and impaired venous drainage of the lumbar venous plexus, rather than increased arterial carbon dioxide because of systemic carbon dioxide diffusion (5,6).
2. The effect of CO2 on the brain as the shunt connects two cavities? Fraser et al. found no episodes of air embolism due to shunt in a study conducted over 51 laparoscopic procedures in patients with VP shunts. Neale et al. studied an in vitro model with nine shunts subjected to increased back pressure and none of the valves showed any signs of leak associated with the increased back pressure. The risk of retrograde failure of the valve system has been shown to be minimal even with intra-abdominal pressures as high as 80 mm Hg (9).
3. Whether the shunt can get infected and cause meningitis?

Nevertheless, during Laparoscopic surgery an injury process with inflammation or infection, the mesothelium cells are prone to damage and suffer exfoliation, exposing the underlying sub mesothelium, which triggers the inflammatory process. The replenishment of regular mesothelial cells could be compromised and affect catheter function due to the formation of fibrotic tissue. Additionally, this decreases the ability to adequately absorb fluids and could sustain the inflammatory process due to constant inflammatory mediators being released by sub-mesothelium tissue, this is the hypothesis for development of pseudocysts and fibrosis. Therefore, this process contributes to persistent VPS failure.

What pre-operative counseling is required for such patient

Patients with VP Shunt do not appear to have any significant risk for laparoscopic surgery but in some cases, there are chances of failure of V P shunt. Abdominal pathology due to infection like appendicitis, pancreatitis, liver abscess and if there are chances of peritonitis then there are chances of shunt failure. In these conditions VP Shunt should be exteriorized.

Although laparoscopic surgeons may face some difficulty like fibrosis, adhesions and pseudocyst Portal entry may be modified if previous incision at the time of VP Shunt is near by routine portal entries.

Adhesions must be separated gently in the area of surgery. The peritoneal catheter must be identified and retracted to safe position. Finally, at the end of laparoscopic surgery Surgeon must check the functioning of VP Shunt.

Anesthesia point of view no controversy in performing laparoscopic surgeries in patients with VP Shunt. Routine anesthetic monitoring should remain the standard of care in the absence of clear evidence to the contrary (7,8).

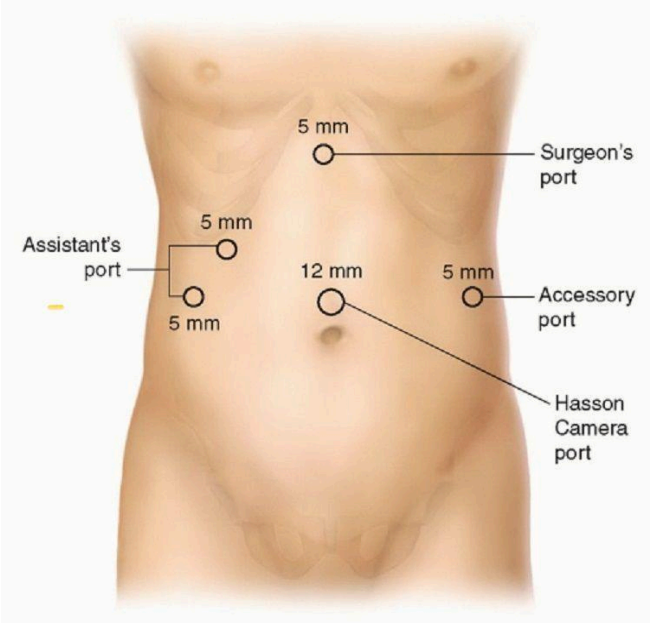

Figure No.1 Showing common site for laparoscope port.

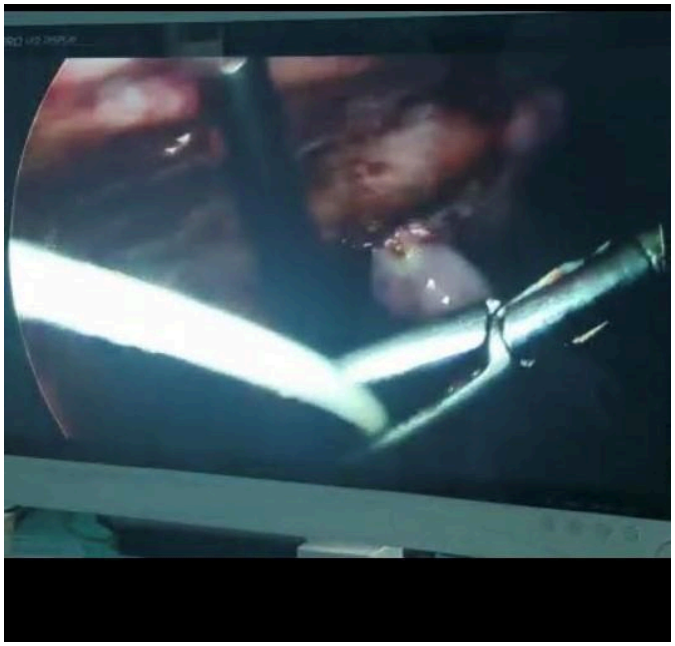

Figure no.2 : VP Shunt peritoneal catheter retracted away from surgery site.

Figure No. 3 Showing C S F drainage from tip of peritoneal catheter at the end of procedure.

Observations: In this study 12 patients were included over the period of five years. In two patients laparoscopic cholecystectomy could not be performed due to inability to create adequate pneumo-peritoneum because of lots of adhesions.

Table no. 1.patients distributions:

Total no. patients		Male	Female
N=12		N=2 , 16.6%	N=10 , 80.35 %

Gallbladder disease is more common in females. Hence laparoscopic procedure is used more in female patients.

Table no. 2 age distributions:

Age group 15 years to 25 years	N=2	Percentage 2/12 =16.6 %
Age group 26 years to 35 years	N=5	5/12 =41.66%
Age group 36 years to45 years	N=3	3/12 =25.00%
Age group 46 years to55 years	N=2	2/ 12 = 16.6%

Table no.3 Pathologies in patients:

Indication for laparoscopic surgery gall stone	Cholecystectomy for Gallbladder pathology	N=10
Other pathologies	Ovarian cyst	N=2
Laparoscopic procedure abandoned	Gallbladder pathology	N=2/12

Conclusion: Laparoscopic surgery in adults with established VP shunts utilizing routine anesthesia monitoring appears to be safe. Currently there is no evidence to suggest that clamping or externalization of the catheter is necessary. So Laparoscopic procedures are not contraindicated in patients with VP Shunt only a cautious approach is required.

References:

1. Laparoscopy in a Patient with a Ventriculoperitoneal Shunt: A Case Report and Literature Review, Int Surg 2021;105:515–520 DOI: 10.9738/INTSURG-D-20-00001.
1. Laparoscopic Cholecystectomy in a Patient with a Ventriculoperitoneal Shunt
2. Chet W Hammill, MD, Timothy Au, MS4, and Linda L Wong, MDauthorhttps://www.ncbi.nlm.nih.gov/pmc/articles/PMC3111663/citedby

3. Sank pal R, Chandavarkar A, Chandavarkar M. Safety of Laparoscopy in Ventriculoperitoneal Shunt Patients. J Gynecol Endosc Surg. 2011;2(2):91-93. doi:10.4103/0974-1216.114082
4. de Aquino HB, Carelli EF, Borges Neto AG, Pereira CU: Non Functional abdominal complications of the distal catheter on the treatment of hydrocephalus: an inflammatory hypothesis? Experience with six cases. Childs Nerv Syst. 2006, 22:1225-1230. 10.1007/s00381-005-0025-z
5. Rosenthal RJ, Hiatt JR, Phillips EH, Hewitt W, Demetriou AA, Grode M. Intracranial pressure. Effects of pneumoperitoneum in a large-animal model. Surg Endosc. 1997;11:376–80.
6. Moncure M, Salem R, Moncure K, Testaiuti M, Marburger R, Ye X, et al. Central nervous system metabolic and physiologic effects of laparoscopy. Am Surg. 1999;65:168–72.
7. Schöb OM, Allen DC, Benzel E, Curet MJ, Adams MS, Baldwin NG, et al. A comparison of the pathophysiologic effects of carbon dioxide, nitrous oxide, and helium pneumoperitoneum on intracranial pressure. Am J Surg. 1996;172:248–53. [PubMed] [Google Scholar]
8. Jackman SV, Weingart JD, Kinsman SL, Docimo SG. Laparoscopic surgery in patients with ventriculoperitoneal shunts: Safety and monitoring. J Urol. 2000;164:1352–4
9. Fraser JD, Aguayo P, Sharp SW, Holcomb GW, III, Ostlie DJ, St Peter SD. The safety of laparoscopy in pediatric patients with ventriculoperitoneal shunts. J Laparoendosc Adv Surg Tech A. 2009;19:675–8.
10. Neale ML, Falk GL. In vitro assessment of back pressure on ventriculoperitoneal shunt valves. Is laparoscopy safe? Surg Endosc. 1999;13:512–5.
11. Al-Mufarrej F, Nolan C, Sookhai S, Broe P. Laparoscopic procedures in adults with ventriculoperitoneal shunts. Surg Laparoscope Endows Percutan Tech. 2005;15:28–9.