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SAFETY OF LAPAROSCOPIC CHOLECYSTECTOMY IN PATIENTS WITH VENTRICULOPERITONEAL SHUNT

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Abstract

Advancements in Laparoscopy and Anaesthesia techniques has greatly minimised the list of contraindications for Laparoscopic surgery. Presence of a Ventriculoperitoneal shunt in patients of Hydrocephalus was considered a contraindication for Laparoscopic surgery as pnuemoperitoneum is described as a cause of raised intracranial pressure that could potentially lead to shunt malfunction. Herein, we discuss elective Laparoscopic Cholecystectomy for Chronic Calculous Cholecystitis in a patient of Hydrocephalus with a V P shunt; without any shunt manipulation or intra-cranial pressure monitoring and a review of the literature pertaining to Laparoscopic cholecystectomy in patients with hydrocephalus having V P shunt.

Key words: Hydrocephalus, Ventriculoperitoneal Shunt, Laparoscopy, Cholecystectomy

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Introduction:

Consequent to the advancements in Surgical and Anaesthesia techniques, the feasibility of Laparoscopy in any patient, is not limited by the presence of associated medical comorbidities. Laparoscopic procedures were previously contraindicated in patients of Hydrocephalus having a Ventriculoperitoneal (VP) shunt. A routine laparoscopic procedure like cholecystectomy for Gallstone disease was fraught with potential risks like shunt malfunction or blockage and infection. Shunt blockage follows the elevation of the intra-cranial pressure resulting from pnuemoperitoneum induced raised intra-abdominal pressure [1, 2]. However, the literature now has conclusive evidence indicating that it is safe to perform laparoscopic surgery on these patients using routine anaesthetic monitoring and without any shunt manipulation. The authors discuss elective Laparoscopic Cholecystectomy in a patient with a VP shunt and a brief review of literature

Case report:

A 65 year old male patient presented in the surgery department of ESI PGIMSR and Model Hospital (Andheri , Mumbai) with a 3 month history of right upper quadrant pain associated with dyspepsia and sour eructation. Written Informed Consent was obtained from the patient for the Laparoscopic procedure and the subsequent publication of this case report. Clearance from the Institutional Ethical committee was obtained. His past medical history included subarachnoid haemorrhage (SAH) from anterior communicating artery aneurysm 6 years ago for which he had aneurismal coils and a VP shunt for subsequent chronically elevated Intracranial pressure (ICP). SAH had left him with a

residual right Hemiparesis. On examination, the patient was afebrile, anicteric and had only a mild discomfort in the right upper quadrant. Laboratory data showed normal Haemogram, White blood cell count, liver function test, Serum Lipase and Amylase. An Abdominal Ultrasonography revealed a distended gall bladder with multiple calculi and a normal Common Bile duct with the rest of the scan being normal.

A Neurosurgeon and a Neurophysician were consulted and a shunt series was obtained. This included plain radiographs of the head, chest, and abdomen to evaluate the subcutaneous and intra abdominal path of the shunt catheter. The imaging demonstrated an intact VP shunt with the tip of the catheter seen within the abdomen. The patency of the shunt and its proper functioning of were preoperatively verified by the Neurosurgeon and the patient was planned for Elective Laparoscopic Cholecystectomy after a thorough assessment by the Anaesthesiologist. An informed consent for the Laparoscopic cholecystectomy was obtained from the Patient.

Laparoscopic Cholecystectomy was carried out using a standard 4-port technique.(Fig 1)The first port access was achieved using Hasson's technique and the other ports were placed by inserting trocars under vision away from the shunt. The abdomen was insufflated with CO2 to a pressure of 12–15 mmHg. Intra-operative findings included flimsy adhesions between the omentum and the fundus of the gallbladder, a thick gallbladder wall and a long narrow cystic duct. The shunt was seen lying free in the abdomen without any adhesions (Fig 2).

Routine anaesthetic monitoring took place all through the operation without the need for ICP monitoring or special precautions. The surgery was completed laparoscopically. The shunt was seen lying free and intact at the end of the procedure. Complete haemostasis was achieved. No drains were left in situ. The patient tolerated the pnuemoperitoneum and the entire procedure with no hemodynamic instability to suggest increased intracranial pressure.

The patient's post-operative recovery was uneventful and was discharged on the 4th post operative day with the Neurophysician and Neurosurgeon certifying fitness for discharge. Upon follow-up, 3 months post discharge, the patient had recuperated well with no neurological deficit or signs of increased ICP.

Discussion:

Laparoscopic surgery in the presence of a VP shunt has been reported and discussed in literature; however the safety of Laparoscopy in such patients has been controversial [1]. A Ventriculo-peritoneal shunt comprises of a silicone catheter stationed in the lateral cerebral ventricle, a reservoir, a unidirectional valve and a tube ending with a catheter lying freely in the peritoneal cavity. From the lateral ventricle the catheter is tunnelled through the subcutaneous tissue into the free peritoneal space in order to drain off the surplus cerebrospinal fluid. A patent and functional shunt relieves the raised ICP resulting from hydrocephalus by virtue of continuous drainage of the cerebrospinal fluid into the abdomen. The unidirectional valve is instrumental in preventing the reflux of cerebrospinal and intra-abdominal fluids [2, 3]. The shunt valve is capable of withstanding a pressure of up to 300 mg Hg. Hence an intra abdominal pressure of 12–15 mmHg which is used to insufflate the abdomen during Laparoscopic Cholecystectomy is very unlikely to produce pneumocephalus [4]. Especially worrisome is the potential rise in the Intra cranial pressures following pnuemoperitoneum which may lead to shunt malfunction.

Uzzo et al have reported transient increases in the intracranial pressure during Laparoscopic procedures on two children with VP shunts [5]. Thus ideally patients with VP shunt, undergoing laparoscopy merit a routine intra-operative monitoring of ICP [6]. Besides this, the technical difficulties during gall bladder dissection, extensive adhesions due to the presence of the shunt, bile spillage, haemorrhagic collection and the use of irrigation fluid during dissection may lead to blockage and infection of the shunt. Several factors contribute to the elevation of intracranial pressure during Laparoscopy. Hypercapnea caused due to

absorption of CO2 from the peritoneal cavity following CO2 insufflation and the effect of insufflation on ventilation, leads to intracranial arterial dilation and increased cerebral perfusion. CO2 insufflation leads to venecaval compression causing engorgement of the cerebral veins.

An incompetent shunt valve may facilitate a retrograde insufflation of CSF. Distal obstruction of the shunt catheter by soft tissues can occur during creation of pnuemoperitoneum [7]. Several measures have been suggested to decrease the risks of raised intra-cranial pressure during the procedure including intra operative ICP monitoring, lowering the intra abdominal pressure during CO2 Insufflation, ventricular drainage , clamping or clipping the distal Intraperitoneal end of the shunt catheter and shunt externalization and clamping the subcutaneous portion of the catheter for the entire duration of the procedure [7,8] . However, invasive ICP monitoring may precipitate intracranial haemorrhage and the clamping or clipping of the intraperitoneal end of the shunt catheter may aggravate the intracranial hypertension, hence these methods have not been used routinely. Besides there are reports of Laparoscopic Cholecystectomy being performed successfully without the need for any modification in intra-abdominal pressure or shunt manipulation [9]. There are two studies with a large series of patients namely Jackman et al published an 18 patient series in 2000[6] and Collure et al published data in 1995 on a series of four patients[4] ,that have soundly concluded that

Laparoscopy is safe in patients with V P Shunts. The main concern while undertaking Laparoscopy in such patients is a clinically significant rise in the intracranial pressure and retrograde shunt failure resulting in pnuemoencephalus and any inadvertent damage to the intra peritoneal portion of the shunt catheter during placement of trocars and the dissection of the gall bladder[11]. The greatest advantage laparoscopy , in such cases is that Laparoscopy permits panoramic visualization of the abdominal cavity, effective adhesiolysis in view of previous Shunt Insertion and also ensures the complete visualization and proper placement of the catheter[10].

The authors, following the standard operative steps and routine anaesthetic monitoring completed the elective Laparoscopic Cholecystectomy uneventfully without any shunt manipulation or intra-operative ICP monitoring.

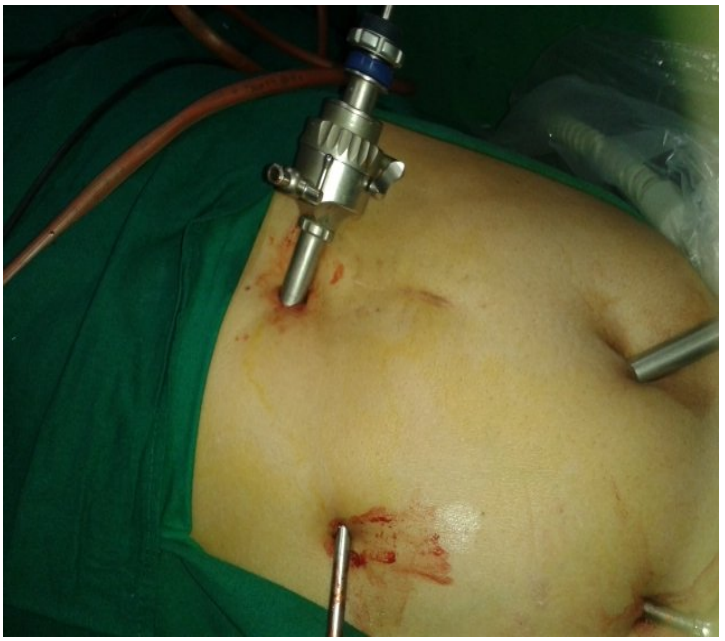

Fig 1: Laparoscopic Cholecystectomy carried out using a standard 4-port technique

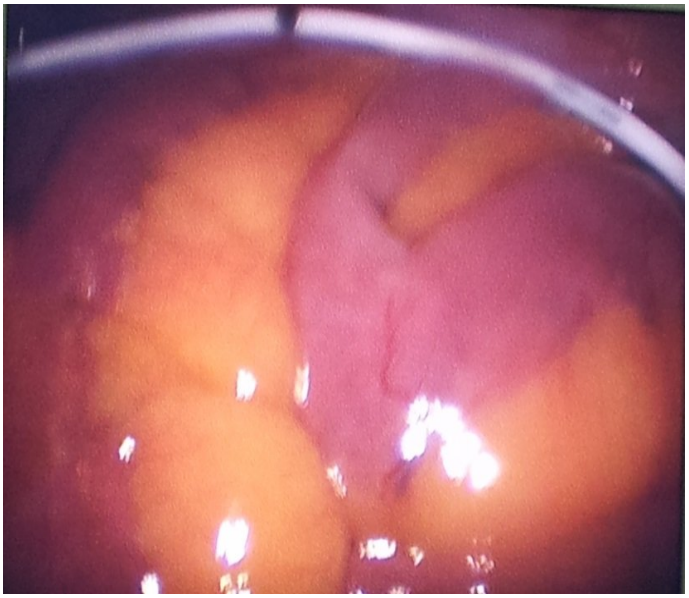

Fig 2: VP shunt lying free in the abdomen without any adhesions

Conclusion:

In adult patients with established VP shunts, a standard Laparoscopic Cholecystectomy can be safely performed using routine Anaesthesia monitoring. A preoperative neurosurgical evaluation asserting a properly functioning shunt is mandatory. Charting the path of the catheter within the abdominal wall helps the surgeon to judiciously avoid damage to the catheter during Trocar placement and Gall Bladder dissection. Knowledge of the position of the shunt reservoir is of importance to the anaesthesiologist and surgeon, so that the reservoir can be pumped if required. The concluding step of the surgeon before decompressing the abdomen should be a thorough inspection of the catheter to ensure that the catheter is not twisted, obstructed or damaged.

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