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VENTRICULO PERITONEAL SHUNT WITH ABDOMINAL PSEUDOCYST – MANAGEMENT, A CASE SERIES STUDY.

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ABSTRACT Hydrocephalus is the excess accumulation of cerebral spinal fluid. The appropriate management option for an individual still remains a dilemma in many situations. We discuss a case series of 10 patients with who presented with abdominal pseudocyst, to arrive at a conclusion which treatment option will be best for the individual

KEYWORDS : Hydrocephalus complications- Pseudo cyst in abdomen- cyst in abdomen- Abdominal swelling

INTRODUCTION

Hydrocephalus is the excess accumulation of cerebral spinal fluid (CSF) within the ventricular system of the brain, leading to increased intracranial pressure (ICP). The most common etiology [1]was intraventricular hemorrhage of prematurity (36%), followed by congenital hydrocephalus (14%), Dandy-Walker cyst (11%), myelomeningocele (11%), aqueductal stenosis (8%), meningitis (6%), brain tumor (6%), encephalocele (3%), arachnoid cyst (3%), and latent hydrocephalus (3%).

Ferguson was the first to perform a lumbar subarachnoid space to peritoneal shunt in 1898, as a treatment for hydrocephalus. The modern day shunt technology has grown by leaps and bounds.[1] Still there are a lot of complications associated with the venticuloperitoneal shunt.

Harsh in 1954, identified abdominal pseudocyst formation as a distal complication of a ventriculo peritoneal shunt. The pseudocyst has no mesothelial cell layer, but has a fibrous layer with inflammatory cells on surface.[2]

The appropriate management option for an individual, who has developed abdominal pseudocyst at the distal tip of ventriculo peritoneal shunt still remains a dilemma in many situations.
The management options [1]include,
1. repositioning the distal catheter into the peritoneum,
2. repositioning the distal catheter into the pleural space, the atrium, or the gallbladder, ureter, fallopian tube, gastric lumen.
3. exploratory laparotomy with deroofing or excision of cyst, lysis of adhesions and repositioning the peritoneal catheter,
4. percutaneous APC(Abdominal Pseudocyst) aspiration only, or
5. shunt removal or disconnection and exteriorisation as EVD (External Ventricular Drain), followed by shunt reinsertion once the CSF culture is negative.

We discuss a case series of 10 patients with who presented with abdominal pseudocyst, as a complication of VP shunt done for varied etiology of hydrocephalus and try to form a protocol based on that to arrive at a conclusion which treatment option will be best for the individual at hand.

The various factors like the age, hydrocephalus etiology, CSF analysis, comorbidities of the patient, previous surgeries and causative factor of the abdominal CSF pseudocyst, help to select the appropriate management option.

MATERIALS AND METHODS

The patients with VP shunt presenting with abdominal pseudocyst from age group of 1 year to 70 years in Madurai medical college were included in the study. The study period was from September 2019 to September 2020. The patients are investigated with routine blood investigations, Ultrasound and CT abdomen, and CE CT abdomen when warranted, CT brain, MRI brain if indicated, CSF analysis (Gram stain, culture, glucose, protein, and cell counts, including differential, culture and sensitivity of CSF), and following their course of treatment whether conservative or surgical. The decision was made on operating table, by exteriorising lower end first and checking the CSF physical properties. If it is turbid, then removal of shunt and if clear, repositioning of shunt.

Patients with parietal migration of shunt and formation of a collection in the abdominal wall, pus discharge from the wound site, shunt tract tenderness and redness and other obvious signs of infection was excluded from the study.

The culture was asked to be retained atleast for 10 days and a maximum of 14 days in some cases ,as against the common practice of discarding at 7 th day if there is no growth, as pseudocyst formation is mostly by indolent low virulence species[1]. The high virulence species infection mostly presents as peritonitis.

Results

Among the 10 patients,
1. one had become shunt independent after surgery,
2. two of them were treated with cyst deroofing,
3. three with placement of shunt lower end in different position in peritoneum done laparoscopically,
4. two removal of shunt and reinsertion on other side done,
5. one had been treated conservatively as only 5 days post op with small CSF oma,
6. one had been lost to followup during the start of COVID pandemic.
We planned for ventriculo atrial shunt as already two revision shunts had been done. There was delay in procurement of VA shunt.

Discussion

Hydrocephalus was defined as ventriculomegaly with Evan's ratio (maximal width of frontal horns/maximal width of inner skull) more than >0.30; and/or size of one or both temporal horns greater than 2 mm in CT brain.[3]. Choroid plexus coagulation (CPC) combined with Endoscopic Third Ventriculostomy (ETV) have emerged as the mainstay of treatment at present age of minimally invasive surgery followed by ventriculoperitoneal shunt.[7]Prevention of shunt infection, during insertion is an important factor to prevent further complications in such patients. Hydrocephalus Clinical Research Network(HCRN), has developed a standardized 11-step shunt insertion protocol to decrease shunt infection rate. It includes proper hand washing techniques, double gloving, patient positioning, hair clipping, field preparation and draping, preoperative administration of prophylactic antibiotics, administration of intraventricular antibiotics at the time of surgery, and wound dressing.[8]

Two important conditions that have to be differentiated from the abdominal pseudocyst include a tuberculous abdomen and ascites.

Tuberculosis, the Emperor of maladies, is an important cause of meningitis and ventriculomegaly is a well known complication. [4] So, most of the patinets with ventriculomegaly following tuberculosis are shunted. In such patients, there may be a disseminated tuberculosis causing abdominal tuberculosis masquerading as pseudocyst, which in

fact is a tuberculous abdomen with multiple adhesions, in which case laparotomy may prove to be disastrous. Removal of shunt with EVD and ATT, followed by shunting once the acute episode settles can be done. Patients with CSF protein concentration of more than 200 mg/dL had a four times higher risk of having shunt malfunction which may be a guiding factor for the timing of re insertion of a shunt.[6]

The abdominal pseudocyst has to be differentiated always from the ascities which is also a complication of the ventriculo peritoneal shunt and may be due to indolent infections, opticochiasmatic gliomas (increased protein content of CSF), choroid plexus papilloma (increased production of CSF), and very rarely foreign body reaction to peritoneal end of the catheter.[5]

Some times, the ascities may simply be due to hypoproteinemia, especially in paediatric age group and will resolve with treatment of the same.

In management of an abdominal pseudocyst, Lloyd et al suggested for a shunt tapping, and depending on aspirate analysis,

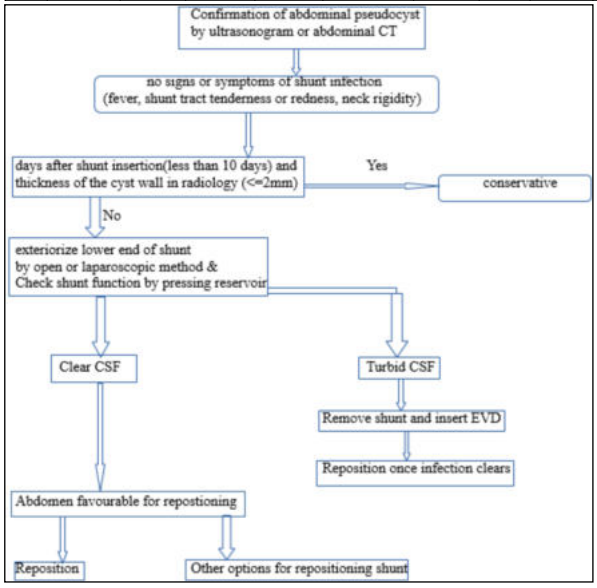
1. If infection known, removal of shunt.
2. If infected exteriorize lower end and treat according to pseudocyst aspirate analysis.
3. If not infected, reposition lower end if abdomen suitable for repositioning.

Among the 64 patients in their study, 28 patients underwent shunt repositioning in another site in abdominal peritoneum, 6 in pleural space, 9 in right atrium of heart, and 8 patients in gallbladder.

In our centre, we usually exteriorize lower end of the VP shunt on operating table first and confirm the shunt function and if the CSF is clear, we prefer no exteriorization, send the CSF for analysis and cyst deroofing with repositioning.

S. No.	AGE & SEX	AGE AT FIRST SHUNT	REASON FOR FIRST SHUNT	NUMBER OF REVISION OF SHUNTS	PRESENTING COMPLAINTS NOW	CSF ANALYSIS	CULTURE & SENSITIVITY	RADIOLOGY IMAGING-BRAIN	ABDOMINAL IMAGING	PRESENT DIAGNOSIS	DRUGS AT PRESENT	PAPILLEDEMA	SURGICAL PROCEDURE PERFOMED	DISCHARGE AT POST OP DAY	ANY RECURRENCE OF SYMPTOMS IN IMMEDIATE POST OP PERIOD	SECOND SURGICAL PROCEDURE
1	13/F	2 months	Progressive head dilatation after an episode of fever	1	Decreased playfulness and pain in abdomen	Clear and high protein content	Nil	Mild tetraventricular dilatation	Abdominal pseudocyst of 5*6 cm	Abdominal pseudocyst		Nil	Cyst deroofing	10	Nil	Nil
2	32/M	5 months	Not known	Nil	Abdominal pain and Headache	Clear	Nil	No ventricular dilatation	Pseudocyst of 13*10*8 cm	Abdominal pseudocyst	ATT	Nil	Removal of shunt, cyst deroofing	16	Nil	shunt independent
3	11/F	3 days	Congenital large head	Nil	Headache and gait disturbances	Clear	Nil	Tetraventricular dialtation	Pseudocyst of 4.5*5 cm	Abdominal pseudocyst		Mild	Cyst deroofing	12	Nil	Nil
4	18/F	16 years	Tuberculous meningitis	Nil	Abdominal distension	Clear and high protien	Nil	Normal ventricles, right VP shunt in position	Pseudocyst of 32*29*28cm	Abdominal pseudocyst	ATT	Nil	Cyst deroofing and distal end reposition laproscopically			
5	10 days/Mch	5 days	Congenital hydrocephalus	Nil	Abdominal end tenderness	Clear	Nil	Obvious dilatation of head	3*2.8*1.5 cm CSF oma	Abdominal pseudocyst		Mild	Advised for pressing of shunt reservoir	16	Nil	Nil
6	19/M	14 years	Tubercular meningitis	2	Headache and blindness	Clear	Nil	Tetraventricular dilatation	10.8*8*7 cm pseudocyst	Abdominal pseudocyst	Empirical ATT	Severe	Exteriorisation of lower end of shunt	Lost		Plan for VA shunt
7	21/M	10 days	congenital	1(2 months before)	Fever and altered sensorium	Pus with CSF	S. Epidermis Vancomycin	Tetraventricular dilatation	Pseudocyst infected – with debris	Abdominal pseudocyst		severe	Removal of shunt, temporary EVD	28	Nil	reinsertion on other side

8	43/F	42 years	Meningitic sequelae, diabetes for 1 year	Nil	Headache and seizures	Clear	Nil	Dilatation	Pseudocyst of 10.4*7.2*6.1 cm	Abdominal pseudocyst			Removal of shunt and reinsertion on other side and excision of cyst in same sitting	8	Nil	Nil
9	54/F	54 years(15 days back)	Tubercular meningitis		Abdominal distension	Clear	Nil	Normal with shunt in situ	21*18.5*16.3 cm	Abdominal pseudocyst	ATT	Nil	Cyst deroofing and distal end reposition laproscopically	7	Nil	Nil
10	47/M	46 years (7months back)	TB		Abdominal distension	Clear	Nil	Normal with shunt in situ	17.3*15.1*13 cm	Abdominal pseudocyst	ATT	Nil	Cyst deroofing and distal end reposition laproscopically	7	Nil	Nil



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