Research Article

Lumboperitoneal Shunt Clinical Applications & Complications

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Abstract

Background: Lumboperitoneal shunting (LPS) is an operation in which CSF is diverted from lumbar subarachnoid space into the peritoneal cavity by devices designed for this purpose using a simplified surgical technique.

Objectives: This study aims to evaluate retrospectively the indications, operative technique and complications of this technique.

Methods: Over a six-year period from September 2004 to September 2010, a retrospective evaluation of 21 patients selected for LPS in Baghdad hospitals was carried out. Fifteen patients had Idiopathic intracranial hypertension, four patients had persistent rhinorrhea & two patients had communicating hydrocephalus.

Results: There was an improvement of 93.7% of cases suffering from headache, 76.9% of cases suffering from visual defects. There was improvement of 100% of cases suffering from rhinorrhea, dizziness & papillodema. The postoperative complications were minor & minimal in 14.1% of cases.

Conclusion: LPS provides an attractive and technically simple solution for a wide range of neurological disorders. It is purely extracranial procedure & it carries no significant morbidity & without any mortality.

Keywords: lumboperitoneal shunt, Idiopathic intracranial hypertension, rhinorrhea, complication.

INTRODUCTION

Lumboperitoneal shunt (LPS) is an operation in which CSF is diverted from the lumbar subarachnoid space into the peritoneal cavity by devices designed for this purpose using a simplified surgical technique[1]. It is the preferred surgical option in the treatment of idiopathic intracranial hyperension (I.I.H) if the non operative measures failed[2] . It is also indicated in high pressure CSF rhinorrhea, to control postoperative CSF fistulae & some have used it as treatment for syringomyelia[3] . Another occasional use of LPS is to treat communicating hydrocephalus , in this case LPS can be inserted without puncture of the cortical mantle and because CSF is not drained preferentially from the lateral ventricles, so lumbar shunts are less likely than ventricular shunts to cause collapse of the cortical mantle with subdural haemorrhage[4] . The goal of this study is to assess the indications, operative technique and to evaluate the complications of the lumboperitoneal shunt.

PATIENTS AND METHODS

Over a six-year period from September 2004 to September 2010, an evaluation of 21 patients selected for LPS in Baghdad hospitals was carried out. The patient ages ranged between 17-50 years (mean age 30 years). All patients underwent LPS. The patients were divided into three groups, according to the diagnosis. The first group of patients with I.I.H. includes fifteen patients(71.4%). Of these , twelve were females (80%) & three were males (20%). The second group of patients had CSF leak from the nose (rhinorrhea).

They were four patients (19.1%), three females & one male . Investgations showed that two of them had tuberculous meningitis, the third patient after removing meningioma develop a hypodense area in the frontal lobe (porencephaly), & the final fourth patient developed rhinorrhea after fracture in the base of the skull after trauma.Two other patients represented the third group, they were presented as a case of communicating hydrocephalus, one post –traumatic & the other post-meningitic. To perform this procedure the patient under general anasthesia is placed in the lateral

decubitus position[5] . The back is flexed to open up the interlaminar space. The area is shaved, prepared & draped in the standard manner. The abdomen is opened by a small horizontal incision just above & lateral to the umbilicus. The peritoneum is not opened at this stage. A small stab incision is made at the L4-L5 interspace. A subcutaneous tunnel is made from the back to the abdominal wound. Then using a Touhy needle, lumbar puncture is done. After confirming the flow of CSF, the proximal catheter is threaded in through the needle into the subarachnoid space. After confirming the flow of CSF, the shunt tube is occluded with a bulldog clamp. The shunt catheter is pulled into the subcutaneous tunnel. After confirming the flow of the cuff from the distal end, the bulldog clamp is reapplied. The peritoneum is then opened & the peritoneal end is placed in the peritoneal cavity & the peritoneum is closed.

The shunt tube is anchored in the back using a non-absorbable stitch. The abdominal wound is closed in layers & the back wound is closed in a single layer.

RESULTS

It is noticed that the main clinical presentation of the patients was headache (76.1%) & visual disturbances (61.9%) as shown in table (1).

Table (1): clinical features of patients treated by LPS.

No. of cases					
Clinical presentation	I.I.H	CSF leak	Communicating Hydrocephalus	Total	%
Headache	15	-	2	16	76.2 %
Visual Disturbance	13	-	-	13	61.9 %
Vomiting	6	-	-	6	28.6 %
Rhinorrhea	-	4	-	4	19.1 %
Dizziness	3	-	-	3	14.3 %

By examination mainly papilloedema was found as shown in table (2).

Table (2): Neurological Manifestations.

Neurological Findings	No. Of Cases				%
	I.I.H	CSF	Communicating Hydrocephalus	Total	
Papilledema	15	-	-	15	71.4%
Abducent nerve Palsy	3	-	-	3	14.2%
Neck Stiffness	-	-	2	-	9.5%
Nystagmus	1	-	-	1	4.7%

The following investigations were done for each patient:

Radiological investigations (including plain skull x-ray and CT scan of the brain), CSF pressure measurement, CSF general analysis and visual analysis (visual acuity & field). Skull x-rays showed erosion of the dorsum sellae in six patients (28.6%) & calcification of choroid plexus & falx cerebri in two patients (9.5%) . The CT scan of the brain was the investigation of choice in diagnosing the patient clinical condition in this study as shown in table (3) .

Table (3): CT scan Findings

Diagnosis	CT Scan Findings With No. Of Patients			
	Normal CT Scan	Slit Ventricle	Dilated Ventricle	Other Changes In CT Scan
I.I.H	2	12	-	1 Hyperdense Area In The Transverse Sinus
Percentage	13.3%	80%	-	6.6%
CSF leak	3	-	-	1 Hypodense Area In The Frontal Lobe
Percentage	75%	-	-	25%
Communicating hydrocephalus	-	-	2	-
Percentage	-	-	100%	-

The visual acuity was examined by Snellen chart & the visual field was examined by the visual perimeteric chart & by computerized perimeteric apparatus. Visual disturbances revealed that five patients (23.8%) had enlargement of the blind spot, two patients (9.5%) had constricted visual field & one patient had central scotoma. All of the above patients were diagnosed as I.I.H. All patients except one underwent CSF measurements and analysis, which were obtained through a standard lumbar puncture as shown in table (4).

Table (4): CSF Examination Findings

Case No.	Sugar mg/dl	Appearance	Pressure mm H2O	Protein mg/dl	Cell No.
1	55	Clear	350	30	2-3
2	62	Clear	170	27	1-2
3	45	Clear	300	40	0
4	70	Clear	180	35	5
5	36	Clear	300	29	-
6	33	Clear	200	42	4
7	25	Clear	250	33	1-2
8	32	Clear	270	41	2-3
9	60	Clear	320	18	1-2
10	75	Clear	200	24	2
11	80	Clear	340	48	0-2
12	58	Clear	270	18	1-3
13	62	Clear	170	29	1-4
14	57	Clear	260	18	1-2
15	-	-	-	-	-
16	47	Clear	220	35	1
17	62	Clear	310	30	1-2
18	55	Clear	320	40	0-3
19	36	Clear	420	42	1-2
20	65	Clear	460	45	3-5
21	43	Clear	400	30	1-3

The CSF pressure was high in all patients who subsequently underwent a LPS operation. The period of follow-up was up to 6 years postoperatively. The mean follow-up period was 3 years. Results were shown in table 5, & table 6.

Table (5): Post-Operative Symptomatic Improvement of Patients.

Symptoms	No. of cases improved	Total	Percentage
Headache	15	16	93.8%
Visual disturbance	10	13	76.9%
Rhinorrhea	4	4	100%
Dizziness	3	3	100%

Table (6): Post-Operative Neurological Improvement of Patients.

Neurological Manifestations	No. of cases affected	Improved	Percentage
Papilledema	15	15	100%
Blind spot	5	3	60%
Constricted V.F	2	2	100%
Scotoma	1	1	100%
Abducent nerve Palsy	3	2	66.7%
Nystagmus	1	1	100%

With this period of follow-up one patient developed CSF collection at the site of the abdominal incision during the first post-operative week due to malposition of the catheter into the preperitoneal fat rather than the peritoneal cavity proper which was treated by revision of the abdominal incision & reinsertion into the peritoneal cavity. The second patient developed chronic subdural haematoma within two months post-operatively, which was drained via burr holes. The third patient developed tuberculous peritonitis (diagnosed by biopsy taken by laparoscopy twelve months post-operatively as shown in table 7.

Table (7): Post-Operative Complications.

Complications	No. of cases	Percentage
CSF Collection-Revision	1	4.8%
Subdural Hematoma	1	4.8%
Tuberculous Peritonitis	1	4.8%

DISCUSSION

The mean age of patients at insertion of LPS was (33.5)years in contrast to what had been mentioned in Duthel study[6] , where the mean age at insertion in his cases was (59.5 years). This difference in age between our series & those of Duthel is probably due to that most of our patients were diagnosed as PTC which occurred in this age group & required treatment with LPS[7,8] while Duthel study include a variety of cases diagnosed as communicating hydrocephalus.

Sixteen patients in our study were females (76.2%) , and five were males (23.8%) , which is similar to other studies [6] . Fifteen cases (71.4%) in this series were diagnosed as I.I.H which is similar to that reported by Eggen Bergaretal [9] . Four patients out of twenty one (19.1%) were complaining of rhinorrhea which was treated successfully by LPS & CSF leak stopped post-operatively. This result is similar to that concluded by Huppert [9] (no significant difference p>0.05). Two patients (9.5%) in our study who were diagnosed as having communicating hydrocephalus were treated by LPS & the patients recovered totally compared with a study done by Brunan Jietal[10], which showed similar good results. Headache is the major compliant in this series (76.6%). A visual disturbance was the second major compliant in this series (61.9%) & this compliant was considered the primary reason for doing LPS.

Investigations include a plain x-ray which provides some guide to the duration of patient compliant, CT scan of brain which excludes other pathological abnormalities, CSF pressure measurement via LP was the investigation of choice for the diagnosis of I.I.H which was elevated above (200 mm H2O) in nearly all patients which is similar to that revealed by Dhiravibulya[11].

The surgical technique which was used in our series is similar to the standard method, such a surgical technique was also used by Alleyne[12]. Post-operative complications in this series are similar to that of Aoki[13]. The complications as subdural haematoma & infection were infrequent (4.7%) & completely reversible.

The most important post-operative complication among the majority of our patients was headache occurring during movement which can be treated by adjusting & controlling posture. In conclusion LPS provides an attractive & technically simple solution of a wide range of neurological disorders.

It carries no significant morbidity & without any mortality.

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