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Lumbar Peritoneal Shunt in Idiopathic Intracranial Hypertension

İdiyopatik İntrakraniyal Hipertansiyonda Lumbar Peritoneal Şant

Yad Ram YADAV[1], Vijay PARIHAR[1], Moneet AGARWAL[1], Pushp Raj BHATELE[2], Navneet SAXENA[3]

[1]Netaji Subhash Chandra Bose Medical College, Jabalpur MP India, Department of Neurosurgery, Jabalpur, India
[2]Netaji Subhash Chandra Bose Medical College, Jabalpur MP India, Department of Radiodiagnosis, Jabalpur, India
[3]Netaji Subhash Chandra Bose Medical College, Jabalpur MP India, Department of Ophthalmology, Jabalpur, India

Correspondence address: Yad Ram YADAV / E-mail: yadramyr@yahoo.com

ABSTRACT

AIM: Treatment options for idiopathic intracranial hypertension (IIH) are lumbar peritoneal shunt (LP), optic nerve fenestration, ventriculoperitoneal shunt and venous stenting. We report our experience of 24 cases of LP shunt.

MATERIAL and METHODS: All the patients had preoperative fundus examination, cerebrospinal fluid pressure estimation and examination, visual field charting, CT scan and MR venography. Postoperative fundus examination and visual field charting was done in all cases. Follow up ranged from 18 to 137 months.

RESULTS: Preoperative papilledema, headache, decreased vision, optic atrophy and diplopia were seen in 24, 24, 19, 10 and 11 patients respectively. Shunt failure, CSF leak and temporary over drainage complications in the form of headache were seen in 2, 1 and 15 cases respectively. Vision improved in 10 out of 18 patients. Only one patient, out of 9 who had only perception of light and optic atrophy preoperatively, had improved vision while all patients with vision of finger counting or better without optic atrophy improved after shunt.

CONCLUSION: LP shunt is safe and effective in IIH. Results in terms of improvement in vision were better in good pre operatively vision group.

KEYWORDS: Pseudo tumor cerebri, Benign intracranial hypertension, Cerebrospinal fluid shunt, Lumbar peritoneal shunt

ÖZ

AMAÇ: Lumboperitoneal şant, optik sinir fenestrasyonu, ventriküloperitoneal şant, ve venöz stentleme idiyopatik intrakraniyal basınç artışındaki tedavi seçenekleridir. Lumboperitoneal şant takılan 24 olgudaki deneyimimiz aktarılmaktadır.

YÖNTEM ve GEREÇ: Tüm hastalara ameliyat öncesinde göz dibi muayenesi, görme alanı, beyin omurilik sıvısı basıncının ölçümü ve analizi, bilgisayarlı tomografi ve manyetik rezonans görüntüleme venografisi yapılmıştır. Ameliyat sonrası tüm hastalara gözdibi muayenesi ve görme alanı değerlendirmesi yapıldı. Hastalar 18-137 ay arasında izlendi.

BULGULAR: Ameliyat öncesi dönemde papilödemi, başağrısı, görmede azalma, optik atrofi ve çift görme 24,24,19,10,11 hastada sırası ile görülmüştür. Onsekiz hastadan 10'unda görme düzelmiş. Optik atrofisi olmayan 9 hastada görme daha iyi hale gelmiş, optik atrofisi olan bir hastada ise preoperatif dönemde olan ışık algılaması daha iyi hale gelmiş.

SONUÇ: İntrakraniyal basınç artışında lumboperitoneal şant güvenli ve etkili bir yöntemdir. Ameliyat öncesi dönemde görmesi iyi olan hastaların görmesindeki düzelme daha belirgin olmaktadır.

ANAHTAR SÖZCÜKLER: Psödotümör serebri, Benign intrakranial hipertansiyon, Serebrospinal sıvı şant, Lomber peritoneal şant

INTRODUCTION

Idiopathic intracranial hypertension (IIH) is a condition that usually affects young, obese women. This is characterized by the abnormal elevation of the intracranial pressure with a normal composition of the cerebrospinal fluid (CSF) and in absence of ventriculomegaly without some intracranial expansive lesion. Management is aimed at controlling symptoms of increased intracranial pressure (ICP) and prevention of visual failure due to papilledema. Various surgical procedures like lumbar peritoneal (LP) shunt, (11-14,16,22,25) optic nerve sheath fenestration (OPSF), (5,8,10,14,21,24,26) ventriculoperitoneal (VP) shunt (28,29) and venous stenting (4,5) have been described. Incidence of CSF diversion is increasing in IIH in USA (9). We are reporting our experience of 24 cases of LP shunt in IIH.

MATERIAL and METHODS

This in a retrospective study of 24 patients treated at tertiary care centre from Jan 1999 to Dec 2008. Written consent was obtained from all the patients or their legal representative. A detailed history was taken and a thorough physical examination was performed in all the cases. Pre operative fundus examination and visual field charting was done in all the cases. Pre-operatively CT scan was done in all the patients. MR venography was also done in all patients (Figure 1). Cerebro spinal fluid examination was performed in all

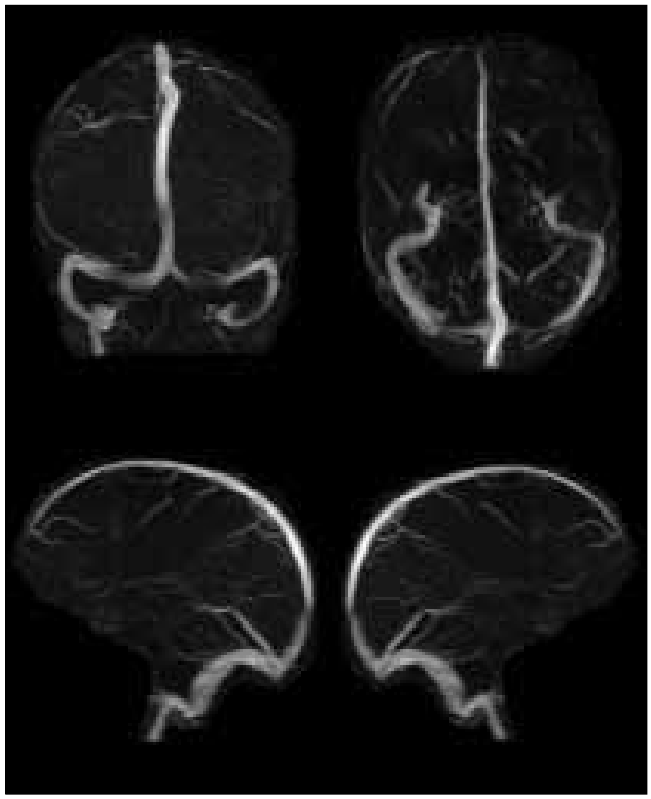

Figure 1: MR venography showing patent venous sinuses.

the cases and lumbar CSF pressure was measured. Chhabra LP shunt was used in all cases. Indication for surgery was persistent headache, loss of visual field or decline in visual acuity in spite of medical therapy. Complications such as infection, headache, CSF leak and failure of procedure were assessed. Post operative fundus examination and visual field charting was done in all cases at 3 months interval. Follow up ranged from 18 to 137 months (average 51 months).

RESULTS

A total of 24 patients underwent LP shunting procedures. Age ranged from 17-58 years with an average of 39 years. There were 22 females out of these 20 were between 15-44 age group. All patients had papilledema and headache (Table I). Vomiting was seen in 8 patients. There was some kind of visual deficit in 18 patients. Nine patients were not able to count fingers. Optic atrophy was seen in 10 patients. Diplopia was seen in 11 patients. MR venography was normal in all patients.

Twenty two patients experienced significant improvement of headache after shunting. Shunt failed in 2 cases. Shunt revision was done in both the cases. CSF leak was seen in one case. There was no infection. Temporary over drainage complication in the form of headache on sitting and walking only, was seen in 15 patients. There was no headache in resting stage in these patients. Such patients improved gradually. They were asked to sit for short period of time and this period was progressively increased over 3 -7 days time.

Eighteen patients had visual deficit preoperatively and 10 of them improved following LP shunt. Only one patient out of 9 who had only perception of light and optic atrophy preoperatively improved her vision while all the patients with vision of finger counting or better without optic atrophy improved after shunt.

DISCUSSION

Management of IIH is aimed at controlling symptoms of increased ICP and prevention of visual failure. Surgical treatments for IIH are the insertion of a LP shunt, OPSF, VP shunt and, in selected cases, venous sinus stenting. All of the procedures have their advantages and disadvantages and may fail with time no matter what procedure is used. Various authorities have vehemently advocated one or the other of these procedures. Medical management by anti edema measures and hyperbaric oxygen treatment do have role.

Complications in such patients could be those due to the disease and due to the surgical procedure. Shunt block is not an uncommon complication. We also had two shunt blocks in our series. Diagnosis of shunt block is difficult in LP shunt cases. The evaluation of shunt patency can be done using a laparoscopy-assisted technique (13). The intrathecal administration of In-111 DTPA (diethylene-triamine-penta-acetic acid) and sequential images of the abdomen and of the head can be used to assess shunt patency (3). Patency can also be assessed by LP shuntography by intraperitoneal spread of the contrast medium injected intrathecally via the lumbar route (27). Over drainage complications are also seen in LP shunt. We came across temporary problem in the form of headache on sitting which was relived by gradual change of posture. We did not come across any permanent over drainage complications in this series. The incidence of over drainage complication like ACM was very high in Chumas et al. (6) and Payner et al. (20) series while it was very low in Yadav et al. (30,31) , Aoki et al. (2) and in Lam et al. series. (15) Rekate at al (22) did not come across any risk of ACM in children; they used valve system in majority (84%) of patients. Laurent Riffaud et al. observed that the valveless LP shunt may expose the patient to the risk of symptomatic ACM and syringomyelia. They suggested LP shunt with an adjustable valve to prevent such complications (23). Roger Strachan et al. observed that the catheter length and placement are important in reducing the risk of low pressure symptoms. They stressed the need for further research and development to design innovative ways to over-come problems related to over drainage (25). Placement of short length of thecal end catheter could result in over drainage complications. We used Chhabra system without valve and a catheter length of 7-10 cms was not associated with any permanent over drainage complication. Programmable shunt can also reduce over drainage complications (19,23).

Ventriculoperitoneal shunts are technically difficult due to the small size of the ventricles. Advances in Neuro navigation can overcome problem of hitting the small ventricle. Ventriculoperitoneal shunting may be a viable alternative in

Table I: Demography, Clinical Features and Results of Lumbar Peritoneal Shunt in Idiopathic Intra Cranial Hypertension

S. No	Age in years and sex	Pre operative visual status	Pre operative other clinical features	Post operative vision	Post operative other clinical features	Follow Up In months
1	17f	Vision 6/6, peripheral visual field defect	Headache, vomiting, Papilledema	Vision 6/6	Headache improved, Temporary over drainage	56
2	22 m	Diplopia, Vision 6/6, peripheral visual field defect	Headache, Papilledema	Vision 6/6	Headache improved, Temporary over drainage	18
3	29f	Vision 6/6, Diplopia, peripheral visual field defect	Headache, vomiting, Papilledema	Vision 6/6	Headache improved	72
4	35f	Diplopia, Vision 6/6, peripheral visual field defect	Headache, Papilledema	Vision 6/6	Headache improved, Temporary over drainage	58
5	37f	Vision 6/6, Diplopia, peripheral visual field defect	Headache, Papilledema	Vision 6/6	Headache improved	47
6	49f	Diplopia, Vision 6/6, peripheral visual field defect	Headache, vomiting, Papilledema	Vision 6/6	Headache improved, Temporary over drainage	45
7	42f	Decreased vision, perception of light only, Optic atrophy	Headache, Papilledema	Vision 6/36	CSF leak, Shunt blocked	52
8	41f	Decreased vision 6/18, Diplopia, peripheral visual field defect	Headache, vomiting, Papilledema	Vision 6/6	Headache improved, Temporary over drainage	58
9	43f	Decreased vision, perception of light only, Optic atrophy	Headache, Papilledema	No vision	Headache improved, Temporary over drainage	137
10	42f	Decreased vision 6/24, Diplopia, peripheral visual field defect	Headache, Papilledema	Vision 6/9	Headache improved, Temporary over drainage	50
11	38f	Decreased vision, perception of light only, Optic atrophy	Headache, Papilledema	Perception of light only	Shunt blocked	47
12	34 m	Decreased vision 6/18, Diplopia, peripheral visual field defect	Headache, vomiting, Papilledema	Vision 6/9	Headache improved, Temporary over drainage	44
13	44f	Decreased vision, perception of light only, Optic atrophy	Headache, Papilledema	Perception of light only	Headache improved	53
14	39f	Decreased vision 6/24, Diplopia, peripheral visual field defect	Headache, Papilledema	Vision 6/9	Headache improved, Temporary over drainage	48
15	58f	Decreased vision, perception of light only, Optic atrophy	Headache, vomiting, Papilledema	No vision	Headache improved, Temporary over drainage	55
16	41f	Decreased vision 6/18, Diplopia, peripheral visual field defect	Headache, Papilledema	Vision 6/6	Headache improved	49
17	39f	Decreased vision, perception of light only, Optic atrophy	Headache, Papilledema	Perception of light only	Headache improved, Temporary over drainage	42

Table I: Continued

18	42f	Decreased vision 6/36, Optic atrophy, peripheral visual field defect	Headache, vomiting, Papilledema	Vision 6/9	Headache improved	53
19	39f	Decreased vision, perception of light only, Optic atrophy	Headache, Papilledema	No vision	Headache improved	54
20	44f	Decreased vision 6/24, Diplopia, peripheral visual field defect	Headache, Papilledema	Vision 6/9	Headache improved, Temporary over drainage	43
21	42f	Decreased vision, perception of light only, Optic atrophy	Headache, Papilledema	Perception of light only	Headache improved, Temporary over drainage	36
22	40f	Decreased vision 6/36, peripheral visual field defect	Headache, vomiting, Papilledema	Vision 6/24	Headache improved, Temporary over drainage	48
23	39f	Decreased vision, perception of light only, Optic atrophy	Headache, Papilledema	Perception of light only	Headache improved	25
24	40f	Decreased vision 6/36, peripheral visual field defect	Headache, Papilledema	Vision 6/24	Headache improved, Temporary over drainage	36

***Foot note: S No=** Serial number, **f=** female, **m=** male*

IIH (11). Optic nerve sheath fenestration also appears to be effective surgical means to reduce the pressure on the optic disc (8,10). Preliminary experience of hyperbaric oxygen in the treatment of IIH has shown some promising results (17).

There is a paucity of information regarding visual outcomes from cerebrospinal fluid diversion procedures. Visual outcomes from OPSF are better documented (10). The first sign of incipient post papilledema optic atrophy is constriction of the inferior nasal quadrant of the visual field with a border respecting the nasal horizontal midline (nasal step). This starts in the most peripheral points in the visual field (ie, 50 degrees from fixation) and progresses inward. Vision is usually normal until significant peripheral visual field loss has occurred. Color vision is not sensitive in picking up early post papilledema optic atrophy, since color perception is concentrated in the central visual field. Improvement in vision was seen in all cases in our series that had pre operative vision of finger counting or better without optic atrophy while only one patient improved out of 9 cases that had perception of light with optic atrophy. These results suggest that the results in terms of vision are better in patients with good pre operative vision. Surgery therefore should be done early as soon as possible when medical treatment fails or there is a beginning of any field defect. Feldon SE reviewed the published literature to compare surgical techniques for management of visual loss in idiopathic intracranial hypertension unresponsive to medical treatment. They reviewed seventeen patients treated by stent placement, 31 by VP shunt placement, 44 by LP shunt placement, and 252 patients by OPSF. Improved or resolved visual deficit was noted in 38.7% of patients after VP shunt, 47% after stent placement, 44.6% after LP shunt and 80% after OPSF. Visual worsening was rare after any of the procedures. Visual outcomes from OPSF appeared to be superior to other surgical techniques for management of IIH in their review. They suggested further studies to find out visual outcomes after surgical procedures other than OPSF in IIH (10). Eighty-five percent visual improvement was also seen after OPSF in other series (1). Vision improved or remained same in 85% cases in Corbett JJ et al. series (7) after OPSF. They also stressed the need of early surgery when there is early evidence of progressive loss of visual field or acuity. There is little opportunity for visual improvement when there is severe vision loss pre operatively but OPSF may be used as a last effort to preserve or restore vision. We also had good results in our series in patients with good pre operative vision while patients with severe vision loss faired badly. Brazis PW (5) reviewed the literature on the surgical treatment of IIH. Surgeries were performed when medical therapy failed or when visual function deteriorated. The main procedures performed included LP shunt, VP shunt and OPSF. Venous sinus stenting procedures were also performed on selected patients, especially those with venous sinus occlusive disease. They found that OPSF, LP shunt, VP shunts and, in selected cases, venous sinus stenting could improve or prevent deterioration of vision in IIH. They suggested a prospective, randomized study to compare the results of OPSF, LP shunt or VP shunt to better answer the efficacy of the surgical procedures.

We had good results (92%) in this series in terms of headache improvement. There was no recurrence of headache in our study. Other series also reported good improvement in headache immediately after the shunt (18) but severe headache recurred despite a properly functioning shunt in 19% and 48% patients after 12 and 36 months follow up respectively (18).

ABBREVIATION LIST

Arnold Chiari malformation = ACM

Cerebrospinal fluid = CSF

Computerized tomography = CT

Diethylene-triamine-penta-acetic acid = DTPA

Idiopathic intracranial hypertension = IIH

Intracranial pressure = ICP

Lumbar peritoneal = LP

Magnetic Resonance = MR

Optic nerve sheath fenestration = OPSF

Ventriculoperitoneal = VP

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