Study on hydrocephalus and complications of surgical treatment

Saad F. Kadhim* **MBChB, FICMS**
Ali K. Al- Shalchy* **MBChB, FICMS, MRCSI (UK)**

Fac Med Baghdad
2009 Vol. 51 No. 3
Received: Mar. 2008
Accepted: Aug. 2008

Summary:

Background: Shunt operations are performed for different reasons mainly hydrocephalus congenital or acquired. It's associated with certain morbidity and mortality.

Patients and method: A prospective study from Jan 2004 to Jan 2006, 226 patients under went shunt operation in the specialized surgical hospital in Baghdad. The patients were divided into two groups according to the way of applying the upper end catheter. In group A49 patients where posterior parietal approach was used, and group (B) 174 where parietal or temproprietal approach was used.

Results and discussions: different complications were recorded, but the most frequent was upper end obstruction by choroids plexus or by debris.

In group (A) only one patient 2% while in group (B) 27 patients 15.5% this wide difference in incidence of this complication, clears the significance of posterior parietal approach as a method of choice in applying ventricular catheter.

Other complications were recorded as infection, lower end obstruction of others. A low rate of mortality recorded and discussed thoroughly.

Conclusion: Choosing the post parietal type with prophylactic antibiotics carries the best results.

Key words: Hydrocephalus, shunt post parietal.

Introduction:

Pathophysiology of Hydrocephalus

Hydrocephalus, as defined in pathophysiological terms, may be regarded as an imbalance of CSF formation and absorption of sufficient magnitude to produce a net accumulation of fluid within the cerebral ventricles (1). Where as this excess in fluid usually lead to an elevation of pressure, compensatory adjustment occur, especially in very young and very old subject, that can reduce prevailing CSF pressure to normal range(2). Hydrocephalus may be classified into two ways according to the cause. **First** classification, hydrocephalus could be obstructive (non-ommunicating) hydrocephalus. **Second** classification, hydrocephalus, could be caused by obstruction to the CSF or oversecretion of CSF or impaired venous drainage. In non-communicating hydrocephalus there is usually pathological obstruction at some point along of CSF pathway. (4,5) Treatment SurgicalTreatment Surgical removal of causative lesion which causes obstruction to the CSF flow. Diversion of CSF fluid, either by implantation of device or by endoscopic neurosurgical procedures. Non Surgical treatment of hydrocephalus Headwrapping, diuretics, and steroid.Shunt complications Shunt Obstructions:, proximal Shunt Obstruction, Distal Shunt Obstruction (Malposition of the Catheter, peritoneal infection)(6), shunt infection-wound complication, complication occurring after shunting like subdural collection, slite ventricle syndrome, overdrainage syndrome, ascitis, bowel perforation, and seizure. (6)

Patients and methods:

Between Jan. 2004-Jan, 2006,226 shunt operations were collected in Al- jerahat Surgical Specialties Hospital, Medical city, for various aetiologies. All patients with hydrocephalus and in need for shunting were selected. In the theater, the shunting operations were performed by two groups of surgeons advocating different methods in implanting the shunt. First group, (A) the site of cephalic incision was in the posterior parietal region. The burr hole is located 3 cm from the midline and 1 cm anterior to lambdoid suture.Second group, (B) the site of cephalic incision was in the parietal region. The burr hole is located 2 cm above and 2 cm behind the pinna of the ear.

**Dep. Of Neurosurgical, Unit of specialized surgical hospital*

Results:

Table (1): Causes ot hydrocephalus that shunted according to their pathology

Causes of Hydrocephalus	No. of patient	Percent %
Congenital	137	60.6
Acquired	35	15.5
Post-meningitis	17	7.5
Posterior fossa tumour	16	7.1
Post-tramnatic	7	3.1
Dandy Walker cyst	6	2.6
Thalamic tumour	2	0.8
Others*	6	2.6
Total	226	100%

*Others; choroid plexus papilloma, posterior fossa, arachroid cyst, pineal tumour, lymphoma of CNS, craniopharyngeoma, and osteogenic sacroma of the occipital bone.

Table (2): Causes of revision in 91 patients that had be revised. Number of patients in each cause and their percentages.

Causes of revision	No- of patients	Percent %
Upper end obstruction by choroids plexus or by debris	28	30.7
Post operative meningitis	12	13.2
Lower end obstruction.	12	13.2
Infected cephalic wound	9	9.9
Upper end catheter is long	5	5.5
Abdominal wound infection	4	44
Lower end obstruction of VA shunt (intra- atrial)	3	3.3
Upper end catheter introduction Extraventricularly	2	2.2
Lower end catneter introduced extraperitonial by using trocher	2	2.2
Epidural hematoma	2	2.2
Lower end catheter of VA shunt placed in external jugular vein	2	
Lower end disconnection	2	2.2
CSF collection under the skin in the abdominal incision because in proper suturing of the rectus sheath	2	2.2
*Others	6	6.6
Total	91	100

* Others; Lower end catheter expose from vagina by using trocher, subdural hematoma, migration of the device inside the value, calcification of pericranium, lower end pass through inguinal hernia, and intraventricular hematoma.

Table (3): Comparism between the number of upper end obstruction by choroid plexus or debris, using different site of implantation

Approach	No. of revision	No. of patients without revision	Total
Group(A) posterior parietol	1	48	49
Group(B) Parietal	27	147	174
Total	28	195	223*

Table (4): Number of the patients were shunted in both groups, number of infected patient and their statistically significance.

Group	Infection	No Infection 150	Total 74
A	1*	48	49
B	24	150	174
Total	25	198	223

Table (5): Causes of death in 24 patients and their percentage

Caused or death	No. of dead patients	Percent (%)
Upper end obstruction	11	45.8
Infection	10	41.7
Over drainage of CSF	2	8.3
Reveres conning in post-fossa tumour with hydrocephalus	1	2
Total	24	100

Discussion:

The study included two groups of surgeons implying different methods in handling the shunting procedures. In our group (a). Use a posterior-parietal placement of the ventricular catheter. Introducing it with it's stylist passing the level of foramen of moron, a lower rate of failure of the ventricular catheter, introduction it with it's stylet passing the level of For foramen of monro,a lower rate of Failure of the shunt was achieved and this correlates with standard neurosurgical practice elsewhere. In group (B), use a parietal or tempro-parietal placement of the ventricular catheter behind foramen of monro, a high rate of upper end obstruction (ventricular tip) by choroids plexus or by debris

occurred.To explain this point in numbers, from 226 shunt procedures in our study (VP or VA), 174 patients were shunted by group, B, method with 27 (15.5%) upper end obstruction by choroids plexus or debris. So shunt frequent in group (B), 49 patients were shunted by posterior approach and only patient (2%) had upper end obstruction by the same cause. This shows the importance of proper placement of the ventricular catheter in front of foramen of monro to decrease incidence of shunt failure and the frequency of revision.Upper end obstruction was also seen to have been caused by:excessive length of the ventricular catheter. This leads to its tip becoming embedded in cerebral tissue in the other side of the ventricle,failure to canulate the ventricle,the catheter placement being not checked for free now of CSF. Prior and after connecting to the valve system,in preoperative:some patients with congenital hydrocephalus or post meningitic hydrocephalus were operated on without CSF analysis to exclude meaning, other underwent shunt replacement where a known source of infection e,g chest infection, skin infection.etc. already exists and preoperative causes: were usually in attention, proper surgical details, non meticulous application of antiseptics during washing the field of the operation, skin was not draped properly with direct contact of the shunt system with the skin of the patient during tunneling of the lower end catheter. Prophylactic antibiotics were not used routinely, table (4) this clear difference in the rate of infection in both group will explain the importance of prophylactic antibiotics during the induction of the anesthesia.
Lastly skin-closure share an important factor in the development of infection when badly done by the surgeon.

Conclusion:
Choosing the post parietal type with prophylactic antibiotics carries the best results.

References:
1. joseph H. piatt:jr hydrocephalus treatment . Nrursurgery , editor, Robirt H, Wilkins, Sett S, Rengachary-2nd ed. 366-3633-35, 1996.
2. Elisabeth M. post: Shunt system. Neurosurgery, editors, Robert, H.Wilkins, Setti S, Renhschary- 2nd ed.1996:367-3645.
3. AndrewH.Kaye:Raised intracranial pressure and hydroxephalus.Essential Neurosurgery, 1996:39-57.
4. Humbert G.Sullivan, jerry D Allison: Physiology of CSF. Neurosurgery,editor,Robert H.Wilkins , Setti S.Rengachary
5. Robert G. Ojimann, Peter MCL. Black: Evaluation of the parent with dementia and treatment of normal pressure hydrocephalus.Neurosurgery.
6. Peter MCL. Black Mitsunori Matsumae P. langham Gleason:Evaluation of the patient with dementia and treatment of normal pressure Hydrocepgalus Neurosurgery, editor, Robert H,Willkins, Sitte S, Rengachary,1995:31-328-332