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Original Research Paper

Role of Venticuloperitoneal Shunt in Neural Tube Defect Repair: Indication and Outcome

Medical Science

KEYWORDS : Meningomyelocele, Neural tube defect (NTDs), MPVP shunt, Neonatal surgery.

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ABSTRACT

Neural tube defects are abnormalities that can occur in the brain, spine, or spinal column of a developing embryo and are present at birth. There is controversy in timing of repair of neural tube defect and insertion of MPVP shunt in neonates. Aim: To improve outcomes of neural tube defect repair and early management of hydrocephalous. Conclusion: The MPVP shunt surgery indicated to some patients of the neural tube defect. It can be performed with minimum morbidity with some risk of infection and malfunction of shunt.

Introduction:
Neural tube defects are abnormalities that can occur in the brain, spine, or spinal column of a developing embryo and are present at birth.

Very early in the development of an embryo, certain cells form a tube called neural tube that will later develops in spinal cord, the brain, and the nearby structures that protect them, including the backbone also called the spinal column or vertebra. As development progresses, the top of the tube becomes the brain and remainder becomes the spinal cord. A neural tube defect occurs when this tube does not close completely somewhere along its length, resulting in a hole in spinal column or another type of defect.

Aim: To improve outcomes of neural tube defect repair and early management of hydrocephalous.

Objective:
1. To know incidence pathophysiology and cause of NTDs in our setup and its various complications.
2. To find association between NTDs and hydrocephalous,
3. To explore complication of MPVP shunt in hydrocephalous and its management.

Material & Method:
It is a prospective case series in which all cases of NTD operated in neonatal period in department of Pediatric Surgery, IMS, BHU, Varanasi from 1.8.2013 to 30.7.15 were included i.e. 30 cases. The present study was taken to access indication of repair of neural tube defect and indication of MPVP shunting in them.

The type of defect its location associated neurological deficits, and clinical features of hydrocephalus were recorded.

The preoperative investigation done included X-ray, spine ultrasonography of cranium. Utrasound of abdomen and echocardiography were done to evaluate associated cardiac and abdominal abnormalities. Preoperative MRI spine was done in selected neonates whose clinical and neurological examination suggested abnormalities.

The neonates needing simultaneous shunt and neural tube defect repair were taken for operation under general anesthesia. Standard techniques were followed for shunting following patients were positioned to prone. Repair of neural tube defect was then done. All children received antibiotics during perioperative period.

*Pre-operative LSMMC **Peri-operative LSMMC

Result
Thirty cases were operated during study period. The distribution of neural tube defect was as follows-

1. Lumbosacral region	–	16
2. Lumber region	-	08
3. Thoracic region	-	04
4. Cervical region	-	02.

The male, female ratio was 17:13.

The median age and weight at operation were two days and 2.5 Kg respectively. In 10 cases diagnosis was made on antenatal USG scan. Antenataly diagnosed cases delivered by cesarean section at SS hospital, IMS, BHU, Varanasi.

Twenty six patient had meningomyelocele where as four had meningocele. Six of the patients had cerebrospinal fluid leak at time of delivery and needed urgent surgery. Of the patient of meningocele all had normal lower limb muscle power with no clinically detectable bladder/ bowel involvement. Of the patient with MMC four had decreased anal tone with no limb function.

Four neonates had hydrocephalous at birth and needed simultaneous MPVP shunt. USG criteria utilized to identify patient needing simultaneous MPVP shunt was dilated lateral ventricles size more than 15 mm.

There were post operative complications as follows –

1. Wound infection – 06
2. CSF leak – 01
3. Prolong postoperative ileus – 03

S.no.	Defect	Type	Hydrocephalus	Age	Defecit	Treatment	Outcome
1	T	MC	No	2days	No	Repair	Stable HC

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2	LS	MMC	HC 42 cm.		De-crease anal tone	Repair & MPVP shunt	Shunt func-tioning
3	LS	MMC	No		Lower limb weak-ness	Repair	Stable HC
4	C	MC	No		No	Repair	Stable HC

Criteria to detect hydrocephalous

1. Clinical: Poor feeding, vomiting deformed head, tense anterior fontanel, sunset sign, split sutures.

2. USG cranium: Deformation of the frontal horn rounded and enlarge third ventricle contrasting with a small 4th ventricle-obstructive hydrocephalous.

Discussion

Neural tube defect and hydrocephalous are closely associated, hydrocephalous present at birth or can develop after repair MMC. Whether, the shunt operation is to be done simultaneously with neural tube defect repair.

The head circumference is often use a criteria for follow up of patient for development of hydrocephalous but its normal value in new born cannot rule out hydrocephalous**1**. In our series four new born had venticulomegaly but normal head circumference. Clinical examination of mylodysplastic neonates usually does not reveal evidence of hydrocephalous and venticulomegaly on ultrasound predict the later development of hydrocephalous following meningomyelocele closer**2**. The timing of neural tube defect is controversial with recommendation of immediate repair in newborn period to delayed repair**3.** The advantage of repair of in new born period includes preventing CSF infection and further neurological deterioration. Morever, primary neurosurgical repair of MMC with in 72 hrs after delivery provide and improved neurogenic bowel/ bladder prognosis compared to repair at later time**4**.

In fact, an increased risk of shunt malfunction has been reported following delayed MMC repair because of increase CSF protein and debris which may lead to shunt occlusion even without infection**5**. Our approach aims to repair the neural tube defect within 72 hrs. Hydrocephalous is frequently associated with MMC (80-90%) that it may be considered part of malformation.

In, <15% of cases hydrocephalous are already overt at birth, manifesting with classical sign of raised intracranial pressure. The neonates who have required MPVP shunt can be managed by either early MMC repair followed by MPVP shunt or simultaneous MPVP shunt and MMC repair**6 .** The advantage of simultaneous repair includes administering only one anesthetic diminution in incidence of CSF leak from the repair side and protecting brain parenchyma**7**. Disadvantage only increases shunt infection and prolong surgery time**8**.

Conclusion

The MPVP shunt surgery indicated to some patients of the neural tube defect. It can be performed with minimum morbidity with some risk of infection and malfunction of shunt.

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