

Risks of Surgery for Myelomeningocele in Children

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ABSTRACT

Objective: To know about complications in Myelomeningocele (MMC) surgery.

Material and Methods: Fifty five children underwent surgical repair of MMCs and represent our experience about complication in surgery for MMC. Retrospective observational study carried out in Neurosurgery ward, Lady reading hospital Peshawar, from 2013 to 2015. Patients suffering from MMC were admitted. The clinical, radiological and laboratory finding of patients were documented on a designed proforma. Moreover ventriculoperitoneal shunting (V/P) was performed for children who had or developed hydrocephalus. Elliptical incision in vertical plane was given in 45 cases and horizontal incision in 6 cases. Plastic surgery unit consulted for very large MMC in rest of 4 cases and transposition of gluteus maximus musculocutaneous unit performed. All patients with MMC of both gender and age range from 1 month to 10 years who were willing and fit for surgery were included in this study and all those who were not willing and fit for surgery were excluded. The study was approved by Institute of Research in Ethics and Biomedicine (IREB). This study will help to make recommendations.

Results: Patients in this study were in the age range of 1 month to 10 years. Mean age was 1.8 years. Thirty seven patients (67%) were Paraparetic (MRC grade from 1 to 4) and 18 patients (32.72%) were completely paraplegic. Seventeen patients (30.9%) had ruptured MMC at presentation and underwent surgery in emergency. Fifteen patients (27.27%) had V/P shunting before surgery for MMC and 11 patients (20%) developed hydrocephalus after excision and repair of MMC and V/P shunting carried out. Seven patients (12.72%) developed wound dehiscence and CSF leak and subjected to redo surgery. Three patients (5.45%) had wound infection followed by meningitis and two patients (3.63%) died after surgery.

Conclusion: From this study we concluded that wound dehiscence and CSF leak are the most common complication after surgery for MMC and can be prevented by tensionless closure of the wound. In MMC patients with overt hydrocephalus prior to repair and excision of MMC V/P shunting should be performed. If patient develop hydrocephalus after surgery then immediate diversion of CSF should be carried out.

Keywords: MMC, Wound dehiscence, Complications, Spinal dysraphism, Hydrocephalus, V/P shunting

Abbreviations: MMCs: Myelomeningocele Surgery. VP: Ventriculoperitoneal Shunting.

INTRODUCTION

The nervous system development in humans occurs from a small, specialized plate of cells along the back of an embryo. In the early stages of development, the edges of this specialized plate starts to bend up toward each other to form the neural tube that is a narrow sheath which close to make the brain and spinal cord. As development proceeds, the upper end of the tube deve-

lops into brain and the caudal end develops into spinal cord. This process takes 28 days to complete. Any problem during this period results into brain disorder known as neural tube defects which is called spine bifida.¹

Spina bifida is a combination of words gives literal meaning of split or divided spine. It is a disease resulting from defect in development of spine of an infant

(WHO, 1996). The types of spina bifida are: Occulta, Meningocele and Myelomeningocele.¹ Myelomeningocele form, is the most severe congenital neural tube defect that result from failure to close the spinal column during the initial 28 days of pregnancy.¹ When spina bifida is involving lumbosacral area, the clinical presentation mimics a spinal cord injury including neurogenic bowel, bladder and weakness of the lower limbs.²

Most of the patients with MMC also suffer from hydrocephalus, most of whom needs V/P shunting.³ The frequency of hydrocephalus varies greatly in different studies ranging from 52% to 92%.³ CSF diversion procedure has many complications including infections, mal positioning and over or under drainage. These patients with shunt failure and revisions have poor prognosis and bad neuropsychological performance.^{4,5} The complications of myelomeningocele range from moderate to severe physical disabilities and mental retardation secondary to hydrocephalus or Chiari malformation. These mental disabilities include difficulty in paying attention and understanding in language and reading.¹ The effects of MMC are determined by size and location of malformation whether it is ruptured or unruptured. The part of the spinal cord or nerve roots located at the level and below is affected by the disease to different degrees.

In MMC patients, the only therapeutic option is surgical repair of the defect and optimization neurological deficit. The neurological deficit that already exist in MMC cannot be reversed. In this repair, patients usually suffer from different degrees of paresis and bowel bladder dysfunction. Moreover, most patients develop hydrocephalus after surgical repair.⁶

In this paper, we report our experience about complications in Myelomeningocele (MMC) surgery. This study will take into consideration mainly the immediate complications that occur after surgery before the discharge of the patients.

MATERIAL AND METHODS

Fifty five children underwent surgical repair of MMCs and represent our experience about complication in surgery for MMC. Retrospective observational study carried out in Neurosurgery ward Lady reading hospital Peshawar from 2013 to 2015. Patients who were suffering from MMC admitted. The clinical, radiological and laboratory finding of patients were documented on a design proforma. Moreover ventriculoperitoneal shunting was performed for children who had or

developed hydrocephalus.

All patients with MMC of either gender and age range from 1 month to 10 years who were willing and fit for surgery were included in this study and all those who were not willing and fit for surgery were excluded. The study was approved by Institute of Research in Ethics and Biomedicine (IREB). This study will help to make recommendation.

Surgical Steps

The patient put in prone position with a cushion beneath the chest and hip for smooth breathing during anaesthesia. The upper limbs were flexed at elbow towards head of the patient. Cleaning and dressing of surgical field is carried out and patient draped with thick towels to avoid hypothermia during procedure. The incision site is marked between the neural placode and the immediate dystrophic skin. Elliptical incision in vertical plane was given in 45 cases and horizontal incision in 6 cases. The sac is dissected in layers until spinal dura is reached. The dural sac is dissected down until the margin of bony defect of vertebral column. The dura is then freed from the underlying fascia by blunt dissection. The dura is closed water tight with 4/0 (vicryl) suture. The fascia is closed as a second layer by incising it as far laterally as possible in a semicircle fashion at both sides, elevating it from the underlying muscle and reflecting it medially and closed with a 4/0 (vicryl) suture. The subcutaneous tissue is closed with absorbable suture and the skin is mobilized from the surrounding tissue by blunt dissection and closed longitudinally or horizontally. Plastic surgery unit consulted for very large MMC in rest of 4 cases and transposition of gluteus maximus musculocutaneous unit performed.

RESULTS

In the one and a half years, the department has received 55 cases of having MMC. Patients in this study were in the age range of 1 month to 10 years (Table 1). Mean age was 1.8 years. The 58% of patients (i.e. 32) were males and 42% (i.e. 23) were females (Figure 1).

Thirty seven patients (67%) were Paraparetic (MRC grade from 1 to 4) and 18 patients (32.72%) were completely paraplegic. Seventeen patients (30.9%) had ruptured MMC at presentation and most underwent surgery in emergency (Table 2).

Fifteen patients (27.27%) had V/P shunting before surgery for MMC and 11 patients (20%) developed

Table 1: Demographic Data of Patients (n = 55).

Age:	
Mean	1.8 years
Range	1month to 10 years
Gender:	
Male	58%
Female	42 %

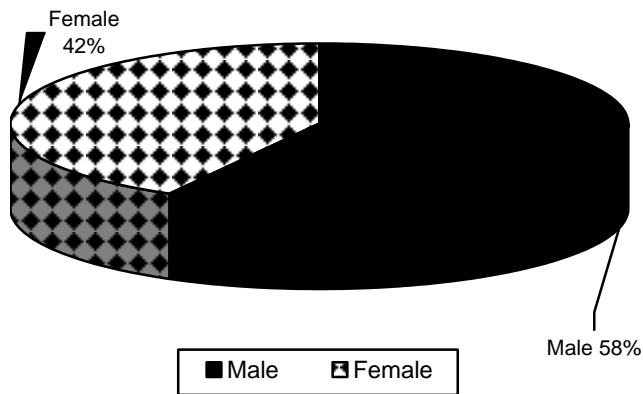


Fig. 1: Gender distribution of MMC.

Table 2: Presenting Features.

Paraparetic	32.72%
Paraplegic	67%
Un-Ruptured MMC	31%
Ruptured MMC	69%
Elective surgery	73%
Emergency surgery	27%

hydrocephalus after excision and repair of MMC and V/P shunting carried out. Seven patients (12.72%) developed wound dehiscence and CSF leak and subjected to redo surgery. Three patients (5.45%) had wound infection followed by meningitis and two patients (3.63%) died after surgery.

DISCUSSION

In our study, we had 58% male and 42% female of

Table 3: Early Complications in MMC Surgery (n = 55).

Complications:	
CSF leak	12.72%
Wound Dehiscence	12.72%
Hydrocephalus:	
Before surgery	27.2%
After surgery	20%
Wound infection	5.45%
Meningitis	5.45%
Expired	3.63%

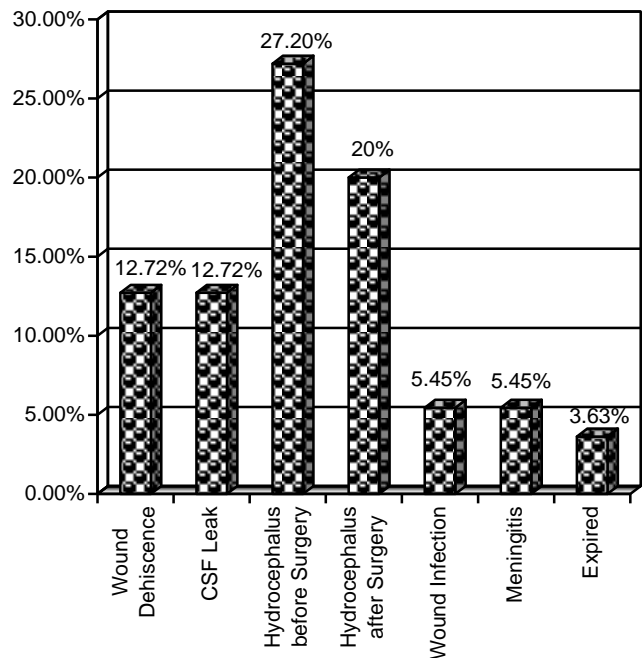


Fig. 2: Early Complications in MMC Surgery (n = 55).

MMC with youngest child operated was 1 month and the oldest was 10 years which is consistent with most of the previous studies. In a study, 55% were male and 44.5% were females and the age range was 4 days to 15 years.

In our study, 55 cases of MMC underwent surgical repair. Out of these, 27.2% had V/P shunting before surgery and 20% immediately after surgery. The overall shunt rate of our patient population was low as compared to other studies.^{7,8} A study reported that 72

patients had MMC surgery, 75% had V/P shunting. The annual CSF diversion rates varied from 45% to 100%. The significant change was not observed in the rate of patients with MMC undergoing CSF diversion through the study period.³

The overall shunt rate in our study was lower than the reported range of 80% to 85% in the MMC population.^{9,10} This rate of CSF diversion is also less than the 92% shunt rate for infant in the MOMS trial who underwent post natal closure. The shunt rate in our study was low as compared to other studies likely due to short duration and small sample size.^{3,9,10}

The second most common complication of MMC repair in our study was CSF leak which was 12.72%, consistent with other studies like a study reported 293 patients had MMC surgery and 38 cases developed CSF leak which is 12.96%.¹¹ Contrary to this, some studies reported lower rate of CSF leak documented 5.3% of MMC repaired.^{3,7,12} Further, other study reported 72 MMCs repaired 4 had CSF leak from wound site.³

In our study, wound infection and meningitis after procedure was 5.45% which is in line with other studies such as one study reported 5.3% wound infection after repair of MMC.⁷ However, there were (11.7%) wound infection after MMC repair presented in another study.¹³

CONCLUSION

From this study, we concluded that wound dehiscence and CSF leak are the most common complication after surgery for MMC and can be prevented by tensionless closure of the wound. In MMC patients with overt hydrocephalus prior to repair and excision of MMC V/P shunting should be performed. If patient develop hydrocephalus after surgery then immediate diversion of CSF should be carried out.

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