ORIGINAL ARTICLE

Frequency of Cerebrospinal Fluid Leak in Patients Undergoing Myelomeningocele and Tethered Cord Syndrome Repair

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ABSTRACT

Aim: To determine the frequency of cerebrospinal fluid leak in patients undergoing myelomeningocele and tethered cord syndrome repair.

Study design: Cross-sectional

Place and duration of study: Department of Neurosurgery, Chandka Medical College Hospital, Larkana from 1st October 2019 to 30th September 2020.

Methodology: Sixty eight patients of both genders were enrolled in this study. Patients were ages between 3-21 years. Patients detailed demographics age, gender and body mass index were recorded. Patients who underwent myelomeningocele and tethered cord syndrome repair were included. Frequency of cerebrospinal fluid leak in patients was calculated.

Results: Mean age of the patients was6.4± 4.8 years. Thirty six (52.9%) patients were males and 32 (46.1%) were females. Twenty two (32.35%) patients had cerebrospinal fluid leak. Mean duration of cerebrospinal fluid leaks was 5-18days. Among 22 patients, 15 patients hadmyelomeningocelerepair, 3 patients had tethered cord syndrome release and 4 patients had meningocele repair. Four patients had a cerebrospinal fluid leak with hydrocephalus postoperative signals that settled by inserting the shunt in a single position along with a primary wound repair, strengthened by tincture benzoyl. After stitches improved by benzoyl tinctures, three other patients showed signs of hydrocephalus without cerebrospinal fluid leak and were later put in the shunt.

Conclusion: Frequency of cerebrospinal fluid leaks was greater in patients undergoing myelomeningocele and tethered cord syndrome repair. These patients can be cured after skin reinforcement by using tincture benzoyl.

Keywords: Cerebrospinal fluid leak, Myelomeningocele, Tethered cord syndrome

INTRODUCTION

Myelomeningocele (MMC) is an open, neural tube defect which, in the developing countries, affects an average of three out of 10 000 live deliveries and is associated with a high health-care costs for the entire life cycle of the patient.[1-4]Myelomeningocele, which is distinguished morphologically by a placode, epitheliosis area and cross-cutting zone, is found most commonly in the lumbar region. A placode is a non-neurulated spinal cord and has this tag, which can be differentiated by its red color from the surrounding tissue by the development of a plaque rather than the cylindrical appearance of a neurulated spinal cord. Placodes of the vascularized tissue recognized as the epitheliosis region are surrounded by irregular tissue isolated by the functional zone from normal skin.

The classical MMC repair technique involves the removal of the placode and the placode by means of a pial suture that facilitates tunicization. This is accompanied by lateral exposure of the dura, sutured to cover the tuned placode, and the skin is usual closed. In birth, the MMC patient's conusmedullaris is below a typical anatomical level, typically at L1 or L2, and the placode is connected to the surrounding structures, which characterizes the anatomically bound thread. This attachment can contribute to spinal cord extension during childhood and can become symptomatic in 30 percent of neurologically, urologically and orthopedically affected patients in average.[5] This is commonly recognized as a tethered cord syndrome.[6] This is also known as the disorder. The tethered cord syndrome (TCS) is mainly related to thick, occult, and secondary scar repair, filumterminale, and other kinds of occult spinal dysraphism.[7] Secondary TCS is the term used when a primary surgery, such as MMC, caused the therapy. Cochrane[8], Pierre-Kahn et al[9] and Chapman[10] used "Complex Tethered Rope" synonymously with secondary TCS, which emphasizes the anatomy problems posed by operations.

In 1976, Hoffman et al[11] coined the word "termed spinal cord" for the first time. They identified 31 long cord patients with improved symptoms following filumterminale section. Nevertheless, other authors have also found an association between dysraphism and neurological symptoms[12,13]. The word 'Filum Finale Syndrome' was coined by Garceau, who mentioned a short, thick filumterminale syndrome that had a short STIR sign. In addition, an irregular filum was released from surgery and neurological signs were strengthened and symptoms resolved.

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MATERIAL AND METHODS

This cross-sectional study was conducted at Department of Neurosurgery, Chandka Medical College Hospital, Larkanafrom 1st October 2019 to 30th September 2020.and comprised of 68 patients. Patient's details demographics age, gender and BMI were recorded after taking written consent. Patients with history ofmyelomeningocele and TCS repair those with no consent were excluded.Patients were ages between 3-21 years.Patients who underwent myelomeningocele and TCS repair were enrolled. Frequency of cerebrospinal fluid leak in patients was calculated. Gender and type of procedure was noted after first surgery, associated infections, hydrocephalus and management type.Management type was conservative in applying tincture benzoyl paste, refreshing the edges of the wound and rework in the form of a ventriculoperitoneal shunt (VP) or the repair of the dural leaking site. Complete data was analyzed by SPSS 27.

RESULTS

Mean age of the patients was6.4±4.8 years. Thirty six (52.94%) patients were males and 32 (47.06%) were females.Mean duration of cerebrospinal fluid leaks was 5-18days (Table 1).

Table 1: Baseline detailed demographics of enrolled patients

Variables	No.	%
Gender		
Males	36	52.9
Females	32	47.06
Mean age (years)	6.4±4.8	
CSF Duration (days)	5-18	

Twenty two (32.35%) had cerebrospinal fluid leak. In which 15 (68.18%) were males and 7 (31.82%) were females (Table 2).

Table 2: Frequency of cerebrospinal fluid leaks among patients

Variables	No.	%
CSF Leaks		
Yes	22	32.35
No	46	67.65
Gender		
Male	15	68.18
Female	7	31.82

Among 22 patients, 15 patients showed MMC repair, 3 patients had tethered cord syndrome release and 4 patients had meningocele repair. Four patients had a cerebrospinal fluid leak with hydrocephalus postoperative signals that settled by inserting the shunt in a single position along with a primary wound repair, strengthened by tincture benzoyl (Table 3).

Table 3: Distribution of cerebrospinal fluid leaks postoperatively according to repairs(n=22)

Variables	No.	%
Myelomeningocele (MMC)	15	68.18
TCS release	3	13.64
Meningocele repair	4	18.18

DISCUSSION

Post-operative infection and CSF leak are the biggest post-operative complications for spinal dysraphism surgery and the incidence of CSF leak varies from 8% to 30% in different studies.[14,15]In the present study, post-operative CSF leak rate of 32.5%, most of these patients responded to simple skin reinforcement sutures along with post op benzoyl tincture application, another study conducted by Marino R also encouraged and appreciated the use of tincture benzoyl for CSF leak.[16]

Benzoyl tincture is a natural compound, its use for fissures, leaks and discharge has been there for very long but it is also considered to cause allergic reactions and contact dermatitis at wound site , a study by Scardamaglia et al[17] reported that benzoyl may not be responsible for any allergic reaction itself, it is the cross reaction of other elements as a mixture of the tincture compound that are added and less than 30 benzoyl related dermatitis cases were reported. In the current study, only three patients required expansileduraplasty due to recurrent infections and leak. Another complication of spinal dysraphism case is the tethering of the cord where adhesion may develop at the repair site and patient presents with neurological manifestations later, but no such complication was noted probably because of the short duration of follow-up. In our study mean age of the patients was 6.4±4.8 years and majority of the patients were males 52.9%. Mean duration of CSF leaks was 5-18 days.[18,19]Cohrs et al[20] have collected unique pro-inflammatory and pro-apoptotic mediators that may underlie secondary TCS after the MMC repair and have been identified in 12 patients with receiving treatment. They believed that the prevention of these lesion cascades could increase retreat rates by the use of anti-inflammatory and anti-apoptotic factors combined with a diligent operative technique. Statistically small rates for tethering and a higher occurrence of dermoid cysts have been identified in patients who have undercut fetal repair of MMC.[2] The better functioning of these patients, making it possible to identify tethering symptoms, might explain the fact. Failure of fetal repair to separate transitional skin might explain the incidence of cysts due to the inclusion in fetal surgery of unknown young tissues.

There typically is a link between increased symptom and spurts of childhood due to the prolongation of the spinal canal that causes progressive spinal cord injuries associated with the metabolic, vascular and mechanical variables taken into account in past experimental studies. Some studies indicate that the most common age at which signs are seen is two peaks of incidence: one between two and four years and one between eight and ten years of age; but one study reports only one, between five and nine years.[21,22] Recent studies involving a Danish population showed progressive spinal deformations (40%), decaying ambulation (38%), and decaying bladder and/or bowel dysfunction in 45 of the 166 patients with myelomeningocele who received care (32%).[23] Increased capacity even below the anatomical degree of myelomeningocele repair, indicating good functional results for that group, was seen in electrophysiological monitoring of tethered cord syndrome in fetal myelomeningocele repair patients.

CONCLUSION

Frequency of cerebrospinal fluid leaks was greater in patients undergoing myelomeningocele and tethered cord syndrome repair. These patients can be cured after skin reinforcement by using tincture benzoyl.

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