OPEN ACCESS

Saudi Journal of Medical and Pharmaceutical Sciences
Abbreviated Key Title: Saudi J Med Pharm Sci
ISSN 2413-4929 (Print)|ISSN 2413-4910 (Online)
Scholars Middle East Publishers, Dubai, United Arab Emirates
Journal homepage:https://saudijournals.com

Original Research Article **Pediatric Neuro Surgery**

Management of Spinal Dysraphism-Our Clinical Experience

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DOI:10.36348/sjmps.2023.v09i03.008 | **Received:** 11.02.2023| **Accepted:** 18.03.2023| **Published:** 22.03.2023

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Abstract

Background*:** Spinal dysraphism refers to a group of developmental abnormalities that affect the spinal cord and its surrounding structures. The main goals of treatment of spinal dysraphism are to prevent further damage to the spinal cord and to improve the patient's neurological function and quality of life.Aim of the Study*:** The aim of this study was to assess the management of spinal dysraphism .***Methods*:** This cross-sectional study was conducted in Department of Pediatric Neuro Surgery, Bangladesh Shishu Hospital and Institute, Sher E Bangla Nagar, Dhaka 1207, Bangladesh, during the period from 1st April 2020 to 31st March 2021. Total 1052 patients were admitted under Neurosurgery department (SU IV) from them 93 patients had spinal dysraphism. After excluding patients with encephalocele, lipomeningocele, meningocele and DORB, total 60 patients with myelomeningocele were included in this study.***Result*:** Majority of the subjects (71%) were less than a week old. there was a slight female preponderance (54%) among the study subjects. The most affected (83.33%) region of the spine among the study subjects was lumbosacral. The data showed that 65% of the study subjects had no lower limb movement, while 35% of them had slight movement. In the study, all study subjects had abnormal bowel and bladder habits. In the study, the majority (62%) had a moderate ventricular index level before operation. About 83.33% of the study subjects had a satisfactory outcome after the surgery, while 6.66% had poor outcomes, and 1.66% of the study subjects died after the surgery. The data showed that 80% of the study subjects had a severe Ventricular Index after two weeks of surgery, while 20% had a moderate Ventricular Index. The data also indicated that 85% of the study subjects had a healthy wound after surgery, while 15% had an unhealthy wound.***Conclusion:***From the findings of our study, it can be concluded that for improving the quality of life of the patients with spinal dysraphism, surgery is the prominent treatment accompanied by optimal post-operative care. Surgery of spinal dysraphism is associated with higher satisfactory rate and lower post-operative complications.

Keywords: Management, Spinal Dysraphism, and Myelomeningocele.

I. INTRODUCTION

A number of congenital defects that cause a faulty neural arch through which the meninges or other neural components herniate, known as spinal dysraphism, which can cause a range of clinical symptoms [1, 2]. Aperta (visible lesion) and occulta are the two categories (with no external lesion) [1, 2]. The number of occurrences of the disease is considered to be less than 1% [2]. Congenital heart disease is the most prevalent form of birth abnormalities, followed by neural tube anomalies [3]. Neural tube abnormalities include spinal dysraphisms as a subtype [4]. 90% of instances involve the lumbosacral spine, which is then followed by the thoracic spine (6%–8%) and cervical spine (2%–4%) as the most frequent sites [5]. Strong evidence suggests that incidence has decreased globally since the 1970s, however it is uncertain whether this is a temporary or long-term trend [6, 7]. The introduction of prenatal diagnosis, which results in therapeutic abortion in as many as half of the diagnosed cases in

some countries, as well as systematic use of maternal nutrition and dietary folic acid before and during the gestational months, are likely to be to blame for this reduction [8- 10]. Depending on the populations investigated, the condition affects newborn females equally or somewhat more frequently than male neonates (female, 1.0-1.7/male, 1.0). Pediatric Neuro surgeon and Urologists are most familiar with myelomeningoceles because they are by far the most typical spinal dysraphic disease affecting the lower urinary tract [11]. The most often impacted spinal regions are the lumbar and sacral areas [12]. Open spinal dysraphism (myelomeningocele), according to embryology, is considered to happen 3 to 4 weeks after conception, when the neural tube is closing [13]. Up to 75% of adult survivors may be reliant on their parents or other providers; nonetheless, the social and economic effects of this disease are not fully understood [14]. Approximately 80% of spina bifida kids are able to maintain their continence with just occasional catheterization and anticholinergic drugs [15]. To establish continence, the remaining kids require some kind of surgical intervention at the right time. In the past, ureterosigmoidoscopy was used to perform urine diversion. Ascending infectious problems are a downside of this operation, which has since been linked to a high incidence of cancer at the ureterosigmoid anastomose [16]. Nevertheless, long-term follow-up showed a significant frequency of upper tract issues, including pyelonephritis and declining renal function [17]. The occurrence of these upper tract issues was unaffected by attempts to enhance this kind of conduit diversion employing right or left colon segments with the addition of a ureteric anastomosis antireflux approach [18]. It is yet unknown if fetal surgery can treat myelomeningocele [19]. The current study was conducted to evaluate the management of spinal dysraphism.

II. OBJECTIVES

- To assess the management of spinal dysraphism.

III. METHODOLOGY & MATERIALS

This cross-sectional study was conducted in Department of Pediatric Neurosurgery, Bangladesh Shishu Hospital and Institute, Sher E Bangla Nagar, Dhaka 1207, Bangladesh, during the period from 1st April 2020 to 31st March 2021. Total 1052 patients were admitted under SU IV from them 93 patients had spinal dysraphism. After excluding patients with encephalocele, lipomeningocele, meningocele and DORB, total 60 patients with myelomeningocele were included in this study. All the patients in our study underwent repair of rupture myelomeningocele. Consent of the guardians was taken before collecting data. After collection of data, all data were entered into computer and statistical analysis of the results being obtained by using windows-based computer software devised with Statistical Packages for Social Sciences version 22. After compilation, data were presented in the form of tables, figures and charts, as necessary. P value of less than 0.05 was considered statistically significant.

IV. RESULT

Table-I provides baseline characteristics of the study subjects. The age distribution of the study subjects indicated that the majority of the subjects (71%) were less than a week old. The sex distribution showed that there was a slight female preponderance (54%) among the study subjects. Most of the study subjects were poor (63%). The majority of the mother of the study subjects (88%) took antenatal care. The affected sib status of the study subjects was presented in three categories: 1st (52%), 2nd (31%), and 3rd (17%). Figure 1 demonstrates the affected region of spine. The most affected (83.33%) region of the spine among the study subjects was lumbosacral. Table-II shows the neurological status of the study subjects. The data showed that 35% of the study subjects had lower limb movement, while 65% of them did not. In the study, all study subjects had abnormal bowel and bladder habits, which suggested that there were significant neurological deficits affecting these functions. Figure 2 demonstrates the ventricular index of the study subjects. In the study, the majority (62%) had a moderate ventricular index level before surgery. The table III indicates that 83.33% of the study subjects had a satisfactory outcome after the surgery, while 6.66% had poor outcomes, and 1.66% of the study subjects died after the surgery. The data showed that 80% of the study subjects had a severe Ventricular Index after 2nd week of the surgery, while 20% had a moderate Ventricular Index. The data also indicated that 85% of the study subjects had a healthy wound after surgery, while 15% had an unhealthy wound.

Table I: Baseline characteristics of the study subjects (N=60).

Characteristics		**n**	**%**
Age	<1 week	43	71
	<1 month	12	20
	1-3 months	5	9
Sex	Male	28	46
	Female	32	54
Socioeconomic status	Poor	38	63
	Middle class	18	30
	Rich	4	7
Antenatal check up	ANC	53	88
	Non-ANC	7	12
Affected sib	1st	31	52
	2nd	19	31
	3rd	10	17

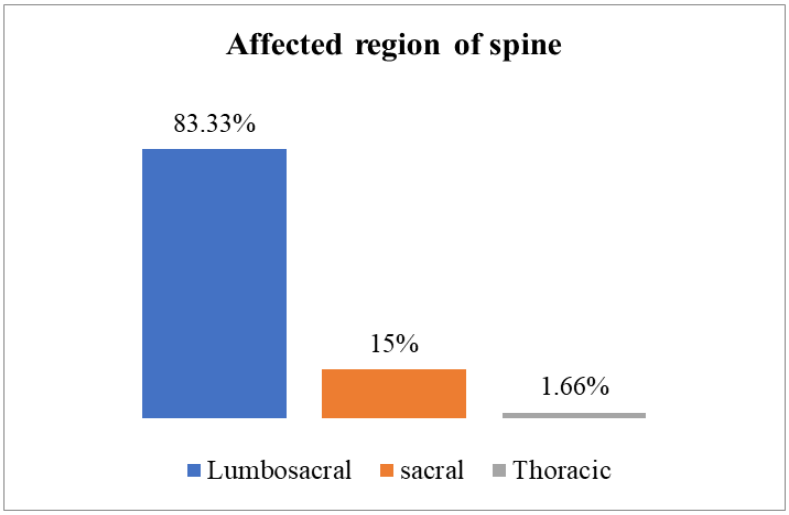

Figure 1: Affected region of spine (N=60)

Table II: Neurological status of the study subjects (N=60)

Neurological status		**n**	**%**
Lower limb movement	Present	21	35
	Absent	39	65
Bowel habit	Abnormal	60	100
	Normal	0	0
Bladder habit	abnormal	60	100
	Normal	0	0

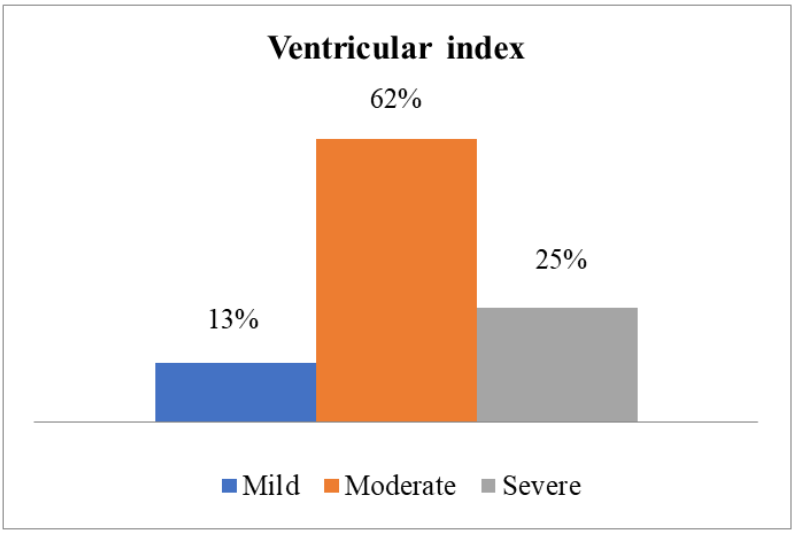

Figure 2: Ventricular index of the study subjects (N=60)

Table III: Post-operative outcome of the study subjects (N=60)

Parameter		**N**	**%**
Outcome	Satisfactory	50	83.33
	Equivocal	5	8.33
	Poor	4	6.66
	Death	1	1.66
Follow up			
Ventricular index	Severe	48	80
	Moderate	12	20
Condition of wound	Healthy	51	85
	Unhealthy	9	15

V. DISCUSSION

The current study was conducted to evaluate the management of spinal dysraphism. In our study, age distribution of the study subjects indicated that the majority of the subjects (71%) were less than a week old. Similar result found in the study of Gupta VK *et al.,* [20] where children below the age of 1 month were mostly affected (number of cases= 17). Among them, most of the patients (57%) were neonates. But in other studies, mean age of the patients is seen higher compared to our study [21-23]. The sex distribution showed that there was a slight female preponderance (54%) among the study subjects. In a study of Anderson FM [24], among 27 patients, there were 20 girls and 7 boys which indicate higher female preponderance compared to our study. Most of the study subjects were poor (63%). We found that, majority of the mother of the study subjects (88%) took antenatal care. In the study of Agrawal A *et al.,* [21], mothers of 15 children did not seek any regular antenatal checkup which is not in line with our study. In our study, more than half had 1st category of affected sib status. We found that, the most affected (83.33%) region of the spine among the study subjects was lumbosacral. This is in accordance with the study of Agrawal A *et al.,* [21] where they also found that the most common site was lumbosacral region (67.8%). Patients with myelomeningocele face long time residual disabilities like paralysis of the lower limbs; sensory loss; impaired cognition; and bladder & bowel incontinence, and sexual dysfunction [25]. The lower limb movement is an essential indicator of the function of the central and peripheral nervous system. The current study showed that 65% of the study subjects had no lower limb movement, while 35% of them had lower limb movement. The absence of lower limb movement may suggest the presence of a neurological problem, which can be further investigated. In the study of Gupta VK *et al.,* [20], 30% patients showed weakness at hip, 50% patients and weakness in right knee and ankle and 43% patients reported weakness at left knee and ankle. Another study of Iftikhar and De Jesus [26] showed motor weakness and sensory deficit in the lower limbs of the patients with spinal dysraphism. Bowel and bladder habits are also important indicators of neurological function. The data indicate that all study subjects have abnormal bowel and bladder habits, which suggests that there are significant neurological deficits affecting these functions. In the study of Gupta VK *et al.,* [20], 30% patients reported with bladder and bowel incontinence, 3% had bladder incontinence but no case of bowel incontinence was reported. In the study, the majority (62%) had a moderate ventricular index level before the operation. In our study, 83.33% of the study subjects had a satisfactory outcome after the surgery, while 6.66% had poor outcomes, and 1.66% of the study subjects died after the surgery. In the study of Gupta VK *et al.,* [20], out of 30 patients who underwent surgery, 67% patients had good outcome, 20% reported satisfactory outcome and 13% reported poor outcome with an overall mortality rate of 13%. Though the operative outcome is similar to our study, the mortality rate of their study is higher compared to our study. In our study, 80% of the study subjects had a severe Ventricular Index after the surgery, while 20% had a moderate Ventricular Index. The data also indicated that 85% of the study subjects had a healthy wound after surgery, while 15% had an unhealthy wound. Banskota N *et al.,* [22] found that among 15 patients, 2 had wound infection which is in line with our study. Similar result was found in another study of Sreeharsha SV *et al.,* [27]. In their study, 6.4% patients had wound infection, 2.5% had skin necrosis, 3.8% had ventriculitis, 5% had new onset paraparesis, and death occurred in 2.5% cases. Early diagnosis and prompt surgical interventioncan improve the outcome of patients with spinal dysraphism.

Limitations of the Study

In our study, there was small sample size and absence of control for comparison. Study population was selected from one center in Dhaka city, so may not represent wider population. The study was conducted at a short period of time.

VII. CONCLUSION AND RECOMMENDATIONS

From the findings of our study, it can be concluded that for improving the quality of life of the patients with spinal dysraphism, surgery is the prominent treatment accompanied by optimal post-operative care. Surgery of spinal dysraphism is associated with higher satisfactory rate and lower post-operative complications. Further study with larger sample size is required to have better understanding about the management of spinal dysraphism.

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