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Original Research Article

Lumbodorsal flap for repair of meningomyelocele- a procedure matched controlled study

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ABSTRACT

Background: Open neural tube defects have been approached by innumerable surgical techniques. Hitherto, excision of the exposed neural tube component, water tight closure of dura, approximation of paraspinal soft tissue and skin closure repair was stressed. Support of vertebral defect was not adequately addressed. Objectives were to introduce lumbodorsal/thoraco dorsal fascial flap as an effective answer to the vertebral defect component of MMC. To compare conventional paraspinal soft tissue closure with lumbodorsal/ thoracodorsal fascial flap.
Methods: This was a procedure matched controlled study conducted from 1984-2015. A total of 121 procedures were performed by the same team formed the cohort of the study. Conventional muscle mobilization group A (n=50) and lumbodorsal flap group B (n=71) were the two groups. Demographic data, CSF leak, CSF collection, wound dehiscence, duration of drain and duration of surgery were the parameters evaluated with statistically blinded method.
Results: The series mostly constituted lumbar (28%) and lumbo-sacral meningomyelocele (56%). Most of the children in both the groups are either at birth or <1 month. Only few patients in group B with lipo-meningocele presented beyond the age of 5 years (7%). 12% in group A had hydrocephalus, whereas 15.4% had in group B. The patients underwent similar technique at all sites of MMC. Grossly it appears that there is less wound dehiscence, less CSF leak, less hygroma formation in group B cases. Duration of surgery is similar in both the groups, most of them requiring 60 to 120 minutes. The duration of drainage was more than 7 days in group A (34%) as compared to group B (20%).
Conclusions: Lumbodorsal/thoraco dorsal fascial flap adequately supports the vertebral defect and skin flaps. They seem to be superior in addressing the vertebral defect component.

Keywords: Latissimus dorsi flap, Lipo-meningocele, Meningomyelocele, Spina bifida

INTRODUCTION

Neural tube defects like spina bifida have been a troublesome congenital anomaly. Despite advances like high end imaging tools, and administration of folic acid antenatally, meningomyelocele continue to pose a challenge to the pediatric surgeons. This common neural tube anomaly had been repaired primarily concentrating on water tight closure of dura with adequate skin cover.[1] There has been a casual approach to the care of defect, paraspinal muscles mobilization for the closure. CSF leaks, wound dehiscence, CSF collections had been nagging issues. Authors have tried to address the issue of spinal defect in meningomyelocele using either single or

two sided lumbodorsal flap.[2]

Present study was conducted with the objectives of to compare the conventional repair with lumbo-dorsal fascia with regards to CSF leaks, wound dehiscence, duration of surgery, CSF collections (hygroma) and need for its drainage.

METHODS

This case controlled study was conducted from 1984-2015. A total of 121 procedures formed the cohort study. The cohort was divided into two groups- group A (n=50) conventional muscle mobilization and group B (n=71) lumbo-dorsal flap.

Inclusion criteria

All meningomyelocele and large meningocele were included.

Exclusion criteria

Rachischisis and small pedunculated meningocele were excluded.

New born with MMC formed the largest number in both the groups 42% and 38% respectively (Table 1). Most of the remaining cases presented within one month of age. Lumbar and lumbosacral were the commonest sites in the series with group A (L28% LS 56%) and group B (L30.9% LS 57.7%) (Table 2). Most of the cases had a vertebral defect of 2-3 vertebrae- group A (78%) and group B (63%) (Table 3). Incidence of hydrocephalus presenting at the time of surgery along with MMC in group A and group B was 12 % and 15.4% respectively-Table IV. Post-operative CSF leak, wound dehiscence, duration of drain, duration of surgery and associated Hygroma were also studied in the present series (Tables 4-9).

The lumbodorsal fascia was dissected on either side after the mobilization of meningocele and myelomeningocele. The nonfunctional exteriorized neural tissue was excised and the dura was closed watertight. The spinal tissue was defined and a lumbo-dorsal flap was marked one and half times on each side and raised based on the border of the defect depending on the need. Both the flaps were approximated in an overlapping fashion. Large defects of three vertebrae could also be reinforced and covered with bilateral edge defect based lumbo-dorsal fascia.

A blinded statistical analysis was done. Chi square and odds ratio was calculated.

RESULTS

Age distribution of study subjects as shown in Table 1, where maximum number were newborns 42% in group A and 38% in group B. Only 2% and 2.8% of cases were above 1 year age in group A and B respectively.

Table 1: Distribution of study subjects as per demographic data.

Age at presentation	Group A (n=50)		Group B (n=71)	
Newborn	21	42%	27	38%
<1 month	17	34%	16	22.5%
>1 month- 1 year	11	22%	21	29.5%
>1 year-5 years	01	02%	02	2.8%
>5 years	00	00	05	7%

Table 2: Distribution of study subjects as per site.

Group A n=50					Group B n=71				
Lumbar	Lumbo sacral	Thoraco-lumbar	Cervical	Sacro-coccygeal	Lumbar	Lumbo-sacral	Thoraco-lumbar	Cervical	Sacro-coccygeal
14 28%	28 56%	4 8%	0	4 8%	22 30.9%	41 57.7%	4 8%	1 1.4%	3 4.2%

In both group A and B, maximum cases were seen in lumbo-sacral region 56% and 57.7% respectively. Lumbar cases were also distributed similarly 28% and 30.9% respectively. Both the groups had 8% cases in thoraco-lumbar site.

In both the groups A and B maximum cases had 2-3 vertebrae defect i.e. 78% and 63% respectively. Only 4% and 4.2% in both groups had defect of more than three vertebrae (Table 3).

Table 3: Distribution of study subjects defect size.

Defect	Group A (n=50)		Group B (n=71)	
1 vertebra	09	18%	23	32.3%
2-3 vertebrae	39	78%	45	63%
>3 vertebrae	02	04%	03	04.2%

74% of cases in group A and 73.2% of cases in group B had no hydrocephalus. 12% in group A and 15.4% of cases in group B presented with MMC. 14% of cases in

group A and 11.4% in group B developed hydrocephalus later (Table 4).

Table 4: Distribution of study subjects hydrocephalus.

	Group A		Group B	
Present along with MMC	06	12%	11	15.4%
Developed later	07	14%	08	11.4%
No hydrocephalus	37	74%	52	73.2%
Defects				
S2 S3 S4	04	08%	05	07%
Paraplegia	02	04%	02	02.8%
CTEV	03	06%	03	04.2%

CSF leak was more in group A (38%) and only 12.6% in group B. This difference was statistically significant p<0.005. Patients in group A had 4.22 times more risk of CSF leak as compared to group B patients (Table 5). The incidence of wound dehiscence was similar in both the groups, as statistically, there was no significant difference p>0.05 (Table 6).

Table 5: Comparison of CSF leak in both the groups.

Postoperative leak	Group A n=50	Group B n=71	P=0.001
Leak	19 38%	09 12.6%	significant
No leak	31 62%	62 87.4%	

C.I. = 1.71-10.41.

Table 7 shows that drain duration was for more than seven days in 34% of cases in group A as compared to 20% of cases in group B which was statistically significant p<0.05. Table 8 shows that the duration of surgery was almost similar in both the groups and there was no statistical difference p>0.05.

Table 6: Comparison of wound dehiscence.

	Group A			Group B			
	Day 1	Day 2	Day 3	Day 1	Day 2	Day 3	
Wound dehiscence +	1/9	10/39	2/2	1/23	9/35	3/13	P=0.2149 Not significant
Healed well	8/9	29/39	0/ 2	22/23	26/35	10/13	

C.I.=0.6552–3.75.

Table 9 shows that CSF hygroma was seen in 14% of cases in group A, while in group B it was seen in 2.8% of cases, the difference of which was statistically significant p<0.05.

Table 7: Drain duration in two groups.

Drain duration	Group A		Group B		
<7 days	33	66%	57	80%	P=0.0382
>7 days	17	34%	14	20%	significant

C.I. =0.2086–1.09.

DISCUSSION

Spina bifida is one of the commonest neural tube defects. Myelocele and MMC form the largest group of spinae bifida. Embryologically, it is due to improper fusion of spinal columns over growing neural tube leading to protrusion of either neural tube coverings or along with it neural tube contents MMC and MC. Extreme cases can be seen as open neural tube- Rachischisis.[1,2] MMC often present in neonatal period with or without neural deficit like patulous anus, expressible bladder, CTEV alone or frank paraplegia. The present series also shows MMC in the newborn as the commonest presentation. Antenatal detection and fetal surgery had been tried with partial success.[3,4] Fichter MA et al attempted a fetal in utero, feto-endoscopic repair of MMC.[4] These surgeries did not become popular to become a reality in practice of management of neural tube defects.MMC has three important issues to be addressed to 1) neural contents with dura mater, 2) spinal defect and 3) skin closure. Joseph C Watson et al [3], Fichter MA et al, Cologlu et al and Santechhia L have published large numbers primarily concentrating on type of skin closures.[3-6] The skin approximation with large defects requiring imaginative local reconstruction flaps to avoid necrosis.

Table 8: Duration of surgery in two groups.

Duration of surgery	Group A	Group B	
<1 hour	09 18%	13 18.3%	P=0.4224 Not significant
1-2 hours	36 72%	45 63.3%	
>2 hours	05 10%	13 18.3%	

C.I.=0.382–2.505.

Table 9: Occurrence of CSF hygroma.

Group A		Group B		P=0.01048
7	14%	2	2.8%	significant

The author here routinely used rotation advancement for skin closures. The spinal defect was not addressed to clearly in the literature. Santechhia L from Italy and others number of flaps like lumbodorsal flap or

paravertebral muscle mobilization and closure.[6] Author has conceived lumbodorsal fascial flaps based on the edges of defect one sided or if needed bilateral lumbodorsal fascia (thoracodorsal fascia in cases of thoracic defects) were used for closure.

CSF leak incidence was described by Mavani SB et al and Yadav A in lumbodorsal groove.[1,2]

Wound failures were less; delayed CSF leaks (hygroma/pseudo meningocele) were also less.[1] Authors have had reduced incidence of hygroma with lumbodorsal flap in comparison to paravertebral muscle closure. Prolonged drainage was seen more in group A (34%) where paravertebral muscles are used for closure, where as in group B only 20% needed it. Duration of surgery was similar in both the groups. The author strongly feels lumbo-dorsal fascial flaps seem to be more advantageous with less post- operative complications. Deficits in neural function were not analysed as there were very few cases in both groups. Hydrocephalus is seen in both the groups. Literature shows associated stenosis of aqueduct of Sylvius or Arnold- Chiari malformation along with hydrocephalus. In present series 12% had hydrocephalus and were treated with simultaneous ventriculo-peritoneal shunt.

CONCLUSION

Lumbodorsal/thoracodorsal fascial flap is a better substitute over dural closure in spinal column defects. Larger defects >3 vertebrae can be closed with bilateral lumbo-dorsal fascial flaps.

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