ORIGINAL ARTICLE

Reconstruction of Large Meningomyelocele Defects with Local Fasciocutaneous Flaps

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ABSTRACT

Objective: *To determine the versatility and safety of local fasciocutaneous flaps for reconstruction of large meningomyelocele defects in terms of flap survival and dural coverage.*

Materials and Methods: *Meningomyelocele is a congenital defect in the vertebral arches with cystic dilatation of meninges. Closure of the skin defect in broad based meningomylocele is a challenging reconstructive problem. We present our experience of use of local fasciocutaneous flaps for coverage of skin defects in meningomyelocele patients. In this* ***descriptive case series*** *we managed 15 patients with broad based myelomeningocele defects in the Plastic & Reconstructive Surgery department Lahore General Hospital, Lahore from March 2008 to April 2016. The age of patients ranged from 4 days to 8 years. The diameter of the defect ranged between 8×5 to 13×8 cm. In all patients, reconstruction of soft tissue defect was done with local fasciocutaneous flaps. We performed Double Z-plasty in 2 (13%) patients, bilateral transposition flap in 4 (26%) patients, bipedicle skin flap in 4 (26%) patients, unilateral long superiorly based flap in 3 (20%) patients, and inferiorly based flap based on gluteal perforator in 2 (13%) patients. Donor site was primarily closed in 10 (66%) patients.*

Results: *In 5 (33%) patients flap donor area was skin grafted. Superficial wound dehiscence was seen in 2 (13%) patients. One patient (6%) had necrosis of distal part of flap which was managed conservatively. No neurosurgical complication occurred post operatively. Average follow up of 2 years showed no recurrence or dural sac herniation in any patient.*

Conclusion: *Reconstruction of large meningomyelocele defects with local fasciocutaneous flaps provides safe and predictable outcomes and is the method of choice for most of the defects in the lumbosacral area.*

Key Words: *Large Meningomyelocele, Fasciocutaneous flaps, Wound dehiscence.*

INTRODUCTION

Meningomyelocele is the most common defect of central nervous system occurring at approximate rate of 1 in 800 – 1000 live births.[1] The large lumbosacral meningomyelocele closure poses a great challenge for reconstruction. Emergency closure is required to prompt from ascending infection resulting in meningitis. Majority of myelomeningocele especially smaller ones can be closed primarily. In broad based meningomyelocele coverage of the skin defect by split thickness skin graft is vulnerable to **fail** and subsequent CSF leakage can occur.[2] McDonnell and Seyfer recommended skin graft as temporary biological dressing for meningomyelocele patients[3].

Local flaps for closure of large meningomyelocele can be raised in various ways. Among the local flaps various options are transposition flap, rhomboid flap, double Z-plasty, bipedicle flap and bilateral transposition flap.[4] Tension free closure & wide undermining is the key to success in performing local flaps. Surgical repair is performed to cover the exposed spinal cord, eliminate cerebrospinal fluid (CSF) leakage and prevent infection. Primary wound healing protects the functional neural tissue. We present our experience of closure of broad based meningomyelocele defects with local fasciocutaneous flaps.

MATERIALS AND METHODS

Fifteen patients with large meningomyelocele were operated over the span of 8 years from March 2008 to April 2016 in the Plastic and Reconstructive surgery department, Lahore General Hospital, Lahore. Lumber and lumbosacral large meningomyelocele were included in study. Patients with narrow based meningomyelocele amenable to primary closure were excluded from the study. Thorough clinical and neurological assessment was done in all patients. All patients except two were paraplegic. No other associated anomaly was found on clinical examination. Patients were operated in prone position under general anesthesia. The closure of dural defect was done by neurosurgeons. Closure of the skin defect was done after assessment of available adjacent skin with local flaps.

Fig. 1a: *Meningomyelocele defect lumber region in a 14 year old female.*

Local flaps were designed for tension free closure. Bipedicle flaps were designed by making parallel incision in 4 patients (26%). In 2 (13%) of these 4 patients lateral defects were allowed to heal by secondary intension. In the other 2 (13%) patients donor site grafting was done. Double Z-plasty performed in 2 (13%) patients. Superiorly based transposition flaps designed in 4 (26%) patients. Dimension of the defect measured and height of flap was made 1.5 times the defect size. Inferiorly based flap based on gluteal perforators was done in 2 (13%) patients. Inferiorly based flaps were designed with a wide base. To improve the flap vascularity maximum perforators at the flap base were preserved. Drain was placed to prevent seroma collection and drainage of CSF leak. The patients were placed in prone position post operatively. Skin sutures were removed 14 days after surgery. Drains were removed on 3rd post-operative day. Follow-up was done monthly for 3 months and 3 monthly for 2 years.

Fig. 1b: *Marking of Bilateral transposition flaps.*

Fig. 1c: *Flap Dissection.*

RESULTS

The study conducted in the Plastic and Reconstructive Surgery department Lahore General Hospital, Lahore from March 2008 to April 2016. 15 patients with meningomyelocele were operated with local fasciocutaneous flaps (Table 2). There were 10 male and 5 female patients. Age ranged from 4 days to 8 years. Six (40%) patients had meningomyelocele involving lumber area while 9 (60%) patients had lumbosacral

Fig. 1d: *Flap In-setting.*

Fig. 2a: *Meningomyelocele defect lumbosacral region in a 9 year old female.*

Fig. 2b: *Dural repair after wound excision.*

Fig. 2c: *Inferiorly Based Transposition Flap.*

meningimyelocele (Table 1). All except two patients were paraplegic. Shunt surgery by neurosurgeons was performed in 6 patients (26%) having hydrocephalus. No neurosurgical complication occurred postoperatively.

No major wound complication was seen in any of the patient (Table 3). In 2 patients (13%) superficial skin infection and partial wound dehiscence was seen which was managed conservatively. One patient (6%)

Fig. 2d: *Dissection of Flap.*

Fig. 2e: *In-setting of Flap.*

had necrosis of distal part of flap and CSF leakage in between the sutures. For CSF leakage shunt procedure was performed by neurosurgeons while flap necrosis in one patient was treated conservatively. Long term follow up showed stable, durable soft tissue coverage with no recurrence of dural sac herniation.

Table 1: *Location on of Dysraphism.*

Skin Lesions	N = 15
Lumbar	6
Lumbosacral	9

Table 2: *Reconstruction method used for coverage of defects.*

Procedure	Number of Patients	%
Bibedicle flap	4	26
Double Zplasty	2	13
Superiorly based transposition flap	3	20
Inferiorly based transposition flap	2	13
Bilateral transposition flap	4	26

Table 3: *Complications.*

Location	N = 8
Wound dehiscence	2
Flap Necrosis	1
Donor site Partial Graft loss	2
CSF leak	1
Hydrocephalus	2

DISCUSSION

Primary closure of small meningomyelocele is possible with wide undermining but attempts at closure of large meningomyelocele are associated with wound dehiscence. The challenge in large meningomyelocele is to provide adequate soft tissue cover over neural repair. Petterson and Till initially in a series of 130 patients with meningomyelocele observed that only 25% required more elaborate closure techniques than primary closure[5]. The primary wound healing can be achieved in small meningomyelocele with wide underminig of the wound edges. The classification of meningomyelocele in terms of the defect area was given by Ozverenetal.[6] This classification is helpful in selecting the closure techniques. Closure of meningomyelocele with the help of skin graft leads to problem of wound healing and graft donor site issues. Durable well – padded soft tissue is always required to prevent infection and neural desication.

Adjacent skin can be used in various ways as local skin flaps for coverage of meningomyelocele defects. Soft tissue cover is needed as soon as dural closure is done. In various studies successful closure of large meningomyelocele has been achieved by using local flaps like advancement flap, bipedicle flap, local trans-

position flap, rotational flap and limberg flap. McCraw, Hayashi and Maruyama described various ways of using myocutaneous flaps to promote early and predictable healing.[7,8] Meningomyelocele in lower sacral region is more difficult to close because of insufficient muscle in this area.

We operated 15 patients of meningomyelocele with local flaps. In 2 (13%) patients with meningomyelocele at sacral region inferior based fasciocutaneous flaps were used. Hand held Doppler was used to identify perforators at the base. Fascia over gluteus maximus was incorporated to maintain optimal blood supply. Results were comparable with the case series described by Ramirizetal.[9] This technique was modified by sparing the muscle and relying on perforators at gluteal area for raising of fasciocutaneous flaps. We used bilateral para-lumbar flaps in 4 (26%) patients. In a similar large series Lacobucci utilized bipedicle flaps with no major complications.[10]

Bilateral fasciocutaneous flaps in rotation or Z-plasty manner was used in 4 (26%) patients.[11] The flaps were planned in such a way that direction of rotation of one flap was against the other and the design was oriented according to the skin reverse vector to close with minimum tension. In our patients, the smallest defect repaired by bilateral fasciocutaneous flap was 32 cm^2. Ozceliketal used bilateral fasciocutaneous flaps to cover the defects of 3 (20%) patients.[12] We were successful in achieving good results in 4 (26%) of our patients. Bilateral rising of flaps provide coverage without tension and no suture line over dural repair. The shorter duration of surgical intervention in raising the local flap diminishes the morbidity of anesthesia as well. Bilateral fasciocutaneous flaps are quicker, easy to perform and results in no suture line over the dural repair.[13] The favorable outcome of long flank flaps indicates its importance especially when sizable perforators on one side are available in good quality.

Patients with complications like meningitis and hydrocephalus should be operated upon early. Coverage of the defect and ventriculoperitoneal shunting should be done to avoid hydrocephalus. Variety of options available for local flaps can help to miminize the problem of early and easy coverage of large defects.

CONCLUSION

Local transposition or rotation of fasciocutaneous flaps is relatively simple and reliable option for reconstruction of lumbar and lumbosacral large meningomyelocele defects.

Author's Contribution

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REFERENCES

1. Ersahin Y, Yurtseven T. Delayed repair of large myelomeningoceles. Childs Nerv Syst. 2004; 20: 427-9.
2. K. Muramatsu, K. Ihara, Y. Imazyo, T. Taguchi, "Experiences with the "reverse" latissimus dorsi myocutaneous flap," Plastic and Reconstructive Surgery, 2006; 117: 2456–2459.
3. Campobasso P, Pesce C, Costa L, Cimaglia M.L.The use of the Limberg skin flap for closure of large lumbosacral myelomeningoceles. Pediatr. Surg. Int. 2004; 20: 144-147.
4. McDonnell DE, Seyfer AE. In: Colon M, ed. Mastery of plastic surgery. Boston: Little, Brown, 1994: 1240.
5. Patterson TJ. The use of rotation flaps following excision of lumbar myelomeningoceles: an aid for the closure of large defects. Br J Surg. 1959; 46: 606–608.
6. Ozveren M.F., Erol F.S., Akdemir I. The significance of the defect size in spina bifida cysticain determination of the surgical technique. Childs Nerv. Syst. 2002; 18: 614-20.
7. Hayashi A, Maruyama Y. Bilateral latissimus dorsi V-Y musculocutaneousflap for closure of a large meningomyelocele. Plast Reconstr Surg. 1991; 88: 520 –523.
8. McCraw J.B., Penix J.O. and Baker J.W.: Repair of major defects of the chest wall and spine with the latissimusdorsimyocutaneous flap. Plast. Reconstr. Surg. 1978; 62: 197-204.
9. Ramirez OM, Ramasastry SS, Granick MS, et al. A new surgicalapproach to closure of large lumbosacral meningomyelocele defects. Plast Reconstr Surg. 1987; 80: 799–809.
10. Lacobucci J. Marks M.W. and Argenta L.C: Anatomic and clinical experience with fasciocutaneous flap closure of large myelomeningoceles. Plast. Reconstr. Surg. 1996; 97: 1400.

11. Y. Zakaria and E. A.Hasan, "Reversed turnover latissimus dorsi muscle flap for closure of large myelomaningocele defects,"Journal of Plastic, Reconstructive & Aesthetic Surgery, 2010; 63: 1513–1518.
12. Luce EA, Walsh J. Wound closure of the myelomeningocoele defect. Plast Reconstr Surg. 1985; 75: 389 – 393.
13. Bajaj PS, Welsh F, Shadid EA. Versatility of lumbar transposition flaps in the closure of meningomyelocele skin defects. Ann Plast Surg. 1979; 2: 103–108.

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