Original Article

Surgical Outcome of Tethered Cord Syndrome

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ABSTRACT

Objective: Surgical Outcome of tethered cord syndrome. **Study Design:** Retrospective descriptive. **Period and Place of study:** Neurosurgery Department Allied Hospital Faisalabad over 6 months from October 1, 2014 to March 28, 2015. **Materials and Methods:** Forty patients were selected at Neurosurgical Department, Allied Hospital, Faisalabad with age ranging from 2 months to 27 years(average 2.58 years). These were assessed clinically and their orthopedic and urological aspects were also assessed. MRI of relevant area was advised. Counselling was done regarding surgery under general anesthesia and its outcome. Laminectomy or laminotomy was done. Cord was detethered from its attachments from dura, and, in case of lipomeningocele, from its extradural component. In case of diastometomyelia, bony spur was extirpated and dura- plasty was done. Tight filum terminale was divided. Surgery was done using microsurgery techniques. Postoperative assessment was done immediately at the time of discharge, at 6 and 12 months. **Results:** A total of 40 patients, M:F ratio was5:3. Average age was 2.58 years. Age was ranging from 2 months to 27 years. Power improved in 44 % to grade 5/5 and 37% in grade 4/5 at one year. There was 65 % improvement in anal sphincters and 71% improvement in urinary sphincters at one year. **Conclusion:** Our clinical and neurological evaluation showed satisfactory outcome after surgery, particularly when performed before the onset of irreversible deficit. Neurological status prior to surgery has profound impact on the outcome. **Key words:** Tethered cord syndrome, lipomyelomeningocele, detethered, diastometomlyelia, spur, CTEV.

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INTRODUCTION

Tethered Cord Syndrome is a developmental anomaly of neuroaxis which poses a significant clinical problem. Garceau first described this term, filum terminale syndrome, in 1953.[1] Later Hoffman et al, called it tethered spinal cord[2] and Yamada et al attributed it as stretch induced functional disorder also due to anomalies other than tight filum terminale.[3] Due to relatively rapid growth of spine, as compared with the growth of spinal cord during neonatal period and childhood, a tethered cord can force the spinal cord to be stretched more than normal, which is exacerbated in flexion and extension leading to further stretching of the spinal cord.[4] Due to this difference in the rate of growth of spinal cord and musculoskeletal element, conus medularis may end at any level from D12 to the L2-3 inter space in adult.[5] In infants and children it ascends from L3 level. A cord below the L2/ L3 interspace is considered tethered in adults.[6] MRI is a preferred tool for confirming the diagnosis in patients with clinical features of tethered cord syndrome.[7] Tethered cord syndrome is related to neural tube impairment in the embryonic period and its pathophysiology remains unclear. When there is tethering, a series of metabolic disorders are associated with the phenomenon, such as hypoxia, decrease of cytochrome a3 and reduction of interneuornal potential in the spinal cord.[8]

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Yamada et al noted that metabolic disorders, particularly in the interneurons of the spinal cord, may be emerged followed by this impairment in oxidative metabolism. This event occurs in tethered cord syndrome due to the stretching of the spinal cord and may have irreversible drawbacks if not treated in advance.[9] Hilal and Keim demonstrated that tension on the conus caused arterial stretching and ischemia, with resultant cord damage.[10] The syndrome is not only limited to lumbosacral region, rare cases have been reported in the cervical and dorsal region.[11] Most cases with tethered cord are identified in patients with spinal dysraphism with bifida aperta such as myelomeningocele, meningocele and myeloschisis and cases with spina bifida occulta like lipomyelomeningocele, diastometomyelia, neuroenteric cyst or dermal sinus. The tethering may be due to thickened filum terminale, adhesions of neural tissue with dura and adherence of neuronal placode due to previous surgery. The tethering results in significant progressive neurological dysfunction in lower extremities and sphincter function, sensory loss in feet and perianal areas, back pain, orthopedic deformities like pes caves, claw toes and scoliosis. It may result in trophic ulcers. Early clinical and radiological diagnosis is necessary for early surgical measures for preservation of functioning neuronal tissue. MRI is preffered tool for diagnosing tethered cord syndrome in a patients having features of tethered cord syndrome.[7] It is fact that surgery can prevent the neurological deficits of the spinal cord and to some extent, may restore some of its functions.[12] Surgery is performed to release the tethering component. Many patients are having more than one pathology. Each one of these may be contributing to tethering of cord.

MATERIALS & METHODS

Forty consecutive patients were selected from OPD with clinical impression of tethered cord syndrome. These were investigated by MRI of relevant area. They were counselled for general anesthesia and surgery. Surgery was performed using microscope and neural tisse was detehered completely. Lipomeningoceles are associated with intradural and extradural components. Detethering is done with maximum debulking of adipose tissue and mega facial graft is used to reconstruct the dural sleeve so that lipomatous conus could float within the dural sleeve.

Follow up was done at the time of discharge, 6 months and 12 months.

RESULTS

Forty patients (M:F 5:3) were selected. Average age was 2.58 years (range 2 months---27 years). Average stay at hospital was 11 days (ranging from 6 to 19 days).

Table 1: Male to female distribution

Male	Female
25	15

Table 2: Clinical Features

Clinical Features	No of Patients
Sensory loss	21
Urinary control dysfunction	19
Anal sphincteric dysfunction	17
Average proximal power of LL	4/5
Average distal power of LL	3.5/5
CTEV deformity	19
Dermal sinus	4
Pain	2

Table 3: Causes of tethering

Causes	No of patients
Lipomeningocele	29
Diastometomyelia	4
Dural tethering	3
Dermal sinus	4
Filum terminale	3

Table 4: Patients were operated like

Operation	No of patients
Detethering of lipomatoous neural tissue	29
Excision of dermal sinus	4
Division of thickened filum terminale	3
Division of spur	4

Table 5: Improvement in sphincteric problem

Sphincter	No of patients at admission with dysfunction	No of patients Improved at 3months	No of patients improved at 12 months
Anal	17	10(58.82)	11(64.70)
urinary	21	13(61.19)	14(66.66)

Table 6: Power in lower limbs

	proximal	Distal
Average	4	3.54
Minimum	3	2
Maximum	5	5

DISCUSSION

The most common anomaly observed in this study was lipomyelomeningocele which was causing tethering in 29 patients. Lipomatous tissues were debulked maximally and proximal laminectomy or laminotomy was perfomed when needed. Mega dural graft was constructed.

In our study urinary dysfunction was present in 21 cases while anal sphincteric control dysfunction was present in 17 cases. Most of cases improved. Rajpal et al reported improvement in sphincteric function in 62%[13] while other study shows improvement in sphincteric dysfuction in 66.6% cases.[14] In our study there was improvement in 65% cases in anal sphincters and 71% in urinary control at 12 months follow up.

Our 13 patients had 5/5 power in lower limbs on Franklin scale. Twenty seven patients had weakness of lower limbs. Forty four percent patients improved to grade 5 and 37% were in grade 4. Only one did not improve. Daszkiewicz et al showed that meaningful improvement was obtained in 32.2% patients, rsmore pronounced in lower extremities than in sphincter.[15]

For the correction of CTEV, patients were referred to orthopedic department.

Our two patients had ages like 5 and 27 years. They had lipomatous tethering of cord. They had backache and lower limb pain. Postoperatively patients had improved pain in lower limbs. Rajpal et al reported improvement in back pain in 65 %[13] while other study shows improvement in back pain in 57.1%and leg pain in 100%.[14]

In our cases CSF collection, pseudomenigocele has occurred in 8 (20%)cases and CSF leakage in one patient while in another study pseudomeningocele has occurred in one (3.7 %) case and CSF leakage has occurred in 3 (11.1%) cases.[16] Putting a redivac drain in all patients with pseudomeningocele, improved the wound healing and patients with leakage had to undergo re enforcement with graft with no CSF related problem in follow up.Postoperative infection and retethering have been reported[17] but these complications were not present in our study. It may be due to smaller size of study sample.

The recommended surgical measures include laminectomy or laminotomy and spinal cord detethering. Recovery has close relation with the degree of neurological impairment prior to surgery. Also, prompt diagnosis and treatment has been associated with satisfactory outcome.[18]

CONCLUSION

Our clinical and neurological evaluation shows that there are satisfactory results with surgery, particularly when performed before the onset of irreversible deficit. Neurological status prior to surgery has profound impact on outcome of management.

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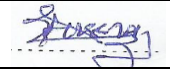
Dr. Nazar Hussain	1st Author	
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