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Tethered Spinal Cord in Adults: ten years experience of CHU BEO Algiers

Moelle basse fixée chez l'adulte : 10 ans d'expérience du CHU Bab El Oued Alger

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Abstract

Introduction: The Tethered spinal cord is a malformation that affects commonly children, adult cases are rare. It is the result of the spinal cord fixation by multiple pathologic entities
Materials and Methods: We conducted a ten years retrospective study from 2008 to 2018; thirteen out of 63 patients admitted with tethered spinal cord in neurosurgical department of BEO Algiers were adults . The Clinical, imaging and outcomes data were gathered and analyzed; Surgery involved arachnoids' dissection and the section of the filum ,use of neuro-stimulation and the treatment of associated lesions
Results: The most common sign was Sensitivo motor deficit in 8 patients which represented (61,53%)followed by sphincter dysfunction (46,15 %) and cutaneus stigmatae (46,15 %). we noticed orthopedic signs like feet deformations (38,45%) and scoliosis (15,38%). Back pain was the main complaint of 3 patients (23,07%).We investigated all our patients with lumbar spine MRI, the spinal cord was tethered by thick filum in 2 patients (15, 38%) and a lipoma in 6 patients (46, 15%). Some features associated with the tethered cord included diastematomyelia

in 3 patients (23, 07%), meningocele 3 patients (23, 07%), epidermoid cyst 2 patients (15, 38%).

Conclusion: Nowadays there is a possibility of diagnosis in asymptomatic patients since the advent of MRI; the surgery guided by neurostimulation stopped progression but sphincter dysfunction remained in half the cases. There are superior results in early diagnosis and treatment.

Keywords: Tethered, Malformation, Filum; spinal cord, Algeria

Résumé

Introduction: La moelle basse fixée est une malformation qui affecte habituellement les enfants; les cas adultes sont rarement décrits. Elle est le résultat d'une fixation du cordon médullaire par plusieurs entités pathologiques. Matériels et méthodes: Nous avons effectué une étude retrospective de 2008 à 2018, treize de nos soixante et trois patients admis pour moelle basse fixée étaient des adultes. Les résultats cliniques , radiologiques et les données de l'évolution sont analysées . La chirurgie consistait à la section du filum terminale l'utilisation de la neurostimulation et le traitement des lésions associées. Résultats: Le signe le plus fréquent était le deficit moteur pour 8 patients ce qui represente 61,15% suivi des

troubles sphinctériens (46,15%) et les stigmates cutanés (46,15%). Nous avons noté des signes orthopédiques comme les pieds bots (38,45%) et la scoliose (15,38%). Trois patients avaient comme signe principal des lombalgies (23, 07%). Nous avons réalisé une Imagerie par Résonance Magnétique (IRM) pour tous les patients; le cordon médullaire était attaché à un filum terminale épais chez deux patients (15,38%) et un lipome chez 6 patients (46,15%). Certaines lésions sont associées comme la diastématomyélie chez 3 patients (23, 07%), méningocele 3 patients (23, 07%), kystes épidermoïdes chez 2 patients (15,38%).

Conclusion: De nos jours, il est possible de poser le diagnostic sur des patients asymptomatiques avec l'avènement de l'IRM; la chirurgie guidée par la neurostimulation permet d'améliorer les signes cliniques mais les troubles sphinctériens persistent dans la moitié des cas.

Mots clés: Moelle basse, Filum , Malformation, Cordon médullaire, Algérie

Introduction

The Tethered spinal cord is a malformation that affects commonly children, adult cases are rare [1, 2]. It is the result of the spinal cord fixation by multiple pathologic entities.

To further clarify definitions and the TCS syndrome itself, SHOKEI YAMADA [3] propose 3 categories as follow:

Category 1 includes patients whose neurological symptomatology is correlated with the traction effect on the spinal cord above the tethering site and below the counteracting site, that is, usually at the lowest pair of dentate ligaments attached to the T12–L1 cord segments.

Category 2 includes patients with anomalies to the dorsal aspect of a higher cord level (between L-1 and S-1).

The symptomatology may be partly the manifestation of TCS and partly the result of local effects or the latter alone. Often, fibrous tissue associated with cord compression or ischemia and impaired cerebrospinal fluid circulation is responsible for local dysfunction.

Category 3 patients do not show signs and symptoms of TCS, although the spinal cord appears to be tethered.

Nowadays lumbar spine MRI is an important tool because it can show the level of fixation and associated malformations.

The pronostic depends on the time of spinal cord releasing even though there is an ongoing debate of whether asymptomatic patients with a tethered cord should be operated or not.

Materials and Methods

We conducted a ten years retrospective study from 2008 to 2018; thirteen_out of 63 patients admitted with tethered spinal cord in neurosurgical department of BEO Algiers were adults. All patient whose age was above 17 years is considered as an adult. Patients with progressive symptoms since childhood were excluded from this study. The median age of our patients is 28, 84 years-old with range 17 to 54 years. There were seven (7) females and six (6) males with sex ratio Female/Male 1, 16.

The mean time of disease progression is about 8 years and the mean follow up time after surgery is six (6) years. Surgery involved arachnoid dissection, the section of the filum and treatment of associated lesions, the use of neuro-stimulation is mandatory.

Results

The most common sign was Sensitivo motor deficit in 8 patients which represented (61, 53%) followed by sphincter dysfunction (46, 15 %) and cutaneus stigmatae (46, 15 %). we noticed orthopedic signs like feet deformations (38, 45%) and scoliosis (15, 38%). Back pain was the main complaint of 3 patients (23, 07%). We investigated all our patients with lumbar spine MRI, the spinal cord was tethered by thick filum in 2 patients (15, 38%) and a lipoma in 6 patients (46, 15%). Some features associated with the tethered cord included diastematomyelia in 3 patients (23, 07%), meningocele 3 patients (23, 07%), epidermoid cyst 2 patients (15, 38%).



Figure 1 : Pre operative MRI of the lumbar spine revealing a low-lying conus tethering at the L5-S1 level.



Figure 2 : Preoperative axial and sagittal T2-weighted lumbar MR images of the patient demonstrating a fatty filum and low-lying conus at the L5 S1 level

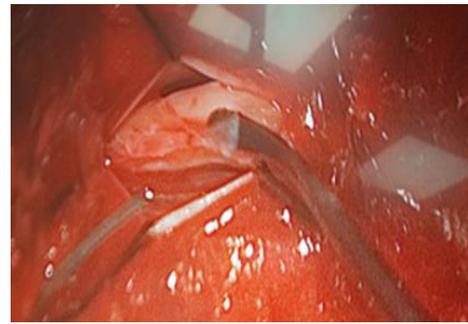


Figure 3: Intra operative image showing the thick filum terminale

A 41 years old man consulted for light leg pain and hypoesthesia, after the diagnosis of tethered spinal cord the patient refused the operation because he is afraid of neurologic outcomes of surgery. We operated 12 patients; the technique included releasing the spinal cord as well as the treatment of the eventual associated features (**Figure 4**).

Per op findings	Number	Surgery
Thick filum	2	untethered
Lipoma	6	untethered and resection of the lipoma
Epidermoid cyst	2	untethered and complete resection
Diastematomyelia	3	Excision of the eperon Cord releasing
Meningocele	3	untethered and resection of the meningocele

Figure 4: per operative findings and treatment

Eight 8 patients improved clinically (66, 66%), but 4(33, 33%) patients had no clinical change. The patient who refused surgery stayed at the same status after five years. We managed some

complications , CSF leaks was observed in 3 patients (25%), for two patients we managed with acetazolamide and daily dressing, the third one underwent reoperation to reinforce the suture of dura matter.

Discussion

The low conus is defined abnormal when situated below the inferior aspect of L2. The manifestation in adulthood is very rare.

An essential question here is why do patients develop signs and symptoms after having grown to become late teenagers and adults?

SHOKEI YAMADA believes that there are several reasons for this phenomenon.

The intrinsic factor: mitochondrial redox activity remains impaired in spinal cords after repeated episodes of forceful spinal flexion and extension that cause cord stretching.

The extrinsic factors (outside the spinal cord) include:

- 1) Increasing fibrosis of the filum, which leads to progressive loss of its viscoelasticity, thus resulting in progressively increasing tension within the lumbosacral cord above the threshold of its tolerance.
- 2) A typical growth spurt in late-teenage or early-adult patients, which could cause rapid increases in spinal cord tension (previously marginal to the development of TCS);
- 3) Increases in physical activity, such as running, gymnastics, or contact sports, which could produce stresses to the spine and spinal cord;
- 4) Osteoarthritic spinal stenosis, which restricts movement of the spinal cord and filum and may accentuate vertical tension within the spinal cord.

[3]

According to Pang and al [8] Specific circumstances involving either additional tugging of the already tight conus, narrowing of the spinal

canal, or direct trauma to the back or buttocks precipitated symptomatic onset in 60% of adult patients.

In our series we noticed a case of disc herniation and two cases of lumbar stenosis; those conditions are known to precipitate symptoms of TCS [9]

The clinical signs of TSC are nonspecific [2, 5].The most common sign is Sensitivo motor deficit in 8 patients which represent 61, 53% followed by sphincter dysfunction (46, 15 %) and cutaneus stigmat (46, 15 %). Back pain was the complaint of only 3 patients (23,07%) in our series but is the most common complaint in series reported by many authors [6,7], this can be explained by the fact that people in our environment seek medical attention at the time of deficit. The time of disease evolution progression is about many years so the late diagnosis is due to slow progression of the pathology. Conservative treatment is an option for asymptomatic patient like our patient who refused surgery; he did not get worse after five years of follow up. We used a lumbosacral laminectomy in all patients to explore the malformation and conduct the section of the filum and also to resect the associated features.

Open surgical detethering of the spinal cord can cause scar formation so the endoscopic unthetering could be an alternative Mehmet Sabri Gürbüz [4] supported that endoscopic technique has the advantages of reduced soft tissue injury, less postoperative pain, minimal blood loss, a smaller incision, and shorter hospitalization. Matthew B. Potts [12] present the use of a minimally invasive (mini-open) approach with an expandable tubular retractor in a small serie of 6 patients; so conclusions on advantages and disadvantages need a wider series on minimal invasive options. Some authors [3] reported vertebral column shortening to reduce tension on the spinal cord, nerve roots, and filum terminale for recurrent tethered spinal cord

The majority (66, 66%) of our patients improved which is the case of many published studies [1; 13]. In the literature [6; 10; 13.] The most common complication of surgical untethering is CSF leakage; this is the case of 25 % of our patients. If surgery is undisputed in the presence of neurological deficit and incontinence, late surgery does not seem to reverse spinal cord's vascular ischemia. Thus, management of asymptomatic TCS in adults remains controversial

GUPTA and al [7] suggested that surgery should be offered to all adult patients with TCS, once the diagnosis is established, even if the patient has no neurological deficit. However, surgery may have to be tailored depending upon the intraspinal pathology. In patients with intraspinal lipomas, especially transitional ones, total excision may not be warranted, as it may lead to an increase in neurological deficits

The issue of mechanical stretching of the spine due to trauma or specific postures (lithotomy position during childbirth) plays an important role in the development of new symptoms in asymptomatic patients.

Conclusion

Nowadays there is a possibility of diagnosis in asymptomatic patients since the advent of MRI; there are superior results in early diagnosis and surgery should be discussed at the first clinical sign. The surgery guided by neuro stimulation stopped progression of symptoms but sphincter dysfunction remained in half the cases. A larger prospective, randomized series is needed to determine the timing of surgery of TCS in adulthood.

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Conflicts of interest: No

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