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Case Report

"Pelvic floor and poliomyelitis. Case report"

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Abstract

Introduction: Living with polio increases the risk of having bladder dysfunction. Normal pelvic visceral function depends on the complex interactions of intact somatic and autonomic nervous systems. Tests that are used to investigate the integrity of the somatic innervation of the pelvic floor muscles and urinary and anal sphincters include electromyography (EMG), nerve conduction studies and the evaluation of the sacral reflexes.

Clinical Picture and Investigation: A 53-year-old South-American man who had a history of poliomyelitis which affected his lower right limb when he was 2 years old. Patient was unable to empty his bladder completely. The aim of this paper is to describe the correlation between pelvic floor dysfunction, bladder symptoms and neurophysiological tests in poliomyelitis.

Conclusion: Neurophysiological diagnostic procedures adopted in our study can discern the degree of central and peripheral nervous system damage and confirmed that pelvic floor and detrusor muscles have been paralyzed by the poliovirus.

Key words: Pelvic floor; Electrophysiologic evaluation; Poliomyelitis

Introduction

A number of diseases or injuries of the central or peripheral nervous system can result in alterations in pelvic visceral function. The response to poliovirus infection is highly variable and has been categorized on the basis of the severity of clinical presentation. Urinary problems in polio infection include retention, incomplete emptying of the bladder, incontinence, nicturia, and hesitancy. They may occur because the pelvic floor and bladder detrusor muscles have been paralyzed by the poliovirus [1].

A weak detrusor muscle may cause incomplete voiding, leaving residual urine-behind, consequently voiding becomes more frequent and overflow incontinence may occur. The autonomic symphathetic and parasympathetic nervous system that control body functions other than striated muscles, may be imbalanced (sympathetic preponderance) and give rise to difficulties in initiation of the voiding process. In order to understand the level and the extension of neurologic damage, a complete neurophysiological study of the pelvic floor is needed.

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Case report o Clinical series

In this study we have evaluated a patient admitted to the Spinal Unite of ICS Maugeri in the period between January 2014 and February 2014; he was subsequently re-evaluated in July 2017 to complete his diagnostic assessment of pelvic floor and urinary dysfunctions.

A 53-year-old South-American man, who had a history of poliomyelitis which affected his lower right limb when he was 2 years old, while his upper limb was not affected.

He presented post-polio residual deformities of the affectedlimb, consisting in a flexion-abduction contracture hip and flexion contracture knee. A subtalar arthrodesis was performed when the patient was 23 to correct the valgus deformity of right foot.

Physical examination revealed atrophy of his right lower limb muscles. There were fasciculations in the quadriceps muscle. The muscle tone was generally reduced. Further examination revealed weakness from myotome L3. Deep tendon reflexes were missing in right lower limb. Sensitivity to soft touch, temperature and pain was intact. Bladder function was impaired: although voiding was attempted by manual compression of the bladder, patient was unable to empty his bladder completely causing caused a significant post void residual volume; self-catheterization, performed four times a day, showed a significant post voiding residual volumes. Due to his urinary dysfunction, patient suffered recurrent urinary tract infection, which

increased episodes of involuntary leakage of urine.

There was no medical history of diabetes mellitus, thyroid disease or alcohol dependence. Magnetic resonance imaging (MRI) of the dorsal spine did not reveal any neurological compression of the cord or nerve roots. Urodynamic testing revealed detrusor underactivity, or underactive bladder (UAB). The renal scintigraphic investigation shows a glomerular, global and separate filtration function within the limits of the standard.

Needle Electromyography (EMG) of right transverse perineal muscle evidenced chronic denervation signs, while motor Evoked Potentials, (MEPs) of the sacral motor roots were bilaterally delayed, with the right latency significantly longer (8 msec) than left latency (5 msec).

Discussion

This study reports the results of various electrophysiological techniques applied to the evaluation of the afferent and efferent nerve pathways in the pelvic floor. The tests allow an evaluation of perineal somatic and visceral functions through the study of the pudendal nerve and its terminal branches.

The electrophysiological methods of the perineal plan, which are not routinely applied in clinical neurophysiology laboratories[2], are useful in functional analysis of the disorders of sphincteric function[3]. Neurophysiologic testing in the pelvis is different than testing performed elsewhere in the body due to the unique difficult –to get access to anatomical characteristics of the pelvis, as well as the special features of the pelvic floor and sphincter muscles.

In our study, Needle Electromyography (EMG) of right transverse perineal muscle showed clear chronic neurogenic changes in motor unit action potentials, without denervation activity at rest. EMG performed in the left transverse perineal muscle showed only mild chronic neurogenic changes. These findings are typical of patients diagnosed with chronic poliomyelitis and are not different from those we found in lower limb muscles (i.e. gastrocnemius medialis).

The EMG examination allows us to confirm the chronic phase of the disease excluding a post-polio recrudescence, which is a common cause of worsening of urinary impairment in polio survivors.

Interestingly, we also studied the muscle responses evoked in transverse perineal muscles by magnetic stimulation (Motor Evoked Potentials, MEPs) of the sacral motor roots. According to normal values used in our Unit, the sacral MEPs were bilaterally delayed, with the right latency significantly longer (8 msec) than left latency (5 msec). All these neurophysiological findings confirm a damage of motor path by poliovirus and they are compatible with a neurogenic weakness of pelvic floor muscles.

Motor Potential evoked was performed to investigate the efferent motor path. The stimulus is able to activate the pyramidal paths and sacral roots and is used to appreciate the changes of the total conduction time. This is determined by the sum of the central conduction time (cortico-medullary) and the peripheral conduction time (time of depolarization of the motor roots from the spinal canal to the sphincter). In addition to the motorways, sensitive conduction investigated by evoked potentials.

Recording of the somatosensory evoked potentials for electrical stimulation of the dorsal nerve of the penis (or clitoris) [4][5] and for anal stimulation [6] completes the ascending evaluation of the pathway to the primary somatosensory cortex and allows to define pathologies involving the peripheral nerve, the medulla, the dorsal columns or the superspinal central pathways [2].

The magnetic stimulation that has the characteristic of being painless and of being able to activate the cortical pyramidal pathway and sacral roots was attempted, in accordance with recent works [7, 8], to appreciate changes in central conduction time and peripheral conduction time.

Although there are many electrophysiological studies of the definition of normative values of the integrity of the central and peripheral pathways involved in the continence function, the specific notions about electrophysiological investigations on groups of patients suffering from urinary and fecal continence disorders are still very few [9,10].

Proper function of the lower urinary tract depends on the integrity of the central and peripheral nervous pathways on multiple levels, and the complexity of this system leaves it susceptible to even minor lesions. Neurophysiological studies of the pelvic floor provide useful informations about the extension of damage to the peripheral and central nervous system in subjects with poliomyelitis. Our case report describes the correlation between pelvic floor, bladder symptoms and neurophysiological tests.

Correlation between needle electromyography findings and motor evoked potential of the sacral roots reveals the same and typical damage of chronic poliomyelitis in perineal muscles: Exploration of Motor Unit via pelvic floor EMG, conduction study of terminal branches of Pudendal nerve by means of terminal motor latency, somatosensory evoked potentials of Pudendal nerve which explores afferent pathway and motor evoked potential of External Anal Sphincter for efferent pathway, sacral reflexes complete the diagnostic protocol.

Conclusions

The level of spinal cord damage can discriminate the evolution and type of bladder dysfunctions that must be quantified with specific investigations. Polio survivors may have a weak sphincter pelvic floor leading to stress incontinence or an imbalance in the autonomic nervous system giving rise to urge incontinence or difficulties in initiation of voiding.

Neurophysiological studies represent the required integration to morphological and functional assessment in sacral area dysfunction. By means of application of neurophysiological tests identifying site, type and degree of neurogenic lesion, the diagnosis of neurogenic alteration is allowed [2]. In our study, urinary disorders of patient where investigate through neurophysiological tests in order to underline a direct effect of primary polio infection on pelvic floor and detrusor muscles. Our findings reveal that pelvic floor and bladder detrusor muscles have been paralyzed due to a direct effect of the poliovirus. A complete and individual rehabilitation project of polio survivors should also include the evaluation and treatment of pelvic floor diseases.

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