-LESIONS ABOVE THE BRAINSTEM

-COMPLETE SPINAL CORD LESIONS:

FROM SPINAL CORD LEVEL T6 TO S2-LESIONS ABOVE THE T6

-TRAUMA OR DISEASE BELOW SPINAL CORD LEVEL S2

-INTERRUPTION OF PERIPHERAL REFLEX ARC

LESIONS ABOVE THE BRAIN STEM

Neurologic lesions above the brainstem (with rare excep-tions) that have an impact on micturition typically result in involuntary bladder contractions (detrusor overactivity) with coordinated sphincter function (smooth and striated sphincter synergy). Sensation and voluntary striated sphincter function are usually preserved, but sensation may be deficient or delayed. Detrusor areflexia may, however, occur, either initially or as a permanent dysfunction. Urinary incontinence may occur owing to the detrusor overactivity.

COMPLETE SPINAL CORD LESIONS FROM SPINAL CORD

LEVEL T6 TO S2:

After recovering from a period of spinal shock, patients with complete lesions of the spinal cord between spinal cord level T6 and S2 usually exhibit absent sensation, involuntary bladder contractions (detrusor overactivity), and smooth sphincter synergy, but striated sphincter dyssynergia. Incontinence may occur owing to detrusor overactivity; however, the outlet obstruction resulting from striated sphincter dyssynergy can also cause urinary retention and overflow incontinence

ABOVE THE T6:

In addition, patients with lesions above spinal cord level T6 may experience smooth sphincter dyssynergia and autonomic hyperreflexia. I

TRAUMA OR DISEASE BELOW SPINAL CORD LEVEL S2

Patients with significant nerve root trauma or injury or disease below spinal cord level S2 typically do not manifest involuntary bladder contractions. After the period of spinal shock resolves, persistent detrusor areflexia is the rule. Various forms of decreased compliance during filling (usually resulting from bladder wall fibrosis) may occur and will depend on the type and extent of neurologic insult. An open smooth sphincter area may result, but whether this is caused by sympathetic or parasympathetic decentralization or defunctionalization (or both or neither) has never been determined. Various types of striated sphincter dysfunction may occur, but commonly an injury in this area is associated with a residual resting sphincter tone (not the same as dys-synergia) and striated sphincter activity is not under voluntary control

INTERRUPTION OF PERIPHERAL REFLEX ARC

Processes that affect or interrupt the peripheral reflex arc (coordination among spine, bladder, and urethra) may cause storage or emptying dysfunctions that resemble those seen after distal spinal cord or nerve root injury. Detrusor areflexia often develops, and low compliance may result. The smooth sphincter may be relatively incompetent, and the striated sphincter may exhibit fixed residual tone that does not voluntarily relax. True peripheral neuropathy can be motor or sensory, and, at least initially, the usual sequelae can be expected

DISEASE AT OR ABOVE THE BRAINSTEM

Cerebrovascular Disease

Cerebrovascular Accident (Stroke)Cerebrovascular accident (CVA) is a common cause of death and one of the most common causes of disability in the world. CVA is the most devastating manifestation of cerebrovascular disease,

After an initial acute CVA, urinary retention from detrusor areflexia often occurs. The neurophysiology of this “cerebral shock” is unclear. After a variable degree of recovery from the neurologic lesion, a fixed deficit may become apparent over a few weeks or months. The most common long-term expression of LUT dys-function after CVA is phasic detrusor overactivity

Sensation is variable but most typically intact, and thus the patient has urinary urgency and frequency with detrusor overactivity

LOWER URINARY TRACT DYSFUNCTION AFTER CEREBROVASCULAR ACCIDENT

In the functional system of classification ,the most common type of LUT dysfunction after CVA would be characterized as a failure to store secondary to detrusor overactivity, specifically involuntary bladder contractions. In the International Continence Society (ICS) classification system, the dysfunction would most likely be classified as overactive neurogenic detrusor function, normal sensation, low capacity, normal compliance, and normal urethral closure function during storage; regarding voiding, the description would be normal detrusor activity and normal urethral function, assuming that no anatomic obstruction existed. Treatment, in the absence of coexisting significant bladder obstruction or significantly impaired contractility, is directed at decreasing bladder contractility and increasing bladder capacity (s

Dementia

Dementia is a poorly understood disease complex involving atrophy and the loss of both gray and white matter of the brain, especially in the frontal lobes, causing deficits with memory and the performance of tasks requiring intellectual mentation. Associated conditions include widespread vascular disease, Alzheimer disease, Pick disease, Creutzfeldt-Jakob disease, syphilis, heat trauma, and encephalitis.

BrainTumor

Disturbances of bladder function have been associated with both primary and metastatic brain tumors. When dysfunction results, it is related to the localized area involved rather than to the tumor type. The areas that are most frequently involved with associated micturition dysfunction are the superior aspects of the frontal lobe). When LUT dysfunction occurs, it usually consists of detrusor overactivity and urinary incontinence

Normal-PressureHydrocephalus

Normal-pressure hydrocephalus is a condition of progressive dementia and ataxia occurring in patients with normal cerebrospi-nal fluid pressure and distended cerebral ventricles, but with no passage of air over the cerebral convexities on pneumoencephalog-raphy (Blaivas, 1985). When voiding dysfunction occurs, it is usually incontinence secondary to detrusor overactivity with syner-gic sphincters.

Cerebral Palsy

Cerebral palsy (CP) is a nonprogressive injury of the brain that typically occurs during the first year of life (but potentially up to 3 years of age) and produces neuromuscular disability and/or specific symptom complexes of cerebral dysfunction. In general, the cause is infection or a period of hypoxia. Affected children exhibit delayed gross motor development, abnormal motor performance, altered muscle tone, abnormal posture, and exaggerated reflexes. Most chil-dren and adults with only CP have urinary control and what seems to be normal storage and emptying.

Parkinson Disease

Parkinson disease (PD) is a neurodegenerative disorder of unknown cause that affects primarily the dopaminergic neurons of the sub-stantia nigra but also heterogeneous populations of neurons in other locations (Lang and Lozano, 1998). The most important site of pathology is the substantia nigra pars compacta, the origin of the dopaminergic nigrostriatal tract to the caudate nucleus and putamen. Dopamine deficiency in the nigrostriatal pathway accounts for most of the classic clinical motor features of PD, a symptom complex referred to as parkinsonism, the major signs of which are tremor, skeletal rigidity, and bradykinesia.

Spinal Shock

A period of “spinal shock” may be expected after a significant SCI, defined as decreased excitability of spinal cord segments at and below the level of the lesion. There is absent somatic reflex activity and flaccid muscle paralysis below this level. Although classic teaching refers to generalized areflexia below the level of the lesion for days to months, confirm that the most peripheral somatic reflexes of the sacral cord segments (the anal and bulbocavernosus reflexes) may never disappear or, if they do, may return within minutes or hours of the injury. However, functions proximal to the level of the injury may be depressed as well .Spinal shock includes a suppression of autonomic activity as well as somatic activity, and the bladder is acontractile and are-flexic. Radiologically, the bladder has a smooth contour with no evidence of trabeculation. The bladder neck is usually closed and competent,

that first affects sensory afferent pathways, causing the insidi-ous onset of impaired bladder sensation. As the classic description continues, a gradual increase in the time interval between voiding results, which may progress to the point at which the patient voids only once or twice a day without ever sensing any real urgency. If this continues, detrusor distention, overdistention, and decompensation ultimately occur. Detrusor contractility, therefore, is classically described as being decreased in the end-stage diabetic bladder. More recently, however, detrusor overactivity has been cited as the most frequent urodynamic finding.

MANAGEMENT OF PATIENTS WITH SACRAL CORD INJURY

Potential risk factors and complications are those previously described, with particular emphasis on storage pressure, which can result in silent upper tract decompensation and deterioration in the absence of VUR. The treatment of such a patient is usually directed toward producing or maintaining low pressure storage while circumventing emptying failure with CIC when possible. Pharmacologic and electrical stimulation may be useful in promoting emptying in certain circumstances