W6: Autonomic Dysreflexia (AD): a serious, rather underestimated condition

Workshop Chair: Charalampos Konstantinidis, Greece
03 September 2019 10:00 - 11:00

Start	End	Topic	Speakers
10:00	10:15	Cardiovascular system and autonomic function	Pierre Denys
10:15	10:25	Pathophysiology of Autonomic Dysreflexia	Giulio Del Popolo
10:25	10:35	Iatrogenic Autonomic Dysreflexia	Charalampos Konstantinidis
10:35	10:50	Prevention - Treatment and awareness programs	Christina-Anastasia Rapidi
10:50	11:00	Questions	All

Aims of Workshop

Autonomic Dysreflexia (AD) is a common complication among patients with Spinal Cord Lesion (SCL) located above the T6 level. Various stimuli below the spinal cord lesion may initiate the onset of AD. In most cases, the phenomenon subsides after the removal of the initial stimuli but sometimes is rapidly reactivated and progressive overexpressed causing uncontrolled blood hypertension with the severe danger of stroke or other cardiovascular accidents (CVAs).

The establishment of adequate awareness among the health care providers and the individuals with SCL is our main goal which may occur by the deep understanding of the pathophysiology of AD. The proper prevention and management of the syndrome are essential for our patient's life.

Learning Objectives

Understanding the pathophysiology of Autonomic Dysreflexia (AD)
Recognizing the signs and symptoms of an AD episode.
How to manage AD episodes.
How to assess AD episodes and educate patients with SCL.

Target Audience

Rehabilitation team working with patients with spinal cord injury, physicians and therapists.

Advanced/Basic

Intermediate

Suggested Learning before Workshop Attendance

2001, Consortium for Clinical Practice Guidelines for Acute management of AD, by Paralyzed Veterans of America.
http://www.isaarsci.ir/internetscifolder/Acute%20Management%20of%20Autanamic%20Dysreflexia.PDF

"Cardiovascular system and autonomic function"

Prof. Pierre Denys, *PRM physician, France*
Chairman of Neuro urology Unit, Hospital Raymond Poincaré APHP, Université de Versailles Saint Quentin
UMR 1179, Paris, France
Member of Neuro-Urology Promotion Committee of ICS

The cardiovascular system is under the control of a complex regulation by the autonomic system. Heart receive innervation from both parasympathetic and sympathetic system and blood vessels receive predominantly sympathetic innervation. This regulation is not under the control of volition. Cardiac muscle has an automatic function that permits to have a rhythmic contraction. Both sinoatrial and atrioventricular nodes are responsible for this rhythmic automatic activity. But in another hand sympathetic and parasympathetic system can modulate, contractility of the cardiac muscle, frequency of heart rate in order to adapt the cardiac activity to various behaviors such as standing, physical activity, or sleeping. Sympathetic nervous stimulation increase rhythm cardiac and vascular contractility leading to an increase in blood pressure. Parasympathetic stimulation decrease heart rate and cardiomyocytes contractility with limited peripheral vascular effect except in some specific regions (brain, genitals).

This complex regulation involves multiple sites of the central and peripheral nervous system and various reflexes. Neurological disorders and spinal cord injury may modify cardiovascular regulation that is severe enough to increase the risk of cardiac arrest, rhythmic abnormalities, hypotension or Autonomic Dysreflexia (AD).

Cardiovascular dysregulation is an important topic to understand and to consider for all physicians in charge of such patients. Depending on the level and the extent of the lesion the type and severity of cardiovascular symptoms are predictable and accessible to treatment and prevention.

"Pathophysiology of Autonomic Dysreflexia"

Prof. Giulio Del Popolo, *Urologist, Italy*
Head of Department of Neuro-Urology & Spinal Unit, Careggi University Hospital, Florence, Italy
Member of Neuro-Urology Promotion Committee of ICS

Autonomic dysreflexia (AD) is a clinical event which can be potentially a life-threatening medical emergency. It occurs mainly as a consequence of uncontrolled sympathetic activity in patients with spinal cord lesion (SCL) at or above T6 due to stimuli under the lesion level, from the bladder, bowel or any others from the sub-lesioned body. The autonomic response is reflex bradycardia and vasodilatation which can only occur in areas which are under suprapontine control above the lesion. Symptoms are characterized by acute severe paroxysmal hypertension associated with throbbing headaches, profuse sweating, nasal stuffiness, flushing of the skin above the level of the lesion, bradycardia, apprehension, and anxiety, sometimes with cognitive impairments. On the other hand, signs, and symptoms of AD sometimes may be minimal or absent despite significant hypertension. This may lead to underestimate AD and delay the appropriate management. The vasodilation induces headache, red skin of the face and superior thorax and can lead to cerebral oedema and, in severe cases, also to death. Patients showing AD may develop verbal or cognitive impairments as an acute consequence of the cerebral effects. This inadequate patient's communication for temporary cognitive deficits can lead to a delay in diagnosis and treatment of AD. Awareness of this condition is consequently of paramount importance to all emergency department staff, careers of spinal cord-injured patients, urologists, and patients themselves.

AD occurs in up to 85% of patients with SCI. A study of 48 patients with SCI level above T6 undergoing urodynamics reported significantly elevated systolic and diastolic blood pressure (BP) on bladder filling, although only 20 had a BP rise above 150/100 mmHg. This was observed more frequently in patients with cervical injuries compared with lower lesions. Other authors have similarly reported a higher incidence of AD with cervical spine injuries (60%) compared with the thoracic spine (20%); in addition, the incidence of AD in women with spinal injuries has been reported by the same authors as 60%, whereas 46% of men are affected. AD has been reported in both complete and incomplete lesions of the spinal cord, although incomplete spinal lesions show milder forms of AD. It's useful to monitor the blood pressure during urodynamic evaluation to understand the impact of bladder filling to provoke AD. The AD attacks are often provoked by urological invasive investigations and treatments. All professional figures involved to the management and treatment of spinal cord injured patients should know the existence of this severe complication, aware of the risk and be prepared to properly prevent and promptly treat an AD attack.

"Iatrogenic Autonomic Dysreflexia"

Dr. Charalampos Konstantinidis, *Urologist, Greece*
Head of Urology and Neuro-urology Unit, National Rehabilitation Center, Athens, Greece
Member of Neuro-Urology Promotion Committee of ICS

Urological procedures and bowel investigations or evacuation management can cause Autonomic Dysreflexia (AD) in individuals who are candidates for AD.

Already in 1996 Linsenmeyer et al. found urodynamics as an excellent tool in detecting both symptomatic and silent AD in men with SCI above T6 [1]. Research activities in the last years yielded important new insights about the frequency and severity of AD triggered by diagnostic and therapeutic interventions in the LUT and in the bowels such as urodynamics, cystoscopy, transurethral lithotripsy, ESWL, sperm retrieval, bowel evacuation by digital rectal stimulation, and transanal irrigation. The incidence of AD varies mainly according to the density of receptors stimulated. The receptor density is high in the area of the bladder neck, prostate, and posterior urethra and in the anal canal, but less in the bladder and the colon. AD is reported with urodynamics in-between 45-78%, with cystoscopy in 80% in cervical and less frequent, in 24-77% resp. 10-40%, in thoracic lesions above T6.

As urodynamics are performed more often than cystoscopies in SCI patients, they are an important screening tool for AD. Curt et al. (1997) reported that urodynamic examination may be an effective and standardized diagnostic procedure for provoking signs of AD [2]. In their study only half of the patients, who showed signs of AD during an examination, presented also with clinical symptoms, the other half had “silent” AD, only diagnosed at the basis of systolic blood pressure (sBP) increase. Therefore, cardiovascular monitoring is mandatory to detect AD using urodynamics as a screening test.

The increase in sBP was also used to compare the severity of AD between urodynamics and cystoscopy. The sBP change was greater during cystoscopy than in urodynamics, indicating that stimulation of the bladder neck, urethra, and prostate area is more potent than just bladder filling. On the other side, if urodynamics cause a severe increase in sBP, the risk for AD in other situations is high.

Bowel management may cause AD, as well. The increase in sBP is low with transanal irrigation compared to evacuation by digital rectal assistance in which the increase in sBP is comparable to that with cystoscopy [3]. As the 60-70% of SCI patients use digital anorectal stimulation for bowel evacuation, at least those with significant AD should use transanal irrigation instead [4].
The occurrence of AD episodes in connection with diagnostic and therapeutic procedures in the LUT and in the bowels can be used as an excellent tool in detecting both symptomatic and silent AD in patients with SCI above T6. Recent studies in this field allow nowadays better interpretation of these findings regarding the risk for AD, thus also counseling of the patient is improved.

References

1. Linsenmeyer TA, Campagnolo DI, Chou IH. Silent autonomic dysreflexia during voiding in men with spinal cord injuries. J Urol. 1996 Feb;155(2):519-22.
2. Curt A, Nitsche B, Rodic B, Schurch B, Dietz V. Assessment of autonomic dysreflexia in patients with spinal cord injury. J Neurol Neurosurg Psychiatry. 1997 May; 62(5):473-7.
3. Faaborg PM, Christensen P, Krassioukov A, Laurberg S, Frandsen E, Krogh K5. Autonomic dysreflexia during bowel evacuation procedures and bladder filling in subjects with spinal cord injury. Spinal Cord. 2014 Jun;52(6):494-8.
4. Liu N, Zhou M, Biering-Sørensen F, Krassioukov AV. Iatrogenic urological triggers of autonomic dysreflexia: a systematic review. Spinal Cord. 2015 Jul;53(7):500-9.

“Prevention, treatment and awareness programs”

Dr. Christina-Anastasia Rapidi, *PRM Physician, Greece*
PRM Department, General Hospital "G.Gennimatas", Athens, Greece
Golden member of ICS

Autonomic Dysreflexia (AD) is a consequence of spinal cord injury (SCI) above T6 neurotome and usually is within the range of maladaptive neuroplasticity. AD is a syndrome unknown to many physicians, nurses, and other healthcare professionals, not specialized in SCI. Persons with SCI, even with high SCI, in danger to present AD episodes, are not always familiar with symptoms and management of AD. Family and caregivers may also be unaware of AD.

Recognizing AD and the underlying cause is mandatory. Delayed diagnosis of an AD episode either by the person with SCI, family, caregivers or by health professionals may lead to serious life-threatening side-effects. Early diagnosis and prompt treatment of an AD episode is important in order to minimize side-effects.

Prevention of AD episodes is the best treatment, this can be achieved by education and awareness on AD, and adequate management of usual triggering causes i.e. neurogenic bladder & bowel dysfunction, skin lesion, etc.

Mild symptoms of an AD episode which is just starting may have sometimes, a functional use i.e. to a person with complete tetraplegia and no bladder sensation. AD could be the awareness of bladder filling, informing the person to empty the bladder.

Lack of knowledge concerning AD, leads to delayed or inappropriate treatment of persons with SCI attending general hospitals under emergency circumstances. According to different triage systems in emergency departments, patients presenting urine retention, the most common reason leading to AD, are categorized to a group which denotes that the ideal maximum time to first contact with the clinician will be up to 60min (according to the Manchester Triage System this is the yellow group). An AD episode is not just "urgent" but "very urgent". Patients with SCI and AD may be stable on arrival and this may be misleading. Around 40% of high-risk for AD persons with SCI, and 40% of health staff at emergency departments have no knowledge of AD. There is a need to improve knowledge and management of AD among healthcare professionals, patients, family members, and caregivers.

A series of strategies may contribute to improve knowledge, prevention and management of AD:

- Patients', family members' and caregivers' structured education concerning AD during rehabilitation and during follow-up by the rehabilitation team.
- Seminars on AD targeting healthcare professionals, not specialized in SCI, in general hospitals, and in the community.
- Use of supporting material with information on AD:
    - Printed leaflets for clinicians and consumers
    - Printed posters for health departments
    - Videos
    - Internet
- Use of a medical emergency AD card. This card is carried by persons with SCI and AD and has information on a short summary of causes, diagnosis, symptoms, signs and management of AD.
- Adequate follow-up post SCI with appropriate bladder and bowel routine, pressure ulcer prevention, and identification and management of specific triggers for AD.

References

1. McGillivray CF, Hitzig SL, Craven BC, Tonack MI, Krassioukov AV. Evaluating knowledge of autonomic dysreflexia among individuals with spinal cord injury and their families. J Spinal Cord Med. 2009;32(1):54–62.
2. Jackson CR, Acland R. Knowledge of autonomic dysreflexia in the emergency department. Emerg Med J. 2011 Oct;28(10):866-9.
3. Previnaire JG, Soler JM, Leclercq V, Denys P. Severity of autonomic dysfunction in patients with complete spinal cord injury. Clin Auton Res. 2012 Feb;22(1):9-15.