W22: Autonomic Dysreflexia (AD): a serious, rather underestimated condition

Workshop Chair: Charalampos Konstantinidis, Greece
19 September 2025 16:00 - 17:30

Start	End	Topic	Speakers
16:00	16:20	Cardiovascular system and autonomic function	Pierre Denys
16:20	16:35	Pathophysiology of Autonomic Dysreflexia	Michael Joseph Kennelly
16:35	17:50	Iatrogenic Autonomic Dysreflexia	Charalampos Konstantinidis
16:50	17:10	Prevention - Treatment and awareness programs	Andrei Krassioukov
17:10	17:30	Questions	All

Description

Background information

The cardiovascular system is under the control of a complex regulation by the autonomic system. The Heart receives innervation from both the parasympathetic and sympathetic system and blood vessels receive predominantly sympathetic innervation. This regulation is not under the control of our volition. The 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. On the other hand, sympathetic and parasympathetic systems can modulate, the contractility of the cardiac muscle, and the frequency of heart rate to adapt the cardiac activity to various behaviours such as standing, physical activity, or sleeping. Sympathetic nervous stimulation increases rhythm and cardiac and vascular contractility leading to an increase in blood pressure. Parasympathetic stimulation decreases heart rate and cardiomyocyte 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.

Key learning points

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 lesions (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 underestimating 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 communication for temporary cognitive deficits can lead to a delay in the 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 above T6 level 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 in the management and treatment of spinal cord injured patients should know the existence of this severe complication, be aware of the risk and be prepared to properly prevent and promptly treat an AD attack.

Urological procedures and bowel investigations or evacuation management can cause AD in individuals who are candidates for AD. Already in 1996, Linsenmeyer et al. found urodynamics as an excellent tool for detecting both symptomatic and silent AD in men with SCI above T6. 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 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. 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 based on 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 causes 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. As 60-70% of SCI patients use digital anorectal stimulation for bowel evacuation, at least those with significant AD should use transanal irrigation instead.
The occurrence of AD episodes in connection with diagnostic and therapeutic procedures in the LUT and 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 counselling of the patient is improved.
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 lesions, 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 into 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 AD high-risk SCI individuals and 40% of health staff at emergency departments do not know 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 improving knowledge, prevention and management of AD:

- Structured education by the rehabilitation team in patients, family members and caregivers concerning AD during rehabilitation and follow-up.
- Seminars on AD targeting healthcare professionals, not specialized in SCI, in general hospitals, and the community.
- Use of supporting material with information on AD, such as printed leaflets for clinicians and consumers, printed posters for health departments, relative videos and websites
- Use of a medical emergency AD card. This card is carried by persons with SCI and AD and has information on a 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.

Take home messages

- AD is a common complication among patients with Spinal Cord Lesions (SCL) located above the T6 level. Noxious or even not noxious stimuli below the spinal cord lesion may initiate the onset of AD. The syndrome is not well known among physicians and other healthcare professionals unless they are working in a spinal cord unit.
- Individuals (with SCL), are not institutionalized or hospitalized, they stay at home and may contact any healthcare unit for any medical reason. Physicians, nurses, and other therapists who deal with incontinence are likely they be asked to manage these patients with paraplegia or tetraplegia. A deep knowledge of AD is essential for early detection, adequate treatment and sometimes even for the life support of these patients.
- Simple urologic procedures such as urodynamics, cystoscopy or sperm retrieval by vibration may lead to uncontrolled AD episodes. The awareness of the syndrome is crucial for the prevention, early detection, and proper management of AD.
- The establishment of adequate awareness among the health care providers and individuals with SCL is our main goal which may occur by a deep understanding of the pathophysiology of AD. The proper prevention and management of the syndrome are essential for our patient’s life.

References

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Aims of Workshop

Autonomic Dysreflexia (AD) is a common complication among patients with Spinal Cord Lesions (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 removing the initial stimuli. Still, it sometimes is rapidly reactivated and progressively 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 individuals with SCL is our main goal which may occur by a deep understanding of the pathophysiology of AD. The proper prevention and management of the syndrome are essential for our patient's life.

Educational Objectives

After a short presentation of the faculty, the workshop will start with an update on the cardiovascular system and autonomic function by Pierre Denys (20 min). The next speaker (Michael Kennelly) will explain the Pathophysiology of Autonomic Dysreflexia (in 15 minutes). After that, we will focus on Iatrogenic Autonomic Dysreflexia (delivered by Charalampos Konstantinidis) for 15 minutes, highlighting the awareness that physicians have to develop during medical interventions. The last lecture (by Andrei Krassioukov) will deal with the Prevention - Treatment and awareness programs among healthcare providers and individuals with SCI (for 20 minutes). The workshop will end with questions, discussion and additional remarks from audience and faculty interaction for 20 minutes.

Learning Objectives

1. Understanding the pathophysiology of Autonomic Dysreflexia (AD)
2. Awareness establishment regarding iatrogenic Autonomic Dysreflexia (AD)
3. Prevention and management of Autonomic Dysreflexia (AD) episodes

Target Audience

Urology, Bowel Dysfunction, Pure and Applied Science, Conservative Management

Advanced/Basic

Intermediate

Suggested Learning before Workshop Attendance

ISCoS International SCI Data Sets: Autonomic Dysreflexia Extended Data Set Data Set Version 1.0
https://www.iscos.org.uk/resource/resmgr/autonomic_dysreflexia_extended_data_set/2023-09-27_International_SCI.pdf