

What is autonomic dysreflexia?

Autonomic dysreflexia (AD) is a potentially life-threatening blood pressure spike that can lead to a hypertensive emergency affecting people with spinal cord injury (SCI) *at the level of T6 or above* (sometimes as low as T8, though rare). Sympathetic neurons within the mid thoracic spinal cord segments control a large group of blood vessels that supply the lower body and many abdominal organs, such as the stomach and intestines. Therefore, higher levels of SCI (T6 and above), as well as complete injuries rather than incomplete, are more likely to lead to the development of AD ([Krassioukov et al. 2003](#); [Curt et al. 1997](#); [Mathias & Frankel 1988](#)).

AD is a medical emergency that requires an immediate response. It occurs more often in the chronic phase of SCI, but can happen in the first few months after injury as well. Episodes of autonomic dysreflexia are usually brief and have an identifiable trigger ([Teasell et al. 2000](#); [Karlsson, 1999](#); [Mathias & Frankel 1988](#); [Elliott & Krassioukov 2006](#)).

What are the signs and symptoms of autonomic dysreflexia?

The main sign of autonomic dysreflexia is a sudden rise in blood pressure. An increase of 20 to 30 mmHg above your patient's normal *systolic blood pressure* is considered to indicate autonomic dysreflexia. Since the normal blood pressure of a person with SCI is often 15 to 20 mmHg lower than a person without an SCI, blood pressure can be in the range of 'normal' or 'slightly elevated' and still indicate an episode of AD.

This rise in blood pressure is usually accompanied by other symptoms, which can range from not feeling anything or having mild discomfort and a headache, to a life-threatening emergency where symptoms can be severe. It is important for patients and clinicians to be able to recognize the symptoms of AD so they can act accordingly. Clinicians should also be aware that in some people with SCI, AD could occur without any symptoms, a condition known as a silent or asymptomatic AD ([Ekland et al. 2008](#); [Linsenmeyer et al. 1996](#)).

Signs and symptoms of autonomic dysreflexia:

- Sudden rise in blood pressure of 20 to 30 mmHg above the person's normal systolic blood pressure (main symptom)
- Change in heart rate – usually a slow heart rate which can sometimes become rapid or irregular
- Pounding or throbbing headache
- Profuse sweating, flushing or blotching of the skin above the level of injury
- Goosebumps or hair standing on end above the level of injury
- Dry and pale skin below the level of injury
- Increased number and severity of muscle spasms
- Metallic taste in the mouth
- Feeling anxious or a feeling of impending doom
- Nasal congestion
- Blurred vision
- Seeing spots
- Nausea
- Difficulty breathing or a feeling of chest tightness

Why does autonomic dysreflexia happen?

AD is the result of sympathetic nervous system overactivity in response to a strong sensory stimulus below the level of injury. This stimulus is often something that is noxious or irritating, such as a wound or tight clothing, but it can also be a normal bodily function, most commonly an overly full bladder or bowel. In response to the stimulus, the sympathetic nervous system signals the arteries to constrict, which increases blood pressure. This increase in blood pressure is followed by reflexive a slowing of the heart rate which can then become irregular. Because of the damage to the spinal cord, the body can not effectively control the blood pressure and restore it to normal levels, resulting in AD.

Triggers of autonomic dysreflexia

Bladder issues

- Urinary tract infection
- Urinary retention
- Blocked catheter
- Overfilled collection bag

Skin issues

- Pressure ulcers
- Extreme heat or cold
- Pressure or pinching of the skin
- Ingrown toenails
- Burns
- Tight clothing
- Any direct irritant below the level of the injury

Bowel issues

- Distention or irritation of the bowel
- Constipation or impaction of the bowel
- Hemorrhoids
- Infection or irritation of the bowel

Sexual activity and reproductive processes

- Overstimulation
- Reproductive activity
- Menstrual cramping
- Labor and delivery

Other causes

- Heterotopic ossification
- Acute abdominal conditions (such as ulcers)
- Fractures

What should I do if my patient has an episode of Autonomic Dysreflexia?

AD is a medical emergency and requires immediate treatment. The most effective treatment strategy is to identify the trigger of the episode and reduce the stimulation that is causing it. The goal of intervention is to alleviate symptoms and avoid the complications associated with uncontrolled hypertension ([Vallès et al. 2005](#); [Eltorai et al. 1992](#); [Pine et al. 1991](#); [Yarkony et al. 1986](#)).

If the conservative treatments for AD are not effective in reducing blood pressure and it remains at or above 150 mmHg, drug treatments are used. This involves the use of fast-acting anti-hypertensive drugs to rapidly lower the elevated blood pressure.

Which prevention methods are effective?

Preventing an AD episode is far more effective than treating one ([Braddom & Rocco 1991](#)). Researchers have done studies on various treatments to determine which are helpful in preventing incidents of AD ([Courtois et al. 2012](#); [Krassioukov et al. 2009](#)).

Capsaicin: Studies have shown that administering the chemical compound, Capsaicin, and its more concentrated cousin, Resiniferatoxin, into the bladder by a catheter can decrease the incidence AD during bladder procedures ([Igawa et al. 2003](#); [Kim et al. 2003](#); [Giannantoni et al. 2002](#)).

Surgical bladder augmentation: Some early evidence suggests that surgery to augment the bladder may also reduce or resolve episodes of AD (Ke & Kuo, 2010; [Perkash, 2007](#); [Sidi et al. 1990](#); [Barton et al. 1986](#)).

Sacral denervation: Sacral deafferentation surgery may reduce bladder-related episodes of AD ([Hohenfellner et al. 2001](#); [Kutzenberger, 2007](#)).

Botulinum toxin: Two studies have demonstrated that injections of Botulinum toxin into the muscles of the bladder is effective in reducing episodes of AD ([Walter et al. 2020](#); [Huang et al. 2024](#)), which is supported by previous findings ([Chen & Kuo 2012](#); [Chen et al. 2008](#); [Kuo, 2008](#); [Schurch et al. 2000](#); [Dykstra et al. 1988](#)).

Anticholinergic and antimuscarinic medications: The use of anticholinergic medications does not appear to be effective in preventing AD during bladder procedures ([Giannantoni et al. 1998](#)). One study ([Walter et al. 2023](#)) supported the effectiveness of antimuscarinics, specifically fesoterodine, in reducing the frequency and severity of AD episodes.

What to do if your patient has autonomic dysreflexia

1. Move patient into an upright sitting position
2. Check blood pressure, and re-check every 5 minutes
3. Loosen tight clothing
4. Search for and eliminate the cause of the incident where one can be identified
 - a. Check bladder
 - b. Check bowel
 - c. Check skin
5. Seek medical attention if there is no reduction in blood pressure after following these steps

Source: [Consortium for Spinal Cord Medicine, 2001](#)

Lidocaine: A lidocaine anal block has been found to limit the AD response in patients undergoing anorectal procedures ([Cosman & Vu 2005](#)). Topical lidocaine may prevent AD during digital bowel stimulation, but not during anorectal procedures ([Furusawa et al. 2009](#); [Cosman et al. 2002](#)). Intravesical lidocaine may reduce the incidence and severity of AD during catheter change ([Solinsky & Linsenmeyer 2018](#)).

Anesthesia for use during pregnancy and labour: Studies have found that the use of adequate anesthesia (spinal or epidural if possible) is needed with vaginal, Caesarean, or instrumental delivery to prevent AD during labour. Epidural anesthesia is preferred and effective for most women with SCI ([Skowronski & Hartman 2008](#); [Cross et al. 1992](#); [Cross et al. 1991](#); [Hughes et al. 1991](#)).

Anesthesia for use during general surgery: Anesthesia should be used during surgery for people with SCI despite the apparent lack of sensation to prevent AD. Anesthesiologists and surgeons working with patients with SCI need to be able to recognize, prevent, and manage AD ([Eltorai et al. 1997](#); [Lambert et al. 1982](#)).

Topical anesthesia during functional electrical stimulation (FES) treatment: Studies have found that the application of topical anesthesia is not effective in preventing AD during FES treatment. More research is required to understand how to prevent AD during FES ([Matthews et al. 1997](#)).

Stoma surgery: There is preliminary evidence that stoma surgery may reduce the number of incidents of autonomic dysreflexia, if other treatments have failed to improve management of neurogenic bowel ([Coggrave et al. 2012](#)).

Where can I find more information?

For more information, please click through the rest of the Autonomic Dysreflexia chapter (<https://scireproject.com/evidence/autonomic-dysreflexia/introduction/>), refer to the PVA guidelines ([Krassioukov et al. 2021](#); <https://pva.org/research-resources/publications/clinical-practice-guidelines/>) and consult a physician who specializes in SCI and/or Cardiovascular issues.