CHAPTER 4  Autonomic Nervous System

**Autonomic Dysreflexia**

**What is Dysreflexia?**

Autonomic dysreflexia (or hyperreflexia) is a complication which occurs in people with spinal cord injuries at or above the level of T6 (or rarely as low as T8). In other words, it can occur in all persons with tetraplegia and in those with paraplegia who have loss of sensation at or above the lower rib cage. Complete and incomplete injuries are usually susceptible as well. It apparently does not occur in any condition other than spinal cord injury (SCI), therefore most General Practitioners may require information regarding management.

**When Does Dysreflexia Begin?**

Episodes of dysreflexia will usually begin within four to six months after SCI but may be as early as two months or as late as 10 to 12 years.

**What Causes It?**

A triggering stimulus (for example, the messages sent by an over stretched bladder) initiates excessive reflex activity of the autonomic nervous system. Normally messages from the brain act to dampen down these reflexes. After a spinal cord injury, the reflexes are not dampened and therefore the actions of the autonomic nervous system cause the blood vessels to contract and the blood pressure to rise rapidly. In response to this increased blood pressure, the body usually slows the heart and dilates the blood vessels above the level of the injury.
If it is not treated, then the blood pressure can rise to dangerously high levels, possibly resulting in seizures, bleeding in the brain (i.e. a stroke) or cardiac arrest (when the heart stops beating).

**Common Causes**

- **Urinary:** The most common cause is increased pressure in the bladder due to overfilling with catheter blockage or bladder spasms. It may also be caused by inserting or irrigating a catheter and urological procedures such as cystoscopy, urodynamics, etc.

- **Bowel:** The second most common cause is rectal distension due to constipation. Other causes include inserting a suppository, gas, ‘bloating’, doing a rectal examination, digital stimulation for bowel movement, impaction, enema, etc.

- **Skin:** Anything below the level of the SCI that would be painful (if it could be felt) can trigger dysreflexia, including pressure sores, staying too long in one position, ingrown toenails, burns, etc.

- **Less Common Causes:** Tight clothing or shoes, tight leg bag straps, broken bones, ejaculation, uterine contractions associated with menstrual cramps, labour or delivery, excessive heat or cold.

**How Often Does Dysreflexia Occur?**

The frequency varies widely, from several times a day to once in several years. Some individuals seem to be very sensitive and every minor stimulus triggers dysreflexia. Others may only have dysreflexia with a major stimulus, such as a markedly over filled...
bladder. Since the first episode can occur many years after the onset of SCI, everyone with an injury at or above T6 must be considered at risk, even if they have not yet had an episode of dysreflexia.

**What are the Signs and Symptoms?**

Symptoms may vary considerably from one individual to another, from one episode to another and from moment to moment during the same episode. The symptoms may be mild at first and gradually become more intense, or they may become very severe within the first one or two minutes.

**Mild Dysreflexia**

- **Sweating:** The first sign is usually profuse sweating on the face and neck, that is, above the level of the injury.

- **Mild Increase in Blood Pressure (Up to 140/90):** Since the typical resting blood pressure (BP) for a person with tetraplegia is 90/60 (which is low normal), even a BP of 120/80 could suggest dysreflexia. Until the blood pressure reaches higher levels, the situation is not urgent, but it is important to try to identify and eliminate the cause before this happens.
Severe Dysreflexia

- **Hypertension:** When the BP reaches 200/100 or higher it should be considered an emergency because the sudden change from very low to very high blood pressure can lead to convulsions, stroke or even death. The BP can rise quickly during an episode of dysreflexia, so it is important to check the BP frequently, at least every two to five minutes, until the cause has been found and eliminated.

- **Pounding Headache:** The headache is due to the sudden elevation of blood pressure; however, the severity of the headache is not necessarily related to the severity of the hypertension. Therefore, the headache is not a reliable indicator of when the BP is dangerously high. A headache associated with normal blood pressure is not due to dysreflexia.

- **Heart Rate Changes:** The heart rate is usually very slow (bradycardia) but may be very fast (tachycardia) during an episode, so heart rate alone does not help to make the diagnosis.

- **Flushing:** Reddening of the face and neck (above the level of SCI). This might be associated with pale, cold skin on the trunk and extremities (below the SCI).

- **Less Common Symptoms:** Nasal congestion, anxiety, nausea, blurred vision, difficulty breathing, increased spasticity, chest pain and ‘goose bumps’. These symptoms alone do not suggest dysreflexia.
What Should be Done if This Occurs?

Remember: This is a medical emergency! Do not leave the individual alone. One person should monitor blood pressure if able, while another provides treatment.

Initially:

- Elevate the individual’s head and lower the legs. (This will help lower BP while the cause is identified.)
- Loosen any constricting clothing.
- Monitor blood pressure every two to five minutes.

Medication

If the BP is near 200 and the cause is not obvious, it is advisable to give medication to lower the BP to less dangerous levels while continuing to look for the cause of the dysreflexia. The most frequently used medication is nifedipine (adalat) by mouth. The dosage is usually 5 to 10 mg or as directed by your doctor. It should lower the blood pressure, but will not stop the sweating.

Eliminate the Cause

The most effective management is to identify and eliminate the cause as quickly as possible. This will usually result in immediate lowering of the blood pressure.
What Should You do to Eliminate the Cause?

Bladder

1. **For a Person Wearing a Uridome or Doing Intermittent Self Catheterisation:**

   Avoid pressing over the bladder. If the bladder is distended and the patient is unable to void in their usual manner, lubricate the urethra with a generous amount of lignocaine (local anaesthetic) jelly, wait two minutes and then pass a catheter to empty the bladder. Leave the catheter in place until the reason for retention is identified and remedied.

2. **For a Person with an Indwelling Catheter:**

   - Check bladder drainage equipment for kinks or other causes of obstruction to flow, such as clogging of inlet to the leg bag or overfull leg bag.
   - Empty the leg bag and estimate the volume. To determine if the bladder is empty or not, consider the individual’s fluid intake and output earlier that day and normal pattern of drainage.
   - If the catheter seems blocked, irrigate the bladder *gently* with no more than 30 mls of sterile normal saline.
   - If urine does not drain after irrigation, recatheterise using a generous amount of lubricant containing a local anaesthetic, eg lignocaine (Xylocaine) jelly.

Skin

Change the person’s position to relieve skin pressure. Check for tight clothing.
Rectum

For Faecal Evacuation:

If you are sure the bladder is empty and symptoms persist, gently insert a generous amount of lignocaine jelly into rectum. Wait five minutes before gently inserting finger to remove faecal matter.

If the cause is not easily found and resolved, then the individual should quickly attend the nearest hospital’s Accident & Emergency Department. It is necessary to take your medical alert card and a catheter.

How Will You Know When the Cause Has Been Removed?

Sweating

The sweating will become less profuse or stop. However, in order to recognise this change, it is necessary to wipe off the sweat frequently to see if it comes back.

Blood Pressure

There will usually be an immediate lowering of the BP. However, if it was very high, it may take an hour or more to return completely to the usual resting BP.

Caution: Autonomic dysreflexia is a potentially fatal condition when it is not correctly diagnosed and treated. Most General Practitioners have had little or no experience with people with spinal cord injuries so it is essential for every person with SCI to know how to recognise and treat the condition.
**Recommendations:**

Anyone who has had a spinal cord injury at or above the level of T6 should:

- Understand the signs, symptoms, causes and treatment of dysreflexia
- Have equipment for taking blood pressure available and know how to use it
- Keep a few tablets of nifedipine on hand for emergencies (prescription needed)
- Be sure that your regular General Practitioner has information about dysreflexia
- Have an alert card and new catheter on hand for emergencies
Postural Hypotension

When a person’s spinal cord is damaged, changes in muscle tone and circulation occur. With paralysis or partial paralysis, the transport of blood through the circulatory system becomes more difficult.

Faintness and dizziness is a problem that is most likely to happen when you move from lying down to sitting upright. Because blood tends to pool in your legs and lower abdomen, your blood pressure drops when you sit up suddenly. This can cause you to feel faint, dizzy, or even “pass out” briefly. It takes a few minutes of adjustment for your body to restore the right balance of circulation between your head and legs after you become upright. To give your body enough time to make the adjustment, raise the head of the bed about 30 degrees for at least 15 minutes before getting up. (If you cannot raise the head of the bed, prop yourself up with pillows before getting out of bed). Wearing elastic stockings and an abdominal binder can also help by preventing the blood from pooling in the lower part of your body. If the problem persists despite these measures your specialist may need to introduce medication which can help prevent postural hypotension.

Thermoregulatory Disorders (Regulation of Body Temperature)

Hypothermia

With cervical spinal cord interruption a major portion of muscle mass cannot be activated, making heat production due to shivering insufficient to prevent hypothermia in cold
environments. The appreciation of cold or heat by your skin is also reduced adding to the difficulty in recognising temperature changes. The ability to constrict the small blood vessels in your skin is also impaired which adds to further heat loss from your body.

It is important to be aware of the risk of hypothermia so that steps can be taken to prevent it. These include wearing warm clothing, use of appropriate bedding such as blankets and quilts, use of heating appliances and warm drinks.

**Hyperthermia**

This typically occurs in complete cervical and high thoracic cord lesions during infections or in high environmental temperatures. Thermoregulatory swelling with evaporative heat loss is dependent upon a mechanism, which involves activation of specialised cells within the thoracolumbar spine. Interruption of these connections leads to large areas of impaired sweating. Combined with impairment of the body’s normal ability to dilate blood vessel it is not surprising that hyperthermia occurs when the environmental temperatures are high. Being aware of the risk of hyperthermia and preventing it is the best treatment. This may consist of avoiding hot/humid environments, avoiding strenuous activities in the heat, wearing appropriate head covering and clothing, keeping well hydrated and maintaining appropriate indoor temperatures. For symptomatic hyperthermia tepid sponge baths while blowing air over the body surface is required. Severe hyperthermia requires urgent medical attention.