

Enuresis in Children – A Single Case Report using Adapted Reflextherapy to Facilitate Change

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Received: June 18, 2018; **Published:** July 25, 2018

Abstract

Enuresis is common in young children under the age of 7. Nocturia is another commonly used term to describe bed-wetting. There is no conclusive reason for bed-wetting. However, as neural and muscular structures are immature up to this age they may not be able to cope with controlling the bladder sphincter when the child is asleep. There is some suggestion that symptoms run in families and there is consensus that symptoms usually disappear after the age of 6 or 7. In cases where symptoms persist beyond the age of 7, it is recommended to consult with a paediatrician to rule out diabetes, urinary tract infection (UTI), bladder problems and even severe stress [1]. An alternative cause for bed-wetting is herewith suggested as an effect of injury from a blow to the sacrum and coccyx resulting in disturbance to the autonomic and/or nerve root supplying the bladder (pudendal nerve). A single case report describes the outcome in a 6-year-old boy who, after being dry at night at the age of 5, developed enuresis and, by using an unorthodox treatment named Adapted Reflextherapy (AdRx) [2], was relieved from his symptoms almost immediately. This case report aims to highlight the clinical observations that foot treatments such as AdRx, or of similar nature, could be tried in cases of persistent enuresis as reported in the treatment of children in pain. Anecdotal case reports of treating children in pain support the use of simple interventions as an initial non-aggressive therapy and especially in cases relating to delicate issues such as bed-wetting. Children accept the foot treatment as less threatening, even enjoyable, compared with more orthodox investigations in a hospital environment. Naturally, dubious signs and symptoms should be referred for further medical assessment. This case report discusses a clinical reasoning processing which may be of interest not only in cases of enuresis but also in other spheres of paediatric, adolescent and adult health.

Keywords: *Enuresis; Children; Reflextherapy*

Introduction

Causes of bed-wetting in children under 7 are not well known. It is assumed that organs and mechanisms controlling bladder voiding action are not mature enough to regulate the bladder opening and shutting in a dependable manner. The problem occurs in both genders and most children sleep through the night without wetting the bed by the age of 7. In cases where the child continues to wet the bed after this age further investigations is recommended to rule out organic disease or, possibly, stress-related symptoms. It seems to be part of growing up and the child should certainly not be punished for or alarmed by their 'accidents'.

This anecdotal single case report proposes an alternative reason for bed-wetting. The question is asked: Is it possible that a minor nerve injury happens at time of impact to the sacrum and coccyx from a fall, resulting in neuropathic changes and altered bladder function? The pudendal nerve and the lumbo-sacral nerve complex situated at the base of the spine lies in close relationship to the sacrum and coccyx. Partial nerve injury produces neuropathic pain [3] with nerve dysfunction as a consequence of prolonged pressures. By reversing the question we ask: Can nerve injury produce dysfunction only, without prolonged pain? Nerve injury and treatment using AdRx in the context of pain in children has been described in literature [4,5]. AdRx is a dermal, peripheral tactile stimulus akin to reflexology [6-9]. It was developed coincidentally as a pain-relief therapy for musculo-skeletal issues by chartered physiotherapist Gunnel Berry especially in the context of acute whiplash injury. It has been used to treat children as well adults. AdRx has been found to be particularly useful to address issues around hypersensitivity, allodynia and hyperalgesia. The boy in this case report did not suffer pain but was treated using AdRx.

Implications of bed-wetting.

Implications of bed-wetting are multiple from both the child's and parent's point of view. Here is a list of implications of both:

Child's point of view:

- Bed-wetting is an unpleasant sensation to wake up to in the morning or in the middle of the night by soggy pyjamas and wet bedlinen. In some cases the child is soaked with urine.
- Bed-wetting becomes an embarrassing occurrence when sleeping away from home visiting friends and going on school trips. How does the child tell the host family that they have wet the bed? When staying away on their own, how does the child deal with the situation without parental/carer attention?
- Urine has an unpleasant odour. Bed-wetting becomes a smelly affair which is difficult to hide.
- Urine has a high content of uric acid which may cause pain and skin irritation.
- Bed-wetting is unpleasant but becomes an embarrassing sign when not improved over time. It increases anxiety by not knowing what is wrong.

Parental and/or Carer's point of view

- Bed-wetting is a worrying condition when not knowing what is at stake. Questions arise such as 'will it ever get better'?
- Bed-wetting becomes a worrying feature as the child starts sleeping away from home visiting friends, family and on school trips.
- A bed that has been urinated on becomes unpleasantly smelly. It could become an expensive ordeal as a new mattress and bedlinen have to be purchased. Constant clothes washing adds to expenses.
- It is physically tiring and hard work to change bedclothes. Sometimes and often this happens in the middle of the night and even more than once a night.

Treatment for bed-wetting

Symptoms of bed-wetting usually have a natural resolution. The body functions mature and gain control. Bed-wetting can be seen as a normal part of growing up.

So-called 'reward' systems are available which use friendly paper or plastic stickers as a reward in the event of a dry bed.

'Alarm' mattresses can be used to set off a ringing tone when dampness reaches the mattress. The idea is that the alarm wakes the child up sufficiently to stop the void of urine onto the bed. The effectiveness of this system is not proven.

It has been reported that a foot treatment known as Adapted Reflextherapy has facilitated change in a case of enuresis [10] of a 9-year-old boy who had suffered a brain haemorrhage at birth with subsequent hydrocephalus and insertion of a Spitz-Holter valve. The boy needed a change of bedclothes three times every night to avoid being soaked in urine. At the age of 9, he underwent a series of foot treatments once a week for 6 weeks. He was subsequently completely freed from his symptoms with no return of symptoms as an adult. Although speculative, there is no doubt that the foot intervention changed the boy's and mother's life for the good. Clinical reasoning suggested that pressure on the feet created an action potential at 'spinal' as well as 'central' level which may have influenced outcomes.

It is challenging and thought provoking to understand and ultimately accept these physiological events. To date there is no accepted understanding of how AdRx or reflexology works, yet positive outcomes from the treatment suggest an efficient intervention which suffices to repeat the same treatment again and again. So, when presented with a 9-year-old boy enduring continuous bed-wetting but living in France and therefore unable to attend the clinic, it was suggested to approach a local reflexologist. The outcomes were equally good, that is, no more bed-wetting. It is not known if this particular case was due to spinal injury and/or autonomic compromises. Nevertheless, sufficient positive clinical outcomes, obtained using a transferable intervention, suggest a way forward to try a foot treatment to stem bed-wetting issues.

Process from injury to development of symptoms

Physical injury (Figure 1) to a person is a common occurrence at any age. Unfortunately, it can have dire consequences whereby a fall in persons over the age of 60 can have serious detrimental effects, even to the point of dying prematurely. The younger age group may get away with a bruise or minor fractured bone or muscle injury but will recover to full activity within a short period of time.



Figure 1: Injury: Tissue damage, Neural damage, Cortical damage.

Tissue damage (Figure 2) occurs when soft tissue, muscular or bone tissue reacts violently to a sudden deceleration action where a blow may cause a bone fracture, tissue bruising and minor nerve damage. A direct blow to tissues may cause internal or external bleeding, compromised nerve endings with axon exudate flowing into the tissue matrix causing compromised responses in the nerve conduction influencing immune responses with hormones producing abnormal output of adrenaline etc. to overcome painful experiences. The body builds up a physiological response to injury which ultimately affects mood and the ability to move around (as it hurts too much to move). Exudate collects in the tissue matrix causing swelling and pressure in tissues which cause more pain. Joints become stiff and unyielding which adds to functional disability and physical deterioration. Symptoms appear over time which are not immediately associated with the original injury. Symptoms and injury may be so disparate in time that they are not considered to be related at all. AdRx considers these options in the clinical reasoning for ongoing symptoms.

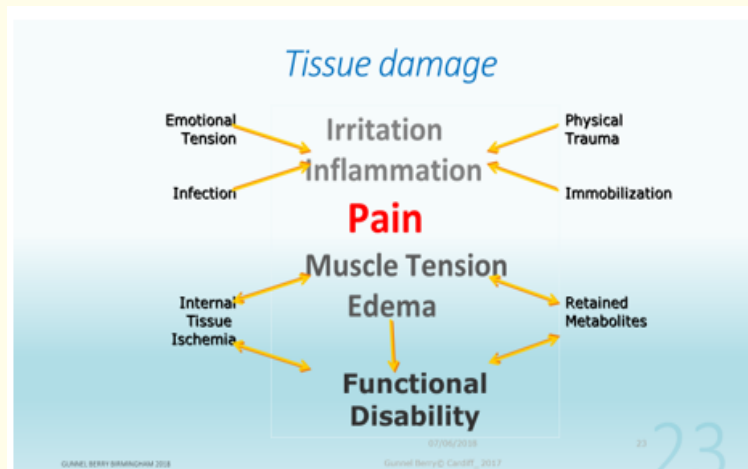


Figure 2: Tissue Damage: Irritation, inflammation, pain, muscle tension, oedema, functional disability.

What is AdRx?

AdRx is a foot treatment used to identify and treat spinal and musculo-skeletal compromises. The therapy has been used in NHS and private physiotherapy practice for over two decades. The therapy is akin to reflexology whereby areas of the feet are targeted by pressure and rotation manipulation. The aim is to achieve physical changes in the foot which then corresponds to anatomical areas. AdRx has been developed by the author and used in clinical practice for over 20 years to treat patients in pain especially those with hyperalgesia and allodynia in association with persistent pain [chronic pain; whiplash pain] [11]. The difference between AdRx and orthodox reflexology is

in the time used to treat the patient, techniques and the clinical reasoning behind the treatment. Reflexology treats the whole of foot (or hand) with the intention of improving general health, while AdRx selects and treats those areas of the feet which have been identified as tender and sensitive to touch as well as ‘stiff’ areas in the medial arches which are associated (in AdRx terms) with the spine. By pressing on the medial arches (Figure 3), commencing at the calcaneum, it is hypothesised that one can identify tenderness and sensitivities at a particular vertebral level (which relate to spinal areas) (Figure 4).

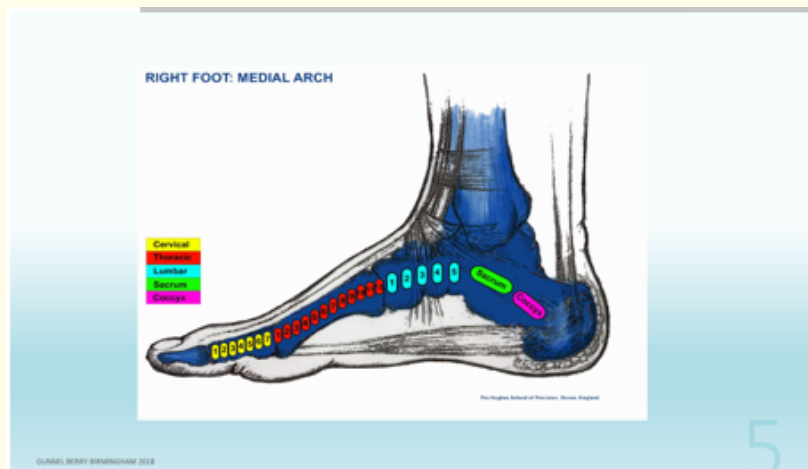


Figure 3: Right Foot. Medial arch. Spinal representation of cervical (yellow), thoracic (red), lumbar (turquoise), sacral (green) and coccyx (pink) areas.



Figure 4: Adapted Reflextherapy: ‘Walking’ on (L) medial arch. Photo by C. James.

What is the theory of AdRx in the context of injury?

It is estimated that physical injury involving acceleration/deceleration forces disturbs the integrity of physiological activity in terms of changing peptide content in the nervous system [12,13]. In addition, physical injury may, as an accommodation and adjustment to the present situation, alter the balance of the two parts (sympathetic, parasympathetic) in the autonomic nervous system [14].

Emotions play a part in the interchange of neural activity also affecting immune responses. See Alford for a discussion on psychoneuroimmune (PNI) responses [15]. Neural Plasticity (NP) is a term used by Raymond Cajal in the nineteenth century to describe the phenomenon that ‘all living cells and all living tissues are in a constant molecular, morphological, and functional remodelling in adaptation to changing physiological conditions’ [16]. The effect of NP in humans matters in terms of therapeutic interventions. The nervous system has

impressive capacity to heal and reorganise itself. The crux of the matter is how to influence the common pathways and to interpret and understand the separate signalling and control pathways [17] which ultimately have implications in the choice of therapeutic intervention after injury. The signalling may not be measurable and may even go unnoticed, yet the body ‘remembers’ [18] and stores all information about previous experiences in the brain. Orthodox medicine interprets symptoms mainly as ‘disease’ or ‘inflammatory’ processes which is fine but limited in terms of discovering the real cause of pain and symptoms, unless the origin is inflammatory of course. An affliction such as a fall has subsequent consequences following a process of physiological events after injury. Treatment should reflect this process.

What is the justification for using AdRx in the context of bed-wetting?

AdRx uses the dermis on the feet to carry out an assessment and treatment in cases of musculo-skeletal pain. By touching the feet and moving the ankle and foot joints in a passive manner it is suggested that action potentials are initiated which reach spinal and cortical levels. AdRx is akin to reflexology, a foot treatment which has a worldwide usage to relieve pain and contribute to well-being. Reflexology has been shown to reduce the sensation of pain in an experiment using hands dipped in ice-cold water [19] and reduce phantom limb pain in amputees [20]. By assessing the feet for spinal sensitivities and possible nerve and spinal compromises, the treatment aims to reduce clinical symptoms.

The hypothesis of AdRx is based on a ‘re-programming’ intention of neural responses after an injury. Neural plasticity is constantly responding to topical input from the periphery as well as the internal demands. The nervous system uses peptides as well as electrical currents to conduct adjustments in sensation and produce reactions centrally and peripherally. These adjustments are normal physiological reactions and workings of the nervous system which correspond to the outside environment and demands of body functions. However, from time to time, there are abnormal circumstances that cause the body and the neural plasticity to react in a different way such as during an episode of infection, stress or physical bodily harm. The neural plasticity responds by changing its content of peptides which alters the body functions to a ‘high alert’ system (sympathetic response) to protect itself from harm, or the opposite, to reduce activity (parasympathetic response) in order to slow the system down. Peptides become the ‘currency’ by which the body communicates with itself to respond and counter-respond in times of risk to survival. By giving a tactile sensory input at the periphery such as massage, reflexology or Adapted Reflextherapy, it is seen as a ‘counter-irritant’ or ‘re-programming’ for the NP to readjust itself even further. This is supported by the notion of stroking mice experimentally whereby oxytocin levels (an inhibitory peptide) levels are raised by the massage [21].

An alternative point of view

An alternative way of looking at bed-wetting is to imagine that the pudendal nerve has been injured mildly during an episode of jumping and landing heavily on the coccyx and sacrum. Children play in the house, play football, tennis, ski and learn to ride a bicycle. The child may easily have fallen and landed on the lower part of the spine and incurred a direct blow, jarring or tearing of soft tissues around the spine. The autonomic nervous system which lies anterior to the sacrum may have had a ‘pull’ to such an extent that the ligamentous attachments have been slightly torn with an effect of changes in the parasympathetic or sympathetic, as discussed by Espinosa-Medina, *et al.* (2016) [22] outlet. Pain may have occurred at time of the blow but the child does not complain of continuous pain and the incident is soon forgotten. Yet, the nervous system has adapted a compromised response to the blow and begun a neuro-plastic response which includes alterations of quality and quantity of peptides and plasticity. Sensitivity around the saddle area after falls has been observed in patients, young and old. It is not possible to estimate with accuracy the changes that have occurred, but when symptoms such as enuresis occur one has to ask the question: Does this have anything to do with a blow to the sacrum/coccyx which, after all, controls the pudendal nerve to the bladder? How is it that a gentle, short duration pressure on the foot can alter ongoing symptoms in a young child? What physiological events have led to this physiological outcome? What other symptoms, seen in clinical practice with unknown origin, have a similar course or cycle of events? What about referred pain, bizarre pain patterns, peptic/gastric irregularities, abdominal and gynaecological, even phantom limb pains? These are massive areas for exploration and research into the effect of injury to the autonomic nervous system, not just its chemical makeup but, how much of neural expression has changed after a modified ‘mechanical’ injury process? The answer to these questions would enhance understanding of the final outcome, i.e. the workings of organs. In other words, how much of organic activity is altered by injury to the spine? In terms of spinal cord injury, Finnerup and Jensen [23] discuss visceral pain being present without organic disease yet present with nausea and autonomic reactions. Are there any parallels whereby enuresis occurs because of spinal cord injury (however minimal) or a peripheral nerve injury?

Case Report

In this case report it is hypothesised that blows to the coccyx and sacrum at a young age can cause disturbance of the nerve supply to the bladder which subsequently disturb bladder control causing enuresis. Young children play, fall over in playgrounds, down stairs and on hard playing fields. Without much protective adipose padding on the sacrum or coccyx, it is possible that nerves to the urinary tract are disturbed. Using foot pressure and manipulation provides access to sensory pathways which appears to change symptoms rapidly.

A normal developing 6-year-old boy suffered bed-wetting at night on and off since being fully potty trained at the age of 3. The boy was of normal height and development with no abnormal medical history and no medical intake. Day-time micturition was normal with normal quantities of urine output and drinking habits and no pain during micturition. He wet his pyjamas/bed six nights out of seven with an average amount of output. The child had a normal upbringing, was not unduly anxious but of alert mind and good physical health. Bed-wetting did not cause the boy unnecessary anxiety but the parents were anxious to understand the underlying causes. A relative brought the boy for assessment on recommendation that maybe AdRx could help.

The initial examination included a postural assessment. The left hip appeared mildly internally rotated with a mild inversion tendency of the left medial foot arch. This issue had been examined by a physiotherapist in the past. An X-ray had been carried out to exclude pathogenesis of the hip joint.

The examination of the feet revealed increased sensitivity of areas relating to (R) sacral vertebrae 2 and 3. This small area was the only area which was sensitive enough to cause a reaction in the boy. He exclaimed 'ouch' when the S 2 and 3 area was pressed with moderate pressure (2 mm indentation) compared with other areas of the same foot and compared with the opposite side. The ankle was limited in dorsal flexion by 20%.

The findings were discussed with the parents. It was suggested that maybe the boy had fallen on the back of the hip at some stage and produced a blow to the sacrum/coccyx area which had caused a minor nerve injury which controls the bladder function. This is a purely hypothetical idea but which may make sense in some clinical situations.

The parents wished that their son should have treatment according to AdRx principles. The treatment was carried out straight away. The boy was lying down on a couch in a comfortable manner. The therapist (the author) was sitting at the end of the bed within easy reach of the boy's feet. A '3-point-adapted' (Figure 5) pressure was applied to the (R) S2 and S3 areas with approximately 2 minutes' duration with a 2 mm depth pressure indentation. The boy could feel the pain on initial pressure, but this pain receded after a few seconds: the accommodation of the nerve to constant pressure means it stops firing the painful sensation. A '4-point-linking' (Figure 6) pressure was applied to the (R) crural joint with pressure on areas relating to the symphysis pubis and sacro-iliac joints, as well as to the hip and sacrum on the medial arch of the calcaneum. Rotation of both right and left ankle joints and maximum dorsi flexion and plantar flexion were carried out to finish the treatment which was completed in approximately 10 minutes.



Figure 5: (L) foot. 3-point adapted at T11 on medial arch.

The treatment was carried out once. The outcome was positive: that is, the bed-wetting stopped and has not recurred after five months.



Figure 6: (L) foot. '4-point-linking' across the crural joint pressing on symphysis pubis, sacro-iliac joint, hip joint and sacrum.

Summary

Justification for using AdRx in treatment of enuresis

- Massage changes levels of biochemistry including decreasing cortisol and increasing serotonin and dopamine levels [24].
- Observation that similar intervention facilitated change in pain in children [25,26].
- Clinical application is simple, non-invasive and non-threatening to the child.
- Reflexology foot treatment for childhood idiopathic constipation has been studied and is supported in a PhD programme by Gordon in 2007 [27].
- AdRx aims to activate and influence nerve action potential into the nervous system.
- AdRx aims to activate communication between sympathetic and parasympathetic nervous system components, the understanding being that action potential reaches dorsal horn synapses within autonomic chain primary nerve endings.
- AdRx aims to engage the neural plasticity activity in central parts of the nervous system as per the premise by Gracely, *et al.* that 'patients with painful peripheral neuropathies often suffer from mechano-allodynia' and that 'lightly touching or brushing the skin evokes an intense pain sensation' [28].

This article aims to highlight a possibility that bed-wetting may result from a minor nerve injury due to a blow to the sacrum or coccyx. Minor injuries may contribute to subcortical reorganisation. Neuroplastic changes occur after injury and symptoms and pain is one symptom resulting from these changes. 'Are we neglecting spinal reorganization following nerve damage?' [29]. Further investigations have to be carried out to increase our understanding and interpretation of symptoms like 'bed-wetting', irritable bowel symptoms, skin irritations etc. as part of the same phenomenon, i.e. cortical and subcortical reorganisation due to peripheral minor nerve injury. Inclusion and comprehension of these issues will have clinical consequences.

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Volume 7 Issue 8 August 2018

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