



RESEARCH ARTICLE

BODY EXCRETA (URINE AND FECES) CONTINENCE, HOW TO GAIN, AND HOW DOES IT FAIL?

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ARTICLE INFO

Article History:

Received 25th April, 2016
Received in revised form
23rd May, 2016
Accepted 17th June, 2016
Published online 31st July, 2016

Key words:

Continence,
Urinary Incontinence,
Fecal Incontinence,
Internal Urethral Sphincter,
Internal Anal Sphincter,
Alpha-sympathetic nerves,
Body Excreta (urine and feces)
Continence,
How to gain and how does it fail?

ABSTRACT

Introduction: We believe that every organ in the body has a strong collagen chassis. Injury and lacerations of the chassis will distort the shape of the organ, lead to its dysfunction, abnormal position and chronic pain. The strong pelvic diaphragm keeps the pelvic organs and tracts in their normal position. Pelvic floor dysfunction is widely present in women particularly around menopause. The internal urethral sphincter (IUS) is a collagen-muscle tissue cylinder that extends from the bladder neck down to the perineal membrane. Its nerve supply is from the thoraco-lumbar alpha sympathetic nerves T10-L2. After toilet training, a gained high alpha sympathetic tone keeps the IUS contracted and the urethra closed and empty all the time. The vagina is a collagen-muscle-elastic tissue cylinder that extends up-wards and backwards from the vulva. Childbirth trauma causes redundancy of its walls with subsequent prolapse. When the injury and lacerations affect the pelvic ligaments, vault and uterine prolapse ensue. The internal anal sphincter (IAS) is a collagen-muscle tissue cylinder that surrounds the anal canal, with the external anal sphincter surrounding its lower part. Its nerve supply is thoraco-lumbar alpha-sympathetic nerves. Toilet training creates high alpha-sympathetic tone at the IAS that keeps it contracted and the anal canal closed and empty all the time.

Pathology: Injury and lacerations of the collagen chassis of the pelvic tracts, lead to voiding troubles, urinary incontinence, genital prolapse and fecal incontinence.

Aim of the study: Is medical imaging, show the difference between normal pelvic organs and lacerated collagen chassis? In addition, does mending the torn collagen chassis of the pelvic organs restore the normal continence and functions?

Surgery: We introduced an operation "Urethro-Ano-Vaginoplasty" to correct those troubles, by mending the torn chassis. We mend the torn IUS, and then do overlapping of the bisected anterior vaginal wall. Thus, we restore the integrity and strength of the IUS, and add to it extra support and narrow the vagina. We mend the torn IAS, then do overlapping of the bisected posterior vaginal wall, approximate the levator ani muscles, and repair the perineum with excellent results of gaining continence and narrowing the patulous vagina.

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Citation: Abdel Karim M. El Hemaly, Laila A.E.S. Mousa, Ibrahim M. Kandil and Khulood Samy Hussein, 2016. "Body excreta (Urine and Feces) continence, how to gain, and how does it fail?" *International Journal of Current Research*, 8, (07), 35036-35040.

INTRODUCTION

Urinary continence is an acquired behavior and is not an inherent character. It is an acquired behavior gained by learning and training in early childhood, toilet training. Failure to gain urinary continence in childhood is either partial or complete failure, leads to nocturnal enuresis. Urinary continence depends on two factors, one is an inherent factor, and the other is an acquired factor. The inherent factor is the presence on an intact and strong internal urethral sphincter (IUS). The IUS is a collagen-muscle tissue cylinder that extends from the bladder neck down to the perineal membrane

in both men and women. The acquired factor is gaining high alpha sympathetic tone at the IUS that keeps the sphincter contracted and the urethra closed and empty all the time, until there is a need or a desire to void. As well, fecal continence is an acquired character gained by learning and training in early childhood, toilet training, how to keep high alpha-sympathetic tone, (T. 10-L. 2) at the internal anal sphincter (IAS), maintaining the sphincter contracted and the anal canal closed and empty all the time, Figures 1 & 2. The internal Urethral Sphincter (IUS): (Pelvic Floor Dysfunction, 2015; Abdel Karim El Hemaly et al., 2014; Imaging of the Pelvic Floor et al., 2014; Abdel Karim M. El Hemaly et al., 2014; Abdel Karim M. El Hemaly et al., 2014; Abdel Karim M. El Hemaly et al., 2012; Abdel Karim M. El Hemaly et al., 2014; Abdel Karim M El Hemaly et al., 2013; Abdel Karim M. El Hemaly

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et al., 2014; Abdel Karim M El Hemaly et al., 2013; Abdel Karim M. El Hemaly et al., 2012; Abdel Karim M. El Hemaly et al., 2011; Abdel Karim M. El Hemaly et al., 2009; <http://www.obgyn.net/displayppt.asp?page=/English/pubs/features/presentations/El-Hemaly03/el-hemaly03-ss>; El Hemaly AKMA, Mousa, 1996; http://www.obgyn.net/urogyn/urogyn.asp?page=/urogyn/articles/abs-urinary_incontinence_gyn_ehemaly; El Hemaly, 1998; El Hemaly and Mousa, 1996; <http://www.obgyn.net/displayppt.asp?page=/English/pubs/features/presentations/El-Hemaly/el-hemaly-ss>; <http://www.obgyn.net/displayppt.asp?page=/English/pubs/features/presentations/El-Hemaly02/el-hemaly02-ss>; Ibrahim M. Kandil et al., 2003; http://www.obgyn.net/urogynecology/?page=articles/nocturnal_enuresis; http://www.obgyn.net/urogynecology/?page=/enhlidh/pubd/features/Presentations/Nocturnal_Enuresis/nocturnal_enuresis). We believe that every body organ has a strong collagen chassis, which is very important for its normal anatomy, (normal shape and state), and normal physiology, (its function). The chassis consists of collagen tissue to allow for body growth. Collagen is the strongest tissue in our body, and it is present widely all over the body. It forms the eyeball, the sclera, the muscle tendons, sheets, ligaments, organs chassis and it is present in the skin. The IUS is a collagen-muscle tissue cylinder that extends from the bladder neck down to the perineal membrane in both men and women. The strong collagen chassis is responsible for the high wall tension of the urethra, which partially creates the high urethral pressure (high Pura). The muscle is a network of plain muscle fibers that lie on top and intermingle with the collagen fibers in the middle of the chassis. The muscle has its nerve supply from the thoracolumbar sympathetic nerve plexus (T10-L2). Toilet training in early childhood creates high alpha-sympathetic tone at the IUS, that keeps the IUS contracted and the urethra closed and empty all the time until there is a need or a desire to void in favorable circumstances. The twofactors, the high wall tension and the acquired high alpha-sympathetic tone create the high urethral pressure (high Pura), which is much higher than the pressure in the urinary bladder (Pves). The IUS in women is intimately lying on the anterior vaginal wall. In men, the prostate surrounds its upper part.

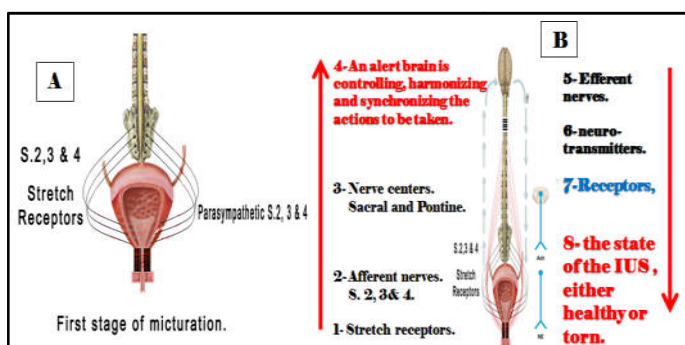


Figure 1. Micturition consists of two stages. The first stage, (A) in infancy and early childhood, before toilet training, stretch receptors from the bladder, when the bladder is full travel along sensory nerves, S. 2, 3 & 4 to the spinal center. Pelvic spinal parasympathetic nerves S. 2, 3 & 4 cause detrusor contractions and emptying of the bladder. The second stage (B), after toilet training, the person will gain high alpha-sympathetic tone (T. 10-L. 2) at the IUS, that keeps the sphincter contracted and the urethra empty and closed all the time

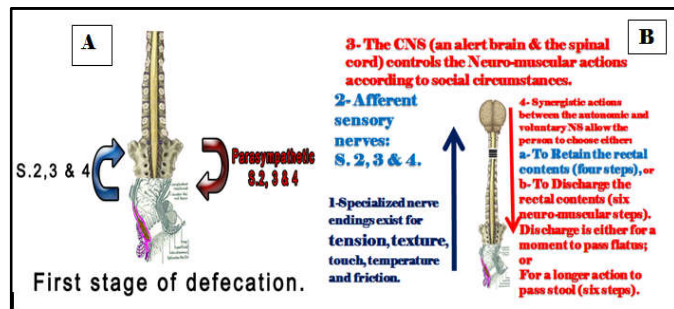


Figure 2. The mechanism of defecation consists of two stages. Stage one (A), in infancy and early childhood, before toilet training, full rectum send sensory nerve impulses through sensory nerves S. 2, 3 & 4 to the spinal cord center. Pelvic parasympathetic exciter impulses (S. 2, 3 & 4) cause contractions of the rectum, those push the stool along an open anus. Toilet training lead to maintain high alpha-sympathetic tone at the IAS, which keeps the IAS contracted and the anal canal closed and empty all the time

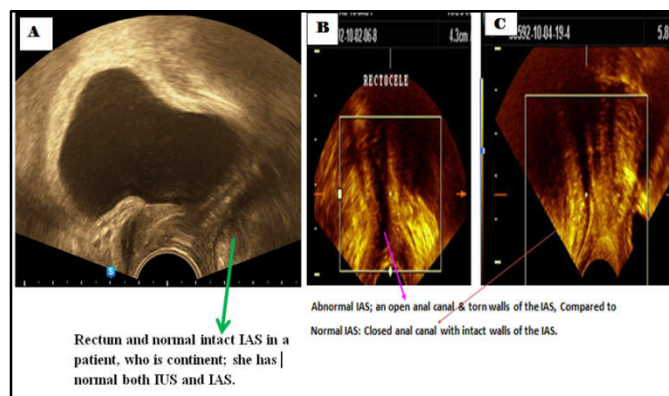


Figure 3. Images of the IAS and the IUS with 3DUS. Image A shows intact both IUS and IAS. Images B the IAS is torn and the anal canal is open. Image C, the IAS is intact and the anal canal is closed and empty

Patho-Physiology: (El Hemaly and Mousa, 1996; Abdel Karim M. El Hemaly; El Hemaly, 1998; Abdel Karim El Hemaly; Abdel Karim M. El Hemaly; Abdel Karim M. El Hemaly)

Anybody action is a nerve muscle action controlled by healthy alert brain (CNS). Toilet training leads to acquire and keep high alpha-sympathetic tone at the IUS, which keeps the sphincter contracted, and the urethra closed and empty until there is a need or a desire to void with favorable suitable social circumstances. This is achieved when the post-ganglionic alpha-sympathetic fibers produce nor-epinephrine (NE) that acts on receptors on the muscle fibers of the IUS. Failure of the alpha-sympathetic nerve fibers to produce NE, this leads to nocturnal enuresis. When the failure is complete, this will lead to enuresis day and night; this happens in about 10% of enuretic children. The majority of enuretic children (90%) have partial production of NE; therefore, they only wet themselves when sleeping. During daytime, when they feel urine about to leak, embarrassment, will initiate reflex sympathetic activity, which will induce contraction of the IUS preventing day enuresis. The partial weak alpha-sympathetic tone gained will be lost during sleep, and voiding will happen.

Those children are heavy sleepers, they go to deep sleep rapidly; it may be due to general lack of NE. Therefore, giving those children alpha-sympathomimetic drugs like ephedrine will cure the trouble. Ephedrine has a dual action, it acts on the receptors as agonist, and it acts on the alpha-sympathetic nerve fibers to stimulate them to produce NE. It may have another effect on the brain and CNS, as an analeptic, it restores normal sleep in those children. In women, the IUS is intimately lying on the anterior vaginal wall. Vaginal delivery especially difficult, quick, instrumental, and multiple and frequent deliveries will insult the vagina, causing lacerations of the vaginal chassis and the intimately lying IUS. Lacerations in the chassis of the IUS cause its weakness so it cannot stand against sudden rise of abdominal pressure and urine will leak, stress urinary incontinence (SUI). Depending on the level of the main trauma along the collagen tissue cylinder of the IUS, the type of SUI will ensue. When the lacerations affect mostly the upper part of the cylinder, (the bladder neck) it will lead to funneling of the bladder neck as seen by imaging, and over active bladder (OAB) clinically, detrusor over activity by urodynamic studies. When the main trauma is in the lower part of the IUS cylinder, genuine stress urinary incontinence is the result. When the trauma affects the whole length of the IUS cylinder, then mixed type of SUI ensue, which is the most prevalent type of SUI. In men with benign prostatic hyperplasia, in median lobe hypertrophy will induce funneling of the bladder neck. On sudden increase of abdominal pressure, urine will enter the funneled upper part of the urethra, which leads to overactive bladder (OAB), nocturia and urinary incontinence. Lateral lobe hyperplasia will add extra load preventing proper relaxation of the IUS and dilatation of the urethra, causing hesitancy, feeling of incomplete emptying and dysuria. Trilobar hyperplasia will cause combination of the two mentioned voiding troubles.

Diagnosis: (Ibrahim M. Kandil *et al.*, 2003)

Clinical history and examination, laboratory tests are important tools. In women, in addition to the history and examination, in the local examination, the examiner should take in consideration few new important notes. If, without asking the patient to strain, you can see the anterior vaginal wall, then there is anterior vaginal wall descent. Normally, the anterior vaginal wall is going up and backward and not seen on inspecting the vulva, and the vaginal introitus. The external urethral meatus has, normally, a forward direction, if its direction is forward and upward, then there is a loss of posterior urethra-vesical angle and this patient has overactive bladder (OAB). As well, the posterior vaginal wall is going up and backward normally and is not visible at the vaginal introitus. If, without straining the posterior vaginal wall is bulging, then there is posterior vaginal wall prolapse. The size of the perineum is to be noticed and measured. Imaging of the pelvis, by ultrasound (US), magnetic resolution imaging (MRI) and computerized axial tomographic scanning (CAT scan) will show the urethra open with lacerated walls in cases of urinary incontinence, SUI. As well, the anal canal is open with lacerated walls in cases of FI (Abdel Karim M. El Hemaly *et al.*, 2014; Abdel Karim M El Hemaly *et al.*, 2013; Abdel Karim M. El Hemaly *et al.*, 2014; Abdel Karim M El Hemaly

et al., 2013; Abdel Karim M. El Hemaly *et al.*, 2012; Abdel Karim M. El Hemaly *et al.*, 2011; Abdel Karim M. El Hemaly *et al.*, 2011; Abdel Karim M. El Hemaly *et al.*, 2009; Abdel Karim M. El Hemaly *et al.*, 2010; Abdel Karim M. El Hemaly *et al.*).

The internal anal sphincter (IAS): (Abdel Karim M. El Hemaly *et al.*, 2014; Abdel Karim M. El Hemaly *et al.*, 2011; Abdel Karim M. El Hemaly *et al.*, 2010)

Anatomy:

The IAS is a collagen-muscle tissue cylinder that surrounds the anal canal, with the external anal sphincter (EAS) surrounds its lower part. The IAS is a collagen-muscle tissue cylinder. The collagen forms its strong chassis. The muscle is network of plain muscle fibers that lie on and intermingle with the collagen fibers in its middle. The collagen gives the sphincter its high wall tension. The muscle has its nerve supply from the thoraco-lumbar sympathetic nerves T10-L2. The IAS has an intimate relation to the posterior vaginal wall.

Patho-Physiology: (Abdel Karim M. El Hemaly *et al.*, 2014; Abdel Karim M. El Hemaly *et al.*, 2011; Abdel Karim M. El Hemaly *et al.*, 2010)

Before toilet training, as the rectum is full, sensors send impulses along sacral sensory nerves (S 2, 3 &4) to the sacral nerve center which responds, through pelvic para-sympathetic nerves (S 2, 3 &4), leading to contractions of the rectum which evacuate the stools through an open anal canal. Toilet training creates high alpha-sympathetic tone at the IAS, which keeps the sphincter closed and the anal canal empty and closed all the time. On need or a desire, and favorable social circumstances, sensors (for tension, texture, temperature, touch & friction) send impulses along sacral sensory nerves (S. 2, 3 & 4) to the central nervous system (CNS), the person chooses to relax the IAS just for a moment to pass flatus, or for a longer time to pass stools. When the person chooses to pass stools, then he inhibits the high alpha-sympathetic tone at the IAS relaxing it an opening the anal canal. The distal colon and the rectal muscles contract to push the stools along the open anal canal. The abdominal muscles and the diaphragm contract to increase the abdominal pressure help in pushing the stools. The person will relax the EAS, which is a voluntary muscle innervated with voluntary nerves to allow for defecation.

The EAS then contract sequentially, the deep then the superficial then the subcutaneous parts to propel and squeeze the anal canal from any residual stools. In women, the IAS lies closely to the posterior vaginal wall, and both are exposed to childbirth trauma (CBT). CBT causes lacerations in the chassis of both the vagina and the IAS, which leads to posterior vaginal wall prolapse and FI. This can be diagnosed from the medical history, examination and medical imaging. Medical imaging can be ultrasonic scanning, MRI and CT scanning. On scanning the diagnosis is made on visualizing an open anal canal with lacerated IAS.

Conclusion

Laceration of the collagen chassis of the IUS leads to its weakness and subsequent stress urinary incontinence (SUI). Redundant lax vaginal walls, due to lacerations in the collagen chassis of the vagina leads to vaginal prolapse. Similarly, lacerations of the collagen chassis of the IAS lead to its weakness and FI.

Reconstructive Surgery: (Abdel Karim M. El Hemaly et al., 2010; Abdel Karim M. El Hemaly et al.,; Abdel Karim et al.,; Abdel Karim M. El Hemaly et al.,; Abdel Karim M.El Hemaly et al.,)

Urethro-Ano-Vaginoplasty is new operation for the surgical management of SUI, FI and Vaginal prolapse. It consists of two parts, the anterior part and the posterior part.

We correct the SUI and the anterior vaginal wall descent, as follows:

- 1- Expose the IUS (we separate the IUS clear from the anterior vaginal wall). The laceration in the posterior wall of the IUS will be obvious, we mend it with interrupted simple stitches with slowly absorbable suture material e.g. polyglycan (vicryl) number one.
- 2- Mend the torn wall of the sphincter; this may take 5-7 simple interrupted stitches.
- 3- Strengthen the anterior vaginal wall by overlapping the two vaginal flaps, we do this by the innovated "pull, or dragging sutures". We start on the left vaginal flap, far lateral, go with the needle to the near edge of the right vaginal flap, then come down about 1-2 cm. then go with the needle far lateral to the left vaginal flap below the start. When we tie the suture, this will drag (pull) the right vaginal flap beneath the left one. We repeat this suture 5-6 times, start externally and go up towards the cervix. We then, suture the free left vaginal edge as far lateral to the right side of the vagina. By doing this maneuver, we add extra support to the mended IUS and, in addition, narrow the patulous vagina.

In the posterior section, we correct the FI and the prolapsed posterior vaginal wall as follows:

- 1- Expose the IAS (by separating the torn IAS clear from the posterior vaginal wall), the lacerations in the anterior wall of the IAS will appear. Start mending the torn walls of the IAS using simple interrupted vicryl number one, simple stitches.
- 2- Mend the torn sphincter; this may take 4-6 simple stitches.
- 3- Approximate the two-levator ani muscles leave the thread on pairs of artery forceps not tied until later after overlapping the posterior vaginal wall.
- 4- Strengthen the posterior vaginal wall by overlapping the two vaginal flaps; also, we add extra support to the mended IAS and narrow the patulous vagina.
- 5- Repair the perineum.

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