

# Continence

Abdel Karim M. El Hemaly\*, Laila A. S. E. Mousa and Ibrahim M. Kandil

Faculty of Medicine, Al Azhar University, Cairo, Egypt

**Abstract:** Continence is self-restraint and self-control especially temperance, sexual behavior and the body excreta (ability to control one's bowel and bladder).

Continence is an acquired behavior gained by learning and training. Continence is a nerve-muscle action. An alert healthy nervous system (NS) and intact reactive muscles are the tools for expressing continence.

To gain continence, is how to control and train your sympathetic nervous system (NS). Most sympathetic nerve endings secrete nor-epinephrine (NE). NE excites most of the visceral structures. The sympathetic NS mobilizes the body's systems during confronting a situation "Fight or flight."

We gain progressively rising up sympathetic tone from everyday life stress, teaching, and experience. Stimulation of the sympathetic NS, leads to rise in blood pressure. It dilates the pupil of the eye. It excites the liver to release glucose, and increases the rate of metabolism of essentially all the cells of the body "fight or flight". The integrative centers of the brain can acquire by learning, and training how to master, synchronize, and harmonize different responses according to social circumstances. Therefore, it is how to control the sympathetic NS is the way to gain continence.

After learning, sympathetic stimulation leads to: holding back (continence) or fight or flight". If the situation is over –whelming, the result is sympathetic failure and subsequent incontinence.

Incontinence results from fault in the sympathetic NS, CNS and/or the target organ.

Therefore, correcting the pathology of body's excreta incontinence is by correcting the sympathetic nerves and their neurotransmitters medically or treating the target organs (IUS & IAS) surgically.

**Keywords:** CNS, Sympathetic NS, Nor-epinephrine NE, Continence, Body excreta, Incontinence.

## INTRODUCTION

Continence is self-restraint and self-control especially temperance, sexual behavior, and self-control of the body excreta, *i.e.* the urine, flatus and the stool which means the ability to control one's bladder and bowels [1].

Continence is a nerve-muscle action. Continence is an acquired behavior gained by learning and training.

### Patho-Physiology of Continence

All the body' actions are neuro-muscular sequel. The central nervous system (CNS) gets, analyzes, integrates and controls all the actions to perform. The CNS consists of the brain and spinal cord. It contains the integrative and control centers. It consists of the somatic nervous system (NS) and the autonomic NS. The somatic NS has afferent sensory nerves and efferent exciter voluntary nerves. The autonomic NS is the non-conscious part of the central nervous system (CNS), which controls: muscles (smooth and cardiac muscles), glands, and viscera. It consists of the sympathetic nervous system and the para-sympathetic

nervous system. The sympathetic NS (thoraco-lumbar nerves) mobilizes the body systems during activity "fight or flight". The Para--sympathetic NS (cranio-sacral nerves) conserves energy. It promotes "body-keeping" functions during rest and sleep, rest and digest, feed and breed.

Most sympathetic nerve endings secrete nor-epinephrine (NE). NE excites most of the visceral structures. The sympathetic NS mobilizes the body's systems during activity "Fight or Flight" [2].

Functionally, the parasympathetic NS dominates the functions of the autonomic NS in the fetus in intra-uterine life and after birth in the infant/child, rest and digest and later in adults feed and breed.

Stimulation of the sympathetic NS dilates the pupil of the eye. It leads to rise in the blood pressure (BP). It excites the liver to release glucose, and increases the rate of metabolism of essentially all the cells of the body, "fight or flight".

### INCONTINENCE: [3-30]

It means loss of continence. There are two major types of incontinence of body excreta, urinary incontinence (UI) and fecal incontinence (FI). Both are

\*Address correspondence to this author at the Faculty of Medicine, Al Azhar University, Cairo, Egypt; Tel: +2 22607085- +2 01001577969; Fax: +2 24020184; E-mail: profakhemaly@hotmail.com

major health and social problems. Both or either one leads to loss of self-esteem and poor quality of life (QOL).

In cases of body excreta (urine and stool), the ability of controlling the bladder and the bowel is gained by learning and training in early childhood how to keep high alpha sympathetic tone at an intact internal urethral sphincter (IUS) and healthy internal anal sphincter (IAS), thus maintaining their closure all the time. In addition, we described the IUS and the IAS as collagen-muscle tissue cylinders. The IUS extends from the urinary bladder neck to the perineal membrane in both sexes. The IAS surrounds the anal canal, with the external anal sphincter surrounds the IAS in its lower part. Urinary and fecal incontinence can be due to troubles in the nerve receptors, sacral nerves, the CNS, the sympathetic nerves or torn, weak IUS and/or the IAS. In women, childbirth trauma leads to over stretching of the vagina thus causing laceration of the closely related IUS in front and/or the IAS posteriorly [3-7]. The lacerations affect the collagen

chassis of the sphincters causing their weakness, and subsequent incontinence, Figure 1 and 2.

**MANAGEMENT**

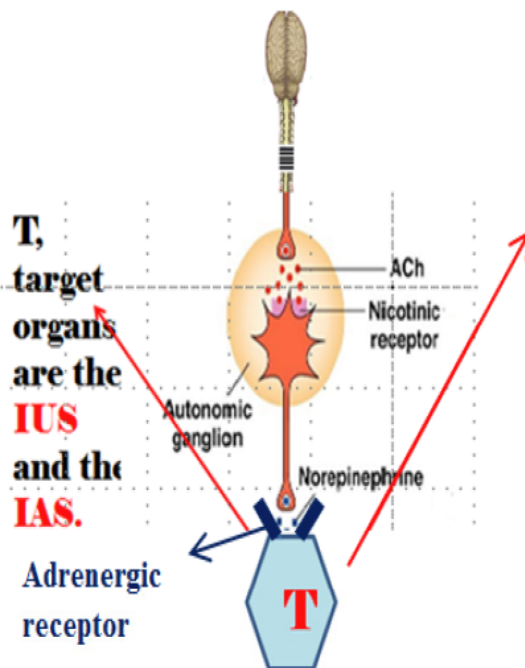
**1. Diagnosis: [3, 10-15]**

In addition to the clinical history and examination, medical imaging is important. Medical imaging with tools which show multi-plane e.g. ultrasound (US) especially three-dimension ultrasound (3DUS), computerized-tomography (CT) scan or magnetic resonance imaging (MRI) to show lacerations in the IUS and/or the IAS. Normally, imaging the pelvis you find the urethra is empty and closed. If you see it open then there is urinary incontinence. Similarly, normally the anal canal is empty and closed in continent people; if on imaging it is open then there is fecal incontinence.

**2. Treatment: [5, 16-20, 23]**

Correction of the pathology of body's excreta incontinence is either: Medical, e.g. giving alpha-

**The CNS controls the sympathetic system.**



**Continence is a**

**Nerve-muscle action.**

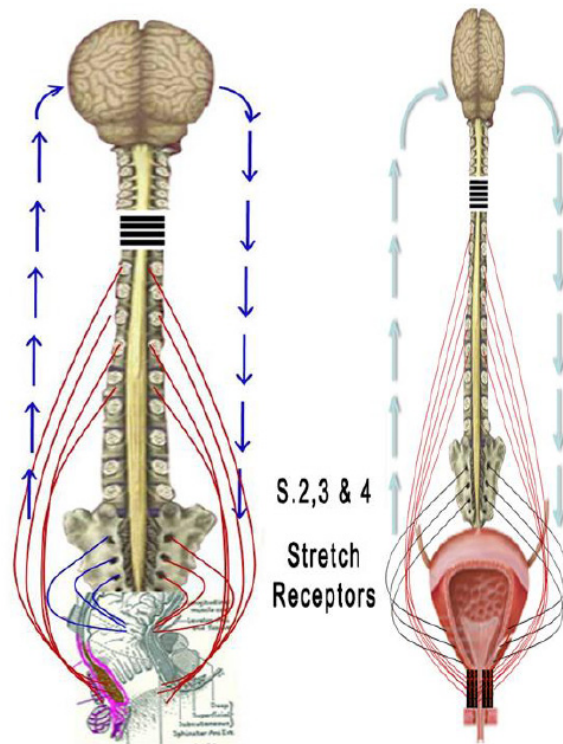
**T. Target organs: IUS & IAS.**

**Correction of the pathology is:**

**Medical or Surgical.**

T=target organs. IUS= Internal urethral sphincter. IAS= Internal anal sphincter. Ach=Acetylcholine. NE= Nocturnal Enuresis.

**Figure 1:** CNS controls the neuro-muscular actions taken to gain continence on body excreta. T is target organ (the internal urethral sphincter (IUS) –the internal anal sphincter (IAS)). Correction of the pathology is by medical treatment e.g. giving alpha-sympathetic stimulants e.g. ephedrine in cases of NE; giving alpha-blocker in cases of retention of urine. Surgical correction of torn IUS &/or IAS will cure SUI and FI.



**The integrative and controlling centers of the brain can acquire by learning, and training how to master, synchronize, and harmonize different responses according to social circumstances.**

**Figure 2:** CNS controls the second stage of micturition and defecation.

sympathetic stimulant like ephedrine in cases of nocturnal enuresis (NE); and giving alpha-blockers in cases of retention of urine Figure 3 and 4.

Surgical correction in cases of torn IUS and/or IAS in cases of stress urinary incontinence (SUI), and/ or fecal incontinence (FI) is to perform Urethro-Ano-Vaginoplasty operation.

#### **DISCUSSION: [3-30]**

Continence is an acquired behavior gained by learning and training how to master and control behavior and reaction to different evoking stimuli.

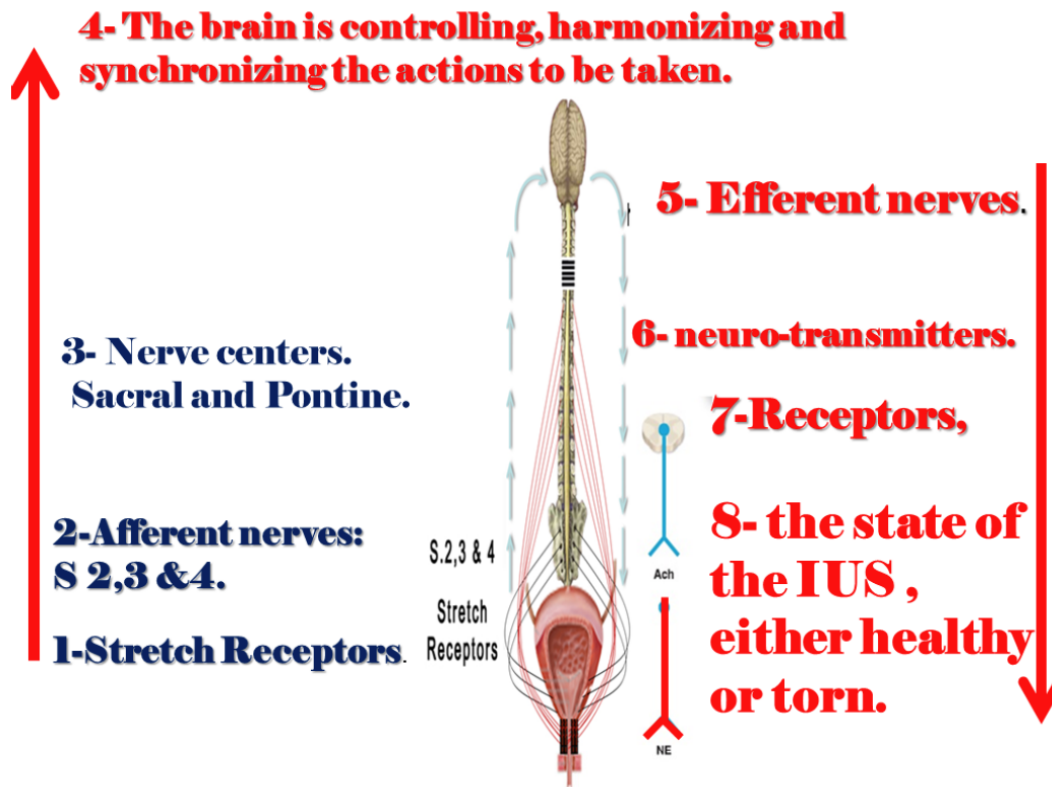
Continence is a nerve-muscle action. After learning, sympathetic response to evoking stimulus leads to: 1- holding back (continence), 2- or fight 3- or flight". If the situation is over –whelming e.g. severe fear, the result is sympathetic failure and subsequent incontinence.

The integrative and controlling centers of the brain can acquire by learning and training how to master, synchronize, and harmonize different responses according to social circumstances. Continence is the result of nerve-muscle actions.

The integrative centers of the brain can acquire by learning and training how to master, control, synchronize, and harmonize different responses according to social circumstances. We gain progressively rising up sympathetic tone from everyday life stress, annoyance, teaching, training, and experience. It is how, one can control the sympathetic NS is the way to gain continence. An alert healthy CNS, peripheral somatic nerves, autonomic nervous system and healthy intact target organs are essential factors to be continent. Temporary failure of the controlling, integrative centers of the brain, (will mask the controlling, facultative and integrative functions of the high CNS centers), as for example getting drunk will lead to temporary or transient incontinence. Damaged, torn target organs will lead to incontinence e.g. torn IUS leads to stress urinary incontinence (SUI); torn IAS leads to fecal incontinence (FI).

Medical correction of nocturnal enuresis is by giving ephedrine. Ephedrine acts on alpha-receptors as agonist; in addition, it stimulates the alpha-sympathetic nerve endings to secrete NE. Surgical correction of body excreta incontinence (SUI & FI) is by performing "Urethro-Ano-Vaginoplasty" [4, 8, 16].

Urethro-Ano-Vaginoplasty operation consists of two parts, Anterior and Posterior sections.



S.2, 3 &4= Sacral nerves 2, 3 &4. Ach= Acetylcholine. NE= Nor-Epinephrine.

Figure 3: Steps of the neuro-muscular control of micturition.

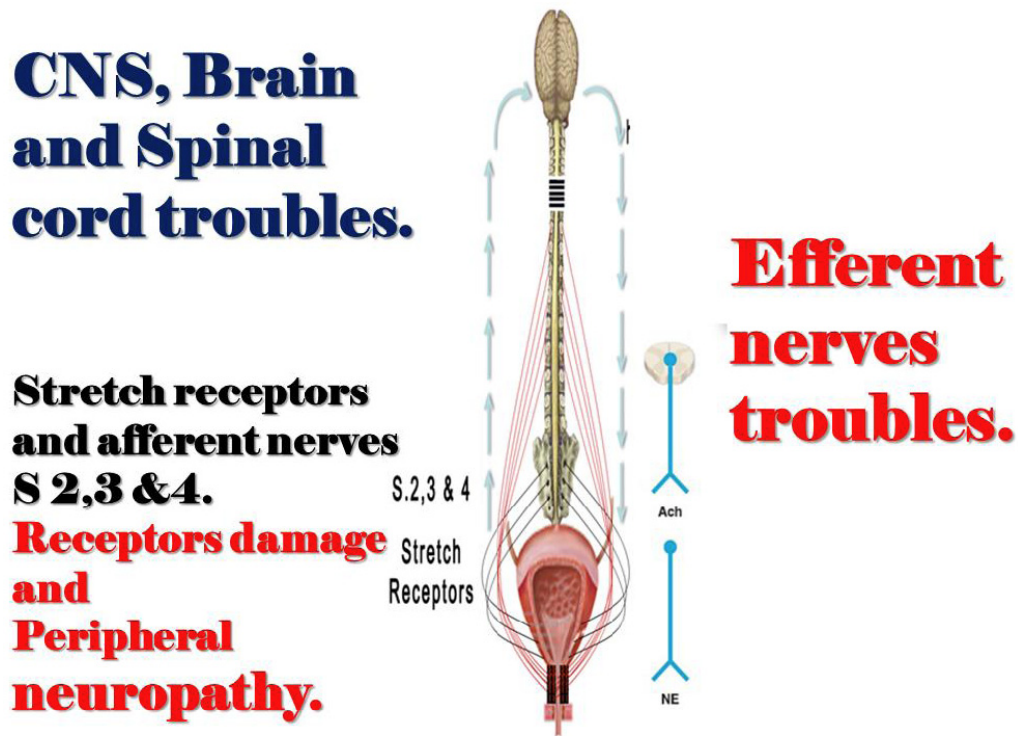


Figure 4: Pathology in the neuro-muscular actions steps, which may affect urinary continence.

In the anterior section, we correct the SUI and the anterior vaginal wall descent by performing:

1- Expose the IUS (we dissect the IUS clear from the anterior vaginal wall).

2- Mend the torn sphincter.

3- Strengthen the anterior vaginal wall by overlapping the two vaginal flaps, by this way; we also add extra support to the mended IUS.

In the posterior section we:

1- Expose the IAS (by dissecting the torn IAS clear from the posterior vaginal wall).

2- Mend the torn sphincter.

3- Approximate the two-levator ani muscles.

4- Strengthen the posterior vaginal wall by overlapping the two vaginal flaps; also, we add extra support to the mended IAS.

5- Repair the perineum.

## CONCLUSION

Continence is an acquired behavior gained by learning and experience how to control the sympathetic NS. There must be an alert brain with healthy nervous circuit and healthy target organs. The most common cause of incontinence in children is nocturnal enuresis and its treatment is with ephedrine. The most common cause of incontinence in women is childbirth trauma leading to torn weak IUS and IAS. This can be treated surgically by performing Urethro-Ano-Vaginoplasty.

## REFERENCES:

- [1] Abdel Karim El Hemaly, Laila Mousa, Ibrahim Kandil. Continence and Incontinence: How Can You Gain Continence? ISBN 978-3-639-66683-0, Scholars press. November 2014.
- [2] Brodal, P. The Central Nervous System: Structure and Function (3 ed.). Oxford University Press, 2004; pp. 369-396. ISBN 0-19-516560-8.)
- [3] Imaging of the Pelvic Floor, Abdel Karim M. El Hemaly, Laila A.E.S. Mousa, Ibrahim M. Kandil and Khaled A Shehata, Current Medical Imaging Reviews 2014; 10(3): pp. 205-214.
- [4] Abdel Karim M. El Hemaly, Laila A.E.S. Mousa, Ibrahim M. Kandil, and Abdul Kareem A. Al-Adwani. Pelvic Floor Dysfunction and its Reconstructive Surgery: Novel Concepts; Createspace, an ISBN 978-1-001-04115, Amazon Company, 2014.
- [5] Abdel Karim M. El Hemaly, Laila A.S. Mousa and Ibrahim M. Kandil. Micturition and Urinary Incontinence, Journal of Nephrology and Urology Research, 2014; 2(1): 19-26.
- [6] Abdel Karim M. El Hemaly, Laila A. Mousa and Ibrahim M. Kandil. The Concept and Pathophysiology of Urinary Incontinence; in: Ammar Alhasso and Ashani Fernando, eds. Urinary Incontinence. INTECH Publication; April 2012; 145-160.
- [7] Abdel Karim M. El Hemaly, Laila A. Mousa and Ibrahim M. Kandil, Magdy S. Al Sayed, Mohammed Abdel Zaher, Magdi SA. Soliman and Ahmad G. Serour. A Novel Concept on the Patho-Physiology of Defecation and Fecal Incontinence (FI) in Women-Moreover, Its Reconstructive Surgery; in: Anthony G. Catto-Smith, ed. FECAL INCOTINENCE Causes, Management AND OUTME. INTECH Publication; April 2014; 47-67.
- [8] Abdel Karim M El Hemaly, Laila A Mousa, Ibrahim M Kandil, Abdul Kareem A. Al-Adwani in Pelvic Floor Dysfunction And Its Surgical Treatment: Novel Concepts On Pelvic Organs Dysfunction And Their Reconstructive Surgery, in Abdul Kareem A. Al-Adwani eds, Al Ahram, Cairo, Egypt, Al Ahram Publication Ltd, October 2013.
- [9] Abdel Karim M. El Hemaly, Laila AS. Mousa, Ibrahim M. Kandil. Micturition and Urinary Incontinence, Journal of Nephrology and Urology Research 2014; 2(1): 19-26.
- [10] Abdel Karim M El Hemaly, Laila A Mousa, Asim Kurjak, Ibrahim M Kandil, Ahmad G Serour. Pelvic Floor Dysfunction, the Role of Imaging and Reconstructive Surgery, Donald School Journal of Ultrasound in Obstetrics and Gynecology, DSJUOG, January-March 2013; 7(1): 86-97
- [11] Abdel Karim M. El Hemaly, Laila A. Mousa, Ibrahim M. Kandil. The Concept and Pathophysiology of Urinary Incontinence; in: Ammar Alhasso and Ashani Fernando, eds. Urinary Incontinence. www. Intechopen.com Publication; April, 2012; 145-160.
- [12] Abdel Karim M. El Hemaly\*, Ibrahim M. Kandil, Asim Kurjak, Laila A. S. Mousa, Hossam H. Kamel, Ahmad G. Serour. Ultrasonic Assessment of the Urethra and the Vagina in Normal Continent Women and Women Suffering from Stress Urinary Incontinence and Vaginal Prolapse. Donald School Journal of Ultrasound in Obstetrics and Gynecology, DSJUOG, 2011; 5(4): 330-38.
- [13] Abdel Karim M. El Hemaly\*, Ibrahim M. Kandil, Asim Kurjak, Laila A. S. Mousa, Hossam H. Kamel, Ahmad G. Serour. Ultrasound Assessment of the Internal Anal Sphincter in Women with Fecal Incontinence and Posterior Vaginal Wall Prolapse (Rectocele). Donald School Journal of Ultrasound in Obstetrics and Gynecology, DSJUOG 2011; 5(4): 330-42.
- [14] Abdel Karim M. El Hemaly\*, Ibrahim M. Kandil, Asim Kurjak, Ahmad G. Serour, Laila A. S. Mousa, Amr M. Zaied, Khalid Z. El Sheikha. Imaging the Internal Urethral Sphincter and the Vagina in Normal Women and Women Suffering from Stress Urinary Incontinence and Vaginal Prolapse. Gynaecologia Et Perinatologia 2009; 18(4): 169-286.
- [15] Abdel Karim M. El Hemaly\*, Laila A. S. Mousa Ibrahim M. Kandil, Fatma S. El Sökkary, Ahmad G. Serour, Hossam Hussein. Fecal Incontinence, A Novel Concept: The Role of the internal Anal sphincter (IAS) in defecation and fecal incontinence. Gynaecologia Et Perinatologia 2010; 19(2): 79-85.
- [16] Abdel Karim M. El Hemaly\*, Laila A. S. Mousa Ibrahim M. Kandil, Fatma S. El Sökkary, Ahmad G. Serour, Hossam Hussein. Surgical Treatment of Stress Urinary Incontinence, Fecal Incontinence and Vaginal Prolapse By A Novel Operation "Urethro-Ano-Vaginoplasty" Gynaecologia Et Perinatologia 2010; 19(3): 129-188.
- [17] Abdel Karim M. El Hemaly\*, Ibrahim M. Kandil, Laila A. S. Mousa and Mohamad A.K.M.El Hemaly. Urethro-vaginoplasty, an innovated operation for the treatment of: Stress Urinary Incontinence (SUI), Detursor Overactivity (DO), Mixed Urinary Incontinence and Anterior Vaginal Wall Descent. <http://www.obgyn.net/urogyn/urogyn.asp?page=/urogyn/artic>



- es/ urethro-vaginoplasty\_01
- [18] Abdel Karim M. El Hemaly, Ibrahim M Kandil, Mohamed M. Radwan. Urethro-raphy a new technique for surgical management of Stress Urinary Incontinence. <http://www.obgyn.net/urogyn/urogyn.asp?page=/urogyn/articles/new-tech-urethro>
- [19] Abdel Karim M. El Hemaly, Ibrahim M Kandil, Mohamad A. Rizk, Nabil Abdel Maksoud H., Mohamad M. Radwan, Khalid Z. El Shieka, Mohamad A. K. M. El Hemaly, and Ahmad T. El Saban. Urethro-raphy The New Operation for the treatment of stress urinary incontinence, SUI, detrusor instability, DI, and mixed-type of urinary incontinence; short and long term results. <http://www.obgyn.net/urogyn/urogyn.asp?page=urogyn/articles/urethroraphy-09280>
- [20] Abdel Karim M. El Hemaly, Ibrahim M Kandil, Bahaa E. El Mohamady. Menopause, and Voiding troubles. <http://www.obgyn.net/displayppt.asp?page=/English/pubs/features/presentations/El-Hemaly03/el-hemaly03-ss>
- [21] El Hemaly AKMA, Mousa L.A. Micturition and Urinary Continence. *Int J Gynecol Obstet* 1996; 42: 291-2. [http://dx.doi.org/10.1016/0020-7292\(95\)02620-7](http://dx.doi.org/10.1016/0020-7292(95)02620-7)
- [22] Abdel Karim M. El Hemaly. Urinary incontinence in gynecology, a review article. [http://www.obgyn.net/urogyn/urogyn.asp?page=/urogyn/articles/abs-urinary\\_incontinence\\_gyn\\_ehemaly](http://www.obgyn.net/urogyn/urogyn.asp?page=/urogyn/articles/abs-urinary_incontinence_gyn_ehemaly)
- [23] El Hemaly AKMA. Nocturnal Enuresis: Pathogenesis and Treatment. *Int Urogynecol J Pelvic Floor Dysfunct* 1998; 9: 129-31. <http://dx.doi.org/10.1007/BF02001079>
- [24] El Hemaly AKMA, Mousa LAE. Stress Urinary Incontinence, a New Concept. *Eur J Obstet Gynecol Reprod Biol* 1996; 68: 129-35. [http://dx.doi.org/10.1016/0301-2115\(96\)02482-7](http://dx.doi.org/10.1016/0301-2115(96)02482-7)
- [25] El Hemaly AKMA, Kandil I. M. Stress Urinary Incontinence SUI facts and fiction. Is SUI a puzzle?! <http://www.obgyn.net/displayppt.asp?page=/English/pubs/features/presentations/El-Hemaly/el-hemaly-ss>
- [26] Abdel Karim El Hemaly, Nabil Abdel Maksoud, Laila A. Mousa, Ibrahim M. Kandil, Asem Anwar, M.A.K El Hemaly and Bahaa E. El Mohamady. Evidence based Facts on the Pathogenesis and Management of SUI. <http://www.obgyn.net/displayppt.asp?page=/English/pubs/features/presentations/El-Hemaly02/el-hemaly02-ss>
- [27] Abdel Karim M. El Hemaly\*, Ibrahim M. Kandil, Mohamad A. Rizk and Mohamad A.K.M.El Hemaly. Urethro-plasty, a Novel Operation based on a New Concept, for the Treatment of Stress Urinary Incontinence, S.U.I., Detrusor Instability, D.I., and Mixed-type of Urinary Incontinence. [http://www.obgyn.net/urogyn/urogyn.asp?page=/urogyn/articles/urethro-plasty\\_01](http://www.obgyn.net/urogyn/urogyn.asp?page=/urogyn/articles/urethro-plasty_01)
- [28] Ibrahim M. Kandil, Abdel Karim M. El Hemaly, Mohamad M. Radwan: Ultrasonic Assessment of the Internal Urethral Sphincter in Stress Urinary Incontinence. *The Internet Journal of Gynecology and Obstetrics* 2003; 2(1).
- [29] Abdel Karim M. El Hemaly. Nocturnal Enureses: A Novel Concept on its pathogenesis and Treatment. [http://www.obgyn.net/urogynecology/?page=articles/nocturnal\\_enuresis](http://www.obgyn.net/urogynecology/?page=articles/nocturnal_enuresis)
- [30] Abdel Karim M. El Hemaly. Nocturnal Enureses: An Update on the pathogenesis and Treatment. [http://www.obgyn.net/urogynecology/?page=/ENHLIDH/PUBD/FEATURES/Presentations/Nocturnal\\_Enuresis/nocturnal\\_enuresisReferences](http://www.obgyn.net/urogynecology/?page=/ENHLIDH/PUBD/FEATURES/Presentations/Nocturnal_Enuresis/nocturnal_enuresisReferences)

Received on 25-03-2015

Accepted on 21-05-2015

Published on 02-07-2015

<http://dx.doi.org/10.15379/2408-9761.2015.02.02.04>© 2015 Hemaly *et al.*; Licensee Cosmos Scholars Publishing House.

This is an open access article licensed under the terms of the Creative Commons Attribution Non-Commercial License

[\(http://creativecommons.org/licenses/by-nc/3.0/\)](http://creativecommons.org/licenses/by-nc/3.0/), which permits unrestricted, non-commercial use, distribution and reproduction in any medium, provided the work is properly cited.