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Short Communication

Non Surgical Management of Stress Urinary Incontinence (SUI)

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Abbreviations

PFMT: Pelvic Floor Muscle Training; SUI: Stress Urinary Incontinence; PRP: Platelet Rich Plasma; POP: Pelvic Organ Prolapse; PUL: Pubourethral Ligament; HIFEM: High-Intensity Focused Electromagnetic; FDA: Food and Drug Administration; HIFU: High-Intensity Focused Ultrasound

Introduction

Urinary incontinence is defined as the involuntary leakage of urine. This condition occurs in both men and women, but is much more frequent in women. It is typically related to dysfunction of urinary bladder or pelvic floor muscles which occur after childbirth or due to ageing related to menopause. In women, there are two main types of urinary incontinence - stress incontinence and urge incontinence.

According to the International Urogynecological Association (IUGA) and the International Continence Society (ICS) standard definition, Stress urinary incontinence (SUI) is defined as "the complaint of any involuntary loss of urine on effort or physical exertion (e.g. sporting activities) or on sneezing or coughing" [1].

Urinary incontinence is the unintentional, accidental, loss of urine. Stress incontinence is the type of involuntary loss of urine that happens during physical movement or activity (for instance coughing, sneezing, laughing, standing up or running, heavy lifting), conditions that elevate the abdominal pressure (stress) on the bladder. Stress incontinence is certainly not related to psychological stress.

Risk factors cited for the development of SUI included: advanced age; obesity; vaginal deliveries, in which, damage may occur to local musculature and innervation as the fetus passes; traumatic deliveries involving forceps and/or episiotomies; multiparity and pregnancy at an advanced age; estrogen deficiency, conditions associated with increased intraabdominal pressure; smoking; diabetes; collagen diseases; neuropathies; and history of hysterectomy [2].

Stress incontinence differs from urge incontinence, which is the unintentional loss of urine which may be caused by the bladder muscle contraction, usually associated with a sense of urgency. Stress incontinence is more common in women of young to middle age.

These two subtypes often coexist, as a combination of symptoms termed mixed incontinence. The reported prevalence rates for urinary incontinence of any type in adult women is between 5 - 72% with a median rate of about 30% [3-9]. As urinary incontinence is highly prevalent, it has an immense effect on health-related quality of life and has huge financial implications [10,11]. The treatment options of urinary incontinence vary from active pelvic floor rehabilitation exercises, lifestyle changes (including fluid optimization), pharmacological treatment or surgery. Non surgery options are often utilized as the first option and are popular in such patients but are difficult to comply. Surgery was often recommended as an option after other treatment options had failed. In this regard, sling procedures like, retropubic mid-urethral sling, trans-obturator mid urethral sling and colpo-suspension were surgery techniques. However, a recent meta-analysis has reported that long term data on patients undergoing such procedures regarding effectiveness and adverse events was lacking. Moreover, all surgeries have inherent risks of infection, injury to other pelvic organs including urinary bladder caused by the mesh tapes for the slings and issues related to anesthesia.

Lately CO_2 Laser, high-intensity focused electromagnetic (HIFEM) therapy, Platelet rich plasma (PRP), High-intensity focused ultrasound (HIFU) has been shown to have good results in treatment of urinary incontinence symptoms and improve the quality of life [12,13]. These non-invasive modalities have lately been approved by FDA for treatment of urinary incontinence.

In 2016, the US Food and Drug Administration (FDA) reclassified the use of mesh kits in urogynaecology as Class III medical devices requiring pre-market approval. The resultant media attention and class actions against manufacturers of these devices has resulted in the withdrawal of most pelvic organ prolapse (POP) mesh devices from the market. Thus, there is strong public interest in and a clinical need for a minimally-invasive, non-hormonal, effective treatment for SUI.

Choice of intervention in stress urinary incontinence (SUI)

Non surgical interventions

1. Behavioral therapy: A behavioral modification program for SUI consists of the following: 1) patient education regarding the function of the lower urinary tract, 2) fluid and dietary management, 3) timed voiding, prompted voiding, or bladder training and 4) a voiding log or diary, usually combined with 5) Kegel exercises. For most patients, the aim of behavioral therapy is to help regain bladder control by increasing the effective capacity of the bladder, thereby reducing the symptoms of urinary incontinence [14].
2. Pelvic floor muscle training: Pelvic floor muscle training (PFMT) can be one of the most important components of behavioral therapy. PFMT exercises help the patient strengthen the muscles of the pelvic floor [14].
3. Fractional CO_2 laser therapy has been shown to be a potential non-surgical treatment alternative for SUI. The subclinical thermal tissue effect from the laser beam induces human dermal fibroblasts to initiate an inflammatory healing cascade, stimulating de novo collagen and elastin synthesis resulting in a thicker vaginal epithelium with larger diameter, glycogen-rich epithelial cells. It is well known that using laser energy to achieve heat pulsing (i.e. temporarily increasing the temperature) of collagen can improve collagen structure and initiate neocollagenesis. As a result of the temperature increase, intermolecular cross-links that stabilize collagen triple-helix structure are broken, which leads to the shrinkage of collagen fibrils and improvement in tissue firmness [15].

   Collagen is an important component of the pelvic floor supportive structures, and it makes up more than 80% of protein content of the endopelvic fascia. Childbirth trauma can lead to destruction of collagen fibers in the pelvic floor, while aging slows down the synthesis of new collagen, both resulting in decreasing collagen content [17]. It was shown that pubocervical fasciae of incontinent women have low collagen content [18] and also that SUI is more frequent in women with reduced collagen content in their anterior vaginal walls [16].
4. HIFEM: The high-intensity focused electromagnetic (HIFEM) therapy would be given by electromagnetic stimulation of the pelvic floor by chair device. The electromagnetic field passes in a non-invasive manner through the neuromuscular tissue where induced electric currents depolarize neuronal cells and initiate action potentials [17]. The high frequency of action potentials then leads to selective and supramaximal muscle contractions. In this device a coil generates pulsed electromagnetic fields that penetrate deep into the pelvic floor muscles when a person sits on the chair inducing stimulation of the pelvic muscles and contracting them rhythmically in order to strengthen them. The device generates a focused electromagnetic field with intensities of up to 2.5 T and penetrating into depths of up to 10 cm. The electromagnetic energy produced is directed vertically upward from the centre of the seat. The chair design ensures that the patient's perineum is centered when he/she is sitting upright on the chair. This deep pelvic floor muscle contractions produced by this device are equivalent of 11,200 Kegel exercises over 28 minutes time interval (as mentioned by the manufactures of the device). This 28 minute time interval would be the total time duration of the single day therapy. The treatment protocol will consist of six treatments scheduled twice a week. In our centre, we have introduced first chair of India with high satisfaction rate.
5. Platelet rich plasma (PRP): Platelet rich plasma (PRP) is extremely rich in growth factors and cytokines, which regulate tissue reconstruction and has been studied extensively among trauma patients and trauma experimental models [18]. To date, however, there is no evidence to support or oppose its use in women who suffer from SUI due to pubourethral ligament (PUL) damage. PRP is an easily produced and relatively inexpensive biologic material. It is produced directly from the patient's blood and is, thus, superior to synthetic materials in terms of potential adverse effects such as from foreign body reaction.

6. High-intensity focused ultrasound (HIFU): In consideration of developing a novel and more effective approach to treating SUI, a transurethral ultrasound energy source that can target tissue regions adjacent to the mid-urethra is required. In defining the proper target zone based upon physiologic studies, the weakest tissue region leading to SUI is around the middle section of the urethra, ~1.5 - 2 cm from the bladder neck, where abdominal pressure is the highest [19]. The targeted treatment region includes endopelvic fascia, pubourethral ligaments, the levator ani and other adjacent connective tissues, ligaments lateral to the urethra. Transurethral high-intensity ultrasound applicators means to precisely target heating in the endopelvic fascia and surrounding tissues along the mid-urethral zone, with potential to generate tissue stiffening and remodeling. Thermal treatment that tightens this tissue may produce a biologic 'hammock' by remodeling collagen and connective tissue and increasing hydrostatic pressure.

Bibliography

1. Bernard T Haylen., *et al.* "An International Urogynecological Association (IUGA)/International Continence Society (ICS) joint report on the terminology for female pelvic floor dysfunction". *Neurourology and Urodynamics* 29 (2009): 4-20.

2. Saja Mohammed Jasim and Raed Younis Khalil Al-Rawi. "Efficacy and safety of vaginal CO2Laser treatment in female stress urinary incontinence". *Medical Journal of Babylon* 15.3 (2018): 251-257.

3. Irwin DE., *et al.* "Population-based survey of urinary incontinence, overactive bladder, and other lower urinary tract symptoms in five countries: results of the EPIC Study". *European Urology* 50 (2006): 1306-1315.

4. Minassian VA., *et al.* "Urinary incontinence in women". *Obstetrics and Gynecology* 111 (2008): 324-331.

5. Ebbesen MH., *et al.* "Prevalence, incidence and remission of urinary incontinence in women: longitudinal data from the Norwegian HUNT study (EPINCONT)". *BMC Urology* 13 (2013): 27.

6. Zhang L., *et al.* "A population-based survey of the prevalence, potential risk factors, and symptom-specific bother of lower urinary tract symptoms in adult Chinese women". *European Urology* 68 (2015): 97-112.

7. Botlero R., *et al.* "Prevalence and incidence of urinary incontinence in women: review of the literature and investigation of methodological issues". *International Journal of Urology* 15 (2008): 230-234.

8. Milsom I., *et al.* "In: Incontinence. 5th International Consultation on Incontinence". Abrams P, Cardozo L, Khoury S, Wein A, editors. ICUD-EAU (2013): 15-107.

9. Stewart WF., *et al.* "Urinary incontinence incidence: quantitative meta-analysis of factors that explain variation". *The Journal of Urology* 191 (2014): 996-1002.

10. DP Keane., *et al.* "Bailey Analysis of collagen status in premenopausal nulliparous women with genuine stress incontinence". *BJOG: An International Journal of Obstetrics and Gynaecology* 104.9 (1997): 994-998.

11. T Rechberger., *et al.* "Role of fascial collagen in stress urinary". *Incontinence American Journal of Obstetrics and Gynecology* 179.1 (1998): 1511-1514.

12. Liu H., *et al.* "Laser induced collagen remodeling: A comparative study *In vivo* on mouse model". *Lasers in Surgery and Medicine* 40 (2008): 13-19.

13. Dumoulin C and Hay-Smith J. "Pelvic floor muscle training versus no treatment, or inactive control treatments, for urinary incontinence in women". *The Cochrane Database of Systematic Reviews* 1 (2010): CD005654.

14. Eric S Rovner and Alan J Wein. "Treatment Options for Stress Urinary Incontinence". *Nature Reviews Urology* 6.3 (2004): 29-47.

15. Fariba Behnia-Willison., *et al.* "Fractional CO2 laser for treatment of stress urinary incontinence". *European Journal of Obstetrics and Gynecology and Reproductive Biology* 1 (2019): 100004.

16. Dumoulin C and Hay-Smith J. "Pelvic floor muscle training versus no treatment, or inactive control treatments, for urinary incontinence in women". *The Cochrane Database of Systematic Reviews* 1 (2010): CD005654.

17. Julene B Samuels., *et al.* "Safety and Efficacy of a Non-Invasive High-Intensity Focused Electromagnetic Field (HIFEM) Device for Treatment of Urinary Incontinence and Enhancement of Quality of Life". *Lasers in Surgery and Medicine* 51 (2019): 760-766.

18. Nikolopoulos KI., *et al.* "Restoration of the pubourethral ligament with platelet rich plasma for the treatment of stress urinary incontinence". *EPUB* 90 (2016): 29-31.

19. Dong Liu., *et al.* "Transurethral high-intensity ultrasound for treatment of stress urinary incontinence (SUI): simulation studies with patient-specific models". *International Journal of Hyperthermia* 34 (2018): 1236-1247.