

Review Article

Focus on Treatment for Bladder Control Problems (Urinary Incontinence)

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Introduction

Disease increases with age and causes problems for those affected. Bladder and urinary tract are among important parts of the body that will have problems related to aging. Urinary Incontinence (UI), also known as involuntary urination is one of these problems. Since this disease has side effects even at the patient's social relationships, trying to cure is of particular importance. Therefore, this article aims at reviewing methods done so far as well as proposing a new approach that is being reviewed and completed by a research team at the University of Sheikhabaee (SHBU). This approach is said to be very beneficial for Urinary incontinence and it lacks any kind of complications.

Urinary incontinence (UI), also known as involuntary urination is one of the most prominent diseases in urinary tract system that has been discussed in the following: Inability to control urination due to the destruction of the sensory nerve fibers and Atomic bladder-If the sensory nerve fibers destroy from the bladder to the spinal cord and prevent transmission of Stretching signals from bladder reflex contraction urination can't be create [1]. In this situation despite being entire neurogenic communication with the brain and despite entire efferent fibers from the cord to the bladder the person loses control of bladder. Bladder instead of emptying periodically fills to capacity and every so often one a few drops of urine through the overflow 4 Urethra. This condition is called uncontrolled urination by overflow that called over flow incontinence [2].

Atomic bladder is a common cause of spinal cord injury from crush sacral area. Some diseases that can enter the spinal cord damage dorsal root nerve fibers. For instance, Syphilis can cause fibrosis tight around nerve fibers in the spinal dorsal root and destroy the fibers. This condition is called Tabes dorsalis and is the resulting disturbances in bladder are known as tabetic blad-

der. Uninhibited Neurogenic Bladder Caused by Lack of Inhibitory Signals from the Brain-Other disorders of micturition, is the uninhibited neurogenic bladder which results in frequent and relatively uncontrolled micturition [2,3]. This is due to partial damage in the spinal cord or the brain stem that cuts most of the inhibitory signals.

Proposed Methods for Involuntary Urination Treatment

Electrodes are temporarily inserted into the rectum or the vagina to stimulate and strengthen the pelvis floor muscles.

Medications: Medications commonly used to treat incontinence include:

- Anticholinergic.
- Mirabegron (MYRBETRIQ).
- Alpha blockers.
- Topical Estrogen.

Medical Devices

Devices that are designed to treat human with incontinence include the following:

Urethral Insert

A small, tampon-like disposable device inserted into the urethra before a specific activity, such as tennis, that can cause incontinence. It is acts like a plug served to prevent leakage of urine and is removed before urination.

Pessary

A stiff ring that is placed inside the vagina and used all day

the device helps hold up the bladder, which lies near the vagina, to prevent urine leakage. Pessary is beneficial if you have incontinence because of a prolapsed bladder or uterus.

Interventional Therapies

Interventional therapies that may help with incontinence include the following:

Bulking Material Injections

A synthetic material is injected into tissue surrounding the urethra. The bulking material assists to keep the urethra closed and reduce urine leakage. This procedure is much less effective than more-invasive treatments such as surgery for stress incontinence and usually needs to be repeated regularly.

Botulinum Toxin Type A (Botox)

Injections of Botox into the bladder muscle may benefit people who have an overactive bladder. Botox is generally prescribed to people only if other first line medications haven't been successful.

Nerve Stimulators

A device resembling a pacemaker is implanted under your skin to deliver painless electrical pulses to the nerves involved in bladder control (sacral nerves). Stimulating the sacral nerves can control urge incontinence if other therapies haven't worked. The device may be implanted under the skin in your buttock and connected directly to the sacral nerves or may deliver pulses to the sacral nerve via a nerve in the ankle.

Surgery

If other treatments aren't working, several surgical procedures can treat the problems that cause urinary incontinence:

Bladder Augmentation via Bowel through Surgery

Bladder augmentation, also called augmentation cytoplasts. This procedure is used for patients with small, stressed, and high pressure bladder that all treatment options mentioned have not worked for them. This procedure is a big and long operation. A piece of bowel (50 to 60 cm) is removed and shaped like bladder and joined to the patient's bladder (see Figure 1 and Figure 2)

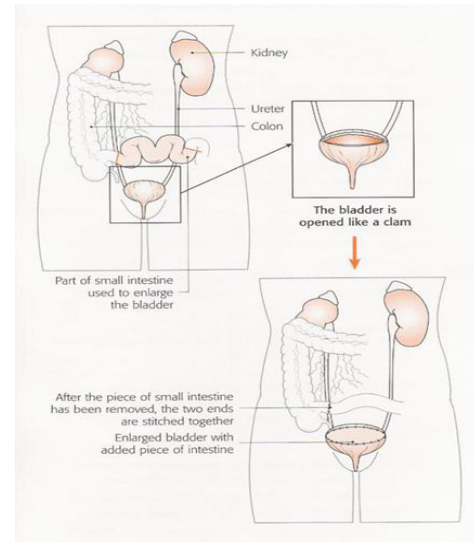


Figure 1: The Schematic of Bladder Augmentation via Bowel via Surgery [4].

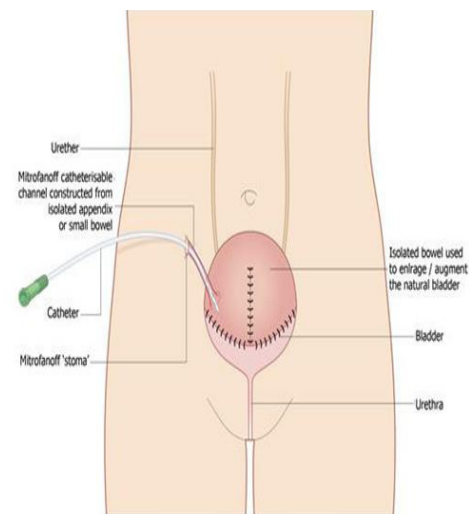


Figure 2: A Bladder augmentation via Bowel via Surgery [5].

Urethral Sling Surgery

The sling helps close urethra and bladder neck specially when coughing and sneezing. This procedure is used to treat stress urinary incontinence (see Figure 3A and Figure 3B).

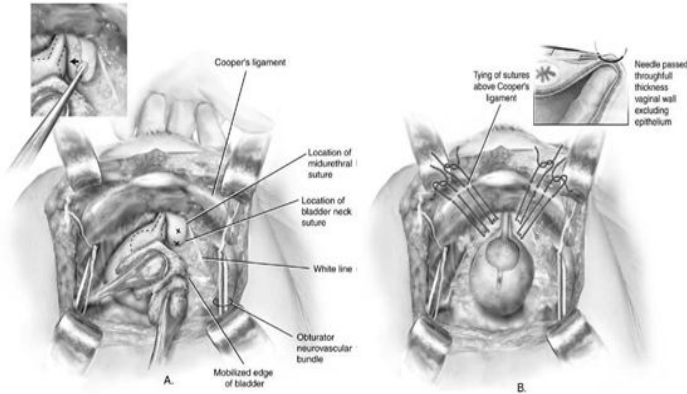


Figure 3A-B: The Urethral Sling Procedure: Figure 3A: Burch Colposuspension and Figure 3B: The Proximal Urethra and Bladder Neck [6].

Bladder Neck Suspension

This procedure is designed to provide support to your urethra-quad bladder neck - an area of thickened muscle where the bladder connects to the urethra. It involves an abdominal incision, so it's done during general or spinal anesthesia. The (Figure 4) shows bladder neck suspension procedure.

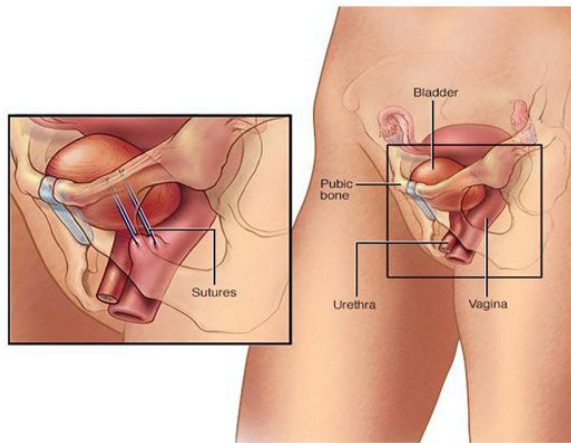


Figure 6: A Bladder Neck Suspension [7].

Prolapse Surgery

In women with mixed incontinence and pelvic organ prolapse, surgery may include a combination of a sling procedure and Prolapse surgery. The normal female pelvic anatomy and vaginal prolapse are presented in (Figure 5 A and Figure 5B).

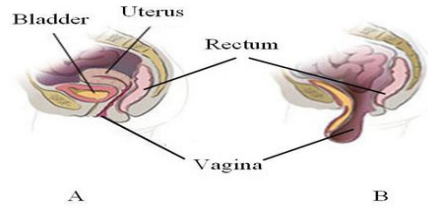


Figure 5A-B: Vaginal Prolapse Signs **Figure 5A:** Normal Pelvic Anatomy and **Figure 5B:** Vaginal Prolapse.

Artificial Urinary Sphincter

In men, a small, fluid-filled ring is implanted around the bladder neck to keep the urinary sphincter shut until you're ready to urinate. To urinate, you press a valve implanted under your skin that causes the ring to deflate and allows urine from your bladder to flow (see Figure 6).

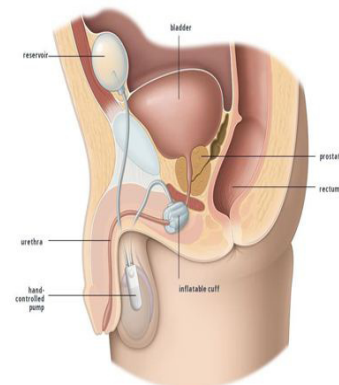


Figure 6: Implanted Artificial Urinary Sphincter [8].

Absorbent Layers and Catheters

If medical treatments can't completely eliminate patient's incontinence, he can try products that help ease the discomfort and inconvenience of leaking urine such as pads and protective garments that can be easily worn under everyday clothing. Men who have problems with dribbles of urine can use a drip collector, a small pocket of absorbent padding that's worn over the penis and held in place by close-fitting underwear.

Intermittent Catheterization

Any patient with incontinence whose bladder doesn't empty properly and urine remains in the bladder and aggravates incontinence and infection should use catheter to eliminate the urine left. It is recommended that the patient himself drain bladder through

catheter every 4-5 hours depending on the severity of residual urine. Patients must be instructed how to do self-catheterization.

Implants (Pacemaker)

Implants are material injected into urethral tissue to close empty spaces in the urethra and reduce optional pressure. Implants can be used by a physician in about half an hour to be injected with local anesthetic. This procedure involves injecting a medical device called a cystoscope into the urethra. The cystoscope allows doctor to see the area. Then doctor injects a needle into the urethra via cystoscope through which an amount of collagen enters the urethra.

The (Figure 7) demonstrates the implantable neuro stimulator device that includes a neuro stimulator, a lead wire and an external control programmer. Collagens add bulk to the urethral tissue and close the opening to prevent urine from leaking out. it has relative success. These injections must be repeatedly performed because the body slowly destroys them. Before you undergo collagen injection, you must do allergy testing to have no adverse reaction to it.

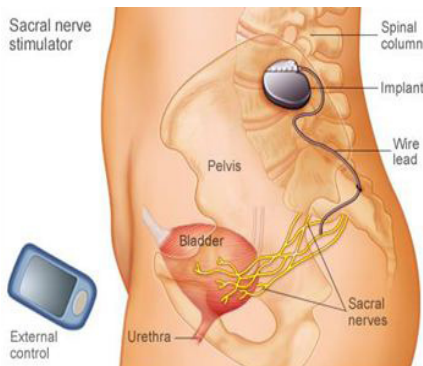


Figure 7: The Medical Bladder Implant [9].

Urinary Catheterization

Urinary catheterization involves inserting a thin, hollow tube in the urethra and the bladder of a person (see Figure 8). (Bladder is the organ that collects urine; urethra is the tube that lets urine pass out.) In catheterization procedure, the following objectives are taken into account.

- Sampling of urine for laboratory studies such as infection.
- Drain the bladder when the person is not able to do it.
- Control how the kidneys work during surgery and while the patient is hospitalized.
- Control fluid balance (incoming and outgoing) during illness
- Keep the bladder empty during surgery.

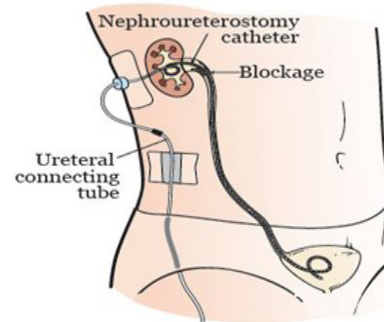


Figure 8: A Urinary Catheter Method [10].

Treatment of Urinary Incontinence in the Elderly

This disorder affects more than one in five people over 85 years, although it may be lower than the true estimate of the prevalence of this problem. Urinary incontinence has both physical and psychological consequences such as: damaged skin, urinary tract infections and increased risk of falling and avoidance of moving away from home and feeling of alienation. It is made obvious that urinary incontinence is treated well neither outside of hospital nor in secondary cares (hospital care) in terms of urinary incontinence care for the elderly. Basic measures such as rectal examination and measurement of residual volume after voiding (the volume of residual urine in the bladder after urination) are done rarely and treatment plans merely limit the problem instead of dealing with the treatment of the underlying cause.

The Use of Sensors for Measuring the Urine

Biosensors playing significant role in medical technology [11-18]. Actually, Sheikhabaee University Department of Biomedical Engineering (SHBU) is designing and manufacturing sensors that can measure the amount of urine in the bladder. In this procedure, the tolerance dose of the patient's bladder is determined and the urinary bladder detection sensors make the patient aware before the amount of urine in the bladder reaches the risk level. The proposed model is shown in (Figure 9).

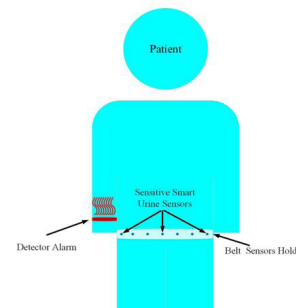


Figure 9: Measurement the Amount of Urine via Sensor.

Conclusion

Urinary tract is one of the most sensitive organs in the body that is involved with various diseases including urinary incontinence. This disease has both psychological and disease burden for people and many elderly people are concerned with it. Therefore, great efforts have been made to treat this disease as we mentioned treatment procedures in the text. At the end, we offered our proposed procedure which is our future idea to improve treatment process with care and regular schedule.

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