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RESEARCH ARTICLE

URINARY RETENTION IN FEMALES – A RETROSPECTIVE STUDY

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ABSTRACT

Sustainable Introduction
Urinary retention in females is very uncommon. Careful evaluation including detailed history, physical examination and urodynamics is required to find out any reversible pathology. Surgical treatment in women should be approached with caution as it carries significant risk of injury to sphincter and incontinence and intervention requires an individualized approach based on careful evaluation. **Aim of the study:** To analyze the causes of urinary retention in female inpatients and outpatients and utilize these results for proper management of urinary retention at an early stage. **Materials and Methods:** The study was a retrospective study conducted from January 2015 to December 2016 in the Institute of urology, Madras medical college, Chennai. Urinary retention was defined as a difficulty in self-voiding despite a sufficient urine volume or more than 250-mL of post void residual urine. The data included are patients' age, ambulatory status, medical and surgical history, classes of taking drugs, and urinary tract infection and menopausal status.
Observations and Results: A total of 234 women were included as retention group with mean age of 59.5 years (41–78years). 190 (81.19%) females were attained menopause. The most common surgical history was cystocoele repair. The patients taking drugs with anti muscarinic effects were 15 (6.41%) and diuretics 32 (13.76%). Urinary tract infection was identified in 97 patients (41.45%). 18 patients were bed ridden. Diabetes mellitus was found in 54 patients (23.07%). Cystocoele was found in 12 patients. Most common benign and malignant tumours observed were urethral caruncle in 12 (5.1%) patients and uterine fibroids in 8 (3.41%) patients and carcinoma cervix in 34 (14.52%) patients and malignant ovarian tumours in 4 (1.70%) patients.
Conclusion: Urinary retention in females is much less common in females than in males. It is very important to identify the cause of the retention. The acute emergency can be managed with transurethral or supra pubic catheterization. The cause of the retention determines further specific treatment.

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INTRODUCTION

Urinary retention in females is very uncommon compared to males. Urinary retention is defined as inability to achieve complete bladder emptying by voluntary micturition, resulting in high post void residual urine. It can be classified as acute urinary retention or chronic urinary retention. Acute urinary retention is a painful bladder distension, which usually presents as an emergency. Chronic urinary retention is non-painful bladder distension, leading to overflow dribbling and risk of impaired upper urinary tract function. Incomplete bladder emptying signifies the presence of high post void residual urine. Incidence of urinary retention in females is estimated at 0.07 per 1,000 inhabitants each year. Urinary retention results from obstruction of the bladder outlet and/or decreased bladder contractility. Although various factors can influence bladder outlet resistance and bladder contractility, benign hypertrophy of prostate plays a major role in males. In contrast, various factors can influence bladder function and the development of urinary retention in females. It may be due to anatomical disease,medicationuse, history of surgery, neurologic problems, infection, as well as psychogenic factors. Postoperative urinary retention is a frequent complication of anaesthesia and surgery of the lower urinary tract, perineum, anus, and general gynaecological interventions, with an estimated incidence rate of 5% to 70%. A number of pharmaceutical agents, which are routinely prescribed to patients, are associated with urinary retention or obstructive voiding symptoms. These are anticholinergic agents, muscle relaxants, calcium channel blockers, antiparkinson agents, α-adrenergic agonists, and antihistamines.

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MATERIALS AND METHODS

The study was a retrospective study conducted from January 2015 to December 2016 in the Institute of urology, Madras

medical college, Chennai in both inpatients and outpatients. Urinary retention was defined as those who had difficulties in self-voiding despite enough volume of urine in the bladder or who had more than 250-mL post void residual urine volume checked by ultra sonography or urethral catheterization. The following clinical data were collected recording patients' age, ambulatory status, medical and surgical history, classes of taking drugs, and urinary tract infection and menopausal status. All patients were tested by urine analysis and urine culture for urinary tract infection.

RESULTS AND OBSERVATIONS

A total of 234 women were included as retention group with mean age of 59.5 years (41 – 78 years). 190 (81.19%) females were attained menopause. The most common surgical history was cystocoele repair. The patients taking drugs with anti muscarinic effects were 15 (6.41%) and diuretics 32 (13.76%). Urinary tract infection was identified in 97 patients (41.45%). 18 patients were bed ridden. Diabetes mellitus was found in 54 patients (23.07%). Cystocoele was found in 12 patients. Most common benign and malignant tumours observed were urethral caruncle in 12 (5.1%) patients and uterine fibroids in 8 (3.41%) patients and carcinoma cervix in 34 (14.52%) patients and malignant ovarian tumours in 4 (1.70%) patients.

Classification of females with urinary retention depending on age

Age group	Total no of patients
40 – 50 YEARS	14 (5.98%)
50 – 60 YEARS	125 (53.41%)
60 – 70 YEARS	72 (30.76%)
70 – 80 YEARS	14 (5.98%)

Benign and malignant tumours in urinary retention females

Nature of tumour	Total no of patients
Urethral caruncle	12 (5.12%)
Fibroid uterus	8 (3.14%)
Carcinoma cervix	34 (14.52%)
Ovarian tumour	4 (1.70%)

Urinary retention due to urological problems

Urological problems	Total no of patients
Urinary tract infections	97 (41.45%)
Urethral / Vesical calculus	8 (3.14%)
Surgery for cystocoele	2 (0.85 %)
cystocoele	12 (5.12%)

DISCUSSION

Physiologically, voiding requires a coordinated bladder contraction and outlet relaxation for achieving complete bladder emptying. Lower urinary tract symptoms may be poor urinary stream, intermittent flow, terminal dribbling and post-micturition dribbling, and urinary retention. Urinary retention is a severe impairment of voiding, which can be defined as inability to achieve complete bladder emptying by voluntary micturition. Acute urinary retention is a painful bladder distension, which usually presents as an emergency. Chronic urinary retention is non-painful bladder distension, leading to overflow dribbling and risk of impaired upper urinary tract function. Incomplete bladder emptying signifies the presence of post void residual urine. Pathophysiologically, urinary retention is a consequence of one or more of reduced bladder contractility, poorly sustained detrusor contraction, lack of an adequate anatomical outlet, deficient outlet relaxation, or impaired neurological coordination of the voiding process. For male patients, particularly in older age groups, bladder outlet obstruction is comparatively common due to benign hypertrophy of prostate. For females, urinary retention is very rare and is a contrasting situation, resulting from a much more diverse set of conditions. It is very difficult to identify the natural history of the various underlying conditions and is only minimally understood. The incidence of urinary retention in women is not well documented. One Scandinavian study revealed an incidence of acute urinary retention in women of 7 per 100,000 populations per year and the male to female ratio was 13:1. In general, female urinary retention is more frequently described in small case series or case reports with unusual causes. This diversity and lack of consensus on management means that treatment outcomes are harder to predict than in the male.

Defining Female Urinary Retention

Although there are no known universally accepted or standardized criteria for bladder outlet obstruction in females, several useful studies have examined the question. Diokno and colleagues defined bladder outlet obstruction in females in 1984 on the basis of videourodynamic studies. They defined bladder outlet obstruction when the detrusor pressure was ≥ 60 cm of water and the peak urine flow rate was less than 15 ml/sec, with relaxation of the external sphincter, and without funnelling of the bladder neck during voiding. The diagnosis of bladder outlet obstruction was established in three of a large pool of patients referred with voiding symptoms, an elevated post void residual, or performing self-catheterization.

Nitti and colleagues derived criteria from evaluation of the videourodynamic studies of 261 women for non-neurogenic voiding function and defined bladder outlet obstruction as radiographic evidence of obstruction between the bladder neck and the distal urethra in the presence of a sustained detrusor contraction of any magnitude, usually associated with reduced flow rate or delayed flow. Blaivas and Groutz derived a nomogram from studying 50 women with somewhat diverse aetiologies, who were concluded to be obstructed on clinical grounds. Their study defined bladder outlet obstruction by presence of free $Q_{max} \leq 12$ ml/sec in repeated free flow studies, combined with a sustained detrusor contraction and $P_{det}\ Q_{max} \geq 20$ cm H_2O in a pressure flow study, or presence of obvious radiographic evidence of bladder outlet obstruction with a sustained detrusor contraction of at least 20 cm of water and poor Q_{max} - regardless of free Q_{max} or inability of void with the transurethral catheter in place despite a sustained detrusor contraction as above. Their nomograms plotted parameters from two separate voids – the maximum flow rate from a free (uncatheterized) flow on the X-axis and the detrusor pressure at maximum flow measured during voiding cystometry on the Y-axis. Whilst use of two separate voids is counter-intuitive, the presence of a urodynamic catheter in the urethral lumen implicitly must alter the gauge of the outlet available for urine flow, potentially confounding the interpretation of the outlet gauge. This nomogram enables differentiation not only between obstructed and non-obstructed patients but also between various degrees (mild, moderate and severe) of bladder outlet obstruction.

Chassange and colleagues derived the relationship between Q_{max} and P_{det} Q_{max}, comparing women with anatomical outlet obstruction versus females with stress urinary incontinence. It was concluded that Q_{max}15 ml/s or less and P_{det} Q_{max} 20 cm H^2 O or more are reasonable pressure-flow parameters to define bladder outlet obstruction in females (giving sensitivity, specificity, positive predicted value and negative predictive value as 74.3, 91.1, 70.3 and 92.6 respectively). These criteria were revised in subsequent publications. De Freitas et al. concluded that the combination of the maximum flow rate of up to 12 ml/s with a detrusor pressure in excess of 25 cmH_2 O represented cut off parameters with the highest sensitivity and specificity for bladder outlet obstruction in females. The various approaches to diagnosing bladder outlet obstruction in females were compared by Akikwala and colleagues, studying 91 patients, in whom obstruction was suspected clinically in 25 women. All the patients were classified as obstructed or unobstructed by the different criteria alluded to above. They calculated that bladder outlet obstruction was diagnosed with at least one diagnostic approach in 40 of the 91 study population; nine were obstructed on all the criteria, while a different nine fulfilled only one criterion. The Blaivas and Groutz nomogram appeared to diagnose more women as being obstructed.

A key issue in diagnosing bladder outlet obstruction is the difficulty gauging the contractility of the bladder during voiding. Impairment of bladder contractility appears to be a feature of the ageing bladder and can be expected to affect urinary flow adversely, potentially leading to over-diagnosis of outlet obstruction. A stop-test, in which the urinary stream is interrupted during voiding, should result in a significant rise in isovolumetric detrusor pressure during the flow interruption .Where the rise in pressure is small, the contractility can be presumed to be reduced, but universally-agreed criteria are lacking. Stop-tests are undertaken in some canters, but the inhibitory effect on the voiding reflex and the likely need for a second filling and voiding study means their use is not widespread. An impression of the bladder contractility can be inferred by simple examination of the detrusor pressure during flow. A fluctuating low-pressure detrusor contraction, corresponding with a fluctuating flow, particularly if the patient supplements the bladder contraction by abdominal straining, does suggest reduced bladder contractility. In these patients, caution is needed with interpretation. While low flow with high detrusor pressure may signify bladder outlet obstruction, low flow with low detrusor pressure does not exclude bladder outlet obstruction. Ascertaining whether raised post void residual urine is a consequence of bladder outlet obstruction or reduced contractility is key dilemma for the managing clinician.

Causes of urinary retention in females

The basis of obstruction is subdivided into urethral compression, bladder neck distortion or luminal occlusion. To these can be added functional issues of non-relaxing sphincter dysfunction and impaired neurological coordination of the outlet components of the lower urinary tract, compounded by reduced bladder contractility. Where all other factors have been excluded, urinary retention might be labelled “psychogenic”, but this diagnosis should be applied following comprehensive evaluation and with considerable circumspection. Case reports have described various scenarios, such as benign inflammatory nervous disease (sacral herpes, meningitis), uterine leiomyoma, cytomegalovirus cystitis, eosinophilic cystitis and incarcerated gravid retroverted uterus.

Anatomical

Extrinsic causes:

1. Gynaecological benign and malignant tumours
2. Pelvic organ prolapsed
3. Post anti incontinence surgery
4. Poorly fitting pessary
5. Constipation

Urethral causes:

1. Urethral benign and malignant tumours
2. Meatal stenosis
3. Diverticulum
4. Stricture
5. skene’gland cyst /abscess

Luminal causes:

1. Ureterocele
2. Bladder /urethral tumours
3. Foreign body
4. Calculus
5. Clot retention

FUNCTIONAL: Impaired coordination:

1. Fowler’s syndrome
2. Pseudo dyssynergia
3. Primary bladder neck obstruction
4. Detrusor external sphincter dyssynergia
5. Neurological – upper motor neuron lesions

Impaired detrusor contractility:

1. Diabetes mellitus
2. Neurological – lower motor neuron lesions
3. Senile bladder changes

Perioperative causes:

1. Pain
2. Analgesia /Anaesthesia
3. Postpartum

Infective/inflammatory causes:

1. Genital herpes
2. Urinary tract infections
3. Acute vulvovaginitis
4. Vaginal lichen planus / sclerosis
5. Eosinophilic cystitis

Pharmacological causes:

1. Antidepressants
2. Opiates
3. Anti psychotic drugs
4. Alpha adrenergic agonists

Post operative urinary retention

Urinary retention is a poorly-understood yet well-recognized complication postoperatively in both males and females. Contributing factors include traumatic instrumentation, bladder over-distension, and reduced contractility of bladder, increased outlet resistance, nociceptive inhibitory effect, pharmaceutical

influences, pre-existing outlet pathology and decreased micturition reflex activity. Various studies have shown that specific types of anaesthesia and analgesia can increase the risk of postoperative urinary retention. In a review of more than 3000 obstetric deliveries Olofsson and colleagues demonstrated that patients who received epidural anaesthesia had an increased risk of urinary retention, in fact, urinary retention post partum is probably under diagnosed in general. Another study compared regional anaesthesia (spinal or combined spinal and epidural) and non-regional anaesthesia (general, monitored anaesthesia with sedation, and local) and incidence of urinary retention following outpatient mid-urethral sling procedure, concluding that regional anaesthesia is associated with higher risk of acute retention. Gallo et al., looked at the effect of low-dose naloxone in patients who received morphine as patient-controlled analgesia following orthopaedic surgery and showed that fewer patients required catheterization postoperatively

Urinary retention following antiincontinence surgery
Stress urinary incontinence surgery

Many females have partial urinary retention in the early stages after stress urinary incontinence surgery. Presumably, several factors will be involved, such as the anaesthetic agents employed; local discomfort or the analgesic agents used to treat the discomfort; oedema or hematoma formation; altered voiding dynamics as a consequence of outlet realignment. Voiding usually recovers comparatively swiftly, but close surveillance is needed to check resolution of symptoms and post void residual urine, and ensure that progression to full acute urinary retention and emergency issues do not ensue. Full acute urinary retention is rare postoperatively, but needs intensive attention at the outset to ensure bladder over distension injury does not occur. Timing of trial without catheter has to be individualized, dependent on resolution of identifiable remediable factors. If spontaneous voiding does not result, an early decision needs to be taken on management strategy. Delaying intervention beyond one month may result in a permanent impairment a-s a consequence of fibrotic in-growth into the tape interstices. Factors in the history comprise whether urinary retention is complete or partial and whether it is improving with time. Key features of past medical history should be re-evaluated. For example, any current or previous neurological problem can alter the neural control of the urinary tract, leading to temporary or permanent difficulty with voiding, unrelated to tape placement. It is also valuable to review the preoperative urodynamics to re-evaluate voiding function, and to review technical problems during the operative placement or subsequent complications, such as hematoma. Physical examination is crucial; for some women with over-tight mid-urethral sling placement it is possible to feel the mid-urethral compression during vaginal examination. In these patients tape incision has a realistic chance of restoring voiding. Less commonly, it is possible to feel the anterior vaginal wall drawn up behind the pubis, suggesting that incision of the tape alone is unlikely to restore voiding and that additional per-operative attention to address the abdominal retro pubic component of the tape will be needed to re-establish voiding. Finally, when physical examination reveals that the anterior vaginal wall lies in an entirely undisturbed location, it can be anticipated that impaired voiding is not a consequence of the urethral compression by the tape; tape incision or excision is then unlikely to achieve re-establishment of voiding. In this last group it is appropriate to consider proceeding to formal voiding cystometry. Various publications have now described the outcomes of releasing mid-urethral tapes surgically, including the restoration of voiding and the recurrence of incontinence as a consequence. If proceeding to cut a mid-urethral tape, cystoscopy should be undertaken at the same time to ensure that no other potential tape-related complications have also arisen. Patients have to be evaluated on an individual basis, rather than simply proceeding to tape incision based purely on failure to achieve normal voiding within a certain time frame. Nonetheless, it is important to proceed in a timely manner if the assessment does suggest that the tape is causing the obstruction, since ongoing mesh fibrosis, potentially compounded by decomposition of detrusor function, may lead to permanent impairment if avoidable delay intervenes. Hong et al. described 32 patients who had voiding dysfunction, of 375 undergoing a Trans vaginal tape placement. Eighty-eight per cent needed intermittent self-catheterization which was undertaken for less than one month. The median time to normal voiding was nine days. Four had the tape sectioned at 61 days, in whom three had recurrence of stress urinary incontinence. Return of incontinence following tape sectioning is seen in a substantial proportion obstructive symptoms tend to improve, whilst storage symptoms tend to remain unchanged.

Other forms of stress urinary incontinence have also been associated with bladder outlet obstruction. Colposuspension can lead to urethral compression or distortion, particularly where sutures are placed close to the urethra. The Marshall-Marchetti-Krantz procedure appeared to carry a definite risk of causing urethral distortion and obstruction in a proportion of patients. Bone anchor slings also led to some obstructive complications. In some cases the placement of the tape to cause urethral compression can be a deliberate therapeutic approach. For example, a compressing autologous sling can be an intended therapeutic strategy used in the management of intrinsic sphincter deficiency, for those women trained preoperatively. A similar approach using trans vaginal tape should not be advocated, in view of the potential risk of late urethral erosion with over-tight tapes, which can occur many years after surgery.

Urgency urinary incontinence surgery

Some forms of surgical management of refractory urgency urinary incontinence or overactive bladder aim to enhance urinary reservoir function by reducing bladder contractions during the storage phase. This can also impair bladder contraction needed for voiding. Thus, patients undergoing successful augmentation cystoplasty or detrusor myectomy will have a substantial post void residual urine in a high proportion of cases.Intravesical botulinum toxin injections, an unlicensed procedure for management of over active bladder also carry a significant risk of urinary retention, which appears to increase with repetition of injections following return of symptoms.Risk factors for urinary retention and regimes achieving optimal balance of sustained efficacy with minimized adverse effects over active are still uncertain

Fowler's syndrome

Fowler's Syndrome affects young females after the menarche, which develops painless retention at high bladder volumes, often following apparently unconnected precipitating events, such as minor surgery. Often, history of prior lower urinary

tract symptoms is minimal and most of the women will not report any prior urinary tract problems. It is estimated that around 40% of women affected have Polycystic Ovary Syndrome. It is important to exclude occult or undiagnosed neurological problems as a cause. The scientific explanation for the underlying sphincter problem in Fowler's syndrome is not understood. It has been hypothesized that changes in the ion channels of the skeletal muscles of the urinary sphincter may be affected by the hormonal environment of the menarche ("hormonal channelopathy") leading to abnormal communication directly between muscle cells (ephaptic transmission). As a consequence, the sphincter becomes overactive and hypertrophic, and reacts excessively to direct stimulation. Diagnostic criteria include: urinary retention of at least 1 litre on at least one occasion; exclusion of other causative factors; raised maximum urethral closure pressure on urethral pressure profilometry; increased sphincter volume on ultrasound or MRI assessment; and; a characteristic urethral sphincter EMG. Difficulties in management can be profound—insertion of the catheter can be straightforward but then discomfort may develop, as if the sphincter were gripping the catheter, leading to consequent difficulty on catheter withdrawal. Flow rate patterns tend to be interrupted. Small volumes often are passed by micturition, leaving substantial post void residual urine.

The most specific diagnostic test for Fowler's Syndrome is a urethral sphincter EMG (USEMG), which differs from the pelvic floor EMG generally used for neuro urological patients. In USEMG, the EMG needle is placed to one side of midline in the anterior vaginal wall, at the mid-urethral point, and advanced on to the dorsal aspect of the urethra. The neurophysiologist undertaking the test has to pay special attention to the audio signal being generated by the EMG, which confirms successful entry into the sphincter zone. The diagnostic parameter for Fowler's Syndrome is an audio signal likened to the sound of whale noises in the ocean. Pelvic floor EMG often is non-diagnostic in this patient group. Management of Fowler's syndrome is specialized, and a sympathetic approach and consideration of psychological elements are essential. Strong efforts should be made to reduce the poly pharmacy that many of these patients have, particularly attempting to discourage use of opiate drugs. For those patients manifesting the characteristic EMG signal who are intolerant, the treatment of choice is sacral nerve stimulation, which can achieve normal voiding in a significant proportion of women affected. Management is difficult in patients without the characteristic EMG signal, or those patients where the sacral nerve stimulation percutaneous needle electrode test fails to elicit a significant improvement in symptoms. Supra pubic catheter placement is generally unsatisfactory in younger women. No drug treatment has yet been established as deriving any substantive benefit. Botulinum injection into the urethral sphincter has not been tested on a systematic randomized basis. Ultimately, reconstructive surgery using a continent diversion (Mitrofanoff procedure) may be necessary.

Distal urethral stenosis

Distal urethral stenosis results from fibrous periurethritis. In due course of time this leads to lateral intra luminal pressure created by frequent and forceful urination. The venous, lymphatic and glandular drainage hampers due to this increased intra luminal lateral pressure and congestion and oedema of Para urethral tissues develops. Super imposed bacterial infection of this para urethral glands leads to true bacterial urethritis. Persistent urethritis and increased urinary frequency leads to incomplete bladder emptying and increased post void residual urine. More post void residual urine invites bacterial colonization and resultant cystitis.

Management

Detailed history, abdominal, pelvic and neurological examination should be carried out. Immediate management of acute urinary retention requires bladder decompression with catheterization, either indwelling or intermittent catheterization. Intermittent catheterization not only avoids potential morbidity with an indwelling catheter but also allows monitoring of return of voiding function, which is usually presaged by a reduction in post void residual urine. Any urinary tract infection should be treated with appropriate antimicrobial therapy. Other reversible causes such as prolapse should be identified and rectified. Further radiological and pressure-flow investigation may be required in some patients. Pelvic ultrasound occasionally reveals relevant findings that may contribute to the symptoms in females with urinary retention. Gynaecological causes are unusual, such as large uterine fibroids, but they must be considered in undertaking complete evaluation. The utility of cystoscopy under local anaesthesia is debatable, but in a minority of cases it can provide additional anatomical information, for example, presence of intra luminal foreign body. Many women undergo urethral dilatation as a part of management, though there is no evidence to support it. In women, α-blockers can lower the resting urethral pressure. However, they achieve no significant difference in success of trial without catheter compared against placebo. Constipation causing urinary retention is treated with laxatives, increased fluid intake, diet modification and changes in bowel habits. Anatomical causes of urinary retention are best treated surgically to remove the obstructive lesion and restore the normal outlet. Treatment of urethral stenosis consists of hormonal replacement (systemic or topical) in postmenopausal women and urethral dilatation in some cases.

Women with urinary retention after anti-incontinence surgery are usually treated with clean intermittent self-catheterisation for up to 6 weeks, or dilatation of the urethra. If these interventions are unsuccessful, transection or removal of the sling may be necessary. In women with cauda equina syndrome, prompt surgical intervention (laminectomy) restores normal bladder function in at least 25% of patients. Women with postpartum urinary retention are usually treated with clean intermittent self catheterization, and the majority of patients will have no long-term impairment of bladder function. In neurological cases continuous indwelling catheterisation may be necessary. If clean intermittent self catheterisation is not feasible, supra pubic catheterisation or urinary diversion may be warranted.

Women with urinary retention caused by herpes simplex virus infection are usually treated by transurethral or supr apubic catheterisation, together with acyclovir or valacyclovir. The retention usually clears up within 6 weeks. Attempts to relax the urethral sphincter include the use of alpha-blockers, injection of botulinum toxin or sacral nerve stimulation. There is little evidence that alpha-blockers are effective in women with urinary retention. Sacral nerve stimulation is successful in some patients, especially women with Fowler's syndrome.

Conclusion

- Urinary retention in females is much less common in females than in males.
- It is very important to identify the cause of the retention.
- The causes can be classified into mechanical/anatomical, functional/neurological and miscellaneous causes.
- A careful and detailed history may identify the cause of the retention.
- Physical examination should include a thorough general, abdominal, bimanual pelvic, speculum and neurological examination
- Urine analysis and culture and sensitivity should be done
- Imaging may include ultrasound of abdomen and pelvis and computed tomography and if needed X-rays of the lumbar spine.
- Cystoscopy and urodynamic studies are special investigations
- Magnetic resonance imaging of the brain and spine is indicated in any patient with neurological symptoms or signs, and if no other cause of the retention is found.
- The acute emergency can be managed with transurethral or supra pubic catheterisation

The cause of the retention determines further specific treatment.

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