CASE 6

Short case number: 3.14.6
Category: Renal and Urinary Systems
Discipline: Medicine_nephrology
Setting: Urban: Emergency department
Topic: Urinary outflow tract obstruction_prostate cancer.

Case

75 year old Thomas Atkinson presents quite distressed with marked lower abdominal pain and an inability to pass urine. Over the last few months he has been experiencing increasing difficulty with passing urine in particular he had noted a poor urinary stream and a need to pass urine more often.
Today he was celebrating his team's lawn bowls finals win with a few beers; he experienced a sudden urge to pass urine and was unable to do so, this was followed by marked lower abdominal pain.

Questions

1. What history and physical examination would you undertake at this stage?
2. Outline the clinical features that would support a diagnosis of acute urinary retention.
3. Outline your immediate management of Thomas.
4. What are the possible complications of acute urinary retention?
5. Describe the underlying pathophysiology of the clinical features seen in urinary outflow tract obstruction.
6. On further assessment Thomas is found to have an enlarged prostate, what clinical features on prostate examination would concern you that Thomas may have prostate cancer?
7. Compare the features of prostate cancer and benign prostatic hypertrophy under the following headings; epidemiology, clinical features, investigations and management.
8. Outline how you would relieve the urethral obstruction. What are the risks and hazards associated with this procedure?

Suggested reading:

- Colledge NR, Walker BR, Ralston SH, Penman ID, editors. Davidson's Principles and Practice of Medicine. 22nd edition. Edinburgh: Churchill Livingstone; 2014. Chapter 17.

ANSWERS

1. What history and physical examination would you undertake at this stage?

History :-

Has there been any past or recent symptoms to suggest an associated urinary tract infection ? Is there a past or recent history to suggest renal or bladder calculi? Has there been evidence of haematuria? Has Thomas been commenced on any medications in the past few months that could result in urinary retention e.g. antimuscarinic anticholinergics (inhibit detrusor contractility) - antipsychotics, antidepressants, antihistamines, respiratory agents; opioids, alpha- adrenergic antagonists (enhance bladder outlet resistance), benzodiazepines, NSAIDs, calcium channel antagonists; or has he recently ceased any treatment to assist flow e.g. finasteride? Is there any symptoms to suggest metastatic prostatic carcinoma - constant back pain, unexplained weight loss etc? Is there any history to suggest a urethral stricture e.g. previous urethral injury (trauma, indwelling catheterization) ? Is there any past occupational history that could suggest bladder cancer – textile, leather, rubber manufacturing industries; painter, hairdresser etc ? Any associated condition to suggest a possible neurogenic cause - diabetes, cauda equina syndrome (unlikely given this scenario) etc ?

Examination :-

General observation- appearance – distress from pain, pallor, cachexia
assess vital signs
Abdominal, including rectal, examination. Examine for phimosis.

2. Outline the clinical features that would support a diagnosis of acute urinary retention.

Abdominal examination may reveal distension with suprapubic tenderness with a palpable bladder, dull to percussion.
Assess for renal enlargement and tenderness.
Enlarged prostate with benign or malignant characteristics on DRE.
Look for signs to suggest a cauda eqina syndrome (see history)

3. Outline your immediate management of Thomas.

Urinary catheterization with assessment of urinalysis (MSU as indicated). Bloods for FBC(anaemia, infection), UEC (renal impairment)

4. **What are the possible complications of acute urinary retention?**

Because the degree and duration of obstruction are the chief determinants of renal dysfunction, early recognition and treatment are the keys to preventing renal loss. Urinary obstruction should be viewed as a potentially curable form of kidney disease.
Prolonged distension of the bladder from any delay in relieving acute retention may result in a delay in return of normal bladder function.
Urinary tract infections may occur due to urinary stasis. Additionally, instrumentation may also introduce contamination.

5. **Describe the underlying pathophysiology of the clinical features seen in urinary outflow tract obstruction**

Chronic urinary tract obstruction can lead to permanent damage to the urinary tract. Infravesical obstruction can lead to changes to the bladder, such as trabeculation, cellule formation (small pockets that are created when segments of the bladder lining are pushed between bundles of superficial muscle fibres which can go on to form diverticula if raised pressure persists), diverticula, bladder wall thickening and, ultimately, detrusor muscle decompensation. Progression of back pressure on the ureters and kidneys can occur and can cause hydroureter and hydronephrosis. The ureter can then become dilated and tortuous, with the inability to adequately propel urine forward. Hydronephrosis can cause permanent nephron damage and renal failure. Urinary stasis along any portion of the urinary tract increases the risk of calculus formation and infection, and, ultimately, upper urinary tract injury. Urinary tract obstruction can cause long-lasting effects to the physiology of the kidney, including its ability to concentrate urine.

6. **On further assessment Thomas is found to have an enlarged prostate, what clinical features on prostate examination would concern you that Thomas may have prostate cancer?**

On rectal examination the prostate often feels nodular and stony hard, and the median sulcus may be lost. However, 10 – 15% of tumours are not palpable.

7. **Compare the features of prostate cancer and benign prostatic hypertrophy under the following headings; epidemiology, clinical features, investigations and management.**

The voiding difficulty that results from prostate gland enlargement and bladder outlet obstruction (BOO) is termed lower urinary tract symptoms (LUTS). Not all men with BPH have LUTS and, likewise, not all men with LUTS have BPH.

Disease	Prostate cancer	Benign prostatic hypertrophy (BPH)
Epidemiology	Rarely occurs under 50 Mean age of presentation 70 years. Common in USA and northern Europe, rare in China and Japan. In UK 2nd most common male malignancy 50cases per 10^5	Prostate increases in volume from age 40. Symptoms common from age 60. 50% over age 80 have LUTS associated with BPH
Clinical Features	Most present with LUTS similar to BPH. Metastatic signs much less common - back pain, weight loss, anaemia, obstruction of ureters. May feel nodular or stony hard, median sulcus may be lost. 10 – 15% not palpable.	Hesitancy, poor prolonged flow, sensation of incomplete emptying ± dribbling. Can present with frequency, urgency and urge incontinence. May present with acute retention. On DRE prostate enlarged, smooth, median sulcus palpable.
Investigations	PSA (depending on result may require free: total PSA), UEC, plain Xray of pelvis and lumbar spine, urinary tract ultrasound to exclude obstruction prostatic biopsy usually aided by TRUS or on tissue endoscopically resected, bone scan for distant metastases	Symptoms are scored on the international prostate symptom score (IPSS) serves as baseline. Prostate volume assessed by DRE and pelvic (or possibly transrectal) ultrasound, assess renal function and identify obstructive nephropathy
Management	Confined tumour in younger Treat with radical prostatectomy or radiotherapy. Locally invasive or metastatic disease – treat by androgen depletion – by androgen suppressing medications* or, less commonly, surgery (orchidectomy) Radiotherapy for localized bone pain. Chemotherapy for failed hormone therapy.	Medications for mild to moderate symptoms – α adrenoreceptor blockers (e.g. tamulosin) reduce smooth muscle tone in prostate and bladder neck. 5α – reductase inhibitors (finasteride) cause prostate to shrink by stopping conversion of testosterone to dihydrotestosterone Surgery for severe symptoms – usually TURP or rarely open surgery for very large glands (>100cm^3)
*Anti-androgen drugs such as cyproterone acetate act by preventing the binding of dihydrotestosterone to androgen receptors in the tumour cells, so preventing cell growth. Gonadotrophin-releasing hormone (GnRH) analogues such as goserelin continuously occupy pituitary receptors, preventing them from responding to the GnRH pulses which normally stimulate LH and FSH release. This initially causes an increase in testosterone before producing a prolonged reduction, therefore the initial dose must be covered with an anti-androgen to prevent a tumour flare.		

8. **Outline how you would relieve the urethral obstruction. What are the risks and hazards associated with this procedure?**

Initially through an indwelling catheter - risks include urinary tract contamination or infection or urosepsis, urethral injury etc. Thomas could discharged, once there is evidence that the obstruction has been fully relieved, with the indwelling catheter in situ and a leg bag. The definitive treatment would require resection either transurethral (TURP) or open depending on the volume of the prostate as determined by DRE and ultrasound assessment. Co-morbidities need to be considered and assessed appropriately.

TURP carries a significant risk of morbidity (18%) and mortality risk (0.23%). Possible complications comprise:-

- haemorrhage which may result in clot retention, blood transfusion, prolonged hospital stay
- TUR syndrome from irrigating fluids being absorbed in significant quantities
- urinary tract infection, urosepsis
- urethral stricture
- retrograde ejaculation ± urinary incontinence may result from damage to the urinary sphincteric mechanism
- impotence

Open prostatectomy is limited to those with very large prostates, those with bladder calculi or bladder diverticula or patients who cannot be positioned for transurethral resection. It may involve significant blood loss.