Chapter 9
Renal & Urogenital Systems

Learning Outcomes
★After viewing this slide presentation, you should be able to:
• identify signs and symptoms of common renal and urogenital pathology
• discuss medical history results that are relevant to renal and urogenital pathology

Learning Outcomes (cont.)
★After viewing this slide presentation, you should be able to:
• describe the physical examination procedures relevant to the renal and urogenital systems
• describe signs, symptoms, treatment, and return-to-play criteria for pathology involving the renal and urogenital systems

Pathology & Pathogenesis

Renal & Bladder Trauma
★Mechanism of injury for kidney trauma
• direct blow to the middle or lower back
• sudden deceleration of the trunk
• fractured rib that injures a kidney
★Significant bladder injuries are rare in athletics
Renal & Bladder Trauma

★ Signs & Symptoms of kidney injury
- hematuria**
- pain in the back, over ribs 10 through 12
- swelling in the same area
- **Grossly observable blood in the urine after a blow to the back or other abdominal trauma requires emergency medical imaging and diagnostic studies

Palpation
- point tenderness in the back, over ribs 10 through 12

Treatment
- most kidney trauma can be treated without surgery
- requires close medical monitoring

Return to play
- takes at least 6-8 weeks before evidence of healing is observable on medical imaging
- collision sports are contraindicated for persons who have only a single kidney

Renal, Bladder, and Genital Infections

★ Urinary tract infections
★ Sexually transmitted infections
★ Pelvic inflammatory disease

Urinary Tract Infections

★ Can be caused by bacteria, fungi, or parasites
★ Bacterial UTIs are most common

As the organism travels up the urinary tract, it can cause
- urethritis (inflamed urethra)
- cystitis (inflamed bladder)
- prostatitis (inflamed prostate)
- pyelonephritis (inflamed kidney)

Symptomatic infection with yeast (Candida albicans) is very common in women
★ Men can carry and transmit yeast infections while remaining asymptomatic
Urinary Tract Infections

- Signs and symptoms depend on the primary site of colonization in the urinary tract

<table>
<thead>
<tr>
<th>Site</th>
<th>Signs and Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urethra</td>
<td>dysuria, discharge</td>
</tr>
<tr>
<td>Bladder</td>
<td>dysuria, urgency, decreased urine volume, nocturia, back pain, pyuria or hematuria</td>
</tr>
<tr>
<td>Prostate</td>
<td>fever, urgency, back pain, dysuria, nocturia, hematuria</td>
</tr>
<tr>
<td>Kidney</td>
<td>fever, back pain, vomiting, costovertebral tenderness</td>
</tr>
</tbody>
</table>

Sexually Transmitted Diseases

- Gonorrhea
- Chlamydia
- Syphilis
- Genital warts
- Herpes

Gonorrhea

- Bacterial infection
- Incubation period: 1 to 3 weeks
- Signs & Symptoms
  - purulent urethral discharge
  - painful dysuria
  - if infected, other mucous membranes (mouth, throat, eyes, rectum) may produce pain, erythema, edema, or purulent exudate

- An individual can be infected and have no signs or symptoms
- They are still contagious and can transmit the infection to others

- Treatment
  - antibiotics
  - sexual contact with others must be strictly avoided until the infection is eliminated
  - recent (previous 3 to 6 months) sexual partners should be contacted, examined, and treated if necessary
<table>
<thead>
<tr>
<th>Chlamydia</th>
<th>Chlamydia</th>
</tr>
</thead>
</table>
| ★ Most common STI  
★ Bacterial infection  
★ Incubation period: 1 - 4 weeks in men  
★ Infected women are usually asymptomatic, but can still transmit the bacteria to their sexual partners | ★ Signs & Symptoms  
• painful dysuria  
• clear or purulent urethral discharge  
• other mucous membranes can also be affected |

<table>
<thead>
<tr>
<th>Chlamydia</th>
<th>Syphilis</th>
</tr>
</thead>
</table>
| ★ Treatment  
• antibiotics  
• screening for comorbid STI  
• abstention from sexual activity is required until infection resolves  
• recent (3 to 6 months) sexual partners should be contacted, examined, and treated | ★ Bacterial infection that initially involves the urogenital system but can then spread to other systems  
• nervous  
• cardiovascular |

<table>
<thead>
<tr>
<th>Syphilis</th>
<th>Syphilis</th>
</tr>
</thead>
</table>
| ★ Signs & Symptoms  
• may not occur for up to 3 months after initial exposure  
• painless chancre sore will appear and then spontaneously resolve within 2 months  
• inguinal lymphadenitis  
• skin rash erupts within 2 months, may last for 2 - 3 additional months  
• low-grade fever  
• fatigue  
• headache  
• loss of appetite  
• myalgia | ★ Treatment  
• begins with early recognition  
• antibiotic therapy  
• identification of any coexisting STI |
### Syphilis

- **If untreated**
  - the disease will go into remission
  - patient may be asymptomatic for decades
  - the disease will invade other tissues and systems
  - bone
  - skin
  - myocardium
  - central nervous system
  - cardiac and central nervous system complications are the most severe, disabling, and ultimately fatal

### Genital Warts

- **Caused by various papilloma viruses**
- **Signs & Symptoms**
  - external warts appear on the genitals after 1 - 6 months
  - internal warts may appear on the rectum, vagina, or cervix

### Genital Warts

- **Treatment**
  - surgical removal
  - topical medications
  - recurrences are common
  - when lesions are present, sexual abstinence is required to prevent communicating the virus

### Genital Herpes

- **Caused by herpes simplex viruses type 1 and type 2**
- **Occurs after contact with the genital lesions of an infected person**
- **These viruses can infect any mucous membrane**

### Genital Herpes

- **Once infected, the virus remains in the ganglia of the associated nerves for the remainder of the host's lifetime**
- **Periodically, the virus reactivates and causes recurrence of the characteristic lesions.**
Genital Herpes

- **Signs & Symptoms**
  - small vesicles appear within 1 week of the initial infection
  - these lesions are circular, painful, appear in clusters
  - lesions generally heal in 1 - 2 weeks
  - dysuria
  - paresthesia
  - other neurological signs may also appear
  - fever
  - malaise
  - inguinal lymphadenitis
  - recurrences usually have shorter duration and are less symptomatic

- **Diagnosis**
  - medical laboratory tests

- **Treatment**
  - medications to control symptoms during outbreaks and to limit recurrent episodes
  - abstention from sexual activity when lesions are present is essential to prevent spreading the virus

Pelvic Inflammatory Disease

- **Infection of the cervix, uterus, or fallopian tubes**
- **Most commonly caused by chlamydia and gonorrhea**

- **Signs and Symptoms**
  - abdominal pain
  - high-grade fever
  - nausea
  - purulent
  - bloody vaginal discharge

  Clinically, the signs and symptoms of acute PID are difficult to differentiate from ectopic pregnancy, thus requiring an emergency medical examination

- **Complications**
  - infertility
  - ectopic pregnancy
  - chronic pelvic pain
  - death

- **Treatment**
  - antibiotics
Renal Disorders

**Urolithiasis**

- Kidney stones
- Form when excess insoluble salts, calcium, or uric acid enter the kidney filtrate
- Produce symptoms when they grow large enough to block the flow of urine or irritate the urinary tract

**Signs and Symptoms**
- no history of trauma
- severe, unilateral pain in the lower back and abdomen
- pain radiating into the anterior thigh
- vomiting
- pallor
- tachycardia

**Treatment**
- small stones
  - pain medication
  - IV hydration to help pass the stones
- large stones
  - shock (lithotripsy)
  - (laser) treatments

**Recurrences are not uncommon**

**Prevention**
- proper diet
- hydration
**Acute Renal Failure**

- **Etiology**
  - caused by toxins or acute obstruction of the ureter
- **Signs**
  - sudden weight gain
  - generalized edema
  - hypertension
  - signs of left-sided heart failure

**Chronic Renal Failure**

- **Chronic renal failure is not common among physically active persons**
- **May occur as a complication of other diseases**
  - diabetes
  - hypertension
  - other kidney disease

**Male Urogenital Disorders**

- **Monorchidism**
  - Absence of one testicle
  - Congenitally occurs in .02% (1 in 5000) of males
  - Can also occur secondary to testicular trauma
  - May exclude a male from contact sports
  - Decisions regarding sports participation should be deferred to a urologist or endocrinologist

- **Prostate Disorders**
  - Acute or chronic inflammation (prostatitis)
  - More common with increased age

- **Prostatitis**
  - More common with increased age
### Prostate Disorders

**Signs & Symptoms**
- dysuria
- painful urination
- increase in urinary urgency & frequency
- nocturia
- dull ache in lower back or sacrum

### Prostate Cancer

**Most common in aging males**

- Causes the second most cancer deaths among men, after lung cancer

- 1 in 6 men will be diagnosed in their lifetime
- 1 in 34 men will die of the disease
- > 230,000 new cases diagnosed each year
- ≈30,000 deaths per year

**Etiology unknown**

- More common in African Americans than in any other races
- Males with a history of a first degree relative (father or brother) with prostate cancer is twice as likely to develop the disease

**Pain from metastases is often the first indication of this disease**

- common sites
  - spine
  - pelvis
  - hips
  - lung
  - liver

**As tumor size increases, the urethra becomes progressively obstructed and urinary function becomes impaired**

- Symptoms
  - pain in low back, hips, and upper thighs
  - dysuria
  - nocturia

![Prostate Cancer Stages](http://www.meb.uni-bonn.de/cancer.gov/Media/CDR0000442273.jpg)
Prostate Cancer

★ American Cancer Society recommendations
• annual prostate screening tests in males > 50 yrs. old
• Prostate Specific Antigen (PSA)
• Digital Rectal Exam (DRE)
• all persons with a suspicion of prostate cancer should be referred to their physician for x-rays and medical testing

Prostate Cancer

★ Diagnosis
• biopsy
★ Survival rates
• five-year without metastasis – nearly 100%
• five-year with metastasis – may be as low as 34%

Scrotum and Testicular Trauma

★ In most cases, can be prevented by wearing a cup
★ Most scrotum trauma is benign
★ Scrotal or testicular pain that does not improve in 10 minutes suggests a more serious injury

Testicular Torsion

★ Caused by a rotation of the testicles leading to twisting of the spermatic cord and compression of arteries and veins
★ Most commonly occurs during late childhood or adolescence

Testicular Torsion

★ Simple scrotum trauma vs. testicular torsion.

<table>
<thead>
<tr>
<th></th>
<th>Scrotum Trauma</th>
<th>Testicular Torsion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td>bilateral, less than 10 min</td>
<td>unilateral, over 10 min</td>
</tr>
<tr>
<td>Scrotum swelling</td>
<td>none</td>
<td>progressive</td>
</tr>
<tr>
<td>Nausea/vomiting</td>
<td>none or very brief nausea</td>
<td>increasing nausea and eventual vomiting</td>
</tr>
<tr>
<td>Testicular position</td>
<td>normal</td>
<td>unilateral elevation</td>
</tr>
</tbody>
</table>

Testicular Torsion

★ Etiology
• trauma
• may occur spontaneously
★ Signs & Symptoms
• testicular pain
• vomiting
• elevation of affected testicle
### Testicular Torsion
- Instruct athlete to perform a self-examination to check for testicular elevation
- Emergency surgery is required to save the testicle

### Varicoceles
- Varicose veins in the scrotum
- Occur most commonly in adolescents
- Signs and Symptoms
  - sensation of heaviness or tenderness
  - more prominent in standing position
  - often described as a "bag of worms"
- Surgical correction may be necessary

### Hydrocele
- Fluid-filled sac on the testicle
- Caused by testicular trauma
- Signs and Symptoms
  - similar to varicocele
  - sudden onset after trauma
- Medical referral is appropriate

### Testicular Cancer
- Most common cancer among males aged 15 to 35
- ≈ 8,000 new cases diagnosed each year
- Risk factors
  - family history
  - cryptorchism
  - significant testicular trauma or infection
  - infertility
- Signs & Symptoms
  - unilateral testicular swelling or nodule
  - back pain (common site for metastases)
  - abdominal pain
  - fatigue
  - weight loss
  - nausea
- The American Cancer Society recommends that males perform monthly testicular self-exams (TSE) starting at 15 years of age.
### Testicular Cancer

- Testicular cancer is curable
- Early detection is critical for long-term survival
- 5-year survival rate (non-metastatic) > 99%
- Metastases to the spine has a worse prognosis, with survival rates dropping below 75%

### Female Urogenital Disorders

- Endometriosis
- Pregnancy
- Ruptured ectopic pregnancy
- Female athletic triad
- Breast disorders
- Breast cancer
- Ovarian cysts
- Cervical, ovarian, and uterine cancers

### Endometriosis

- Occurs when endometrial tissue grows outside of the uterus
- Most common between 30 & 40 yrs of age
- Unknown etiology

### Endometriosis

- Signs & Symptoms
  - painful menstruation
  - increased volume of menstrual discharge
  - painful intercourse
  - lower back
- Complications
  - fibrosis and infertility
- Treatment
  - hormone therapy
  - surgery
Pregnancy

★ A weight gain of 25 to 30 lbs during the course of a pregnancy is normal, but may cause fatigue and musculoskeletal strain syndromes
★ Resting HR increases early in pregnancy (as much as 15 bpm over normal)

Pregnancy

★ BP progressively decreases (8 to 10 mmHg lower by the 20th wk)
  • worse in supine, so exercise in this position should be avoided after 4th month
  • pregnant women should be taught the symptoms of rapidly decreasing BP
    ▪ dizziness
    ▪ syncope
    ▪ nausea

Pregnancy

★ The physician who is managing the woman’s prenatal care should be consulted before recommending any type of exercise program
★ Exercise is contraindicated for women with a history of
  • diabetes
  • hypertension
  • history of miscarriage
  • presence of multiple fetuses

Pregnancy

★ If exercise is recommended
  • 15-minute intervals of regular, low-impact aerobic exercise keeping the HR below 140 bpm
  • duration and intensity should be adjusted to avoid elevating body temperature, injury, exhaustion (i.e., depletion of blood glucose), or dehydration
  • environment (temperature and safety) should be considered
  • an additional 300 kcal/day recommended throughout pregnancy

Pregnancy

★ The NCAA recommendations
  • avoidance of contact and collision sports
  • continue at sub-competitive intensities
  • if a pregnant athlete chooses to compete
    ▪ the athlete should sign informed consent about the risks
    ▪ institution should obtain approval from her personal physician, the team physician, and an institutional official

Pregnancy

★ The circulating concentration of the hormone relaxin increases substantially during pregnancy
★ Relaxin increases the extensibility of connective tissues
★ Relaxin also makes skeletal joints susceptible to injury
★ Precaution is needed during manual therapy techniques, such as joint mobilization
### Pregnancy

- Returning to a “regular” exercise regimen may take several months after delivery.
- Physical changes of pregnancy often persist up to six weeks postpartum.
- Activities to avoid in immediate postpartum stage:
  - Exercise in hot, humid weather (dehydration).
  - High-impact or high-intensity exercise.
  - Excessive stretching or joint motions (due to relaxin).
  - Sudden changes in posture (orthostatic hypotension).
- An additional 400 to 600 kcal/day may be required for women who are breast feeding.

### Ruptured Ectopic Pregnancy

- Occurs when a fertilized ovum attaches outside the uterus, usually in a Fallopian tube.
- When the embryo grows large enough, it ruptures the tube and causes severe internal hemorrhaging.

### Ruptured Ectopic Pregnancy

<table>
<thead>
<tr>
<th>Signs &amp; Symptoms</th>
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<tbody>
<tr>
<td>• Acute, lacerating lower abdominal pain</td>
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<tr>
<td>• Lower quadrant tenderness</td>
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<tr>
<td>• Vaginal bleeding</td>
</tr>
<tr>
<td>• Syncope</td>
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<tr>
<td>• Shock</td>
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### Female Athletic Triad

<table>
<thead>
<tr>
<th>Simultaneous presence of</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Disordered eating</td>
</tr>
<tr>
<td>• Amenorrhea</td>
</tr>
<tr>
<td>• Osteoporosis</td>
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</tbody>
</table>

### Female Athletic Triad

<table>
<thead>
<tr>
<th>Treatment</th>
</tr>
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<tbody>
<tr>
<td>• Depends strongly on early recognition</td>
</tr>
<tr>
<td>• Counseling</td>
</tr>
<tr>
<td>• Decrease in exercise intensity</td>
</tr>
<tr>
<td>• Increase in caloric intake</td>
</tr>
<tr>
<td>• Daily calcium intake of 1200 to 1500 mg</td>
</tr>
</tbody>
</table>
Breast Disorders

★ Breast pain may be a result of direct trauma or repetitive strain from activities such as running with poor support
★ Ice is recommended following a painful blow to the breast
★ Use of a sports bra can prevent repetitive strain injuries caused by sprain of the suspensory (Cooper’s) ligaments of the breast

Breast Disorders

★ Disorders requiring immediate referral
  • breast masses in an adult woman
  • changes in breast shape or resiliency
  • tenderness
  • discharge

Breast Disorders

★ Common benign disorders
  • proliferative breast changes (fibrocystic breast disease)
  • small multiple lumps accompanied by cyclic pain (pain associated with the menstrual cycle)
  • both genetic & hormonal factors linked to these changes

Any new lump found on self-exam should be evaluated by a physician

Breast Cancer

★ Most common cancer among women
★ 1 in 7 women will be diagnosed in their lifetime
★ ≈ 210,000 cases are diagnosed each year
★ > 40,000 deaths a year

Breast Cancer

★ Risk factors
  • positive family history
  • early onset of menarche
  • having never been pregnant
  • have a first child after age 35

★ Typically occurs in women over age 40
★ Diagnosis at an earlier age usually indicates greater severity
Breast Cancer

**Signs & Symptoms**
- palpable lump in the breast tissue
- breast tenderness
- dimpling or discharge from the nipple

**Common sites of metastasis**
- ribs
- vertebrae
- hips

**The American Cancer Society recommends monthly breast self-examinations (BSE) beginning by age 20**
- Approximately 90% of breast lesions are discovered in this manner.

**Regular mammography should begin between ages 35 - 40 years**
- repeated biannually until age 50
- repeated annually after age 50

**Definitive diagnosis**
- biopsy

**Treatment**
- depends on the stage of the disease
  - lumpectomy (removal of the tumor)
  - mastectomy (removal of the entire breast and underlying muscle tissue)
  - chemotherapy
  - radiation therapy are often part of the overall treatment plan

**Early stages: five-year survival rates > 98%**
**Later stages: five-year survival rates < 50%.**
Ovarian Cysts

- Fibrous cysts (vascularized, fluid-filled sacs) that form within the ovaries
- Usually asymptomatic and benign, occasionally they cause significant health problems
- May cause unusual bleeding or interfere with the menstrual cycle
- Many will resolve on their own, others may require surgical removal

Ovarian Cysts

- Ovarian cysts can also rupture
  - sudden and severe internal hemorrhaging
  - lower quadrant abdominal pain
  - peritonitis
  - shock
  - death (rare)

Cervical, Ovarian, and Uterine Cancers

- Occur primarily in women over age 45
- Typically asymptomatic until metastases exist

Cervical, Ovarian, and Uterine Cancers

- Cervical cancer
  - ≈ 10,000 women diagnosed each year
  - 3,700 deaths each year
  - five-year survival rates
    - early stages: > 90%
    - advanced stages: < 70%

Cervical, Ovarian, and Uterine Cancers

- Ovarian cancer
  - ≈ 22,000 women diagnosed each year
  - 16,000 deaths each year
  - five-year survival rates
    - early stages: 90%
    - late stages: 20%

Cervical, Ovarian, and Uterine Cancers

- Uterine cancer
  - ≈ 40,000 diagnosed each year
  - > 7,000 deaths each year
  - five-year survival rates
    - early stages: 50%
    - late stages: < 10%
### Cervical, Ovarian, and Uterine Cancers

- **Unusual vaginal bleeding or discharge** may be the only indication of cancer in these organs.
- **Early pre-cancerous changes of the cervix** can be detected during routine annual medical examination:
  - Pap smear

### Risk factors
- history of numerous sexual partners
- postmenopausal estrogen supplementation
- endocrine disorders
- never becoming pregnant
- family history, and an age of 40 years or greater
- humanpapilloma virus (HPV) [cervical cancer]

### Questions?