# Chapter 31, Introduction to Abdominal and Genitourinary Injuries

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## 1. Introduction to Abdominal and Genitourinary Injuries

- This report focuses on **abdominal and genitourinary injuries**. [2]
- It covers how to **manage patients** with these traumas. [4]
- Recognizing **life threats** and the need for **immediate intervention** is crucial. [5]
- The content includes detailed anatomy, physiology, and pathophysiology. [6]
- Assessment follows the primary and secondary model. [7]
- Specific injuries discussed include blunt versus penetrating mechanisms. [8]
- It also covers eviscerations, impaled objects, and injuries to external genitalia. [8]

## 2. Anatomy and Physiology of the Abdomen

| Organ Type | Organs | Characteristics | Source |
|---|---|---|---|
| Hollow Organs | Stomach, intestines, ureter, bladder | Contents spill into the peritoneal cavity when ruptured, causing inflammation and infection (peritonitis). | [20] |

| | | | |
|---|---|---|---|
| Solid Organs | Liver, spleen, pancreas, kidneys | Perform chemical work (enzyme production, blood cleansing). Rich blood supply leads to severe hemorrhage. | [27] |

- The abdomen extends from the diaphragm to the pelvis. [11]
- It contains organs for digestion, urinary, and genitourinary systems. [11]
- The abdomen is divided into **four quadrants**. [16]
- Quadrant location of pain can indicate involved organs. [17]
- The right lower quadrant is common for swelling and inflammation due to the appendix. [19]
- The mesenteryconnects the small intestines to the abdominal wall. [22]
- mesenteryinjuries can cause significant bleeding into the peritoneal cavity. [23]
- Signs of this include abdominal rigidity and periumbilical bruising. [24]
- The **retroperitoneal space** is the posterior abdomen, behind the peritoneum. [30]
- It includes the kidneys, ureters, bladder, and most of the pancreas. [31]

## 3. Mechanisms and Types of Abdominal Injuries

| Trauma Type | Characteristics | Common Causes | Source |
|---|---|---|---|
| Blunt Trauma | No open wound, can appear initially as abrasions, contusion/hematoma may take hours to be visible. | Motor vehicle crashes, falls, blast injuries, rapid deceleration, compression. | [35] |
| Penetrating Trauma | Foreign object enters the abdomen, opening the peritoneal cavity. Open wounds can be deceiving. | Knives, handguns, shotguns, rifles. | [41] |

- Specific trauma to the abdomen can be from blunt trauma, penetrating trauma, or both. [12]
- Injuries to the abdomen can be either **open or closed**. [34]
- Closed abdominal injuries are from blunt trauma. [35]
- Seatbelts and airbags can cause injuries if not worn properly. [37]
- An **open abdominal injury** involves a foreign object entering the abdomen. [41]

- Maintain a high index of suspicion for unseen injuries with open wounds. [42]
- **Velocity of an object** helps predict tissue damage. [44]
- Low velocity injuries are from handheld objects like knives. [45]
- Medium velocity injuries are from small caliber handguns. [46]
- High velocity injuries are from larger weapons like rifles. [47]
- High and medium velocity injuries have **temporary wound channels** and cavitation. [48]
- Cavitation is pressure transferred to tissues away from the projectile. [49]
- Low velocity penetrations can still damage underlying organs. [51]
- Assume thoracic and peritoneal cavities are violated if injury is at or below the xyphoid process. [52]

## 4. Specific Abdominal Organ Injuries

| Organ/Area | Injury Type | Signs/Symptoms/Complications | Source |
|---|---|---|---|
| Evisceration | Bowel protrudes from peritoneum. | Extremely painful, visually shocking. | [53] |
| Hollow Organs | Rupture/laceration. | Delayed signs/symptoms, contents spill, infection (peritonitis). | [57] |
| Solid Organs | Fracture, laceration, puncture. | Significant bleeding, rapid blood loss or slow oozing. | [63] |
| Liver | Fracture, penetrating trauma. | Hypoperfusion, referred pain to the right shoulder. | [64] |
| Spleen/Pancreas | Fractured, lacerated, punctured. | Heavy bleeding, referred left shoulder pain (spleen). | [66] |
| Diaphragm | Penetrated or ruptured. | Loops of bowel may herniate into thoracic cavity, dyspnea, compressed lungs. | [67] |

| | | | |
|---|---|---|---|
| Kidneys | Impacted or penetrated. | Significant blood loss, blood in urine (hematuria). | [70] |

- An **evisceration** is when bowel protrudes from the peritoneum. [53]
- It is extremely painful and visually shocking. [54]
- Do not push on the patient's abdomen. [55]
- Hollow organ injuries often have **delayed signs and symptoms**. [57]
- Contents spill into the abdomen, and infection develops over hours or days. [57]
- Both blunt and penetrating trauma can cause hollow organ injuries. [57]
- Blunt trauma can cause the organ to pop. [57]
- Penetrating trauma causes direct injury like lacerations. [57]
- Gallbladder and urinary bladder contents are irritating if ruptured. [58]
- Free air in the peritoneal cavityindicates a perforated hollow organ. [59]
- Severe infections and septic shock can develop if not repaired rapidly. [61]
- Solid organ injuries can cause significant and rapid blood loss. [63]
- Solid organs can also ooze blood slowly. [63]
- The liver is large and very vascular. [64]
- It can be injured by fractured lower ribs or penetrating trauma. [64]
- Referred pain to the right shoulder is a common finding with liver injury. [65]
- The spleen and pancreas are also vascular and prone to heavy bleeding. [66]
- Referred left shoulder pain occurs with splenic injury. [66]
- If the diaphragm is penetrated, bowel may herniate into the thoracic cavity. [67]
- This can cause dyspnea and compress the lungs. [68]
- Kidneys can be impacted or penetrated by trauma. [70]
- This can cause significant blood loss. [71]
- Blood in the urine ( hematuria) is a common finding. [72]
- Blood visible on inspection of the urinary meatusindicates significant genitourinary trauma. [72]

## 5. Patient Assessment for Abdominal Injuries

- Assessing patients with potential abdominal injuries is challenging. [75]
- Some injuries are obvious, others easily overlooked. [75]
- Some abdominal injuries develop or worsen over time. [76]
- Start with the **scene size-up**. [76]
- Ensure the scene is safe. [77]

- Call for additional resources early if needed. [77]
- Consider the MOI and NOI. [77]
- Consider early spinal precautions. [77]
- Perform the **primary assessment** quickly. [79]
- Note the patient's level of consciousness. [80]
- Address severe external hemorrhage first. [81]
- Ensure a clear and patent airway. [82]
- Aggressively treat signs of shock. [83]
- Transport to the highest level trauma center if available. [84]
- Obtain a **history**, including SAMPLE and OPQRST. [85]
- Ask about nausea, vomiting, or diarrhea. [88]
- Ask about the appearance of bowel movements and urinary output. [89]
- Ask about referred pain. [91]
- peritonitiscan cause rebound tenderness(pain provoked by removing pressure). [92]
- guardingoccurs when the patient tenses abdominal muscles. [92]
- The **secondary assessment** may not always be possible in the field. [94]
- Remove loosened clothes to expose injured regions. [95]
- Transport in a position of comfort unless spinal injury is suspected. [95]
- Examine the entire abdomen. [96]
- Use D-CAP BTLS to identify injury signs. [96]
- Palpate the abdomen, starting farthest from the painful quadrant. [97]
- Perform a full body scan for other injuries. [98]
- Inspect and palpate the kidney area. [99]
- Obtain and record **vital signs** early. [99]
- Repeat vital signs every five minutes with suspected serious injury. [99]
- hypotensionis a late sign of shock. [100]
- For isolated abdominal injuries, visually inspect for penetrating wounds. [103]
- Check for entrance and exit wounds. [104]
- Do not remove an impaled object. [105]
- In **reassessment**, repeat the primary assessment and vital signs. [106]
- Reassess interventions and treatment. [107]
- Document the MOI, injuries, and vital signs. [107]

## 6. Emergency Medical Care for Abdominal Injuries

| Injury Type | Emergency Care | Source |
|---|---|---|
| Closed Abdominal | Monitor closely for shock progression, suction available for nausea/vomiting, administer oxygen, keep patient warm, assist ventilations, consider ALS. | [109] |
| Open Abdominal | Follow general procedures for blunt injury care, inspect back/sides for exit wound, apply dry sterile dressing, stabilize impaled objects. | [111] |
| Abdominal Evisceration | Place a sterile dressing moist with saline over the wound, apply a bandage, transport, never replace protruding organs, keep affected area warm. | [113] |

- For **closed abdominal injuries**, monitor for shock. [109]
- Have suction available for nausea and vomiting. [110]
- Administer oxygen to unconscious or shocked patients. [110]
- Keep the patient warm. [110]
- Assist ventilations if needed. [110]
- Consider ALS for NG tube placement. [110]
- **Open abdominal injuries** generally have obvious wounds. [111]
- Significant external bleeding is not always present. [112]
- Maintain a high suspicion for unseen blood loss. [112]
- Follow general procedures for blunt abdominal injury care. [112]
- Inspect the patient's back and sides for an exit wound. [112]
- Apply a dry sterile dressing to all open wounds. [112]
- If a penetrating object is in place, apply a stabilizing bandage. [112]
- This controls bleeding and minimizes object movement. [112]
- Severe lacerations can result in an **evisceration**. [112]
- eviscerationis fat or internal organs protruding from the wound. [113]
- Place a sterile dressing moistened with saline over the wound. [114]
- Apply a bandage and transport. [114]
- Never try to replace the protruding injury. [115]
- Keep the affected area warm. [115]

## 7. Anatomy and Physiology of the Genitourinary System

- The **genitourinary system** controls reproductive functions and waste discharge. [117]
- Organs of this system are in the abdomen. [118]
- Kidneys are the solid organs. [118]
- The ureters, bladder, and urethraare hollow organs. [118]
- Male genitalia are outside the pelvic cavity, except for the prostate and seminal vesicles. [119]
- Female genitalia are entirely within the pelvis, except the vulva, clitoris, and labia. [119]

## 8. Injuries to the Genitourinary System

| Organ/Area | Cause of Injury | Consequences/Findings | Source |
|---|---|---|---|
| Kidneys | Force blow, penetrating injury, indirect blow (e.g., football tackle). | Significant injuries, abrasion, laceration, contusion in flank area, hematoma. | [122] |
| Urinary Bladder | Blunt injury to lower abdomen/pelvis (especially when full), penetrating wounds. | Rupture, urine spills into tissues, shearing from urethra (males), increased injury risk in pregnancy. | [125] |
| External Genitalia (Male) | Soft tissue wounds, sudden deceleration, direct blows, straddle injuries, pelvic fractures, penetrating wounds. | Painful, rarely life-threatening (unless significant bleeding), avulsions, amputations, urethral lacerations, scrotal damage. | [132] |
| External Genitalia (Female) | Trauma. | Painful (rich nerve supply), consider sexual assault and pregnancy. | [138] |
| Internal Genitalia (Female) | Rarely damaged (small, deep, protected). | Uterus enlarges and is vulnerable during pregnancy, rich blood supply during pregnancy makes injuries serious. | [134] |

- Kidney injuries are not common and rarely occur in isolation. [122]

- Significant injuries can result from an indirect blow. [122]
- Suspect kidney damage with flank abrasion, laceration, or contusion. [123]
- Penetrating wounds in the lower rib cage, hip, or upper abdomen area suggest kidney injury. [124]
- Fractures of the lower rib cage or lumbar vertebrae can also indicate kidney damage. [124]
- A hematoma in the flank region is evidence of potential kidney damage. [124]
- Urinary bladder injuries may result in rupture, spilling urine into tissues. [125]
- Blunt injuries to the lower abdomen or pelvis can cause rupture, especially if the bladder is full. [127]
- Penetrating wounds of the lower mid-abdomen or perineumcan directly injure the bladder. [127]
- In males, sudden deceleration can shear the bladder from the urethra. [128]
- Bladder injuries increase in later pregnancy due to ureter displacement. [129]
- Fracture of the pelvis can result in bladder perforation. [130]
- External genitalia injuries are painful but rarely life-threatening unless bleeding is significant. [132]
- Pain may be referred to the lower abdomen. [133]
- Internal female genitalia are rarely damaged due to their protected location. [134]
- Exceptions occur during pregnancy when the uterus enlarges and is more vulnerable. [136]
- Uterine injuries during pregnancy can be serious due to rich blood supply. [137]
- External female genitalia injuries are painful due to rich nerve supply. [139]
- Consider sexual assault and pregnancy with female external genitalia injuries. [139]

## 9. Patient Assessment for Genitourinary Injuries

- Potential for patient embarrassment exists with genitourinary injuries. [144]
- Maintain a professional presence and provide privacy. [144]
- Have an EMT of the same gender perform the assessment if possible. [144]
- Assess for scene hazards and threats during the **scene size-up**. [145]
- Apply standard precautions. [146]
- Look for indicators of the mechanism of injury. [146]
- Patients may avoid discussion to avoid physical exam. [147]
- Patients may provide a less embarrassing MOI. [148]
- In the **primary assessment**, quickly scan the patient. [149]
- Injuries can produce a significant amount of blood volume. [149]

- Do not avoid this area if bleeding is present. [149]
- Maintain privacy. [150]
- Control severe bleeding first. [151]
- Ensure a clear and patent airway. [152]
- Provide assessment ventilations as needed. [152]
- Consider the need for spinal motion restriction. [152]
- For **circulation**, assess pulse rate, skin condition, color, temperature, and cap refill. [153]
- Closed injuries do not have visible bleeding signs. [154]
- Treat for signs of shock. [154]
- Note the patient's level of alertness. [154]
- Transport to a trauma center. [155]
- For **history taking**, investigate the chief complaint. [157]
- Common complaints include nausea, vomiting, diarrhea, and blood in the urine. [158]
- Use OPQRST and ask about output, especially blood in the urine. [160]
- Ask about allergies and previous injuries. [160]
- Last food intake and fluids are important. [162]
- Address events leading up to the injury. [162]
- A **secondary assessment** may not always be possible. [163]
- If the patient has an isolated injury, focus on that region. [164]
- Assess for D-CAP BTLS. [164]
- Obtain vital signs and reassess frequently. [164]
- In **reassessment**, repeat the primary assessment and vital signs. [165]
- Reassess interventions and treatment. [165]
- Adjust interventions as necessary. [165]
- Communicate concerns to hospital staff. [165]
- Describe all injuries and treatments given. [166]

## 10. Emergency Medical Care for Genitourinary Injuries

| Injury Type | Emergency Care | Source |
|---|---|---|
| Kidney Injury | Treat for shock, transport promptly, monitor vital signs. | [167] |

| | | |
|---|---|---|
| Urinary Bladder Injury | Suspect with blood in urethra or trauma to lower abdomen/pelvis/perineum, transport promptly if shock/associated injuries present, monitor vital signs. | [169] |
| External Male Genitalia Injury | Use sterile moist compresses for stripped skin, apply direct pressure with dry sterile gauze for bleeding, never manipulate foreign objects, identify and transport avulsed parts, wrap penile avulsion in moist sterile dressing. | [171] |
| Penile Amputation | Manage blood loss with local pressure, never apply constricting device, preserve amputated part in cool container. | [175] |
| Rectal Bleeding | Consider possible causes like sexual assault, foreign bodies, hemorrhoids, or ulcers. | [197] |
| External Female Genitalia Injury | Treat lacerations, abrasions, avulsions with moist sterile compresses, use local pressure, hold dressings with diaper type bandage, do not place dressings in vagina, leave foreign objects in place. | [193] |

- For **kidney injuries**, damage may not be obvious. [167]
- Look for signs of shock or blood in the urine. [167]
- Treat for shock and transport promptly. [168]
- Monitor vital signs en route. [168]
- Suspect a **urinary bladder injury** with blood in the urethraopening. [169]
- Also suspect with signs of trauma to the lower abdomen, pelvis, or perineum. [169]
- Transport promptly if shock or associated injuries are present. [170]
- Monitor vital signs en route. [170]
- For **external male genitalia injuries**, injuries are painful. [171]
- They are rarely life-threatening unless bleeding is significant. [172]
- Use sterile moist compresses for areas stripped of skin. [172]
- Apply direct pressure with dry sterile gauze to control bleeding. [172]
- Never move or manipulate foreign objects in the urethra. [172]
- Identify and take avulsed parts to the hospital. [172]
- If skin on the penis is avulsed, wrap the penis in a moist sterile dressing. [173]
- Transport promptly and use direct pressure. [173]
- Try to save and preserve the skin. [174]

- For **penile amputation**, managing blood loss is top priority. [175]
- Use local pressure on the remaining stump. [176]
- Never apply a constricting device. [177]
- Surgical reconstruction is possible if the amputated part is located. [177]
- Wrap the part in moist sterile dressing, place in a bag, and transport in a cool container. [178]
- Avoid direct contact with ice. [178]
- Severe damage to connective tissue can fracture or angulate the shaft. [179]
- Accidental laceration of the penis head is associated with heavy bleeding. [182]
- Local pressure usually stops hemorrhage. [183]
- Skin can get caught in a zipper. [183]
- Cut pants if a small segment is involved; use heavy scissors for larger segments. [184]
- urethrainjuries in males are not very common. [186]
- Lacerations can result from straddle injuries, pelvic fractures, or penetrating wounds. [186]
- It is important to know if the patient can urinate or if there is blood in the urine. [187]
- Save any urination for hospital examination. [187]
- Foreign bodies protruding from the urethraneed surgical removal. [188]
- A bulging scrotummay indicate damaged contents. [189]
- Wrap scrotal contents or the perineal wall with a moist compress. [190]
- Use local pressure to control bleeding. [191]
- Direct blows to the scrotumcan rupture a testicle and cause blood accumulation. [192]
- Apply an ice pack to the scrotal area during transport. [192]
- For **female genitalia injuries**, treat lacerations, abrasions, or avulsions with moist sterile compresses. [193]
- Use local pressure to control bleeding. [193]
- Hold dressings in place with a diaper type bandage. [193]
- Do not place any dressings into the vagina. [194]
- Leave any foreign objects in place after stabilizing with bandages. [195]
- Injuries are painful but generally not life-threatening. [195]
- Hospital evaluation is required. [196]
- Transport urgency depends on associated injuries, hemorrhage amount, and shock presence. [196]

## 11. Rectal Bleeding and Sexual Assault

- **Rectal bleeding** is a common complaint. [197]
- Possible causes include sexual assault, foreign bodies, hemorrhoids, or ulcers. [198]
- Significant bleeding can occur after hemorrhoid surgery. [199]
- **Sexual assault** is a serious issue. [200]
- Victims are generally women, but can be men and children. [200]
- Often, compassion and transport are the main roles. [201]
- The patient may have multi-system trauma and need shock treatment. [202]
- Do not examine unless obvious bleeding requires a dressing. [203]
- Follow appropriate protocols and procedures. [204]
- Shield the patient from onlookers. [204]
- Document history, assessment, treatment, and response for court appearances. [204]
- Follow crime scene policy. [205]
- Advise the patient not to wash, bathe, shower, douche, urinate, or defecate until after the exam. [207]
- If oral penetration occurred, advise the patient not to eat, drink, brush teeth, or use mouthwash until after the exam. [208]
- Handle the patient's clothes as little as possible. [209]
- Place clothing and evidence in paper bags. [209]
- Do not use plastic bags as mold can destroy evidence. [210]
- Have an EMT of the same gender care for the patient whenever possible. [211]
- Treat medical injuries. [212]
- Provide privacy, support, and reassurance. [212]

## 12. Review and Conclusion

- This chapter reviewed abdominal and genitourinary injuries. [213]
- peritonitismost likely results from hollow organ injuries. [216]
- Solid organs like the liver are most likely to bleed profusely if severely injured. [219]
- Intra-abdominal bleeding is common after blunt trauma. [220]
- The absence of pain does not rule out intra-abdominal bleeding. [220]
- Properly worn seat belts can still cause injury, possibly to the iliac crest. [220]
- A deformed steering wheel suggests the driver experienced an abdominal injury. [222]
- Alternative management for abdominal eviscerationincludes applying an occlusive dressing. [223]
- A patient with possible peritonitismay prefer to sit with legs drawn up. [224]
- Pain in the left flank after a football tackle is most concerning for kidney injury. [225]

- hematuriais defined as blood in the urine. [228]
- Local pressure can usually control bleeding for female external genitalia trauma. [230]
- This report summarizes key aspects of abdominal and genitourinary injuries.