

Duodenal Trauma

Scott Williams, MD

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General Information

General

- Difficult Due to Complex Anatomical & Physiologic Relationships ¹
 - [*See Small Intestine: Anatomy & Physiology](#)
- Delay in Diagnosis is a Significant Factor in Morbidity & Mortality
 - Mortality Risk 4x if Diagnosis Delayed by Over 24-Hours ²
- Morbidity Rate: 22-27% ¹
- Mortality Rate: 5-30% ¹
 - Grade I: 8.3%
 - Grade II: 18.7%
 - Grade III: 27.6%
 - Grade IV: 30.8%
 - Grade V: 58.8%

Etiology

- Rare: Only 3.7-5% of All Abdominal Injuries ³
- Penetrating Trauma Most Common (77.7%) ⁴
 - 81% Gunshot Wounds ¹
 - 19% Stab Wounds ¹
- Blunt Trauma (22.3%) ⁴
 - 85% Motor Vehicle Collisions ¹
 - Other Blunt Causes: Assault & Falls



Mechanism of Injury

- *Penetrating Mechanisms:*
 - Direct Injury
 - Cavitation
 - Shock Wave
- *Blunt Mechanisms:*
 - Crushing Force
 - Shearing Force
 - Bursting Force
- [*See Approach to Abdominal Trauma](#)

Location of Injury ¹

- First Portion: 13%
- Second Portion: 36% – Most Common
- Third Portion: 18%
- Fourth Portion: 15%
- *18% Affect Multiple Portions

Presentation & Diagnosis

Presentation ⁶

- Mostly Nonspecific
- Abdominal Pain, Can Radiate to the Back
- Chest Pain
- Nausea & Vomiting
- Hematemesis
- Rarely Associated with Severe Testicular Pain & Priapism ¹
 - Due to Sympathetic Stimulation Along the Gonadal Vessels

Diagnosis

- **Difficult Due to Complex Anatomical & Physiologic Relationships ¹**
- Requires a High Index of Suspicion
- Stable Patients May Be Diagnosed on CT
- May Be Diagnosed Intraoperatively

AAST Duodenum Injury Scale

- [*See AAST](#)
- Injury Scale is Under Copyright

Associated Injuries ¹

- Liver (17%)
- Colon (13%)
- Pancreas (12%)
- Other Small Bowel (11%)
- Stomach (9%)
- *Rarely Occurs in Isolation

Complications ⁶

- Duodenal Leak/Fistula – Major Source of Morbidity
 - Initial Treatment: Conservative (NPO/NGT/TPN) & Octreotide
- Missed Injury
- Intraabdominal Abscess
- Duodenal Obstruction
- Recurrent Pancreatitis
- Bleeding

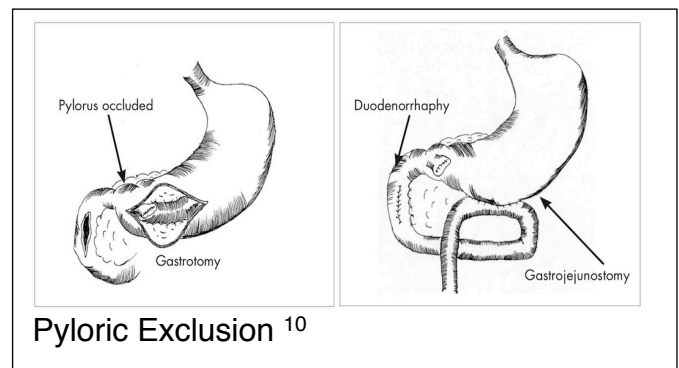
Treatment

Surgical Access

- *Kocher Maneuver*: Access D1, D2 & Proximal D3
- *Cattel-Braasch Maneuver*: Access Entire Duodenum (Including Distal D3 & D4)

Primary Repair

- **Primary Repair is Generally the Preferred Treatment** for Most Duodenal Injuries ⁷
- Successful for 70-85% of Injuries (Even with Full Transection) ⁸
- Requires: Little Tissue Loss with No Tension & No Involvement of the Ampulla
- Considerations:
 - Nasogastric Tube to Protect Repair
 - Extraluminal Drain – Use is Debated with No Level I Evidence
 - Possible Increased Risk for Duodenal Leak ⁶
- *Severe or Concurrent Pancreatic Injury*: **Pyloric Exclusion with Gastrojejunostomy** ⁹
 - Pyloric Exclusion (PEX) – Gastrotomy & Closure of the Pylorus Using Absorbable Suture (Vicryl or PDS) ¹¹
 - After 4-12 Weeks Gastrojejunostomy Closes and Pylorus Reopens
 - Risk for Marginal Ulcer (Some Add Truncal Vagotomy, Most Manage Medically)



If Primary Repair Not Feasible

- *Under Tension or Involves Ampulla: Roux-en-Y Duodenojejunostomy (DJ)* ¹²
 - Jejunum Limb Anastomosis to the Proximal Duodenum & Oversewing of Distal Duodenum
- *Massive Injury Involving Head of Pancreas: Pancreaticoduodenectomy (Whipple Procedure)* ¹³
 - Never Done in an Emergent Setting
 - Requires Wide Drainage at Index Operation & Definitive Repair Upon Medical Stabilization

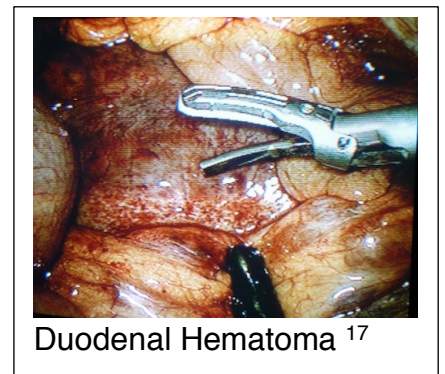
Historical Options Fallen Out of Favor

- *Jejunal Serosal Patch* ¹⁴
 - Less Desirable than Roux-en-Y
- *Retrograde Jejunostomy*
 - For Duodenal Decompression
- *Duodenal Diverticularization* ¹⁵
 - Procedure: Primary Repair, Antrectomy & Gastrojejunostomy
 - Creates a Permanent Bypass of the Repair
 - May Add Tube Duodenostomy for Decompression
- *Triple-Ostomy Repair* ¹⁶
 - Procedure: Gastrostomy, Duodenostomy (Or Retrograde Jejunostomy) & Feeding Jejunostomy
- *Triple-Tube Repair* ¹⁶
 - Procedure: Primary Repair with NG Tube, Feeding Jejunostomy & Retrograde Jejunostomy

Paraduodenal Hematoma

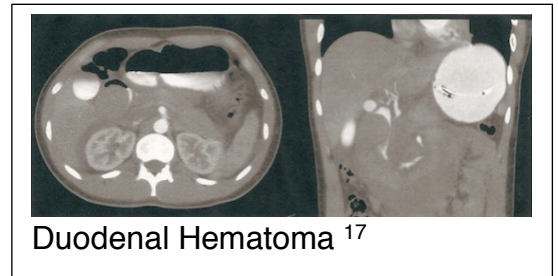
Causes

- Most Common in Peds After Play (Bicycle Handlebars or Sports) or Abuse ¹⁸
- Can Be Spontaneous Due to Hemophilia
- May Be Associated with Anticoagulation in Older Patients ¹⁹
- *Duodenum is the Most Common Site of Intramural Hematoma Among the GI Tract (27.5%) ²⁰



Presentation ¹⁹

- Mostly Nonspecific
- **Primary Concern is Progression Causing Luminal Obstruction**
- Abdominal Pain
- Nausea & Vomiting
- Hematemesis
- Ampullary Obstruction Can Cause Cholestasis or Pancreatitis ²¹⁻²³



Diagnosis

- Often Difficult to Diagnose & Requires a High Index of Suspicion
- Primarily Diagnosed by CT or UGI ¹⁹
 - May Also Be Seen on MRI
- US Often Used in Peds to Avoid Radiation ¹⁹
- “Stacked Coins” or “Coiled Spring” Sign on UGI – Due to Partial Intussusception of the Bowel Wall Distal to the Hematoma ²⁴

Treatment (If Found on Imaging)

- **Conservative Treatment** (NPO & Serial Exams)
 - Most (60-85%) Improve Within a Short Period (2-3 Weeks) ¹⁹
 - Complete Resolution of Symptoms Often Takes Months (Average 13 Months) ¹⁹
- If Obstructs: NGT, TPN, & UGI Every 5-7 Days
- If Persists > 2-3 Weeks: Operative Evacuation ¹⁷

Treatment (If Found Intraoperatively)

- Mostly Conservative Treatment
- Kocher & Thoroughly Inspect for Perforation
- Indications for Hematoma Evacuation: ⁶
 - High Suspicion for Full-Thickness Injury
 - > 50% Luminal Narrowing

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