ADVANTAGES OF SURGICAL APPROACHES ACCORDING TO THE DEGREE OF INJURY IN DUODENAL TRAUMA

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Abstract: *Duodenal injuries, despite being relatively rare in the spectrum of abdominal trauma (0.9–10%), are characterized by diagnostic difficulty, retroperitoneal localization, and a high rate of postoperative complications and mortality.*

The aim of this study was to evaluate the effectiveness of differentiated surgical strategies based on the degree of duodenal injury.

A retrospective analysis was conducted on the surgical outcomes of 5 patients treated between 2019 and 2025. The severity of injury was assessed according to the E. Moore (1990) classification. In each clinical case, pathogenetically justified surgical approaches were applied, including duodenal decompression, gastroenterostomy, biliary drainage, and enteral nutrition.

The obtained results demonstrated that an individualized surgical strategy based on the severity of injury reduces the risk of postoperative complications, including anastomotic leakage and retroperitoneal phlegmon. In high-grade injuries (IV–V), the use of combined decompressive and diversion procedures is considered a pathogenetically justified approach.

Thus, a differentiated surgical approach in duodenal injuries improves clinical outcomes.

Keywords*: duodenum, trauma, gastroenterostomy, decompression, phlegmon, surgical strategy*

ПРЕИМУЩЕСТВА ХИРУРГИЧЕСКИХ ПОДХОДОВ В ЗАВИСИМОСТИ ОТ СТЕПЕНИ ПОВРЕЖДЕНИЯ ПРИ ТРАВМЕ ДВЕНАДЦАТИПЕРСТНОЙ КИШКИ.

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Аннотация: *Повреждения двенадцатиперстной кишки, несмотря на их относительную редкость в структуре абдоминальной травмы (0,9-10%), характеризуются значительными диагностическими трудностями вследствие их ретроперитонеальной локализации, а также* ***высокой частотой послеоперационных осложнений и летальности.***

Цель исследования заключалась в оценке эффективности дифференцированных хирургических подходов в зависимости от степени повреждения двенадцатиперстной кишки.

Проведен ретроспективный клинический анализ результатов хирургического лечения 5 пациентов, находившихся на лечении в период с 2019 по 2025 год. Степень тяжести повреждения оценивалась согласно классификации E. Moore (1990). Во всех клинических случаях применялись патогенетически обоснованные хирургические методы, включая декомпрессию двенадцатиперстной кишки, гастроэнтероанастомоз, билиарное дренирование и энтеральное питание.

Полученные результаты показали, что индивидуализированный хирургический подход, основанный на степени тяжести повреждения, значительно снижает риск послеоперационных осложнений, в частности несостоятельности анастомоза и забрюшинной флегмоны. При тяжелых повреждениях (IV-V степени) комбинированные декомпрессионные и диверсионные операции являются патогенетически обоснованной и клинически эффективной тактикой.

Таким образом, дифференцированный хирургический подход при травмах двенадцатиперстной кишки способствует улучшению послеоперационных клинических исходов и снижению частоты тяжелых осложнений.

Ключевые слова: *двенадцатиперстная кишка, травма, гастроэнтероанастомоз, декомпрессия, флегмона, хирургическая тактика*

INTRODUCTION

Duodenal injuries, although relatively uncommon in abdominal trauma (0.9–10%), are associated with high mortality rates (11–30%) and severe postoperative complications. This is primarily explained by the anatomical and physiological features of the duodenum, including its retroperitoneal location, close anatomical relationship with the pancreas and major biliary structures, as well as exposure to highly enzymatic digestive contents.

Epidemiological data indicate that this pathology predominantly affects males of working age (20–40 years), making it a significant socio-economic problem. In recent years, an increase in road traffic accidents and falls from height has contributed to a rising incidence of duodenal injuries.

One of the main challenges in the early diagnosis of duodenal injuries is the absence of specific clinical signs due to retroperitoneal localization, often resulting in delayed diagnosis and the development of severe complications such as retroperitoneal phlegmon, pancreatitis, and sepsis.

To date, no universally accepted standardized surgical approach for the treatment of duodenal injuries has been established. Proposed strategies vary depending on the severity of injury, anatomical localization, and associated trauma. Therefore, the development of a pathogenetically justified and individualized surgical approach based on injury severity remains an important clinical challenge.

Aim of the Study

The aim of this study was to perform a comparative analysis of differentiated surgical approaches based on the severity of duodenal injuries, to evaluate their pathogenetic justification, and to determine their impact on postoperative complications (anastomotic leakage, retroperitoneal phlegmon, and sepsis) as well as overall clinical outcomes, in order to establish an optimal surgical strategy.

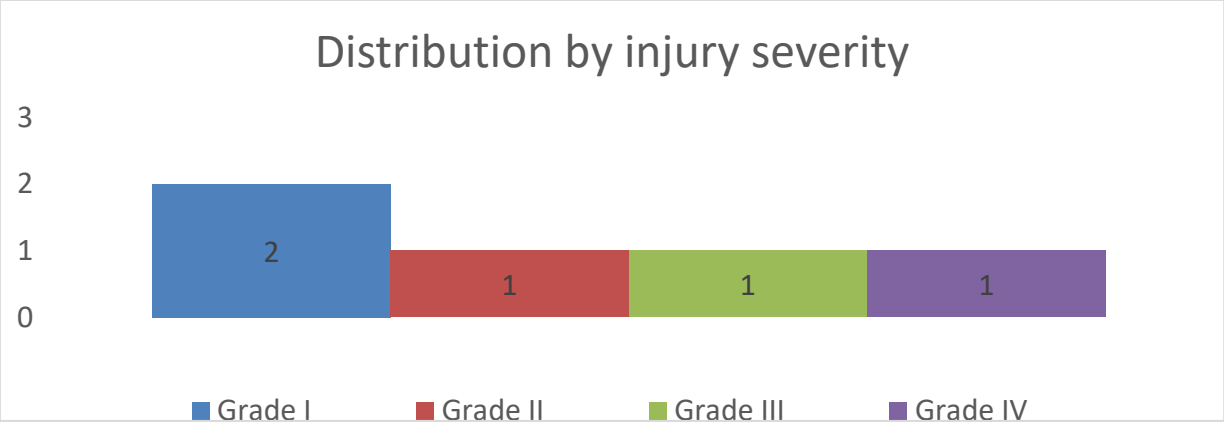
Materials and Methods

This study was designed as a retrospective clinical analysis. Medical records of 5 patients who underwent surgical treatment for duodenal (D1–D2) injuries at the Namangan Branch of the Republican Scientific Center for Emergency Medical Care between 2019 and 2025 were reviewed.

Classification of Injury Severity

For optimal diagnosis, treatment, and specialized surgical decision-making, the E. Moore et al. (1990) classification was applied:

- **Grade I:** Small intramural hematoma of the duodenal wall without mucosal disruption.
- **Grade II:** Large hematoma involving the duodenal wall, affecting up to 50% of its circumference.
- **Grade III:** Transverse laceration involving 50–70% of the duodenal wall.
- **Grade IV:** Extensive injury involving 75–100% of the duodenal wall, extending to the distal part of the duodenal ampulla.
- **Grade V:** Massive pancreatoduodenal injury associated with duodenal devascularization.



All patients were hospitalized within the first 6 hours following injury. Diagnosis and treatment were performed in accordance with the clinical protocols approved by the Ministry of Health of the Republic of Uzbekistan.

The following parameters were analyzed in this study:

- demographic characteristics (Table 1)
- mechanism of trauma
- diagnostic methods
- severity of injury (E. Moore, 1990 classification)
- applied surgical strategies
- postoperative outcomes

The diagnosis was established preoperatively in 60% of cases based on clinical and instrumental examinations, while in 40% of cases it was confirmed intraoperatively during diagnostic laparoscopy.

TABLE 1. Demographic indicators

Index	n	%
Gender		
Male	4	80%
Female	1	20%
Young groups.		
1–18 years old	1	20%
20–39 years old	4	80%

Materials and Methods

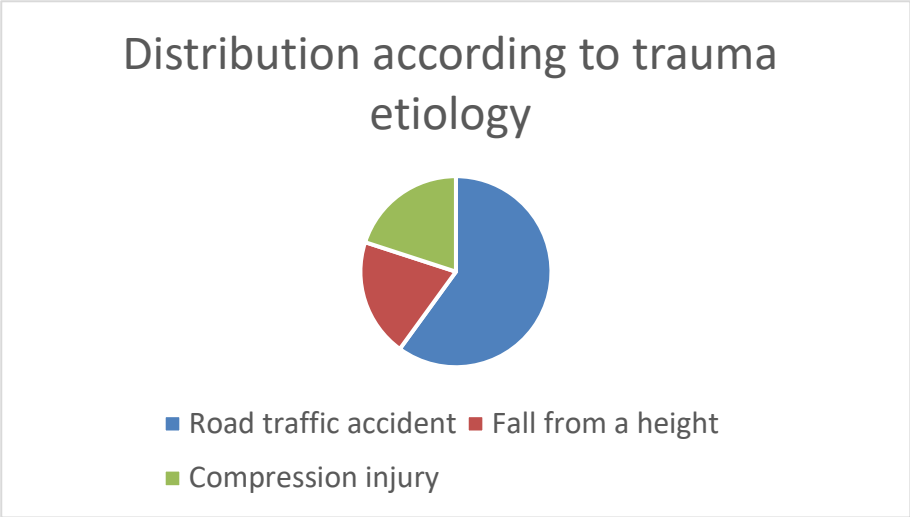
In this study, 5 patients with duodenal injuries underwent surgical treatment at the Namangan Branch of the Republican Scientific Center for Emergency Medical Care between 2019 and 2025.

Among the patients, 4 (80%) were male and 1 (20%) was female. Regarding age distribution, 1 patient (20%) was aged 1–18 years, 4 patients (80%) were aged 20–39 years, and no patients were older than 39 years.

Regarding the mechanism of injury, 1 patient (20%) sustained trauma due to crushing injury, 1 patient (20%) due to a fall from height, and 3 patients (60%) due to road traffic accidents.

All patients were admitted to the hospital within 6 hours after injury. Upon admission, all patients underwent diagnostic and therapeutic evaluation according to the clinical protocols approved by the Ministry of Health of the Republic of Uzbekistan.

In 3 cases (60%), the diagnosis of duodenal injury was established preoperatively based on clinical presentation, medical history, and instrumental investigations, while in 2 cases (40%), the diagnosis was confirmed intraoperatively during diagnostic laparoscopy.



According to the E. Moore classification, injury severity was distributed as follows: Grade I injuries were not observed; Grade II injuries were identified in 2 patients (40%); Grade III in 1 patient (20%); Grade IV in 1 patient (20%); and Grade V in 1 patient (20%).

Results

During surgery, in two patients with Grade II injury, the duodenal defect was closed with a two-layer suture. Two decompression and feeding tubes were placed: one positioned at the sutured area for continuous aspiration, and the second inserted for enteral nutrition approximately 30 cm distal to the ligament of Treitz.

In the patient with Grade III injury, the duodenal defect was closed with a two-layer suture. To reduce intraluminal pressure, a gastroenterostomy (anterior gastroenterostomy) with Braun enteroenterostomy was performed. One tube was placed via the pyloric canal to the sutured area, while the second was introduced through the gastroenterostomy into the jejunum.

In the patient with Grade IV injury, a similar surgical approach was used. In addition, external biliary drainage was performed via the gallbladder and common bile duct (Pikovsky method) to reduce duodenal biliary flow.

In the patient with Grade V injury, the digestive tract was excluded at the pyloric level, and gastric and duodenal stumps were formed. A gastroenterostomy with Braun enteroenterostomy was performed. For continuous decompression and enteral nutrition, feeding jejunostomy was created according to the Donnellan–Hagen and Witzel techniques. External biliary drainage was also performed using the Pikovsky method.

Postoperatively, all patients received intensive therapy aimed at reducing pancreatic exocrine secretion and preventing retroperitoneal phlegmon.

Despite the treatment, one patient (20%) with Grade V injury developed post-traumatic pancreonecrosis, retroperitoneal phlegmon, and sepsis, resulting in a fatal outcome.

Conclusion

Adequate and complex intensive postoperative therapy in patients with duodenal injuries significantly reduces the risk of complications such as anastomotic leakage, retroperitoneal phlegmon, and septic conditions.

Continuous aspiration through nasogastrointestinal decompression tubes effectively reduces intraluminal pressure, minimizes mechanical stress at the anastomotic site, and decreases enzymatic aggression, thereby playing a key pathogenetic role in preventing suture failure.

In all grades of duodenal injury, particularly in Grade III–V lesions, the use of anterior gastroenterostomy combined with external biliary drainage is a pathogenetically justified approach that reduces duodenal pressure, обеспечивает biliary-enteric decompression, and prevents severe complications in the pancreatoduodenal region.

The proposed differentiated surgical strategy allows an individualized approach based on injury severity and improves overall postoperative clinical outcomes.

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