



Review article

Duodenal Injuries Due to Trauma: Review of the Literature[☆]



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A B S T R A C T

Duodenal injuries constitute a challenge to the trauma surgeon, mainly due to their retroperitoneal location. When identified, they present associated with other abdominal injuries. Consequently, they have an increased morbidity and mortality. At best estimates, duodenal lesions occur in 4.3% of all patients with abdominal injuries, ranging from 3.7% to 5%, and because of their anatomical proximity to other organs, they are rarely an isolated injury. The aim of this paper is to present a concise description of the anatomy, diagnosis, surgical management and treatment of complications of duodenal trauma, and an analysis of complications and mortality rates of duodenal injuries based on a 46-year review of the literature.

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Lesiones duodenales secundarias a traumatismo: revisión de la literatura

R E S U M E N

Las lesiones duodenales, debido a su localización retroperitoneal, constituyen un reto diagnóstico para el cirujano, de forma que son identificadas tardíamente y en consecuencia, se asocian a un aumento de la morbimortalidad. En las mejores estimaciones, las lesiones duodenales ocurren en un 4,3% de todos los pacientes con lesiones abdominales, en un rango de 3,7% a 5%, y además, debido a su proximidad anatómica con otros órganos, sus lesiones raramente se presentan en forma aislada. El objetivo de este trabajo es presentar una descripción concisa de la anatomía, diagnóstico, manejo quirúrgico y tratamiento de las complicaciones del trauma duodenal, y realizar un análisis de las complicaciones y de la mortalidad de las lesiones del duodeno en base a una revisión de la literatura de los últimos 46 años.

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Palabras clave:

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Introduction

Duodenal injuries, due to their retroperitoneal location, are a diagnostic challenge to the surgeon; for this reason, they are identified in a late stage, and thus associated with increased morbidity and mortality.

The purpose of this paper is to present a brief description of the anatomy, diagnosis, surgical management and treatment of duodenal trauma complications, and to perform an analysis of the range of duodenal injury morbidity and mortality, based on an extensive review of the current literature.

Materials and Methods

A search was conducted in PubMed to find articles published in English in the last 46 years, from February 1968 to March 2014. Twenty-three case series on duodenal injuries were found. The English key words duodenal injury, duodenal injuries and duodenal trauma were used for the search.

Incidence of Duodenal Injuries

According to the best estimates, duodenal injuries occur in 4.3% of all patients with abdominal injuries, ranging from 3.7% to 5%. The proportion of duodenal injuries between male and female patients is 5–1, and the most affected age range is between 16 and 30 years (70%).¹ In addition, the increase in the number of traffic accidents, as well as violence (knives and firearms) has led to a higher incidence in recent decades.

Mechanism of Injury

The mechanisms of the injuries caused by penetrating trauma occur by a simple lesion in the duodenal wall when it is caused by a knife, and by the penetration and dissipation of kinetic energy from the projectile in the case of gunshot injuries.

The mechanism is more complex in the case of blunt injuries, when both ends may be blunt, and duodenal injuries are a consequence of crushing or compression. Crush injuries usually occur when a direct force is applied against the abdominal wall and transmitted to the duodenum, which is then projected against the spinal column, on which it lies, for example, when the steering wheel impacts the epigastrium. They also occur when acceleration and deceleration forces act on the mobile and non-mobile portions of the duodenum, such as during a fall from a great height.²⁻⁷

The mechanism of penetrating injury is the most common cause of duodenal trauma. In a review of the literature encompassing 24 series published during the last 46 years (1968–2014), 1760 cases of duodenal injury were identified. Out of these, 1400 (80%) occurred as a result of penetrating trauma, while 360 (20%) occurred as a consequence of blunt trauma.²⁻²⁶ The range of penetrating abdominal injuries was 3.9:1 (Table 1). Among the 1400 penetrating injuries, 1135 (81%) were caused by gunshots and 257 (19%) by stabbings. Among

Table 1 – Mechanism of Duodenal Injury.

Author and year (total no. of patients)	Mechanism of injury	
	Penetrating: n (%)	Blunt: n (%)
Morton and Jordan, ⁴ 1968 (131)	117 (6.6%)	14 (0.8%)
Smith, et al., ⁵ 1971 (53)	46 (2.6%)	7 (0.4%)
McInnis, et al., ⁶ 1975 (22)	17 (1%)	5 (0.3%)
Lucas and Ledgerwood, ⁸ 1975 (36)	0	36 (2%)
Matolo et al., ⁹ 1975 (32)	19 (1.1%)	13 (0.8%)
Kelly et al., ² 1978 (34)	28 (1.6%)	6 (0.3%)
Stone and Fabian, ¹⁰ 1979 (321)	294 (16.7%)	27 (1.5%)
Flint et al., ¹¹ 1979 (75)	56 (3.2%)	19 (1.1%)
Snyder et al., ¹² 1980 (228)	180 (10.2%)	48 (2.7%)
Levinson et al., ⁵⁰ 1982 (93)	74 (4.2%)	19 (1.1%)
Adkins and Keyser, ¹³ 1984 (56)	39 (2.2%)	17 (1%)
Fabian et al., ¹⁴ 1984 (10)	0	10 (0.6%)
Ivatury et al., ¹⁵ 1985 (100)	100 (5.7%)	0
Bostman et al., ¹⁶ 1989 (22)	16 (1%)	6 (0.3%)
Cogbill et al., ¹⁷ 1990 (164)	102 (5.8%)	62 (3.5%)
Cuddington et al., ¹⁸ 1990 (42)	16 (1%)	26 (1.5%)
Timaran et al., ¹⁹ 1999 (152)	152 (8.6%)	0
Jen-Feng Fang et al., ²⁰ 1999 (18)	0	18 (1%)
Jansen et al., ²¹ 2002 (30)	27 (1.5%)	3 (0.2%)
Seamon et al., ²² 2007 (29)	29 (1.6%)	0
Rathore et al., ²³ 2007 (23)	16 (1%)	7 (0.4%)
Pereira et al., ²⁴ 2008 (8)	5 (0.3%)	3 (0.2%)
Girgin et al., ²⁵ 2009 (67)	59 (3.4%)	8 (0.5%)
Sanjai et al., ²⁶ 2011 (14)	8 (0.5%)	6 (0.3%)
Total (1760)	1400 (80%)	360 (20%)

blunt trauma, the most frequent mechanism was car crash, with a total of 306 patients (85%).

Associated Injuries

The duodenum, by virtue of its anatomic proximity to other important organs, is rarely injured alone. The occurrence of multiple associated injuries is the rule, not the exception. Isolated duodenal injuries are usually seen in the form of duodenal haematoma.

Among the 1760 patients with duodenal trauma, a total of 3540 associated injuries were identified (Table 2). The liver was the most commonly injured organ, with a total of 600 injuries occurring with a frequency of 17%. Other organs included the colon, with 462 (13%); the pancreas, with 408 (12%); the small intestine, with 395 (11%); the stomach, with 323 (9%) and vascular injuries (arterial and venous), with 536 (15%).^{3,4,6-13,17,19-22,24-26}

Anatomic Location of Injury

To identify the most common anatomic location, 15 published series were reviewed.^{2,6,7,10-15,19,21,22,24-26} A total of 1042 patients were analysed. The most common duodenal injury sites were the second portion (36%), the third portion (18%) and the fourth portion (15%). The least common duodenal injury site was the first portion (13%), and injuries in multiple portions were found in 18%.

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