



PROSPECTIVE STUDY OF PROGNOSTIC FACTORS IN GASTROINTESTINAL PERFORATION

General Surgery

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ABSTRACT

Background: Gastrointestinal perforation is a hole that develops through the entire wall of the oesophagus stomach, small intestine, large bowel, rectum or gallbladder. Perforation of the intestine leads to leakage of intestinal contents into the abdominal cavity resulting in the inflammation of peritoneum called peritonitis. It is often severe because of faecal contamination and overwhelming sepsis resulting in high morbidity and mortality. Outcome is improved with early diagnosis and treatment. The factors which increase the risk of morbidity and mortality are advanced age, presence of pre-existing underlying disease, malnutrition, the nature of the primary cause of bowel perforation and appearance of complications. **Results:** Among 100 patients with GI perforations, 81 were male and 19 were female. Maximum and equal number of patients was noted in three decades, from 31 to 60 years. Duodenal perforation was most common cause for hollow viscus perforation, followed by appendicular perforations. Total mortality in this study was 11 (11 %) with 89 % of successful treatment. Most common post operative complication was chest infection in 15 patients, whereas most common surgical post operative complication was wound infection in seven patients. Increased mortality is noted in colonic perforations with percentage of 50 % followed by ileal perforation with percentage of 28.57 %. **Conclusions:** Factors like advanced age group, delayed presentation, type of perforation, shock on admission, associated co-morbid conditions and post operative complications are associated with increased morbidity and mortality in patients with hollow viscus perforations. Most common type of hollow viscus perforation was duodenal perforation followed by appendicular perforation. Colonic perforation had highest mortality followed by ileal perforation Chest infection was most common post operative complication. Morbidity and mortality could be reduced by avoiding delay in diagnosis and treatment, especially in older age group, by instituting proper treatment of coexisting medical illness & shock and thorough and proper treatment of post operative complications.

KEYWORDS

Gastrointestinal perforation; risk factors; outcome; hospital stay

INTRODUCTION:

Gastrointestinal perforation is a hole that develops through the entire wall of the oesophagus stomach, small intestine, large bowel, rectum or gallbladder. Perforation of the intestine leads to leakage of intestinal contents into the abdominal cavity resulting in the inflammation of peritoneum called peritonitis. It is often severe because of faecal contamination and overwhelming sepsis resulting in high morbidity and mortality. Treatment depends on the underlying cause. The condition is surgical emergency and surgical intervention is nearly always required in form of exploratory laparotomy and closure of perforation with peritoneal wash [1].

Underlying causes include gastric ulcer, appendicitis, gastrointestinal cancer, diverticulitis, superior mesenteric artery syndrome, trauma and ascariasis. In exceptionally rare cases, it can be caused by large objects inserted via the anus such as a colonoscope or sexual exploitation. It may also be due to foreign body such as ingested bone (e.g. a fish bone) [1]

Perforation peritonitis is the most common surgical emergency in India [2]. Despite advances in surgical techniques, antimicrobial therapy and intensive care support, management of peritonitis continues to be highly demanding, difficult and complex. The spectrum of etiology of perforation continues to be different from that of western countries [3] and there is paucity of data from India regarding its etiology, prognostic indicators, and morbidity and mortality patterns [4].

The perforations of proximal gastrointestinal tract were six times as common as perforations of distal gastrointestinal tract as has been noted in earlier studies from India [3], which is in sharp contrast to studies from developed countries like United States, Greece and Japan which revealed that distal gastrointestinal tract perforations were more common [2].

In adults, perforations of peptic ulcer disease were a common cause of morbidity and mortality with acute abdomen until the latter half of the 20th century. The rate has fallen in parallel with the general decline in the prevalence of peptic ulcer disease. Duodenal ulcer perforations are 2-3 times more common than are gastric ulcer perforations [5].

Outcome is improved with early diagnosis and treatment. The factors which increase the risk of morbidity and mortality are advanced age, presence of pre-existing underlying disease, malnutrition, the nature of the primary cause of bowel perforation and appearance of complications

The mainstay of treatment for bowel perforation is surgery. Endoscopic, laparoscopic and laparoscopic-assisted procedures are now being increasingly performed instead of conventional laparotomy [6, 7].

OBJECTIVE OF THE STUDY:

- To determine the demographic factors in patients presenting with spontaneous gastrointestinal perforations.
- To study the outcome and post operative complications in patients undergoing surgery for gastrointestinal perforations.
- To determine risk factors responsible for gastrointestinal perforations in rural populations

METHODOLOGY

Study Design: Prospective study

Study Duration: 18 months (September 2020 -March 2022)

Study Area: Al-Ameen Medical college Hospital (AMCH), Bijapur.

Study Participants: All patients aged > 18 years presenting with spontaneous gastrointestinal perforations

Inclusion Criteria

1. Patients aged ≥ 18 years presenting with spontaneous gastrointestinal perforations.

Exclusion Criteria

1. Patients aged < 18 years presenting with spontaneous gastrointestinal perforations.
2. Penetrating injuries of abdomen like stab injuries, bull gore and gunshot injuries.
3. Blunt trauma to the abdomen.

Method Of Data Collection

The study was conducted in department of surgery, Al-Ameen Medical college Hospital (AMCH), Bijapur. Clearance from the institutional ethical committee was taken before starting the study. Written consent was obtained from parents of all neonates for blood samples. Study participants were included in the study by Purposive Sampling technique. The study participants were included in the study, till the sample size was reached. Detailed history with regard to the age of the patient with profession, address, habit, type of diet, co-morbid conditions, time of presentation, duration of illness and presence or absence of shock. On per abdomen examination –tenderness, evidence of peritonitis. Presence or absence of free fluid. Other systemic examinations – cardiovascular system, respiratory system and nervous system examinations will be carried out. Laboratory assessment included routine blood investigations- complete hemogram with ESR, blood grouping, Rh typing, serum electrolytes, renal function tests, liver function tests, Prothrombin time, activated partial thromboplastin time, random blood sugar, blood for culture and sensitivity, Widal test for enteric fever, Urine routine. Radiological investigations such as erect radiograph of abdomen, Ultrasound, Chest radiograph were done as per requirement. Peritoneal fluid for staining and culture sensitivity obtained by ultrasound guided and/or during laparotomy.

With Informed Consent, if the patient was fit for the surgery, patients were taken up for laparotomy and peritoneal lavage and closure of perforation, resection anastomosis and colostomy was dealt depending on the case and post operatively necessary care and antibiotics will be provided. Patients were followed up post operatively for three months for any complications like wound infection, wound dehiscence, fistula, burst abdomen, post operative adhesive pain abdomen and informing about incisional hernia.

Estimation Of Sample Size:

On the basis of statistics obtained from Department of Surgery, Al-Ameen Medical college Hospital, an average of 5 cases per month fitting the criteria of the study with study duration of 24 months, we can expect to have N=120. Based on this population size, using YAMANE equation, for a known population size, sample size (n) equal to

$$n = N / 1 + Ne^2$$

n=sample size

N=population size

e= margin of error (for 95% of confidence level, margin error=0.05)

$$n = 120 / 1 + 120 * 0.05 * 0.05 = 120 / 1.3 = 92.30$$

Therefore, after approximating, the sample size of the study participants was fixed at 100.

RESULTS:

DEMOGRAPHIC DETAILS		FREQUENCY	PERCENTAGE
AGE GROUP	18-20 years	14	14
	21-30 years	18	18
	31-40 years	19	19
	41-50 years	19	19
	51-60 years	19	19
	> 60 years	11	11
GENDER	MALES	81	81
	FEMALES	19	19

This prospective study had 100 patients, in which 81 were male and 19 were female. The age group of patients in this study ranges between 18 to 90 years. Maximum and equal number of patients was noted in three decades, from 31 to 60 years. Least number of patients was noted in the age group of more than 61 years.

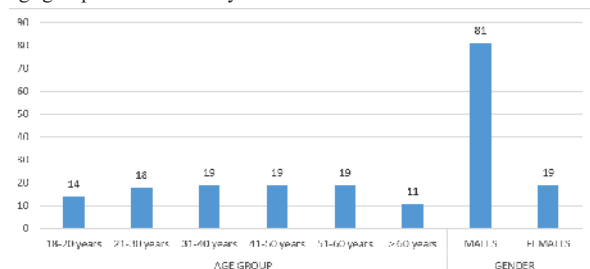


Table No. 2 Distribution of patients on type of perforations.

TYPE OF PERFORATIONS	Frequency N	Percentage %
DUODENAL	42	42
APPENDICULAR	18	18

GASTRIC	14	14
ILEAL	14	14
JEJUNAL	06	06
COLONIC	06	06

Out of hundred patients, duodenal perforation was most common cause for hollow viscus perforation, followed by appendicular perforations. Jejunal and colonic perforations were least common cause for hollow viscus perforations with a value of 6 each.

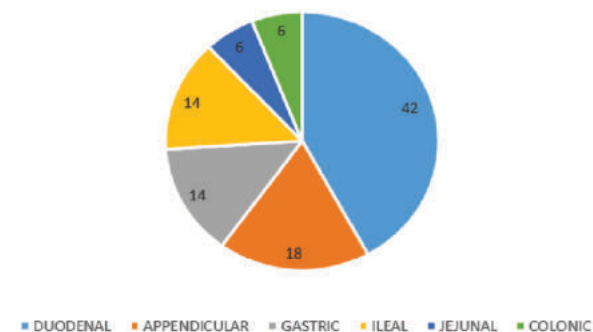


Table no. 3 Distribution of patients on the basis of Outcome

OUTCOME	Frequency N	Percentage %
SUCCESSFUL TREATMENT	89	89
DEATHS	11	11

Total mortality in this study was 11 (11 %) with 89 % of successful treatment. Out of 89 patients few had risk factors which made them to have increased morbidity compared to others.

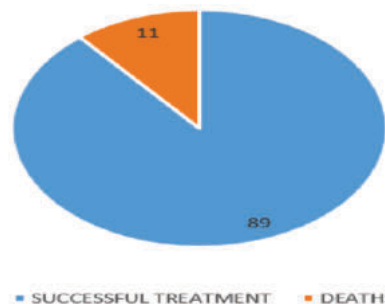
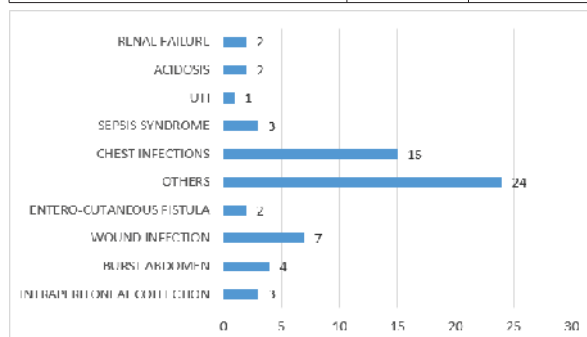


Table no. 4. Distribution of patients according to the post operative complications.

POST OPERATIVE COMPLICATIONS	Frequency N	Percentage %
INTRAPERITONEAL COLLECTION	03	03
BURST ABDOMEN	04	04
WOUND INFECTION	07	07
ENTERO-CUTANEOUS FISTULA	02	02
OTHERS	24	24
CHEST INFECTIONS	15	15
SEPSIS SYNDROME	03	03
UTI	01	01
ACIDOSIS	02	02
RENAL FAILURE	02	02



Most common post operative complication was chest infection in 15

patients, whereas most common surgical post operative complication was wound infection in seven patients. The least common surgical post operative complication was entero-cutaneous fistula in two patients.

Table no 5. Average hospital stay in days according to type of perforations.

TYPE OF PERFORATIONS	NUMBER OF PATIENTS	AVERAGE HOSPITAL STAY IN DAYS
DUODENAL	40	14.12
APPENDICULAR	18	10.50
GASTRIC	13	12.25
ILEAL	10	15.00
JEJUNAL	05	12.80
COLONIC	03	18.00

In this prospective study increased morbidity was noted in colonic perforations compared to other hollow viscus perforations. Patients with appendicular perforation had least average hospital stay of 10.5 days compared to other type of perforations.

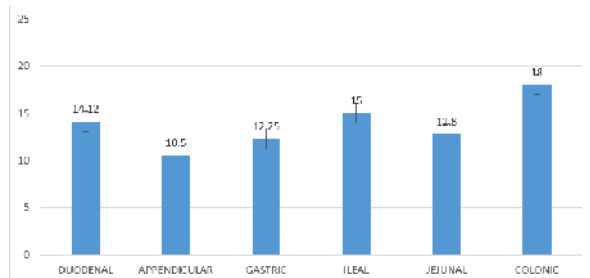


Table no 6. Mortality and morbidity in different type of perforations

TYPE OF PERFORATIONS	MORTALITY	
	Frequency N	Percentage %
DUODENAL	02	4.7 %
APPENDICULAR	00	-
GASTRIC	01	07.1 %
ILEAL	04	28.57 %
JEJUNAL	01	16.6 %
COLONIC	03	50.00%

Increased mortality is noted in colonic perforations with percentage of 50 % followed by ileal perforation with percentage of 28.57 %. No mortality is noted in appendicular perforations.

Out of hundred patients 15 presented with shock at the time of admission. Out of 15 patients 8 patients died. Seven patients who survived with shock at the time of admission had longer hospital stay compared to the patients without shock. 36 patients had surgical and non-surgical post operative complications, in whom eight patients succumb to death. 28 patients who had post operative complication had longer average hospital stay compared to the rest of the patients without post operative complications.

14 patients who presented with hollow viscus perforations had preexisting co-morbid conditions like asthma, diabetes mellitus and hypertension. Two patients with co-morbid conditions succumb to death. Average hospital stay for patients with co-morbid conditions was much higher with a value of 18.9 days compared to patients with no co-morbid conditions.

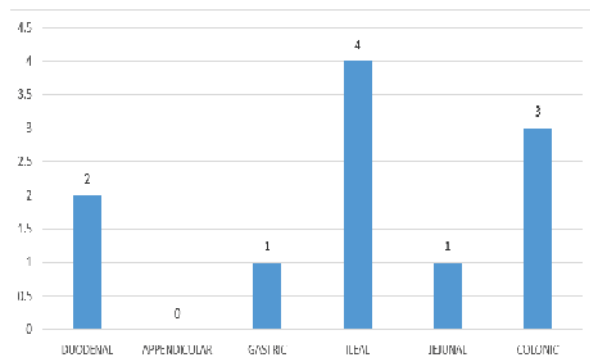


Table No 7. Risk Factor Association With Mortality

RISK FACTORS	N	P VALUE
GENDER	81:19	NS
AGE	< 50 : > 50 Yrs	0.04
AVERAGE HOSPITAL STAY	18 -30 : 31-50 Yrs (31:49)	0.03
SHOCK	< 24 Hrs : > 96 Hrs (37 : 18)	0.009
POST OPERATIVE COMPLICATIONS	08: 100	0.007
CO-MORBID CONDITIONS	02: 100	0.04

DISCUSSION:

Intestinal perforations are common causes of generalized peritonitis. Despite advances in surgical techniques, antimicrobial therapy and intensive care support, management of peritonitis continues to be highly demanding, difficult and complex [1]. The spectrum of etiology of perforation continues to be different from that of western countries and there is paucity of data from India regarding its etiology, prognostic indicators, morbidity and mortality patterns [4]. This is a hospital based prospective study conducted in and around Bijapur at rural setup to determine the factors affecting the outcome in gastrointestinal perforations.

The study includes total number of 100 patients in which 81 were male and 19 were female patients. A similar study conducted at Chandigarh by Rajendrasingh et al shows the males being affected in gastrointestinal perforations is 84 % compared to the 16 % in females [2]. In our study the young & middle age group (70 %) is most commonly affected as compared to the elder age group (30 %). Maximum and equal number of patients with hollow viscus perforations were noted in 2nd to 5th decade. A western study conducted by Suanes et al shows most common age group affected in gastro-intestinal perforations is elder age group [4]. But similar studies conducted in India at Chandigarh shows young population will have major brunt of gastrointestinal perforations as compared to the elderly age group [2].

Duodenal perforations are most common cause of hollow viscus perforations in our study followed by appendicular perforations. Whereas Jejunal and colonic perforations are least common causes. The perforations of proximal gastrointestinal tract is six times as common as perforations of distal gastro-intestinal tract as has been noted in earlier study conducted by Dorairajan L N et al [8]. In sharp contrast to our study, the studies from developed countries like United states, Greece & Japan reveal distal gastrointestinal tract perforations are more common compared to the proximal gastrointestinal tract [2].

89 % of patients had successful treatment with or without morbidity. The overall mortality rate in our study is 11 % with septicemia associated multiorgan dysfunction syndrome (MODS) is most common cause followed by entero-cutaneous fistula and respiratory failure with acidosis.

Duration of symptoms is defined as time span between initial pain perception due to perforation and the surgery. 38 patients had early presentation compared to 62 patients with late presentation in our study. Study conducted by Rajendrasingh et al shows 47 % of patients had early presentation [2].

In our study 40 patients had post operative complications which resulted in increased morbidity and mortality. Most common post operative complication was chest infection in 15 patients. The most common surgical post operative complication was wound infection in seven patients. The fatal complication was entero-cutaneous fistula with 100 % mortality. The study conducted by Rajendrasingh et al shows chest infection as most common post operative complication followed by wound infection [2]. A prospective study conducted in Nigeria on typhoid ileal perforations shows wound infection as most common post operative complication followed by wound dehiscence. The mortality was 75 % in patients with entero-cutaneous fistula [9].

Average hospital stay in patients with no complications or co-morbid conditions was arbitrarily considered as ten days in our study. 31 patients were discharged on or before ten days of surgery. Depending upon the average hospital stay in days morbidity has been calculated for different factors affecting the outcome of gastro-intestinal perforations.

The study shows shorted average hospital stay of 11 days in younger patients compared to the 14 days 14 elder age group. Increased hospital stay in elder age group is because of co-morbid conditions and complications. Patients with early presentation and early operative treatment had lesser morbidity compared to the patients with late presentation. Average hospital stay in patients presenting after 24 hours of pain perception is 14 to 15 days compared to the patients with early presentation who had average hospital stay of 11 days.

The percentage of mortality is significantly increased as duration of symptoms increased. The mortality in patients with early presentation is 5.2% compared to the patients with duration of symptoms of more than 5 days is 66.66 %. This indicates there is high fatality in patients with late presentation. A study conducted in Turkey by G Bas et al shows that the risk of morbidity and mortality is statistically significant in patients with late presentation (> 24 hours) [10]. Another study conducted in Nigeria by A R K Adesunkanmi shows surgical intervention sharply reduces the mortality from 70-100 % to about 30 %, but also early surgical intervention further improved the prognosis [9]. Similarly, even the literature emphasis the early surgical intervention to improve the outcome.

The mortality was higher in colonic perforations with average hospital stay of 18 days followed by ileal perforations with 15 days. Appendicular perforations had least number of average hospital of 10 days. Similarly, there is significant mortality in patients with colonic perforations (50 %) and ileal perforations (28.7%). However, the mortality in appendicular perforations was nil. A study conducted by Ali Nuhu et al at Azare on typhoid ileal perforations shows 28.3 % mortality [11]. Kriwanek S conducted study in Austria to evaluate the prognostic factors in colonic perforations and showed 17 % mortality in patients [12]. Thomas M Beaver conducted study on colon perforation after lung transplantation and showed mortality of 50 % [13].

15 patients presented with shock at the time of admission in whom eight succumb to death and remaining seven had increased morbidity in terms of longer hospital stay (16.75 days). Mario Testini et al shows 55.6 % mortality in patients with shock at the time of admission [14]. Similar studies conducted by Boey J and McIntosh JH also show greater mortality in patients with shock at the time of admission [15, 16].

Out of 100 patients 36 patients suffered from post operative complications with mortality rate of 22.22 %. Rest of the patients had longer hospital stay of 16.75 days. Mario Testini et al show 37.5 % mortality in patients with post operative complications [14].

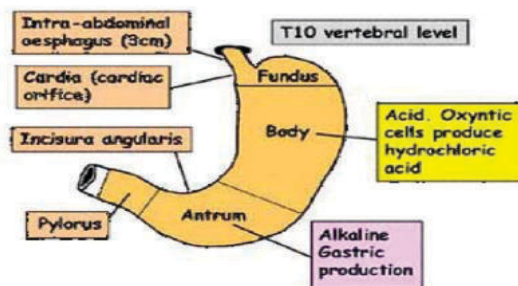
14 patients had pre-existing co-morbid conditions at the time of admission like, asthma, diabetes mellitus and hypertension. The mortality rate in patients with co-morbid conditions was 14.28 %. The survivors had longer average hospital stay of 19 days compared to the patients with no co-morbid conditions. A study conducted in Italy by Mario Testini shows 7.6 % mortality rate in patients with co-morbid conditions [14]. However the study conducted by G Bas on perforated peptic ulcer shows no importance of co-morbid conditions on morbidity and mortality of patients [10].

The indented hypothesis of study of factors affecting the outcome of gastrointestinal perforations and their impact on morbidity and mortality of patients is determined. The factors like advanced age group, delayed presentation, type of perforation, shock on admission, post operative complications and associated co-morbid conditions will bear major brunt on morbidity and mortality of patients with hollow viscus perforations and this fact is revalidated in this prospective study.

CONCLUSION:

In conclusion the factors like advanced age group, delayed presentation, type of perforation, shock on admission, associated co-morbid conditions and post operative complications are associated with increased morbidity and mortality in patients with hollow viscus perforations. Most common type of hollow viscus perforation was duodenal perforation followed by appendicular perforation. Colonic perforation had highest mortality followed by ileal perforation. Chest infection was most common post operative complication. Morbidity and mortality could be reduced by avoiding delay in diagnosis and treatment, especially in older age group, by instituting proper treatment of coexisting medical illness & shock and thorough and proper treatment of post operative complications.

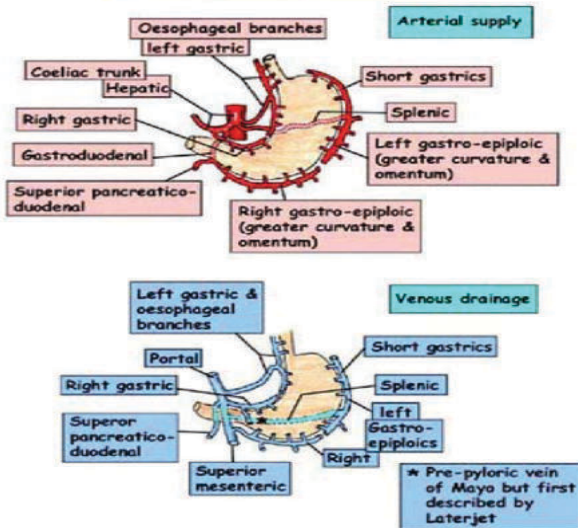
STOMACH - TOPOGRAPHY & OESOPHAGOGASTRIC JUNCTION



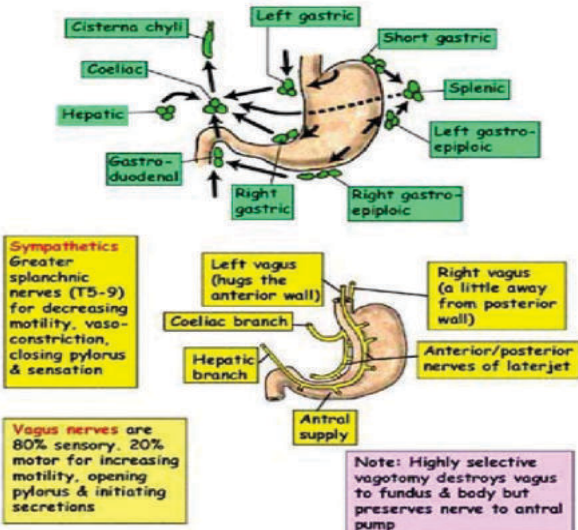
Oesophagogastric junction

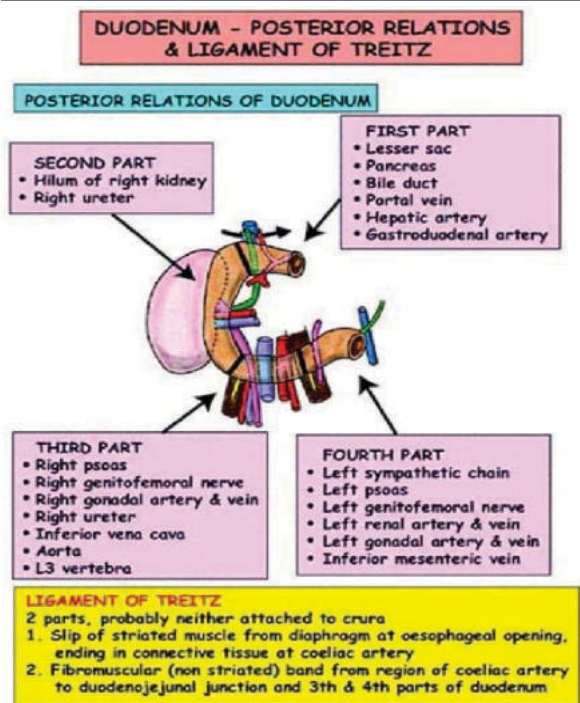
- Effective sphincter/valve because:
- Circular fibres in diaphragm, right crus and oesophagus
- Phrenico-oesophageal ligament (fold of connective tissue)
- Angle of junction
- Mucosal folds
- Intra-abdominal pressure acting to compress the intra-abdominal oesophagus

STOMACH - BLOOD SUPPLY & VENOUS DRAINAGE



STOMACH - LYMPHATIC DRAINAGE & NERVE SUPPLY





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