

CLINICAL STUDY AND SURGICAL MANAGEMENT OF PERFORATED DUODENAL ULCERPramod D¹, Rajanna B², Ramesh M. K³, Manjunath C. S⁴**HOW TO CITE THIS ARTICLE:**

Pramod D, Rajanna B, Ramesh M. K, Manjunath C. S. "Clinical Study and Surgical Management of Perforated Duodenal Ulcer". Journal of Evolution of Medical and Dental Sciences 2014; Vol. 3, Issue 64, November 24; Page: 13979-13992, DOI:10.14260/jemds/2014/3871

ABSTRACT: BACKGROUND: Duodenal ulcer is a very common disease in the southern part of India and complication like perforation is still common and surgical intervention is considered the treatment of choice.⁽¹⁾ **METHODS:** A prospective study consisting of 70 patients of duodenal perforation presenting as acute abdomen to the casualty department of Victoria hospital and Bowring & Lady Curzon Hospital, Bangalore, between October 2009 to Aug 2011. **RESULTS:** In our study, presentation of duodenal perforation is common in males (91.4%) between 3rd to 6th decades. The incidence of the duodenal perforation is more in those consume spicy food, living in rural areas (59%) and with 'O' positive blood group (51%). Most of our patients presented after 48 hours and major post-operative complications observed in these patients (50%). **CONCLUSION:** Live omental patch closure with technical modifications is still the better operation in perforated duodenal ulcer and definitive procedure are reserved when suitable conditions are present.⁽²⁾ Mortality rate in perforated duodenal ulcer is less when compared to other acute abdominal conditions and is directly related to duration of clinical symptoms, age, severity of dehydration, and peritoneal cavity contamination.

KEYWORDS: Duodenal ulcer, perforation, peritonitis, omentoplasty, truncal vagotomy, pyloroplasty.

INTRODUCTION: Duodenal ulcers (DU) may occur in any age group but are most common in the young and middle-aged (20 to 45 years). They appear in men more often than women. About 95% of duodenal ulcers are situated within 2 cm of the pylorus, in the duodenal bulb (cap).^(1, 3) Duodenal ulcer is a very common disease in the southern part of India, even though the incidence is decreasing, the complication like perforation is still common and surgical intervention is considered the treatment of choice. In the earlier years the main treatment of duodenal ulcer was primarily surgical, but now it's out of vogue due to advent of effective medical line of treatment.^(3, 4)

It is estimated that roughly 1.3% of population above the age of 20 years have had some degree of peptic ulcer activity during any annual period. Duodenal perforation is one of the dreaded complications that is known to occur in 15% of all recognized duodenal ulcer cases. Perforation of DU is one of the most serious and life threatening complication of peptic ulcer.⁽⁴⁾

Perforation of duodenal ulcer leads to contamination of peritoneal cavity with duodenal and gastric secretions which may initiate catastrophic cascade of events which until stopped in its track can be detrimental to the life of the patient.⁽⁵⁾ Perforation can occur in about 20% of patient without any relevant preceding symptoms. Thus perforation of duodenal ulcer has become a pestilence that threatens to cripple the economic and social life of significant section of society if attended to and surgical intervention is treatment of choice.

Simple suturing of perforation still remains the most commonly employed method for management of perforated Duodenal Ulcer.

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Radical treatment of perforated Duodenal Ulcer by antrectomy and truncal vagotomy is justified in the hands of experienced surgeon. pyloroplasty with Vagotomy has been carried out successfully in emergency situation.^(6,7) Omental closure is indicated for perforation in poor risk cases and for acute ulcer associated with drug ingestion or acute stress. Only in fit patients with acute ulcer perforation; when an experienced surgeon is available, pyloroplasty with Vagotomy or Highly Selective Vagotomy is undertaken as an ideal operation.^(7,8)

It progresses in definitive manner leading to death due to peritonitis. Mortality increases with delay in operation and mortality rate almost approached zero if operated within 6hrs., from 6-12 hrs the rate is 5-10% and 12-24hrs it is a 25% or higher and in the course of 3rd day or after the surgery is seldom successful. Hence the role of either general Practitioners in identifying the disease and immediate referral to a major surgical center is very important.⁽⁴⁾

AIMS AND OBJECTIVES: To study the prevalence, predisposing factors outcome of surgical treatment and prognosis of perforation duodenal ulcer and its age, sex, incidence & regional distribution.

MATERIALS AND METHODS: SOURCE: A prospective study consisting of 70 patients of duodenal perforation presenting as acute abdomen to the casualty department of Victoria hospital and Bowring & Lady Curzon Hospital, Bangalore, between October 2009 to Aug 2011.

METHODS OF COLLECTION OF PATIENTS AND DATA: DU perforation patients who are presented early <12hrs, with minimal contamination of peritoneal cavity, good general condition are considered for definitive procedure.

In all other DU perforation patients live omental patch closures done. All patients will undergo routine investigation, X ray erect abdomen before the procedure.

Data will be collected by meticulous history taking, careful clinical examination, appropriate radiological studies, operative finding and follow up of patients. The collected data will be analyzed with respect to the presentation by the patient's, age, sex incidence, etiological factors, morbidity and mortality.

INCLUSION CRITERIA: Patient above 18 years, who are willing to give informed consent and presenting with features of hollow viscous perforation clinically, radiologically, and duodenal perforation confirmed during intraoperative period.

EXCLUSION CRITERIA:

- Pediatric age group (<18yrs).
- Patients with traumatic duodenal perforation.
- Patients with hollow viscous perforation other than DU perforation.
- Patients who are hemodynamically unstable even after resuscitation.

RESULTS: The data will be analyzed using chi square test. In the present series age of the patients varied from <20 to >70 years. Median age of presentation is 41.50years, which is quite similar to age incidence in other authors.

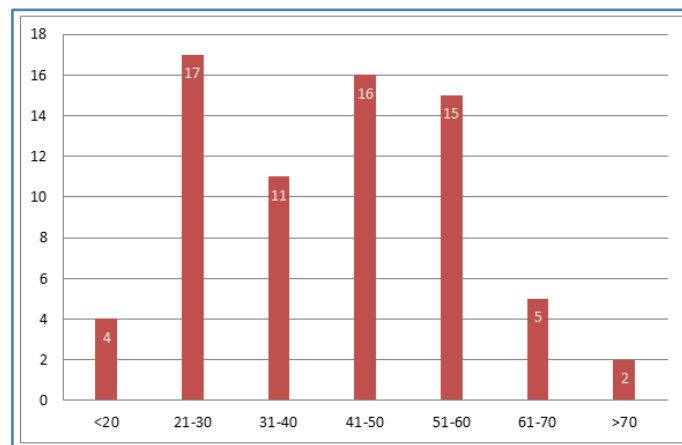
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Age distribution of duodenal perforation in other Studies:

Author	Year	Peak age of incidence
Turner	1951	30-40years, median-38yrs
James hardy and walker	1962	30-50years, median-42yrs
Jmieson	1947	20-40years, median-38.5yrs
Bennett KG, Cannon JP, Organ CH Jr.	1985	30-50years median age 43yrs

Age distribution	<20	21-30	31-40	41-50	51-60	61-70	>70
No. of patients	4	17	11	16	15	5	2

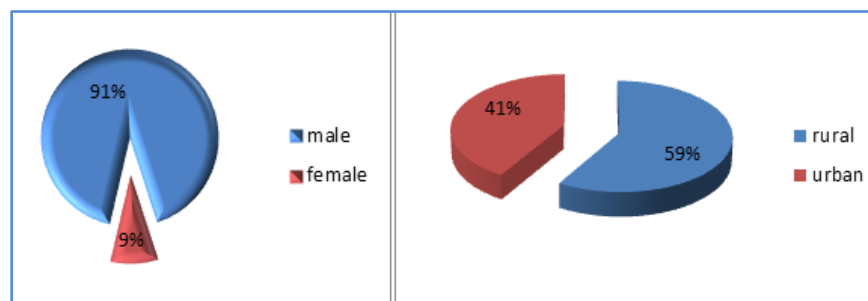
Table 1: Age distribution in our study:



Sex and regional distribution: The following table and chart show sex and region distribution which shows male predominance. Among the region majority are from rural area.

Sex	Number	Percentage	Region	Number	Percentage
Male	64	91.43	Rural	41	59%
Female	6	8.57	Urban	29	41%
Total	70	100	Total	70	100

TABLE 2: Sex and regional distribution:

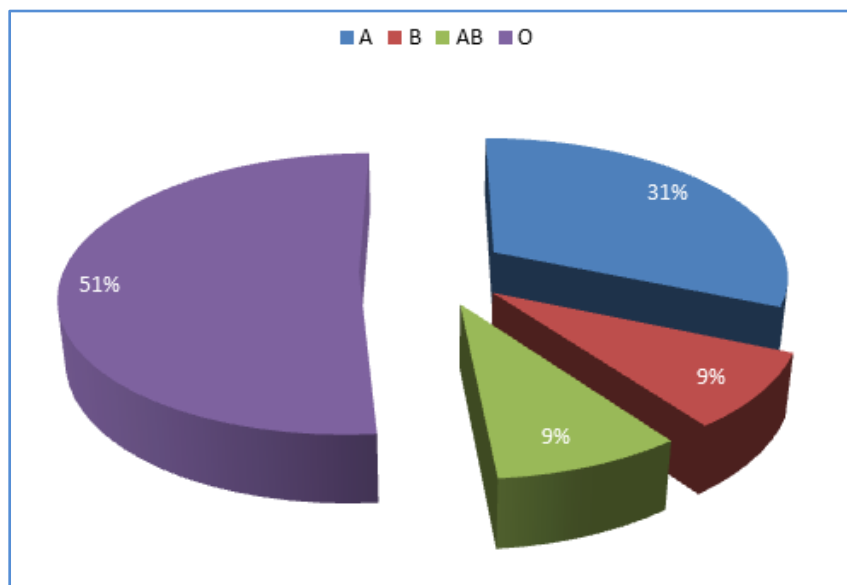


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Blood group distribution: The following table and chart shows that duodenal perforation is most common among blood group O patients.

Blood group	Number	Percentage
A	22	31%
B	6	9%
AB	6	9%
O	36	51%
TOTAL	70	100

TABLE 3: presentation of patients in different blood group



PREDISPOSING FACTORS: The following table shows number of patients with predisposing factors.

HABITS	NUMBER OF PATIENTS
No habit	24(34%)
Spicy food	44(63%)
alcohol	35(50%)
smoking	9(13%)
h/o drug intake	8(11%)
H/o peptic ulcer	14(20%)

Table 4: Predisposing factors

PRESENTATION OF PATIENTS: The following table shows the duration with which patients presented with pain abdomen. According to the table majority (62%) presented within 2 days.

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Pain in days	No. of patients	Percentage
1day	18	26
2days	25	36
3days	14	20
4days	5	7
>4days	8	11
Total	70	100

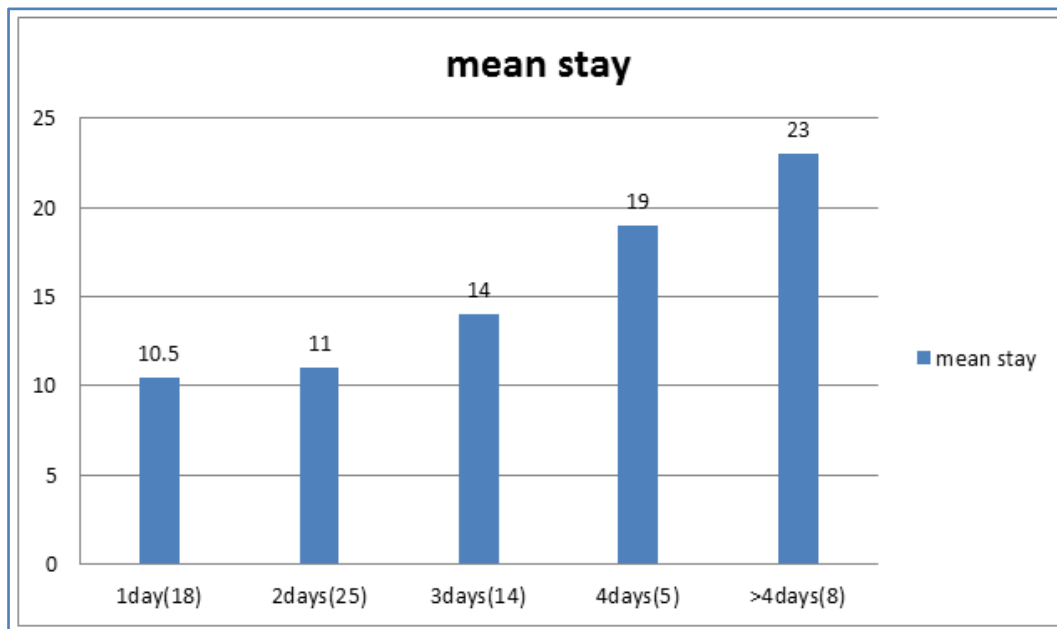
Table 5: Presentation of patients

Association of duration of presentation of symptoms and, mean hospital stay:

Duration of symptoms	Number of patients	Mean hospital stay	Mortality
1day	18(26%)	10.5days	-
2days	25(36%)	11days	-
3days	14(20%)	14 days	-
4days	5(7%)	19 days	-
>4days	8(11%)	23days	4(5%)

Table 6: Association of duration of presentation of symptoms and, mean hospital stay

Above table shows that as the number of days of symptoms increases the mean hospital stay as well as mortality increases. However the mean hospital stay is not only influenced by disease itself but also by cultural practices such as distance from hospital etc.

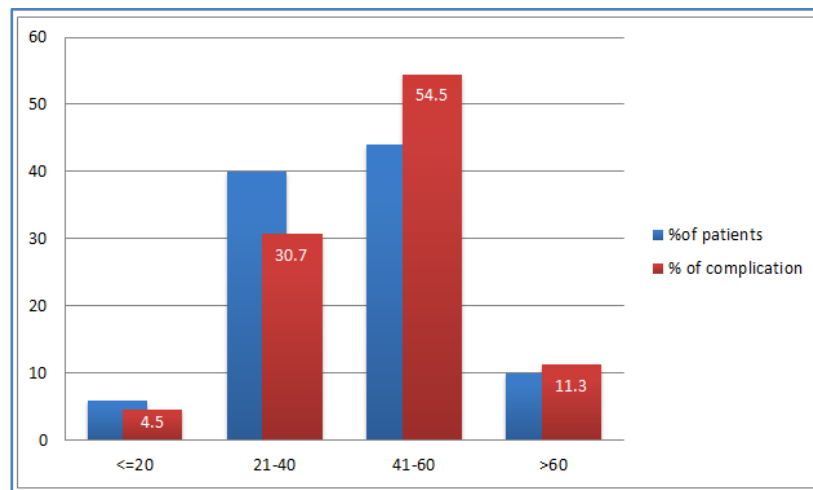


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Association of age and post-operative complications:

Age in years	No. of patients	Total complication	P value	Minor complications	Major complications
<20	4(6%)	1(4.5%)	0.661	1	0
21-40	28(40%)	8(30.7%)	0.212	7	1
41-60	31(44%)	14(54.5%)	0.002	6	8
>60	7(10%)	3(11.3%)	0.176	1	2
Total	70(100%)	26(100%)		15	11

Table 7: Association of age and post-operative complications



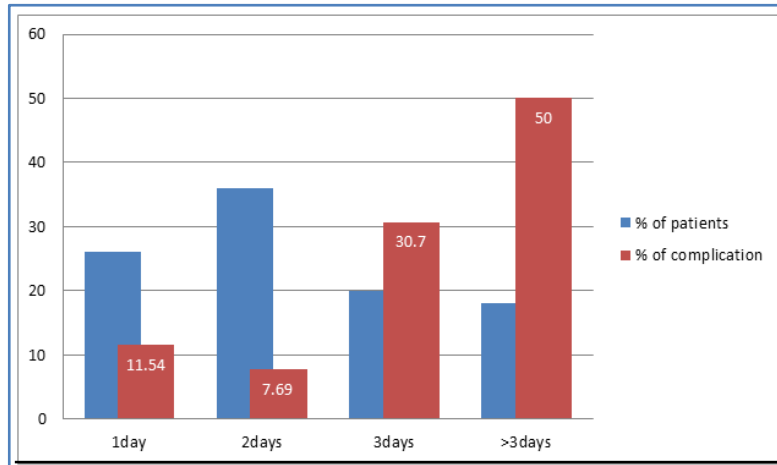
It is observed that, for the age group 41-60 years the proportion of post-operative complication is significantly higher compared to any other age groups ($p < 0.05$). It is also observed that as the age is increased, major complications (including death) were increased.

Association of time since onset of pain and post-operative complication:

Time since onset of pain	No. patients	Total complication	P value	Minor complication	Major complication
1day	18(26%)	3(11.54%)	0.395	3	-
2days	25(36%)	2(7.69%)	0.348	2	-
3days	14(20%)	8(30.7%)	0.00000005	5	3
>3days	13(18%)	13(50%)	0.161	5	8
Total	70(100%)	26(100%)		15	11

Table 8: Association of time since onset of pain and post-operative complications:

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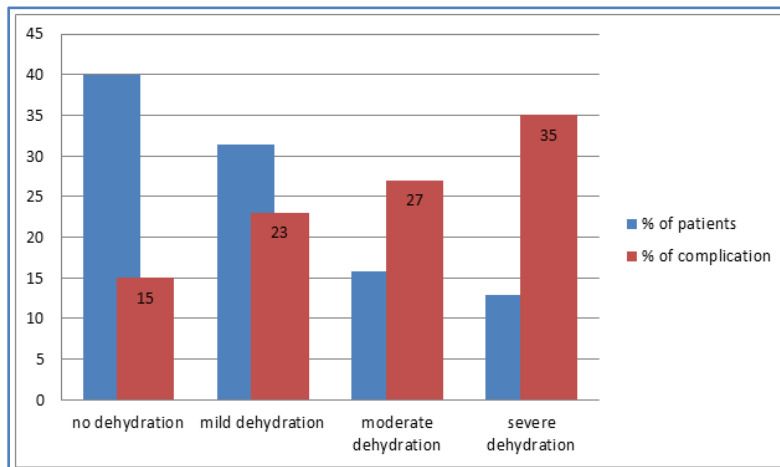
The risk of complication increases with the increase in time since onset of symptoms. This table & graph shows that there is increase in rate of complication when the presentation is more than 2 days ($p < 0.05$). 62% of patients presented to our hospital within 48hrs (2days).

Association of Dehydration of the patients with the post-operative complication:

General condition	No. of patients	Total complications	P value	Minor complication	Major complication
No dehydration	28(40%)	4(15%)	0.00000714	4	-
mild dehydration	22(31.43%)	6(23%)	0.434	5	1
Moderate dehydration	11(15.71%)	7(27%)	0.218	3	4
severe dehydration	9(12.83%)	9(35%)	0.321	3	6
Total	70(100%)	26(100%)		15	11

Table 9: Association of dehydration of the patients with the post-operative complication

Chi-square – 26.60 Degree of freedom – 3P value 0.00000714 (< 0.005).



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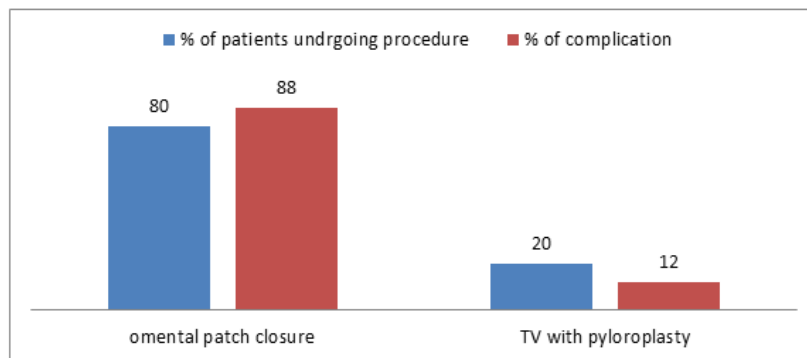
The above table and chart shows that 71% of our patients either presented with no dehydration or mild dehydration. Complications noted in these 2 groups were significantly lower than those presenting with either moderate or severe dehydration ($p < 0.005$). As the severity of dehydration increases risk of post-operative complication also increases.

Association of operative procedure with post-operative complications:

Operative procedure	No. of patients	Total complications	P value	Minor complication	Major complication
Simple closure with live omental patch	56(80%)	23(88%)	0.208	12	11
Trunca lvagotomy with pyloroplasty	14(20%)	3(12%)	0.1376	3	-
Total	70(100%)	26(100%)		15	11

Table 10: Association of operative procedure with post op complications

Chi-square – 1.85, Degree of freedom – 2 p value- 0.1376.



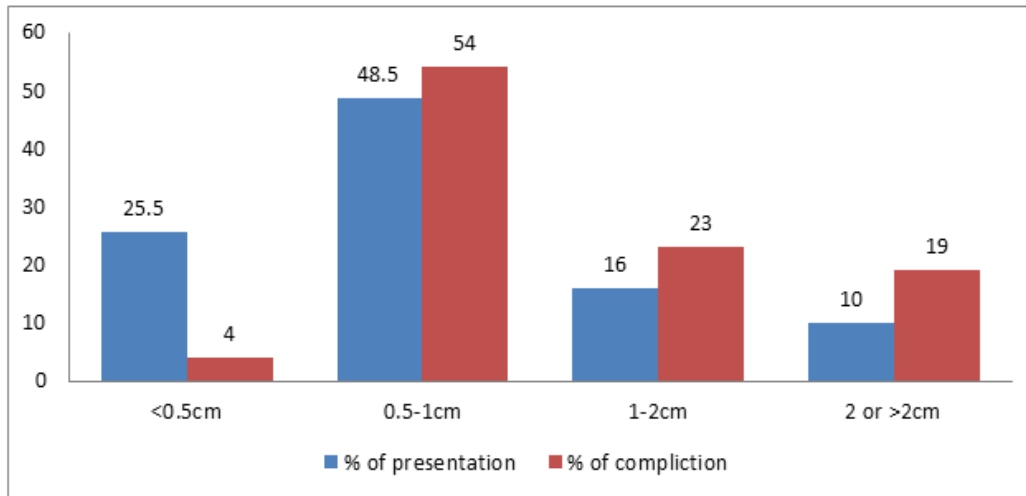
According to the above table and chart, there is significantly increased complications noted in simple closure of perforation with live omental patch compared to truncalvagotomy with pyloroplasty ($p > 0.005$). However in many other studies the opposite is true i.e., complications are more with definitive procedure. These observations are probably due to the criteria for selection of patients, sample sizes in each group are different.

Association of size of perforation with the post-operative complication:

Size of perforation	No. of patients	Total complication	Minor complication	Major complication
<0.5cm	18(25.5%)	1(4%)	1	-
0.5-1cm	34(48.5%)	14(54%)	9	5
1-2cm	11(16%)	6(23%)	2	4
2 or >2cm	7(10%)	5(19%)	3	2
Total	70(100%)	26(100%)	15	11

Table 11: Association of size of perforation with the post op complication:

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The above table and graph shows 74% of patients with duodenal perforation have the size of <1 cm. There is increased rate of complication with increase in size of perforation, in our study it is >0.5cm.

Association of size of perforation with the general condition of the patients:

Size of perforation	No dehydration	Mild dehydration	Moderate dehydration	Severe dehydration	
<0.5cm	10(36%)	8(36%)	-		18
0.5-1cm	13(46%)	12(55%)	6(55%)	3(33.3%)	34
1-2cm	4(14%)	2(9%)	2(18%)	3(33.3%)	11
>=2cm	1(4%)	-	3(27%)	3(33.3%)	7
Total	28(100%)	22(100%)	11	9	70

Table 12: Association of size of perforation with the general condition of the patients:

This table shows that the size of the perforation is related to the general condition of the patient and as the size of the perforation increases rate of morbidity and mortality increases.

Size of perforation	Live omental patch	TV+ pyloroplasty	Total
<0.5cm	18	-	18
0.5-1cm	26	8	34
1-2cm	6	5	11
>=2cm	6	1	7
Total	56	14	70

Table 13: Association of the size of the perforation with procedure performed:

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The above table shows that, live omental patch closure for perforated duodenal ulcer is safer and can be performed in all sizes of perforation. Truncal vagotomy with pyloroplasty which is the definitive surgery in duodenal ulcer perforation can only be performed with increase in size of perforation and there is no contamination in peritoneal cavity.

General condition	Live omental patch	Pyloroplasty+TV	
No dehydration	14	14	28
Mild dehydration	22	-	22
Moderate dehydration	11	-	11
Severe dehydration	9	-	9
Total	56	14	70

Table 14: Association of general condition of the patient and procedure performed

Above table shows that all the cases of truncal vagotomy with pyloroplasty were performed when the general condition of the patient is good with little or no peritoneal contamination to minimize post op complication.

Time gap	No. of patients	Total complication	Minor complication	Major complication
<4hrs	34(48.5%)	9(35%)	9(60%)	-
4-8hrs	26(37%)	12(46%)	5(33%)	7(64%)
>8hrs	10(14.5%)	5(19%)	1(7%)	4(36%)
Total	70	26	15	11

Table 15: Association of time gap since admission to surgery and complication

Chi-square – 3.27 Degree of freedom – 2 p value- 0.194.

The above table shows that delay in taking the patients for surgery has significant direct relationship with complications. However the time for taking the patient for surgery also depends on general condition of the patient on presentation, availability of operation theatre, many other factors related to relatives.

Follow up	Early follow up	Late follow up
Uneventful	48(69%)	59(84%)
Pain at wound site	14(20%)	-
Wound discharge	3(4%)	-
Pain at epigastrium	-	2(3%)
Incisional hernia	-	3(4%)
Lost to follow up	1(1%)	2(3%)
Death	4(6%)	4(6%)
Total	70	70

Table 16: FOLLOW UP

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In our study, we followed the patients at 2 intervals; first at 6 weeks and late follow up at 6 months. 84% of patients had uneventful follow up. 20% of our patients had persistent pain at wound site at 6 weeks none of them had pain at 6 months 3 (4%) of our patients had wound discharge. Among these patients 1 patient presented with 4days pain abdomen, 1 with 5 days pain abdomen and 1 with 6 days pain abdomen. Complications are directly related to duration of symptoms. 2 (3%) of patients developed recurrence of pain at epigastrium which was managed conservatively with anti H. pylori regime. 3(4%) of our patients had incisional hernia which was managed by mesh repair. There were 4 deaths in our study, all of them died in the immediate post-operative period.

DISCUSSION: Duodenal Ulcer perforation is one of the commonest acute abdominal emergencies presenting to the Victoria hospital and Bowring and lady Curzon hospital between Oct 2009 to Aug 2011. Peak age of incidence in our study population is 41.5 years which implies that majority of people developing duodenal ulcer perforation belong to productive period of life (pg no.75). Now-a-days, there is an increased incidence of DU perforation seen in aged individuals and these are the population at risk for morbidity and mortality.^(4,9)

It is more common in low socio-economic status people with rural and urban slum males are being affected commonly. In our study more than half of our patients were of blood group 'O' positive. Predisposing factor for Duodenal Ulcer in our study was consumption of spicy food (63%) followed by alcohol consumption (50%) and smoking (13%) 11% had prior history of drug intake. i.e., NSAID's (15% in others²⁰) 20% had prior H/o peptic ulcer. In those patients with peptic ulcer it varied from 1-2 years, 34% of our patients had no habits.^(10,11)

Most patients presented with sudden onset of acute pain abdomen in epigastrium initially, later became generalized with variable duration. General condition of the patient was stable at the time of admission in those patients who came within 48 hours and in those who were referred from other hospitals or general practitioners.

In our study 71.43% of patients had either no signs of dehydration or mild dehydration. All patients presented with pain abdomen, vomiting was present in 98% of patients and abdominal distension in 92% of patients. All had generalized guarding, rigidity and diffuse tenderness with obliteration of liver dullness.

All cases showed gas under diaphragm in one or both the domes of diaphragm with ground glass appearance. Most of our patient's routine investigations were within normal limit except for few, among the patients who showed abnormality, electrolyte imbalance was the most common finding followed by elevated RFT. Diagnostic peritoneal tap was positive in all cases. It was bilious and in few cases pus was aspirated.⁽¹²⁾

Closure of the perforation was done by live omental patch closure in 80% of patients. It is safer and most common procedure performed in emergency situation. However definitive procedure like truncal vagotomy and pyloroplasty (20%in our study) can also be done safely provided there are definitive indications are present or general condition of the patient is good, there is no gross contamination of peritoneal cavity and the patient is young.

Out of 14 cases who underwent pyloroplasty with truncal vagotomy, 3 underwent due to associated bleeding duodenal ulcer, 1 had second time duodenal perforation, in remaining 10 patients procedure was done as the general condition was good, there were no signs of dehydration, there was no gross contamination of peritoneal cavity or it was limited to the area around the perforation. Out of 14, 6 patients were young belonging to less than 30 years age group.

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In our study, all the patients who underwent definitive procedure were presented with symptoms less than 24hrs duration and intra-operatively, found to be less or minimal peritoneal cavity contamination.

Among the post-operative complications, 15 were minor complications and 11 were major complications. Minor complications include post-operative wound discharge, serous or serosanguinous, wound pain. Out of 15, 2 patients underwent definitive procedure i.e, pyloroplasty with truncal vagotomy. 11 patients had major complications; 6 patients developed biliary leak which was managed conservatively, all patients recovered well. 1 patient had burst abdomen which was managed by tension suturing; he recovered well. 4 patients died.

	BoeyJ, et al^(6, 13, 14)	GrayJG, et al⁽¹⁵⁾	Jordan, et al⁽¹⁶⁾	Sugawa, eta⁽¹⁷⁾	RipinV, et al⁽¹⁸⁾	Our study
Predominant sex	Male	male	Male	male	Male	Male
Rural/urban	Rural	Rural	-	urban	Rural	Rural
Blood gp	0	0	-	-	0	0
Predisposing Factor(MC)	Spicy food,	-	Spicy food	alcohol	Spicy food	Spicy food
Definitive procedure	25%	-	35%	-	46%	20%
Complication (MC)	Wound infection	Wound infection	-	-	-	Wound infection
Recurrence in definitive procedure	11%	-	2%	13%	-	No recurrence till date
mortality	4.7%					5%

MC- most common.

Mortality rate in our study was 5%. Among 4 patients who died 2 people presented to the hospital after 6 days of onset of symptoms, 1 presented after 5 days and 1 presented after 4 days; time of presentation, general condition of patient, size of perforation and time gap for surgery were all related to post-operative complications and mortality. All 4 patients who died had severe dehydration and gross peritoneal cavity contamination.

Increasing size of perforation with the type of closure performed had significant relationship with postoperative complications. Duration of hospital stay was directly related to duration of symptoms, general condition of patient, and presence or absence of post-operative complications, though it is also influenced by distant stay where medical facilities are not available. Most of our patients will get discharged from the hospital only after removal of sutures.

Patients were followed up 2 times post operatively, 1 at 6 weeks and next at 6 months. At 6 weeks follow up 20% of patients had persistent pain at wound site which was not present at 6 months follow up. 3 of our patients had persistent wound discharge at 6 weeks but not present at 6 months.

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At 6 months 2 patients had pain at epigastrium, upper GI endoscopy was done which showed antral hemorrhagic gastritis. They were managed with PPI's. 3 patients developed incisional hernia which was managed by mesh repair. 2 patients were lost to follow up.

Follow up period of 6 months was too short to assess recurrence of ulcer among the 2 different procedure performed. At least 2 years of follow up was recommended to assess the recurrence.

CONCLUSION: Duodenal Ulcer perforation is one of the commonest acute abdominal emergencies in our setup. Duodenal Ulcer perforation is common among male who are living in rural area or urban slums. It is common among people belonging to blood group 'O' positive.

Most common predisposing factor for duodenal ulcer in our study was, consumption of spicy food followed by alcohol and smoking. All our patients presented with signs and symptoms of generalized peritonitis with variable degree of dehydration.

Closure of the perforation was done by live omental patch in 80% of patients. It is safe and the most common procedure performed in an emergency situation. However definitive procedure like truncal vagotomy and pyloroplasty can also be done safely provided there are definitive indications, general condition of the patient is good, there is no gross contamination of peritoneal cavity and the patient is young.⁽¹⁹⁾

In our study among the 14 patients who underwent definitive procedure only 2 patients developed minor complications and no major complications. The results seems to be impressive, however there are many criteria with the selection of the patients.

Considering the time factor, lack of experience in the procedure (majority of emergency procedure were performed by residents or junior staffs) live omental patch closure with technical modifications is still the better operation in perforated duodenal ulcer and definitive procedure are reserved when suitable condition are present as mentioned above.

Postoperative complications are rare unlike ileal perforation. Complications include, mild wound infection, wound pain. Major complications which occurred in our study were biliary leak, wound dehiscence and incisional hernia.

Mortality rate in perforated duodenal ulcer is less when compared to other acute abdominal conditions and is directly related to duration of clinical symptoms, age, severity of dehydration, and peritoneal cavity contamination.

Follow up period was too short to assess recurrence of ulcer in both groups, at least 2 years of follow up is recommended to assess recurrence in other studies.

REFERENCES:

1. Vinay Kumar, Ramzi S cotran, et al; Basic Pathology, 7th Ed. Wb. Saunders Company; P2 No. 508 to 511.
2. King PM, Mc Closs AH, Colin J et al. Perforated duodenal ulcer long term results of omental patch closure has shown excellent results. J.R. College of Surgeons, Edinburgh Ed. 32:79: 198.
3. S Das; A Manual on clinical surgery; 5th edition; Pg.No.335 to 353.
4. Canoy DS, Hart AR, Todd CJ. Epidemiology of duodenal ulcer perforations. Dig Liver Dis 2002; 34: 322.
5. David c sabiston, H Kinlyslly, Sabiston's textbook of surgery, 18thED, Elsevier publication page no.1236-1255.
6. Boey et al; Surgical management of peptic ulcer disease: Br J Surg1987; 74: 286-7.

ORIGINAL ARTICLE

7. Simple closure or vagotomy or pyloroplasty for the treatment of perforated DU. Companion of results show that simple closure remains the selected treatment in majority of patients who present with duodenal ulcer; Digest of Surgery 2000 17 (3). Pg. 225-228.
8. Jordan PRO Morror C et al in a study of 60 patients showed no mortality and recurrence rate of only 2% for simple closure and definitive surgery in a follow up ranging from 1 to 8 years. Surgical Clinic& of North America. Pg.368; 315; 1988.
9. Fischer, et al; Mastery of Surgery, 5th Edition 2007 Lippincott Williams & Wilkins.
10. Haile T. Debas, Edited by Michael J. Zinner, Seymour Schwartz: Harold Ellis; Maingots Text Book of Abdominal operations: Vol I; 11th Ed. McGraw H11 Company 2009. Pg.No.1082 to 1086.
11. John N primrose; Bailey and Love's Short Practice of Surgery, 25th Ed. Arnold Publications. Pg. No.1045-1079.
12. Grassi R, Romano S, Pinto A, et al. Gastroduodenal perforations: conventional plain film, US and CT findings in 166 consecutive patients. Eur J Radiology 2004; 50: 30.
13. Boey J Lee NW Koo J et al. Immediate definitive Surgery for perforated duodenal ulcer; A prospective trial, Ann, Surgery 1982; 196 (3); 338-44.
14. Boey J, et al; comparitve study of surgical management of perforation of acute peptic ulcers; Ann. Surgery 1988: 208 (2) Pg. No. 169-74.
15. Gray JG, Roberts AK et al Definitive emergency treatment of perforated duodenal ulcer Surg Gynecol Obstet. 1996 Dec; 143 (6): 890-4.
16. Jordan PH, Thornby J. Perforated pyloroduodenal ulcers. Ann Surg 1995; 221: 479.
17. sugawa K, Koyanagi N, Hashizume M, et al. Therapeutic strategies in performing emergency surgery for gastroduodenal perforation in 130 patients over 70 years of age. Hepatogastroenterology 2001; 48: 156.
18. Ripin V et al in 1999 showed that surgical treatment of perforated gastroduodenal ulcer sowed excellent results (95.5%) where suture of perforation and selective proximal vagotomy were performed.
19. Dayton MT: Vagotomy and drainage, in Zuidema GD, Yeo CJ (eds): Shackelford's Surgery of the Alimentary Tract, 6th ed., Vol. II. Philadelphia: Saunders, 2002, p 117.

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