CLOSURE OF DUODENAL PERFORATION BY GASTRIC SEROMUSCULAR ADVANCEMENT FLAP

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ABSTRACT

BACKGROUND

Perforation remains a surgical disease and management means emergency surgical intervention. Primary closure with omental buttress, Graham's live/dead omental patch repair, Jejunal serosal (Thal) patch repair and antrectomy with Billroth II reconstruction have been the traditionally followed procedures depending on the site/size of the perforation. This study reports a series of cases of perforated duodenal ulcer closed by Gastric seromuscular advancement flap. This article compares the advantages and disadvantages of either methods and details the indications and method of this alternative repair.

METHOD

Emergency exploratory laparotomy of cases of duodenal ulcer perforation.

RESULTS

Study group of 112 cases with similar survival outcome in uncomplicated cases with added advantage of improved survival outcome in complicated cases with unhealthy or absent omentum.

CONCLUSION

This article takes into account a total of 112 cases of perforated ulcer operated at our institution from 2011-2015 with 50 cases being operated by the method under study. Results with seromuscular flap closure were comparable with that of other methods and more beneficial in the setting of unavailable or contaminated/unhealthy omentum.

KEYWORDS

Duodenal Ulcer, Perforation, Batch, Omentum, Flap, Seromuscular Layer.

HOW TO CITE THIS ARTICLE: Subbiah P, Gayathri, Gopinath, et al. Closure of duodenal perforation by gastric seromuscular advancement flap. J. Evolution Med. Dent. Sci. 2016;5(73):5355-5358, DOI: 10.14260/jemds/2016/1215

INTRODUCTION

The perforation is usually in the first portion of the duodenum and can easily be accessed through an upper midline incision. Perforations smaller than 1 cm can generally be closed primarily and buttressed with well-vascularised omentum. For larger perforations, a Graham patch repair with a tongue of healthy omentum is performed. For very large perforations (>3 cm), control of the duodenal defect can be difficult. The defect should be closed by the application of healthy tissue, such as omentum or jejunal serosa, with placement of duodenostomy tube and wide bore drainage tube. This is likely to result in leakage of GI contents into the drain, but in most cases sepsis will resolve. An alternative in this difficult situation is antrectomy and a Billroth II reconstruction.

AIM & OBJECTIVES

To study the efficacy of Gastric seromuscular flap closure of

Financial or Other, Competing Interest: None.

Submission 31-07-2016, Peer Review 28-08-2016,

Acceptance 02-09-2016, Published 10-09-2016.

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DOI: 10.14260/jemds/2016/1215

Duodenal ulcer perforation over omental patch (Live/dead) in setting of unhealthy/absent omentum. Survival analysis of patients treated by either methods.

The outcome of patients with a perforated ulcer depends on the following:

1. Delay from initial evaluation to treatment: recent data shows a delay in surgical treatment, in part because of more extensive diagnostic work-up.
2. Site of perforation: gastric perforations are associated with a poor prognosis.
3. Patient's age: elderly patients, who often have associated comorbid conditions, have a poor outcome.
4. Presence of hypotension at initial evaluation (Systolic blood pressure <100 mm of Hg) leads to poor results.

The seromuscular advancement flap can be of much help in the following situations: cases with extensive peritoneal contamination leading to unhealthy omentum making it unsuitable for aiding closure; cases where there is non-availability of omentum due to prior surgical interventions.

MATERIALS AND METHOD OF STUDY

Emergency exploratory laparotomy of suspected cases of duodenal ulcer perforation.

Operative Method

Abdomen was opened by an upper midline incision (preferably upper midline). After identifying the

Fig. 1: Site of Perforation

Fig. 2: Seromuscular Flap Raised

Site of perforation, Seromuscular flap is raised adjacent to the perforated site taking care to raise appropriate thickness without breaching the submucosa.

The flap is then rotated/advanced to superimpose upon the perforation and sutured with 2-0 Vicryl.

Fig. 3: Flap Sutured over Perforation

Fig. 4: After the Closure of Perforation with Flap

Disadvantages - Surgical expertise cannot be used for large perforations.

Method of Study

A total of 112 cases of perforated duodenal ulcer operated at our institution from 2011-2016 were included in the study with 50 cases being operated by the method under study.

A prospective randomised trial of gastric seromuscular advancement flap closure versus omental patch closure of perforated duodenal ulcer was done.

Two comparative studies done using the same study group. One under the setting of healthy omentum. Other study done under setting of unhealthy or absent omentum. Both studies compared the efficacy/mortality of seromuscular flap versus omental patching.

RESULTS (DATA ANALYSIS)

Following Factors were taken into Consideration

- Comorbid conditions/age,
- Presence/absence of sepsis,
- Systolic BP at presentation,
- Size of perforation.
- Omental condition (Unhealthy/necrosis/absence).

Total of 112 cases of Duodenal ulcer perforation were selected (Leaving aside gastric & large DU perforations) of which cases with healthy omentum were 70 and unhealthy/absent omentum were 42.

Out of the 70 cases with healthy omentum, 45 cases were operated by Omental patch closure and 22 were operated by GSM flap.

Out of the 42 cases with unhealthy/absent omentum, 14 cases were operated by Omental patch closure and 28 were operated by GSM Flap.

Survival analysis done amongst two groups comparing the two types of perforation closure method. Statistical analysis done. Chi-square tests done.

Frequency Table

	Frequency	Percent
Valid Male	99	88.4
Female	13	11.6
Total	112	100.0
Sex Distribution		

Sex	Age Category				Total
	15-30 Yrs.	31-45 Yrs.	46-60 Yrs.	>60 Yrs.	
Male	25	29	36	9	99
Female	3	3	4	3	13
Total	28	32	40	12	112

Sex* Age Category Cross Tabulation

	Age	Follow-up
N Valid	112	112
Missing	0	0
Mean	44.36	56.95
Median	45.00	60.00
Std. Deviation	14.371	27.859

Statistics

Valid	Frequency	Percent
Present	19	17.0
Absent	93	83.0
Total	112	100.0

Comorbidity

Valid Omentum	Frequency	Percent
Healthy	70	62.5
Unhealthy	42	37.5
Total	112	100.0

Condition of Omentum

	Frequency	Percent
Valid Omentum	62	55.4
GSM Flap	50	44.6
Total	112	100.0

Material for Surgery

	Frequency	Percent
Valid Alive	97	86.6
Dead	15	13.4
Total	112	100.0

Status after Surgery

	Frequency	Percent
Valid 15-30 Yrs.	28	25.0
31-45 Yrs.	32	28.6
46-60 Yrs.	40	35.7
>60 Yrs.	12	10.7
Total	112	100.0

Age Distribution

Comorbidity	Age Category				Total
	15-30 Yrs.	31-45 Yrs.	46-60 Yrs.	>60 Yrs.	
Present	0	2	7	10	19
Absent	28	30	33	2	93
Total	28	32	40	12	112

Comorbidities* Age Category Cross Tabulation

Cross Tab				
Count		Survival		Total
		Alive	Dead	
Omental	Healthy	64	6	70
Condition	Unhealthy	33	9	42

Omental Condition* Survival

	Value	Df	Asymp. Sig. (2-Sided)	Exact Sig. (2-Sided)	Exact Sig. (1-Sided)
Pearson Chi-square	3.741 ^a	1	.052		
Continuity Correction ^b	2.715	1	.099		
Likelihood Ratio	3.612	1	.057		
Fisher's Exact Test				.083	.052
N of Valid Cases ^b	112				

Chi-square Tests

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.63.

b. Computed only for a 2x2 table.

Crosstab				
Count		Survival		Total
		Alive	Dead	
Surgery	Omentum	50	12	62
	Flap	47	3	50
Total		97	15	112

Surgery* Survival

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.256 ^a	1	.039		
Continuity Correction ^b	3.182	1	.074		
Likelihood Ratio	4.587	1	.032		
Fisher's Exact Test				.051	.034
N of Valid Cases ^b	112				

Chi-square Tests

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.70.

b. Computed only for a 2x2 table.

Count			
Age Category	Survival		Total
	Alive	Dead	
15-30 Yrs.	28	0	28
31-45 Yrs.	30	2	32
46-60 Yrs.	35	5	40
>60 Yrs.	4	8	12
Total	97	15	112

Age Category Survival Cross Tabulation

	Value	Df		Asymp. Sig. (2-sided)
Pearson Chi-square	35.127 ^a	3		.000
Likelihood Ratio	27.828	3		.000
N of Valid Cases	112			
Chi-square Tests				

3 cells (37.5%) have expected count less than 5. The minimum expected count is 1.61.

	Chi-square	df	Sig.
Log Rank (Mantel-Cox)	4.122	1	.042
Overall Comparisons			

Test of equality of survival distributions for the different levels of surgery.

Surgery	Estimate	Std. Error	Mean ^a	
			95% Confidence Interval	
			Lower Bound	Upper Bound
Omentum	76.773	3.875	69.179	84.368
Flap	84.940	2.833	79.388	90.492
Overall	80.427	2.527	75.475	85.380

Surgery	Total N	N of Events	Censored	
			N	Percent
Omentum	62	12	50	80.6%
Flap	50	3	47	94.0%
Overall	112	15	97	86.6%
Case Processing Summary				

Age, Comorbid conditions and sepsis/hypotension at presentation affected survival rates equally among both groups.

Overall survival was 80% with omental patch closure and 94% with GSM flap closure.

The above results were statistically significant.

DISCUSSION

Cases have been encountered with late presentations and extensive peritoneal contamination leading on to omental caking/unhealthy omentum. Such cases have traditionally been treated surgically by Primary Closure/Dead Omental Patch/Jejunal Serosal Patch depending on the size of perforation. Thal's serosal patch has been used for large perforation. However, for small/medium-sized perforations, gastric seromuscular flap can be advantageous to that of a dead omental patch.

Rarely some cases may be encountered with absent omentum due to previous surgery (e.g., omentectomy in case of colectomy, obstructed/strangulated hernias). In such cases, this method will be of much benefit.

Studies were performed to see if gastric seromuscular patch elevation is anatomically feasible and to estimate the maximum size of the patch relative to its blood supply.^{1,2,3} A flap composed of greater omentum and a full-thickness segment of the greater curvature of the stomach, based on the right gastroepiploic artery, was first described in 1977 by

Yuzuru Kamei and Shuhei Torii. The flaps were used to treat patients with chronic soft tissue defects,¹ Miller JI, Mansour, KA, Nahai, F et al described management of intrathoracic defects by gastric seromuscular flaps.⁴ Seromuscular gastrocystoplasty lined with urothelium have been used for bladder augmentation. Surgeons have used the gastric wall from which the mucosa and submucosa had been removed.

Studies have been conducted on rats to evaluate the efficacy of repair of a large duodenal defect by a pedicled gastric seromuscular flap.³

New mucosal barrier overlaying the patch appeared to be satisfactory. All rats survived.

Cases of postpneumonectomy bronchopleural fistula treated using a gastric seromuscular and omental pedicle flap have been reported which maintained good postoperative respiratory function.^{1,5,6} Gastro-omental free flaps have been used in head and neck reconstruction, to close⁷ defects in the trachea, pharynx, cervical oesophagus and unfavourable hypopharynx.⁸

So this study was conducted using gastric seromuscular flap to close duodenal defects taking into account that the patch would provide an anatomical barrier to the defect developing a satisfactory new mucosal barrier compared to that of omental patching.

CONCLUSION

Both omental patch closure and GSM flap have similar survival outcomes in case of healthy omentum. In case of unhealthy or absent omentum, GSM flap has a better survival rate.

REFERENCES

1. Kamei Y, Torii S. A new composite gastric seromuscular and omental pedicle flap. *Annals of Surgery* 1994;220(1):97-101.
2. Aslan A, Akkaya B, Karagüzel G, et al. Bladder augmentation with an omental pedicled gastric seromuscular flap without the necessity of gastric resection. *Urol Res* 2004;32(4):298-303.
3. Aslan A, Elpek O. The repair of a large duodenal defect by a pedicled gastric seromuscular flap. *Surg Today* 2009;39(8):689-94.
4. Miller JI, Mansour KA, Nahai F, et al. Single-stage complete muscle flap closure of the postpneumonectomy empyema space: a new method and possible solution to a disturbing complication. *Ann Thorac Surg* 1984;38(3):227-31.
5. Patel RS, Gilbert RW. Utility of the gastro-omental free flap in head and neck reconstruction. *Curr Opin Otolaryngol Head Neck Surg* 2009;17(4):258-62.
6. Kondo R, Seki T, Hanamura N, et al. Gastric seromuscular and omental pedicle flap for bronchopleural fistula after pneumonectomy. *The Japanese Journal of Thoracic and Cardiovascular Surgery* 2000;48(8):536-9.
7. Papachristou D, Fortner JG. Experimental use of a gastric flap on an omental pedicle to close defects in the trachea, pharynx, or cervical esophagus. *Plast Reconstr Surg* 1977;59(3):382-5.
8. Chahine KA, Chaffanjon P, Bettega G, et al. Gastro-omental free flap in the reconstruction of the unfavourable hypopharyngeal defects: a functional assessment. *J Plast Reconstr Aesthet Surg* 2009;62(11):1367-73.