

# Triple-tube drainage versus jejunal serosal patch for management of leaked perforated duodenal ulcer after initial omental patch repair

Ahmed S. Saad, Ehab M. Ali Fadl, Mohammed A. El Sayed

Department of General Surgery, Ain Shams University, Cairo, Egypt

Correspondence to Ahmed S. Saad, MD, Surgery Department, Faculty of Medicine, Ain Shams University, Cairo, Egypt.  
Tel: +20 100 160 027;  
e-mail: ahmedsaad@med.asu.edu.eg

**Received:** 24 October 2020

**Revised:** 22 November 2020

**Accepted:** 30 November 2020

**Published:** 18 May 2021

**The Egyptian Journal of Surgery** 2021, 40:224–230

## Background

Perforated duodenal ulcer (DU) is a dangerous and life-threatening condition, with associated high mortality, especially when there is leakage after initial repair with omental patch. There are multiple methods recommended by different studies for its management. These methods include cholecystoduodenoplasty, a jejunal serosal patch, triple-tube drainage, T-tube duodenostomy, and conservative methods. The aim of the study is to compare between triple-tube drainage and jejunal serosal patch as methods of management of leaked DU regarding the efficacy, failure, and mortality.

## Patients and methods

This study included 20 patients presented with leaked perforated DU treated initially with pedicled omental patch technique. They were divided randomly into two groups: group A included 10 patients who were treated by triple-tube drainage and group B included 10 patients who were treated by jejuna serosal patch.

## Results

The mean age of group A patients was 54 years, whereas for group B patients, it was 51 years. Most of the group A patients were males (80%) and also 90% of the group B patients were males. All patients (100%) of both groups were presented with manifestations of shock like hypotension and palpitation. The average length of hospital stay was 11 days (range, 8–15 days) for the group A patients and 13 days (range, 7–19 days) for group B patients.

## Conclusion

Leaked perforated DU after initial omental patch repair is a life-threatening entity and needs urgent resuscitation and interference. There are several methods of its management, among them are triple-tube drainage and jejunal serosal patch. Both methods have nearly the same success, complications, and mortality rates.

## Keywords:

duodenal ulcers, jejuna serosal patch, triple-tube drainage

Egyptian J Surgery 40:224–230

© 2021 The Egyptian Journal of Surgery

1110-1121

## Introduction

Duodenal ulcer (DU) perforation is a rare but may be a life-threatening condition, with a mortality rate from 8 to 25% in published studies [1].

The surgical treatment of perforated DUs consists of first the urgent treatment then may be followed by a more definitive surgical approach. This urgent treatment usually consists of closure of the defect with an omental patch either through open or laparoscopic approach [2].

There are several factors that might be associated with increased incidence of postoperative leakage with higher mortality in patients with perforated DUs, as severely diseased and scarred perforation may preclude adequate closure [3].

The prolonged duration of the patient symptoms more than 4 days and patient age more than 30 years were

found to be risk factors associated with higher mortality in perforated patients [4].

The incidence of duodenal leakage following Graham's patch ranges between 4 and 16% in various studies [5].

There are multiple surgical and conservative methods recommended by different studies. These methods include cholecystoduodenoplasty, a jejunal serosal patch, triple-tube duodenostomy, T-tube duodenostomy, and conservative methods [6].

## Aim

The aim is to analyze and compare between triple-tube drainage and jejunal serosal patch as methods of

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

management of perforated DU leakage after initial omental patch repair.

### Patients and methods

This study included 20 patients who presented to the Upper GIT Surgery Unit of Ain Shams University hospitals with leaked perforated DU treated initially with pedicled omental patch technique, with peritonitis and unstable hemodynamics, in the last 18 months from January 2019 to July 2020. Approval of the ethical committee was obtained before starting the study and all patients signed written consent after describing the procedure and the possible complication.

Demographic, clinical, and surgical data of the 20 consecutive patients were reviewed.

All clinical information was obtained from clinical records and referrals.

Patients were randomly classified into two groups: group A (patients had triple-tube drainage) and group B (patients had jejunal loop serosal patch). All patients underwent full description and discussion of the surgical procedures to arrest leak, possible complications, and overall survival of the patients, and written consent was obtained. All patients had routine preoperative investigations in the form of complete blood count; prothrombin time and partial thromboplastin time; clotting time; full chemistry, including liver function and renal function; and pelviabdominal ultrasound, which revealed intraperitoneal collection.

### Operative techniques

#### *Triple-tube drainage*

The patient was lying on supine position.

The previous midline exploratory incision was reopened and then the abdomen was explored where any intraperitoneal collection was drained.

The small intestine then was formally explored from duodenojejunal junction to ileocecal junction.

The duodenum was then mobilized using Kocher's maneuver, and then the site of the original perforation was identified. If the primary omental patch repair was present, it was separated, and the edges were trimmed and closed by one or two suture layers, which was buttressed with a healthy piece of the omentum.

Decompression gastrostomy was done followed by the passage of a tube from a point 5 distal to the duodenojejunal junction in a retrograde manner toward the junction between second and third part of duodenum as a retrograde duodenostomy for decompression.

Finally, a feeding jejunostomy was created about 40 cm distal to the duodenojejunal junction using no. 24 Foley's catheter that was inserted in an antegrade manner to provide early enteral feeding. Then lavage of the peritoneal cavity was done with adequate drainage using a large nonsuction drain close to the perforation site, other drain in the Morrison's pouch with a pelvic drain, and then the abdomen was closed.

### Jejunal loop serosal patch procedure

The patient was lying on supine position.

After opening the previous surgical wound, the intra-abdominal collection was aspirated and sucked out. The abdominal viscera were formally explored, then duodenal perforation site was identified, the edges were trimmed, and all obvious necrotic tissues and debris were debrided and cleaned.

The second part of the duodenum was mobilized, then a jejunal loop about 40–60 cm away from the ligament of Treitz was brought over the colon, approximated and sutured over the duodenal defect where the sutures were passing all through the duodenal wall all around the perforation, and then holding the seromuscular layers of the jejunum to be strong enough.

A jejunojejunostomy (diverting) was also passed 20 cm distal to the patch in all cases. After generous intra-abdominal lavage, a large drainage tube (sometime two tubes) was left behind. The abdominal cavity was washed with copious amount of warm normal saline, and a drainage tube was inserted to the right subhepatic space. Catheters were then removed when there was no drainage from the abdominal cavity.

### Statistical analysis

Data were collected, revised, coded, and entered to the Statistical Package for the Social Sciences (IBM SPSS, Armonk, NY, USA), version 23. Data were presented as percentages. The differences in surgical outcomes between the two groups were compared using the Pearson  $\chi^2$  and Fisher exact tests. *P* values were reported, where the results were considered to be significant with *P* value less than 0.05, highly

significant with *P* value less than 0.01, and nonsignificant with *P* value more than 0.05.

## Results

Group A included eight (80%) males and two (20%) females, with a mean age of 54 years (range, 45–61 years), whereas group B included nine (90%) males and one (10%) female, with a mean age of 51 years (range, 43–57 years) (Table 1).

Regarding the patient's presentation, severe abdominal pain was present in eight (80%) of the group A patients and in seven (70%) of the group B patients. All patients (100%) of both groups were presented with manifestations of shock like hypotension and palpitation. A total of six (60%) group A patients presented with fever, whereas five (50%) group B patients had fever.

The mean time elapsed from the previous operations till the patient's presentation was 65 h (range, 48–96 h) for group A patients and 61 h (range, 36–96 h) for group B patients. As seen from the previous reports and operative detail sheets, the mean size of the perforation was 1.75 cm (range, 1–2 cm) for group A patients and 1.9 cm (range, 1–2.5 cm) for group B patients (Table 2).

Regarding the patients' postoperative course, seven (70%) patients of group A developed wound infection in comparison with five (50%) of the group B patients, and then wound infection progressed to duodenocutaneous fistulas in two (20%) patients of group A and in three (30%) patients of group B.

Abdominal wound dehiscence with associated evisceration developed in two (20%) group A

patients, which needed immediate surgical interference, but one (10%) of these patients later developed intractable shock and died (10%), whereas three (30%) group B patients developed abdominal wound dehiscence with associated evisceration and were in need for immediate surgical interference, but two (20%) of them later on developed intractable shock and died (20%).

The average length of hospital stay was 11 days (range, 8–15 days) for the group A patients and 13 days (range, 7–19 days) for group B patients (Table 3, Figs 1–6).

## Discussion

Perforated DU is a frequent surgical emergency challenging general surgeons.

A total of 20 patients were studied. In group A, males represented most cases (80%) and females represented only 20%, whereas group B included nine (90%) males and one (10%) female, coinciding with the literature, as Etoneyaku *et al.* [7] reported that perforated DU was five times more frequent among males compared with females.

Magsi *et al.* [8] also found comparable findings regarding this sex distribution.

The magnitude of male predominance can be justified by the fact that males may be exposed to more strenuous jobs and physical activities, in addition to smoking being higher prevalent in males than females, and thus predisposing them to higher risk of gastroduodenal perforation.

Female to male ratio of 1 : 8 was estimated in another study evaluating the prevalence of DU [9].

In our study, it seems to be a disease of old age groups, as the mean age was 54 years (range, 45–61 years) in group A, whereas in group B, the mean age was 51 years (range, 43–57 years).

Similarly, a prospective study included 87 duodenal perforations and revealed that the median age was

**Table 1 Demographic characteristics of patients**

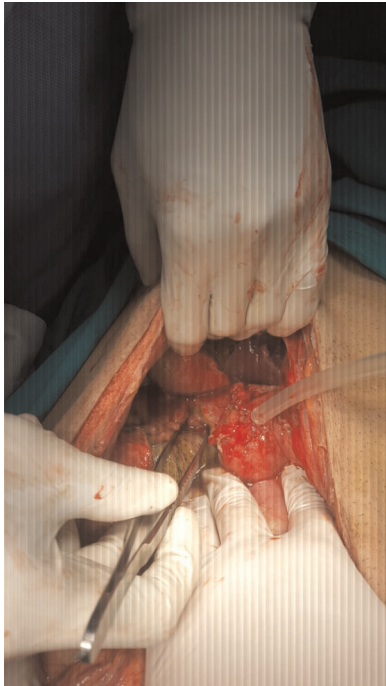
Variables	Group A (N=10)	Group B (N=10)	<i>P</i> value
Sex (male/female)	8/2	9/1	0.298 (NS)
Mean age (years)	54	51	0.38 (NS)

**Table 2 Presenting manifestations of patients and previous operative data**

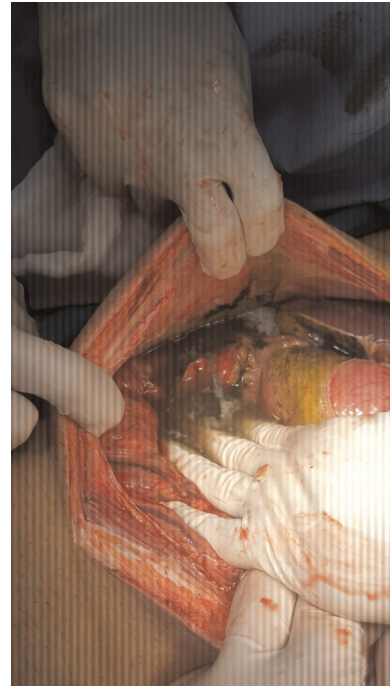
Variables	Group A (N=10) [n (%)]	Group B (N=10) [n (%)]	<i>P</i> value
Abdominal pain	8 (80)	7 (70)	0.08 (NS)
Fever	6 (60)	5 (50)	0.9 (NS)
Shock manifestations	10 (100)	10 (100)	NS
The mean time of presentation after previous operation (h)	65 (range, 48–96)	61 (range, 36–96)	0.07 (NS)
The mean perforation size (cm)	1.75 (range, 1–2)	1.9 (range, 1–2.5)	0.592 (NS)

**Table 3 Postoperative course and patients' outcome**

Variables	Group A (N=10) [n (%)]	Group B (N=10) [n (%)]	P value
Wound (surgical site) infection	7 (70)	5 (50)	0.074 (NS)
Duodenocutaneous fistulas	2 (20)	3 (30)	0.843 (NS)
Abdominal wound dehiscence	2 (20)	3 (30)	0.843 (NS)
Intractable shock	1 (10)	2 (20)	0.08 (NS)
Mortality	1 (10)	2 (20)	0.08 (NS)
Average length of hospital stays (days)	11 (8–15)	13 (7–19)	0.115 (NS)

**Figure 1**

Site and size of re perforation.

**Figure 2**

Soiling and contamination of the field with duodenal content.

55.0 years and the mean age was  $52.2 \pm 17.5$  years [10].

Likewise, another recent study conducted in Saudi Arabia assessed the short-term outcome of perforated peptic ulcer, where the average age was 55 years old [11].

On the contrary, a Yemenian retrospective study observed that the overall mean age of presentation was 39.08 years, and a higher frequency of PPU was noted in patients aged 21–40 years (58.3%) [9].

The clinical presentation of our patients showed that the most common symptom was severe abdominal pain in both group A and group B. However, all patients (100%) of both groups were presented with manifestations of shock like hypotension and palpitation.

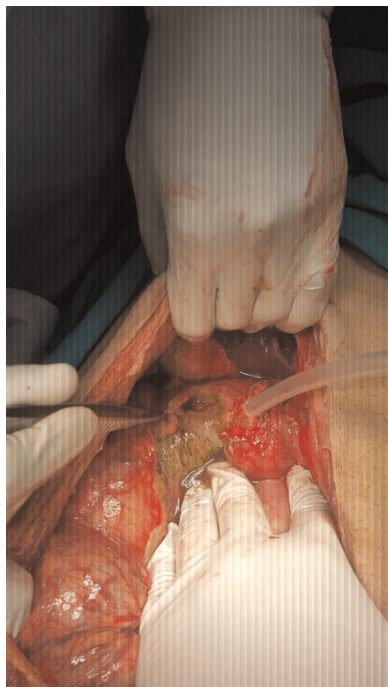
Katkhouda *et al.* demonstrated that patients with shock had worse outcomes when compared with those without shock [12].

On the contrary, other clinical presentations were observed in a recent Indian study, which was conducted on 150 patients experiencing perforated peptic ulcer, where all the studied patients presented with abdominal pain, in addition to peritonitis symptoms and signs, such as guarding, rigidity, rebound tenderness, and masking of liver dullness [13].

The mean time elapsed from pedicled omental patch repair till the patient's presentation was 65 h (range, 48–96 h) for group A patients and 61 h (range, 36–96 h) for group B patients, respectively, and that is longer than those observed by Unar *et al.* [14], as they found the mean  $\pm$  SD time till releak in patients with DU was  $36.43 \pm 7.65$  h.

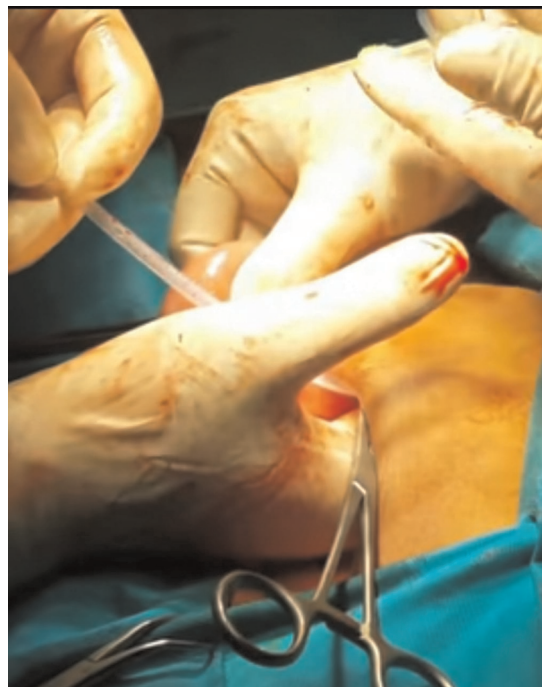


Figure 3



Another picture of re perforation after peritoneal toilet and lavage.

Figure 4



Fashioning of the site of retrograde duodenostomy.

Figure 5



Pushing the tube towards the duodenum (retrograde duodenostomy).

Figure 6



Opening of jejunum to introduce retrograde duodenostomy tube.

However, it is positively correlated with the duration of symptoms observed in the previously mentioned retrospective observational study, as most patients (43%) presented after 72 h, whereas the rest ranged between 24 and 72 h [13].

According to the operative details, the mean size of the perforation was 1.75 cm (range, 1–2 cm) for the group A patients and 1.9 cm (range, 1–2.5 cm) for the group B patients. Likewise, a Bahraini study addressing the same topic, where the mean size of the perforations ranged from 0.5 to 1.2 cm [15].

However, our observational findings regarding the size of duodenal perforation contradicts those found by Khan and Gupta [13], where most of the perforations were equal or less than 5 mm in size.

Moreover, another Indian retrospective study observed that the median size of the ulcer was 5.4 mm (2–20 mm), where of the 41 total duodenal perforations, 28 (56%) of the perforations were of minimal size ( $\leq 5$  mm) and 13 (26%) were massive larger than 5 mm [16].

Etonyeaku *et al.* [7] reported almost the same incidence of the postoperative complications, as intra-abdominal abscess collection occurred among four cases, whereas surgical site wound infection was found among eight patients.

We had no cases with adult respiratory distress syndrome among adhesive bowel obstruction or failed primary repair.

On the contrary, Etonyeaku *et al.* [7] reported that the correlations of perforation duration before surgical procedure with postoperative complication(s) for instance wound infections were as well statistically significant ( $P > 0.05$ ).

Regarding the magnitude of abdominal wound dehiscence with associated evisceration, it developed in two patients of group A who needed immediate surgical interference, but one patient of them later developed intractable shock and died, whereas three patients of the group B patients developed abdominal wound dehiscence with associated evisceration and were in need for immediate surgical interference, but two of them later developed intractable shock and died.

When comparing this point to a similar study assessing the frequency of complications after surgical management of perforated peptic ulcer through a retrospective analysis among 148 cases, the frequency of wound infection and wound dehiscence found was 10 and 16.2%, respectively, versus 20 and 30%, respectively, in our study groups A and B [13].

The magnitude of wound dehiscence varies from hospital to hospital worldwide, but in our study, it may be observed frequently owing to the emergency repair surgeries, as these procedures are life-saving ones, and patients are rushed for operation with short times for stabilization and adequate resuscitation which hugely affect the operative

outcome; moreover, keeping sterility of procedures is also poor during emergency hours as compared with elective hours. In addition, the demographic nature of most of the studied population, being old aged males, which are independent risk factors for wound dehiscence after relaparotomy surgeries, can add to it.

The overall mortality rates in the present study was 10% in group A and 20% in group B, which matches the previous published reports (6–10%) [7]. Increase in mortality rate is reported to be associated with advanced age ( $> 60$  years), late presentation for more than 24 h, shock at presentation, and associated comorbidities [17].

Postoperatively, a total of three patients experienced intractable shock in both groups. A similar finding was observed through a retrospective report of patients operated for failed omental patch procedure at the Memorial Referral Hospital in Addis Ababa, where a total of 16 complications were seen in five patients, distributed as five patients had surgical site infections, two patients had burst abdomen, one patient experienced intractable septic shock, four patients were diagnosed with pneumonia, and three patients had severe hypoproteinemia, with only one had duodenocutaneous fistula. Their overall mortality rate was 20% [18].

The average hospital stay in our study was 12 days (range, 7–19 days). This admission period is considered acceptable and commonly spent by patients of the same condition, as the mean hospital stay was 25.5 days (range, 17–51 days). A mean hospital stay of 25.4 days was reported in a previously mentioned study, which is slightly longer than ours, may be owing to high complications rate observed in this study [18].

---

## Conclusion

Releakage from perforated DU after initial omental patch closure is a very dangerous and may be a lethal condition if not treated urgently. There are several methods for its management either conservative or surgical. Among these methods are triple-tube drainage and jejunal serosal patch. From our study, we concluded that both methods have nearly the same success, complications, and mortality rates, with minimal advantage of triple-tube drainage over the jejuna serosal patch.

## Financial support and sponsorship

Nil.

**Conflicts of interest**

There are no conflicts of interest.

**References**

- 1 Ansari D, Torén W, Lindberg S, Pyrhonen HS, Andersson R. Diagnosis and management of duodenal perforations: a narrative review. *Scand J Gastroenterol* 2019 54:939–944.
- 2 Wendling MR, Linn JG, Keplinger KM, Mikami DJ, Perry KA, Scott Melvin W, Neddlemen BJ. Omental patch repair effectively treats perforated marginal ulcer following Roux-en-Y gastric bypass. *Surg Endosc Other Interv Tech* 2013; 27:384–389.
- 3 Gupta S, Kaushik R, Sharma R, Attri A. The management of large perforations of duodenal ulcers. *BMC Surg* 2005; 5:15.
- 4 Moses JF, Hughes CD, Patel PB, Chao TE, Konneh SA, Jallah TY, *et al.* Surgical outcomes for peptic ulcer: a prospective case series at an academic hospital in Monrovia, Liberia. *Afr J Emerg Med* 2015; 5:60–65.
- 5 Maghsoudi H, Ghaffari A. Generalized peritonitis requiring re-operation after leakage of omental patch repair of perforated peptic ulcer. *Saudi J Gastroenterol* 2011; 17:124–128.
- 6 Sanjanwala SS, Thati VN, Rohondia OS, Rambhia SU. Comparison of operative procedures for re-leaks duodenal perforation: a cross-sectional analysis from a tertiary care hospital in a developing country. *Int Surg J* 2016; 3:1314–1317.
- 7 Etoneyaku AC, Agbakwuru EA, Akinkuolie AA, Omotola CA, Talabi AO, Onyia CU, *et al.* A review of the management of perforated duodenal ulcers at a tertiary hospital in south western Nigeria. *Afr Health Sci* 2013; 13:907–913.
- 8 Magsi AM, Iqbal M, Malik M, Parveen S. Silent peptic ulcer disease perforation. *J Surg Pak (International)* 2017; 22:67–72.
- 9 Bin-Taleb AK, Razzaq RA, Al-Kathiri ZO. Management of perforated peptic ulcer in patients at a teaching hospital. *Saudi Med J* 2008; 29:245–250.
- 10 Ohene-Yeboah M, Togbe B. Perforated gastric and duodenal ulcers in an urban African population. *West Afr J Med* 2006; 25:205–211.
- 11 Almalki OM. Short-term outcome of perforated peptic ulcer; relation with estimated time from the onset of the abdominal pain to surgical intervention. *Egypt J Hosp Med* 2020; 78:332–336.
- 12 Katkhouda N, Mavor E, Mason RJ, Campos GM, Soroushyari A, Berne TV. Laparoscopic repair of perforated duodenal ulcers: outcome and efficacy in 30 consecutive patients. *Arch Surg* 1999; 134:845–850.
- 13 Khan S, Gupta OP. Surgical outcome of management of perforated peptic ulcer: retrospective analysis of 148 cases. *Int Sur J* 2019; 6:3643–3649.
- 14 Unar SK, Danish AA, Bhurt AA, Laghari AA. Outcome of duodenal ulcer perforation after graham omental patch repair. *Ann Punj Med Coll* 2019; 13:14–17.
- 15 Alkhuzai J, AlAradi H. Presentation and management of perforated duodenal ulcer. *Bahrain Med Bull* 2018; 40:212–214.
- 16 Shah PH, Panchal HA. Acute perforation: clinical profile and our experience with operative outcome. *Int Surg J* 2016; 3:2227–2232.
- 17 Zittel TT, Jehle EC, Becker HD. Surgical management of peptic ulcer disease today: indication, technique and outcome. *Langenbecks Arch Surg* 2008; 385:84–96.
- 18 Bekele A, Kassa S, Taye M. The jejunal serosal patch procedure: a successful technique for managing difficult peptic ulcer perforation. *East Central Afr J Surg* 2016; 21:63–67.