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Original Research Article

Primary peritoneal drainage in critically ill patients of perforation peritonitis (an experience of 60 cases)

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ABSTRACT

Background: Objective of the present study was to evaluate applicability of Primary Peritoneal Drainage (PPD) under LA in critically ill patients as pre-laparotomy support when laparotomy under GA could not be done. Also to assess outcome in terms of survival, patients needing definitive surgery and complications associated with the procedure on immediate and follow up basis.
Methods: A prospective designed study including 60 critically ill patients admitted and diagnosed as perforation peritonitis were subjected to PPD under LA as per inclusion and exclusion criteria, at GMC Jammu, Jammu and Kashmir, India from November 2013 to October 2015.
Results: The average age of patients was 53.43 years (20-80 years) with M:F ration of 7:3. All patients presented in shock with very high ASA, combined and MPI scores. 40 patients died after PPD/laparotomy and 20 patients survived. From amongst survivors, 08 (40%) patients required no further treatment and 12 (60%) survivors required definitive laparotomy and treatment of the cause. Overall mortality was 66.67%, attributed to extraordinary delay in presentation, old age, High ASA and other score.
Conclusions: From the present study it was concluded that in adults the procedure did not proved comparable to standard surgical intervention as definite procedure but it did proved to be an effective modality of resuscitation and patient stabilization unlike in NEC of infants; PPD under LA. Overall the procedure is a low cost intervention and provide cheaper alternative to sustain and improvise the status of patient with a possibility of widespread applicability in low resource situations provided interdepartmental support from ICU, Dialysis and CCU is available.

Keywords: Critically ill, Primary peritoneal drainage, Perforation peritonitis

INTRODUCTION

Peritonitis is a serious life threatening and most common general surgical emergency world over, India and this part of country is no exception to it. The common age reported for its occurrence has been 45-60 years in Asian community, with a male: female preponderance of 3:1.[1,2] In developing countries the perforations of proximal gastrointestinal tract are six times more common than distal gastrointestinal tract.[3-5]

Although phenomenon of self-healing has been claimed to be efficient in 50% of patients yet a large number of patients require definitive treatment.[6,7] Laparotomy has been the gold standard for the definitive management. In the event of high risk status of patient, and non-improvement in general condition despite following intensive resuscitative protocols, the immediate laparotomy under general anesthesia is not advisable.[8] Various alternatives to immediate laparotomy recommended are: primary peritoneal drainage (PPD), laparoscopic sanitation; Taylor's conservative method,

laparostomy and planned re-laparotomies.[8-11] PPD under LA has long been established as definitive approach of management in infants with necrotizing enterocolitis associated peritonitis but its use in adults is still under debate and yet not clearly answered.[12,13] There is paucity of surgical literature on alternative methods to immediate laparotomy, especially the role of PPD under LA in critically ill patients of generalized peritonitis. Therefore, the study was undertaken with intent to evaluate efficacy as well as advantage, if any of primary peritoneal drainage under local anesthesia to overcome the immediate and added insult of major abdominal surgery and effects of general anesthesia in already critically ill patients. Evaluations was also done to see whether this procedure provides definitive cure, or a temporary alternative of source control and optimization of the patient for definitive surgery.

METHODS

This study was a prospective study conducted in the Postgraduate Department of Surgery, Government Medical College, Jammu, Jammu and Kashmir, India from 1st November 2013 to 31st October 2015 as per inclusion and exclusion criteria.

Inclusion criteria

- Peritonitis with shock
- Patients unfit for GA due to medical co morbid condition
- Failure of initial resuscitative protocols.

Exclusion criteria

- Early peritonitis in young patient with stable vitals
- Primary peritonitis or spontaneous bacterial peritonitis (e.g. cirrhosis)
- History of multiple previous abdominal surgeries.

As per the inclusion criteria, the patients who were undertaken for optimization with initial resuscitative protocol and still could not be optimized in 8-12 hours were subjected to primary peritoneal drainage procedure. Thereafter, patients were followed and their vitals were recorded and all data was collected according to Performa established. Their risk stratification was done, outcome was recorded and final results were assessed against outcome parameters selected for study as are detailed in results.

Operative technique

In conjunction with conservative measures, percutaneous peritoneal drainage was performed under local anesthesia through a 2-2.5cm long skin incision in either flank. Site and type of incision was dependent on clinical suspicion and ultrasonography report of collection and history of any previous surgery. The external oblique aponeurosis, internal oblique, and transverses abdominis were splited under vision with the help of artery forceps. Upon entering the peritoneal cavity, the index finger was swiped in all direction to allow protection and good drainage. Two wide bored intra-abdominal tube drains of 28/32F were placed in either flanks through these incisions. One drain was kept towards the pelvic cavity and the other in upward direction. Pus/fluid/bile was evacuated and collected for culture and sensitivity. Patients who could be clinically optimized after PPD, and who continued pouring excess fluid through drains were subjected to standard laparotomy for definitive surgical procedure.

Post-operative period

Regular vitals monitoring and physiological maintenance of patient's health were done. The nasogastric tube to decompress the stomach and a Foley's catheter to monitor urine output remained in situ in post-operative period for a desired period of time. Intravenous fluids and broad-spectrum antibiotics were continued till culture sensitivity of the fluid was available and specific antibiotics started thereafter. In selected cases, insertion of a central venous line was done for accurate fluid resuscitation and monitoring. Everyday drain output was monitored and contents noted. Abdominal-pelvic ultrasonography was performed after 12 hours, 24 hours and 36 hours to see the quantum of fluid in the peritoneal cavity. For patients on NPO for more than 3 days total parenteral nutrition (TPN) was started. RFT including serum electrolytes and CBC was regularly monitored.

RESULTS

The results of study are detailed below:

Clinical presentations and severity scores

The average age of patients in the study group was 53.43 years (20-80 years) with a standard deviation of 16.91 years. There were 42 males and 18 females in the study group with M:F ration of 7:3. 28 males and 08 females were above 60 years.

Table 1: Distribution of patients according to systolic blood pressure at admission (n=60).

Systolic blood pressure (mmHg)	Number of patients (%)
50-60	6 (10)
60-70	6 (10)
70-80	12 (20)
80-90	21 (35)
90-100	15 (25)

Mean±SD=78.67±13.32mmHg; Range=50-100mmHg.

All the patients in the study group had frank peritonitis with abdominal distension and moderate intensity

diffused abdominal pain. 40 patients (66.66%) were having fever. All the 60 patients had features of shock i.e. tachycardia and hypotension at presentation. Majority of the patient (n=46) had systolic blood pressure of <90mmHg and rest were having systolic blood pressure of >90-100mmHg at presentation. Mean systolic blood pressure among all the patients was 78.67mmHg with standard deviation of 13.32mmHg (Table 1).

Table 2: Distribution of patients according to serum urea at admission (n=60).

Serum urea (mg/dl)	Number of patients (%)
40 - 100	24 (40)
100-150	28 (46.67)
More than 150	08 (13.33)

Mean±SD=120±43.9mg/dl; Range=46-262mg/dl.

Hemoglobin range of the patients included in our study was between 4.5-10.0 gm/dl with average of 7.9gm/dl. Among them, 14 (23.33%) patients were hemoglobin less than 7gm/dl. Serum urea showed a wide range from 46mg/dl to 262mg/dl with mean value of 120mg/dl and standard deviation of 43.9mg/dl. Similarly, serum creatinine ranged from 1.2 to 5.7mg/dl with mean value of 3.0mg/dl with standard deviation of 1.2mg/dl (Table 2 and 3).

Table 3: Distribution of patients according to serum creatinine at admission (n=60).

Serum creatinine (mg/dl)	Number of patients (%)
Less than 1	0 (0)
1-2	20 (33.33)
2-4	26 (43.33)
More than 4	14 (23.33)

Mean±SD=3.0±1.2mg/dl; Range=1.2-5.7mg/dl.

Table 4: Distribution of patients according to combined score (ASA plus Boey's score).

Combined score	Number of patients (%)
7	12 (20)
8	40 (66.67)
9	8 (13.33)

All the patients had delayed presentation 3-10 days. Majority of the patients i.e.38 (63.33%) patients had >72 hours delay in presentation after onset of symptoms. Out of 60 patients, 40 (66.67%) patients had single co-morbidity and 20 (33.33%) patients had multiple co-morbidity. COPD was seen in 24 (40%) patients, ARF in 36 (60%) patients and hypertension in 6 (10%) patients. 36 patients (60%) presented with ASA score of 5 and 24 (40%) presented with ASA score of 4. Among the included patients, 8 (13.33%) were given a combined score of 9, 12 (20%) were given a combined score of 7 and 40 (66.67%) were given a combined score of 8. MPI score calculated varied from 17 to 43 with an average of 28 and standard deviation of 6. 38 patients (66.67%) had MPI score between 25 and 30. Out of 60 patients, only 4 (6.67%) patients had MPI score between 15 and 20. (Table 4 and 5).

Table 5: Distribution of patients according to MPI score (n=60).

MPI score	Number of patients (%)
15-20	4 (6.67)
20-25	7 (11.66)
25-30	38 (63.33)
30-35	5 (8.83)
35-40	2 (3.33)
40-45	4 (6.67)

Mean±SD=28±6; Range=17-43.

Outcome parameters

Out of 60 patients, 34 (56.66%) patients drained bilious fluid. Similarly, feculent and purulent fluid was drained from 10 (16.66%) patients each. Gastro bilious fluid and urine was drained from 03 (5%) patients each. In first 24 hours, the drain output of the patients had a wide range from 500 to 3000ml. By day 2nd, out of 60 patients, 24 (40%) patients had expired. Among the survivors, drain output varied from 300 to 2000ml in next 24 hours. From amongst the 36 survivors, 22 (patients had drain output less than 500ml and only 4 patients had drain output more than 1500ml in 24 hours. On day 3rd, 6 more patients expired, thus number of patients expired till 72 hours was 30 (50%). In 26 survived patients, drain output varied from 100ml to 1000 ml in next 24 hours, only 4 patients had drain output more than 1000ml in next 24 hours (Table 6).

Table 6: Distribution of patients according to amount of fluid drained (n=60).

Drain output (ml/day)	Number of patients Day 1 (%)	Number of patients Day 2 (%)	Number of patients Day 3 (%)
Less than 500ml	6 (10)	22 (36.67)	14 (23.33)
500-1000ml	14 (23.33)	4 (6.67)	12 (26.66)
1000-1500ml	22 (36.67)	6 (10)	4 (6.67)
More than 1500ml	18 (30)	4 (6.67)	0 (0)

We observed that 40 patients (66.67%) expired, 39 after PPD and 01 after definitive procedure. From amongst the 21 (35%) patients who survived after standard resuscitative protocols beyond 72 hours; 08 continued on tube/corrugated drain only for varying period, maximum for 19 days when the drain was removed and patient discharged satisfactorily. Rest 13 patients were subjected to laparotomy and definitive procedures. One patient of large gastric perforation died of ARDS and MODS after definitive surgery (Table 7 and 8). Peritoneal fluid

drained from all the patients sent for culture and sensitivity revealed *E. coli* in 26 (46.7%); *Klebsiella* in 04, mixed growth in 20 and no growth in 10 patients. Maximum sensitivity was shown to cefoperazone-sulbactam, piperacillin-tazobactam and amikacin.

Table 7: Parameters of the survivors after definitive surgery (n=12).

Age/ Sex	Cause of peritonitis	Procedure	Day of procedure after PPD	Outcome
63/M	UB perforation after TUR(P)	Laparotomy with closure	5th	D/C on 10th POD
42/F	Partial Ureteric tear following URS	End to end anastomosis over DJ-stent	11th	D/C on 10th POD
35/M	DUP	Lap with closure	7th	D/c 10th POD
43/M	Do	Do	7th	Do
37/F	Do	Do	6th	Do
35/M	Do	Lap with closure with feeding jejunostomy	7th	D/C on 17th POD
62/M	DUP	Do	5th	D/C 10th POD
50/M	DUP	Lap with closure	5th	Do
45/M	Liver abscess ruptured	Laparotomy with drainage of abscess cavity	6th	D/C on 14th POD
42/M	Infected ruptured hydatid cyst liver	Do	6th	D/C on 15th POD
48/M	Sigmoid Perforation	Laparotomy with colostomy	5th	10th POD
65/M	Large gastric perforation	Laparotomy with closure of perforation with feeding jejunostomy	6th	ARDS/MODS and Died on 17th POD

Out of 20 survivors, after definitive surgery (n=12) and PPD (n=08), majority was <45 years of age (n=15) and males (n=16). Majority of them were having low ASA, combined and MPI scores (n=18). Among non- survivors, 30 patients were having ASA score of 5; 32 having combined score of 8 or more. Furthermore, 36 patients were having MPI score of more than 28.

Table 8: Parameters of the survivors after PPD (n=08).

Age/ Sex	Cause of peritonitis as per draining fluid	Day of stoppage of drain
63/M	Urinary (Urine)	14th
42/F	DUP (bilious Fluid)	15th
35/M	Do (bilious fluid)	Do
43/M	Do (bilious fluid)	Do
37/F	Do (bilious fluid)	Do
35/M	Do (bilious Fluid)	14th
45/M	Do (bilious fluid)	14th
42/M	Gastric (gastro bilious fluid)	16th

Post laparotomy/PPD patients were followed up for 3 month, during which 4 patient developed features of sub-acute intestinal obstruction and were managed conservatively. 01 patient had large pelvic abscess that was drained after laparotomy.

Figure 1: Incision in flank.

Figure 2: Corrugated drain being placed intra-peritoneal.

Figure 3: PPD with tube drain.

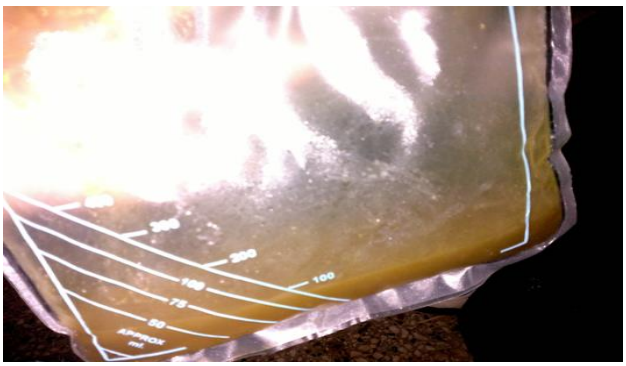

Figure 4: Contents in bag.

DISCUSSION

In abdominal sepsis including peritonitis, surgery is the gold standard treatment.[14] The principles of managing peritonitis like elimination of septic focus and removal of necrotic tissue have not changed till today. But desire of achieving this goal with a single operation, is not always possible.[15] In 1909 Notzel conceptualized peritoneal lavage and adequate intervention known as "source control" but mortality rate remained up to 60-90%.[16] Kirschner in 1926 presented an impressive study of 5468 patients and introduced basic principles of surgery in intra-abdominal infections: (i) elimination of the septic foci, (ii) removal of necrotic tissue, and (iii) drainage of purulent material that brought mortality to 50%. Better antibiotics further reduced to 30% during early 1970s.[17] Similarly, Taylor in 1956-57 proposed conservative treatment that was further explained by observations of Donovan et al advocating that phenomenon of self-healing was efficient in 50% cases.[6,7,10] Primary peritoneal drainage as a modality of treatment depended on same concept of self-healing and expected recovery in patient's status if sepsis causing peritoneal collection is drained away. The role of primary peritoneal drainage in early and premature neonates with NEC has been well established by various studies.[18-21] PPD role in adults especially critically ill patients, in whom anesthesia was detrimental, was proposed and surgeons started evaluating it only recently, Saber A et al and Baloch et al has provided one of pioneering work in this regard.[22,23]

In the present study (n=60), average age of patients was 53.43 years (20-80 years) with M:F ratio of 7:3. This is almost consistent with other series in the literature.[23-25] 36 patients (60%) presented with ASA score of 5, 48 patients (80%) had combined score of 8 and 28 patients (47%) had MPI score of >25. This is much more than what Saber A et al reported that 8 (33%) but almost consistent with study of Baloch et al.[22,23] All the patients in the study had history of delayed presentation ranging from 3-10 days. This is in sharp contrast to the other available series in the literature which reported early presentations of these patients to the hospital.[22,24,25] The mortality was higher in delayed presentations. Delayed presentation remained a major decisive factor in this study.

In present study group, all the patients (100%) had features of shock i.e. tachycardia and hypotension at presentation. Similarly, Bucher P et al reported 23% patients with shock, whereas; in Saber A et al series 66.67% patients presented with shock.[22,26] Furthermore, 40 (66.67%) patients had single co-morbidity and 20 (33.33%) patients had multiple co-morbidity. This parameter is too in sharp contrast to other studies in the literature, that have reported comparatively less co morbid conditions.[22-24,26] Thus it is observed that presence of co-morbidity further worsens the outcome of patient as they seem to be unfit for immediate surgical intervention. Among the included patients, all the patients had raised serum urea levels while 66.66% patients (n=40) had deranged serum creatinine ranged from 1.2 to 5.7mg/dl. These parameters are also in sharp contrast to others who have reported lass number of patients with deranged RFT's.[22,26]

As final outcome of present study, it was observed that 66.6% patients (n=40) expired after primary peritoneal drainage or definitive procedure, and only 20 patients survived. Nusree R reported no mortality, Jhobta RS et al in their study reported (10%) overall mortality, similarly Pascal et al reported 30% mortality in their group.[24,25,27] Furthermore, Saber A et al reported overall mortality of 20.8%.[22] This disparity with high mortality in our study could be attributed to following factors:

Delay in presentation and seeking medical consultation owing to difficult hilly terrains not supported by the hospital, leading to sepsis and severe shock at presentation.

Improper health education, treatment from quacks or self-medications leading to delayed presentations to the higher medical centers.

Lack of complete support system and equipments like ICU and dialysis requirements in such patients, as major co-morbidities associated with the high mortality was chronic obstructive pulmonary disease and acute renal failure.

Post laparotomy we followed our patients for up for 3 month, during which 2 patients developed features of sub-acute intestinal obstruction but were managed conservatively, in 02 patients of PPD only, laparotomy was required for residual abdominal abscesses. Patient made uneventful recovery with no reported complication in next 3 months. Similar findings have been reported in other series also.[13,22,28]

CONCLUSION

Peritonitis, one of the commonest surgical emergency world over causing great physical morbidity also socio-economic losses. Exploratory laparotomy and peritoneal lavage has been gold standard of management in generalized peritonitis. Severity of associated sepsis and unrelated co-morbidities combined with delay in treatment contribute to preclude surgical management and patient pursues a deteriorating course. In present study it is observed that although PPD in NEC of infants may be an established procedure yet in adults it do not meet similar fate. Though it was applicable in young neonates and to some extent in young adults with lower grades of peritonitis as described by Taylor, Pascal, Aly Saber and others. Its role in critically ill patients was under debate. The present study tried to place evidence based answers to some of the unanswered questions. The mortality rate in present study is exceptionally high but that can be attributed to high ASA score, delayed treatment, state of irreversible shock and old age in most patients. This parity may be reduced by better technical support, early reporting of patients to tertiary care center and provision of better inter departmental co-operation especially between surgery, radiology, I.C.U care facilities and medicine. Though the procedure did not prove comparable to standard surgical intervention as definite procedure but it did prove to be an effective modality of resuscitation and patient stabilization. Overall the procedure is a low-cost intervention and provide cheaper alternative to sustain and improvise the status of patient with a possibility of widespread applicability in low resource situations.

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REFERENCES

1. Bali RS, Verma S, Agarwal PN, Singh R, Talwar N. Perforation peritonitis and the developing world. ISRN Surg. 2014;2014:105492.
2. Ramakrishnan K, Salinas RC. Peptic ulcer disease. Am Fam Phys. 2007;1(7697):1005-12.
3. Dorairajan LN, Gupta S, Deo SVS, Chumber S, Sharma L. Peritonitis in India-A decades experience. Trop Gastroenterol. 1995;16(1):33-8.
4. Sharma L, Gupta S, Soin AS, Sikora S, Kapoor V. Generalized peritonitis in India. The Tropical Spectrum. Japan J Surg. 1991;21(3):272-7.
5. Ahmad MM, Wani M, Dar HM, Thakur SA, Wani HA, Mir IN. Spectrum of perforation peritonitis in Kashmir: a prospective study at our tertiary care centre. Int Surg J. 2015;2(3):381-4.
6. Taylor H. The non-surgical treatment of perforated peptic ulcer. Gastroenterology. 1957;33:353-68.
7. Donovan A, Berne T, Donovan J. Perforated duodenal ulcer: an alternative therapeutic plan. Arch Surg. 1998;133:1166-71.
8. Nusree R. Conservative management of perforated peptic ulcer. Thai J Surg. 2005;26:5-8.
9. Sedov VM, Izbasarov RZH, Strizheletskiĭ VV, Rutenburg GM, Luchkin AN. Programmed sanation laparoscopy in treatment of peritonitis. Vestnik Khirurgii Imeni I. I. Grekova. 2008;167(1):88-91.
10. Taylor H. Perforated acute and chronic peptic ulcer; conservative treatment. Lancet. 1956;270:397-9.
11. Leppäniemi AK. Laparostomy: why and when? Leppäniemi Crit Care. 2010;14:216.
12. Ein SH, Marshall DG, Gervan D. Peritoneal drainage under local anesthesia for perforations from necrotizing enterocolitis. J Pediatr Surg. 1977;12:963-7.
13. Rahman MM, Al Mamun A, Hossain MD, Das MK. Peptic ulcer perforation: management of high risk cases by percutaneous abdominal drainage. Trop Doct. 2005;35:1-30.
14. Boermeester MA. Surgical approaches to peritonitis. Br J Surg. 2007;94:1317-8.
15. Robledo FA, Luque-de-León E, Suárez R, Sánchez P, de-la-Fuente M, Vargas A, et al. Open versus closed management of the abdomen in the surgical treatment of severe secondary peritonitis: a randomized clinical trial. Surg Infect (Larchmt). 2007;8:63-72.
16. Noetzel W. The operative treatment of diffuse purulent peritonitis. Negotiations of the German Society of Surgeons. 1908;34:638-707.
17. Kirchner M. Treatment of acute purulent free abdominal arthritis. Langenb Arch Chir. 1926;142:53-267.
18. Ein SH, Marshall DG, Gervan D. Peritoneal drainage under local anesthesia for perforations from necrotizing enterocolitis. J Pediatr Surg. 1977;12:963-7.
19. Moss RL, Dimmitt RA, Henry MCW, Geraghty N, Efron B. A Meta-Analysis of Peritoneal Drainage versus Laparotomy for Perforated Necrotizing Enterocolitis. J Pediatr Surg. 2001;36(8):1210-3.
20. Moss RL, Dimmitt RA, Barnhart DC, Sylvester KG, Brown RL, Powell DM, et al. Laparotomy versus peritoneal drainage for necrotizing enter colitis and perforation. N Engl J Med. 2006;355(8):856.
21. Zenciroğlu A, Çakmak Ö, Demirel N, Baş AY, Yılmaz D, Karaman I, et al. Outcome of primary peritoneal drainage for perforated necrotizing

enterocolitis: comparison between laparotomy and drainage. Eur J Pediatr Surg. 2005;15(04):243-7.
22. Saber A, Gad MA, Ellabban GM. Perforated duodenal ulcer in high risk patients: is percutaneous drainage justified? North Am J Med Sci. 2012;4(1):132-5.
23. Baloch I, Shaikh A, Shaikh SF. Pre-operative peritoneal drainage as a part of resuscitation in severe peritonitis. J Pak Med Assoc. 2013;63(7):919-20.
24. Jhobta RS, Attri AK, Kaushik R, Sharma R, Jhobta A. Spectrum of perforation peritonitis in India-review of 504 consecutive cases. World J Emerg Surg. 2006;1:26.
25. Bucher P, Oulhaci W, Morel P, Ris F, Huber O. Results of conservative treatment for perforated gastroduodenal ulcer in patients not eligible for surgical repair. Swiss Med Wkly. 2007;137:337-40.
26. Singh R, Kumar N, Bhattacharya A, Vajifdar H. Preoperative predictors of mortality in adult patients with perforation peritonitis. Indian J Crit Care Med. 2011;15(3):157-63.
27. Nusree R. Conservative management of perforated peptic ulcer. Thai J Surg. 2005;26:5-8.
28. Hanumanthappa MB, Gopinathan S, Rai GD, Dsouza N. A non-operative treatment of perforated peptic ulcer: a prospective study with 50 cases. J Clin Diagn Res. 2012;6(4):696-9.

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