

Diagnostic validity of peptic ulcer perforation scoring system in predicting mortality in patients with perforated peptic ulcer at a tertiary care hospital in India



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ABSTRACT

Background: One of the prevalent ailments impacting the population of India is peptic ulcer. Although generally benign in its course, it can cause dangerous complications such as perforation and bleeding. Perforation is a life-threatening complication of the peptic ulcer. The status of patients may suddenly deteriorate if they wait too long to seek hospital care or if a diagnosis is delayed due to an unusual presentation. For triage and risk classification, it is critical to accurately and promptly identify high-risk surgical perforated peptic ulcer patients. **Aims and Objectives:** Perforations in peptic ulcer disease are known to cause considerable morbidity and mortality. The objective of this study was to verify the reliability of the peptic ulcer perforation (PULP) score in predicting patient death after surgery for PULP. **Materials and Methods:** This was a retrospective cross-sectional study included 50 PULP patients who underwent surgery and analyzed the data until discharge or death at tertiary care university hospital in India. **Results:** The mortality rate observed was 24%. Elderly population, raised serum creatinine, liver cirrhosis, steroid abuse, pre-operative shock, and American Society of Anesthesiologists (ASAs) grade were identified as risk factors for poor post-operative prognosis. The area under curve for mortality prediction was 0.947 for PULP score. **Conclusion:** Poor outcome was significantly higher in the elderly, patients with raised serum creatinine, pre-operative shock, and ASA. PULP score proved to be a more precise indicator of mortality. A larger study inclusive of other mortality risk prediction models would help formulate a more accurate and population specific scoring system.

Key words: Perforated peptic ulcer; Peptic ulcer perforation scoring system; Risk factors; Mortality

INTRODUCTION

Peptic ulcer disease is linked to potentially fatal consequences such as blood loss, perforation, and obstruction. Perforation occurs most commonly after bleeding and is the second most common complication.¹ There have been numerous reports on prognostic variables for mortality and morbidity after peptic ulcer perforation (PULP).²⁻⁶ However, none of the scoring methods proved superior to the others. The Boey score, which is used to forecast mortality based on pre-operative shock, presence of significant medical

illness, and perforation lasting longer than 24 h, is the most well-known prediction rule in patients with perforated peptic ulcer (PPU).⁷ Seventy percentages of peptic ulcer patients die due to perforation, and the mortality rate of PULP is 10 times higher than that of other acute abdominal disorders, including acute cholecystitis and acute appendicitis. To predict mortality among patients undergoing surgery for PULP, Møller et al., were the first to develop a PULP scoring system.⁷⁻⁹ The purpose of this study was to verify the reliability of the PULP score in predicting patient death after surgery for PULP.

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Aims and objectives

Perforations in peptic ulcer disease are known to cause considerable morbidity and mortality. The objective of this study was to verify the reliability of the PULP score in predicting patient death after surgery for PULP. The goal of this study was to assess patient mortality after PPU surgery.

MATERIALS AND METHODS

This retrospective cross-sectional study included 50 PULP patients who underwent surgery and analyzed the data until discharge or death. Patients who did not undergo surgery or who had insufficient medical information were excluded from the study. Data were gathered in a consecutive manner. Utilizing ROC analysis, the “cutoff” PULP score value was evaluated. This score is defined by eight factors and includes age >65 (score 3), AIDS or active malignancy (score 1), steroid drug use (score 1), liver cirrhosis (score 2), serum creatinine level >1.47 mg/dl (score 2), pre-operative shock (score 1), the time between perforation and hospital arrival of >24 h (score 1), and four levels of American Society of Anesthesiologists (ASA) scores (2–5) (Table 1).

RESULTS

In the present study, out of 50 (100%) PULP patients, majority of them (n=41, 82%) were in the age group <65 years and remaining 9 (18%) of the patients were >65 years. Male predominant was observed in the study, that is, among 50 PULP patients about 42 (84%) of the patients were male and 8 (16%) were female. The duration of symptoms for majority of the patients were more than 1 day (n=30, 60%) and about 20 (40%) of the patients had symptoms <1 day. There were 8 (16%) patients with the diagnosis of active malignancy of AIDS, about 2 (4%) patients with liver cirrhosis, 5 (10%) patients with steroid abuse, and 21 (42%) patients with preoperative shock. About 25 (50%) of the PULP patients had serum creatinine levels >1.47 mg/dL and ASA grade of 3 was present in 36 (72%) patients and ASA grade 4 was present in 14 (28%) of the patients. The PULP score between 1 and 6 was there in 34 (68%) of the patients and about 16 (32%) patients had PULP score between 7 and 18. The study had witnessed 12 (24%) mortality (Table 2).

The PULP score's ability to predict mortality in operated patients with PULP was very good, as evidenced by an ROC area value >0.8, which was equal to 0.94, according to the results of the ROC curve (Figure 1). The best “cutoff” value was determined to be ≥ 7 , which signifies a high mortality risk. There is also a report on the specificity and sensitivity of each “cutoff” value. In this research, the sensitivity and specificity from that “cutoff” value are 100% and 89.5%,

respectively. Of the total 50 participating patients in this study, 16 had ≥ 7 PULP scores, while in 34 patients the score was <7. The PULP score's validity as per the gold standard examination had 100% sensitivity, 89.5% specificity, 75% positive predictive value, 100% negative predictive value, and 92% accuracy for predicting mortality in patients who had undergone surgery for PULP (Table 3).

DISCUSSION

PULP is a surgical emergency that needs immediate intervention. It causes various complications and can cause even death if left untreated. Although several risk factor

Table 1: Assignment of points according to the peptic ulcer perforation

Variables	Points
Age >65 years	3
COMorbid active malignant disease or AIDS	1
COMorbid liver cirrhosis	2
Concomitant use of steroids	1
Shock on admission*	1
Time from perforation to admission >24 h	1
Serum creatinine >130 μ mol/l	2
ASA score 2	1
ASA score 3	3
ASA score 4	5
ASA score 5	7
Total PULP score	0–18

*Shock on admission is defined as blood pressure <100 mmHg and heart rate >100 beats per min. PULP: Peptic ulcer perforation, ASA: American Society of Anesthesiologists

Table 2: Characteristics of the participants and research variables

Variables	Categories	Frequency, n (%)
Age (years)	<65	41 (82)
	>65	9 (18)
Gender	Male	42 (84)
	Female	8 (16)
Duration of symptoms (day)	<1	20 (40)
	>1	30 (60)
Active malignancy/	Yes	8 (16)
AIDS	No	42 (84)
Liver cirrhosis	Yes	2 (4)
	No	48 (96)
Steroid abuse	Yes	5 (10)
	No	45 (90)
Pre-operative shock	Yes	21 (42)
	No	29 (58)
Serum creatinine >1.47 mg/dL	Yes	25 (50)
	No	25 (50)
ASA grade	3	36 (72)
	4	14 (28)
PULP score	1–6	34 (68)
	7–18	16 (32)
Mortality	Yes	12 (24)
	No	38 (76)

PULP: Peptic ulcer perforation, ASA: American Society of Anesthesiologists

assessment scores have been used, it is our opinion that the PULP score is a very good predictor of morbidity and mortality in these situations. In patients with PUD, the lifetime perforation prevalence is only approximately 5%.¹⁰ Mortality from PPU can range between 1.3% and 20%.^{7,11,12} Approximately 30% of the post-operative complications have been documented.^{13,14} Pneumonia, surgical site infection, abscess/intra-abdominal collection, enterocutaneous fistula, wound dehiscence, peritonitis, ileus, and incisional hernia are complications that can occur after surgical closure of PPU. According to one study, pneumonia (28%) and surgical site infections (48%) were the most frequent post-operative complications.¹⁴ The prevalence of mortality in our study population (24%) was less as compared to that noted in the previous studies on Western populations,^{3,9} but higher than studies in other Southeast Asian populations.^{15,16} This may be due to the advanced age of patients presenting with PPU in Western studies (mean age ~70 years) compared to Asian studies (mean age ~50 years). The elderly, besides suffering from additional

pre-operative illnesses such as hypertension and diabetes, have poor physiological reserves to deal with post-operative complications and hence are more prone to fatality.

Male predominance was observed in PPU patients similar to two other studies.^{15,16} Another Indian study comprising 50 PPU patients noted a very high male-to-female ratio (11.5:1) and attributed it to the habits of smoking and alcohol consumption in young men.¹⁷ The present study did not elicit the habits of smoking and alcohol consumption in our patient population. We recorded PPU more commonly in age groups <65 years. Analogous to our data, an Indian study noted a lower mean patient age (38.1 years).¹⁷ The odds of death were 1.91 times more if the age of patient was more than 60 years, which confirms the findings that the elderly suffer from more debilitating morbidity and mortality.^{9,18}

As per the findings of Unver et al., the duration of symptoms does not exhibit any significant outcomes for mortality and morbidity in this trial, where patients with pain onset more than 24 h before the patient reached the hospital only 30% died.¹⁹ This is contradictory to evidence from multiple studies, which found that the length of symptoms had a substantial impact on mortality and morbidity.²⁰⁻²⁵

In contrast, we discovered two patients in this study who had comorbid cirrhosis of the hepatic disease, and both of whom died postoperatively. Møller et al., did not specifically address how liver cirrhosis affects post-operative mortality in their investigation.⁹ Periodic steroid use is included as one of the factors that contribute to mortality in PULP scores; however, the findings of this research were different. Two of the five were confirmed to be taking steroids and passed away. In addition, ten of the 45 patients who did not use steroids died, which is comparable with other studies.^{22,25} In contradiction to numerous research studies that support the steroid's role as steroid user groups had a high mortality rate.^{4,6,20,26} As per the PULP score and Boey score, the incidence of shock when patients come is considered very influential in predicting death.^{7,9} Similar to what was observed in this research, about 60% of patients with shock passed away postoperatively. In addition, Chandra and Kumar's study also supports this.²³

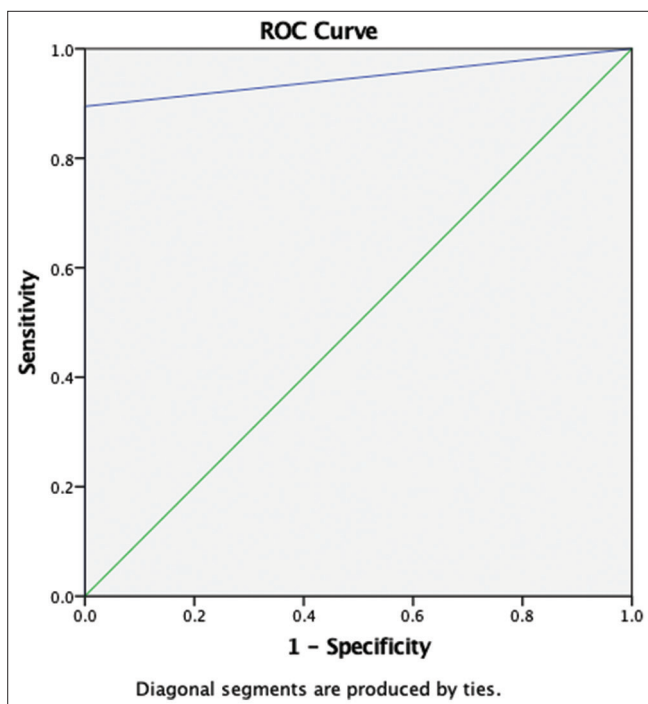


Figure 1: ROC of PULP score ability to predict the mortality outcomes of patients with operated perforated peptic ulcer post-operative. AUC=0.947

Table 3: The results analysis of the PULP score validation using the best “cutoff” value to predict the mortality of patients with operated peptic ulcer perforation

PULP score	Mortality		Sensitivity	Specificity	PPV	NPV	Accuracy
	Yes	No					
High risk (≥7)	12	4	100	89.5	75	100	92
Low risk (<7)	0	34					

PULP: Peptic ulcer perforation, PPV: Positive predictive value, NPV: Negative predictive value

One of the independent factors in this PULP score is the hepatic cirrhosis prevalence, which has a value of 2. This disparity is also impacted by the insufficient post-operative care provided to patients suffering PULP s at the research site, which raises mortality in patients.

In this instance, the PULP score was utilized both as the foundation for patient and family education and the initial screening of patients before therapy. The researcher found that the PULP score had a high sensitivity, which was 100%. In addition, the accuracy of the PULP score in this study was 92% in comparison to the Boey score's accuracy of only 48%.

The rates of long-term steroid were lower (10%) in the present study compared to a study by Møller et al., (13%) but higher than those noted by Anbalakan et al., (0.3% and 1.8%).^{9,16} The proportion of PPU patients presenting with pre-operative shock in our study was higher than that observed by two previous studies.^{9,18} Møller et al., listed AIDS/active malignancy as one of the factors that influence mortality; in this study, four of the eight patients suffering from active malignancy died postoperatively. However, more samples are needed to assess the impact of AIDS and active malignancy on post-operative deaths.⁹ The impact of AIDS or active malignancy on mortality was also mentioned in numerous research studies.^{21,27}

One of the factors most strongly influencing mortality in PULP score is a rise in serum creatinine.^{9,10,28,29} Similar findings were discovered in this investigation, wherein 25 patients with more than 1.47 mg/dl serum creatinine levels resulted in 11 deaths. In comparison, out of 25 patients with levels of serum creatinine below that, only one patient passed away. As per Møller et al., one of the factors that influence mortality is the ASA score.⁹ Similar findings were seen in this research, where the mortality risk increased with greater ASA scores. Similar to other investigations, nine among 14 patients died who had a 4 ASA score, and three among 36 patients died with a 3 ASA score.^{8,19,21,22,28,30}

As a measure for the initial screening of patients with PULP who will undergo surgery regarding post-operative death risk, the PULP score was first proposed by Møller et al.⁹ In addition to the Boey score, which has already received widespread recognition, this score was designed exclusively for PULP patients. The Boey score was used in some studies to assess the mortality risk among patients. However, this score was associated with false-positive prediction reaching 50% and performed less than other available scores. This could be explained due to the lack of prognostic factors on the Boey score.⁹ With more specific criteria, the PULP scoring system is anticipated to be more

reliable for predicting death after surgery. Since just simple examinations as well as laboratory testing are required, the PULP score's use is quite simple and involves no complex investigation. Although ASA score is the easiest to calculate, it was not designed for PPU studies. Prior studies have concluded that ASA physical status is an objective scoring system having interobserver variability and hence prone to observer bias.^{9,31} If the acute state of the patient is not taken into consideration, it may affect the outcome in terms of mortality.³² Boey scoring system includes only three parameters: comorbidity, pre-operative shock, and time from onset of abdominal pain. Therefore, it is simpler for clinical application.¹⁸

Variations in patient demographic profiles and study inclusion criteria may bias comparison of the AUC values between different studies. Therefore, it is preferable to compare ROC curve analysis and AUC values of studies carried out in similar group of patients.³³ The PPU scoring systems found in the literature were validated at different times in different countries on different populations with varied ages. Hence, further validation is recommended before any particular scoring system can be applied to any one population.³³ The PULP score's best "cutoff" value in this study was ≥ 7 for predicting post-operative mortality (AUC 0.94). A sorting risk factor is very helpful in patient stratification as well as early identification. This scoring system can be used to more effectively and efficiently improve the efficacy of therapy, early resuscitation of problems, aggressive surgical care, provision of more adequate perioperative services, and especially the provision of education and information to the family. A PULP score of ≥ 7 was also found to be associated with higher mortality rates with a mortality risk of 25% and above in other studies also.^{9,34-36}

Limitations of the study

This study has several limitations. This was a single-center study catering to a single demographic outlet. The sample size was small. Long-term follows up was not done. With the above considerations, the present study requires further validation on a larger population to derive any conclusive results.

CONCLUSION

According to the validity test, the optimal "cutoff" value for the PULP score on an operated PPU patient to predict post-operative death is ≥ 7 , with 100% sensitivity scores, 89.5% specificity, 75% positive predictive value, and 100% negative predictive value, and 92% accuracy. This score can be utilized as a screening tool to forecast post-operative mortality in patients who underwent an operation for PPU due to its considerably well sensitivity.

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REFERENCES

- Milosavljevic T, Kostic-Milosavljevic M, Jovanovic I and Krstic M Complications of peptic ulcer disease. *Dig Dis*. 2011;29(5):491-493.
<https://doi.org/10.1159/000331517>
- Thomsen RW, Riis A, Christensen S, Norgaard M and Sorensen HT. Diabetes and 30-day mortality from peptic ulcer bleeding and perforation: A Danish population-based cohort study. *Diabetes Care*. 2006;29(4):805-810.
<https://doi.org/10.2337/diacare.29.04.06.dc05-1748>
- Moller MH, Shah K, Bendix J, Jensen AG, Zimmermann-Nielsen E, Adamsen S, et al. Risk factors in patients surgically treated for peptic ulcer perforation. *Scand J Gastroenterol*. 2009;44(2):145-152, 2 p following 152.
<https://doi.org/10.1080/00365520802401261>
- Thomsen RW, Riis A, Munk EM, Nørgaard M, Christensen S and Sørensen HT. 30-day mortality after peptic ulcer perforation among users of newer selective COX-2 inhibitors and traditional NSAIDs: A population-based study. *Am J Gastroenterol*. 2006;101(12):2704-2710.
<https://doi.org/10.1111/j.1572-0241.2006.00825.x>
- Blomgren LG. Perforated peptic ulcer: Long-term results after simple closure in the elderly. *World J Surg*. 1997;21(4):412-414; discussion 414-415.
<https://doi.org/10.1007/pl00012263>
- Christensen S, Riis A, Nørgaard M, Thomsen RW, Tønnesen EM, Larsson A, et al. Perforated peptic ulcer: Use of pre-admission oral glucocorticoids and 30-day mortality. *Aliment Pharmacol Ther*. 2006;23(1):45-52.
<https://doi.org/10.1111/j.1365-2036.2006.02722.x>
- Boey J, Choi SK, Poon A and Alagaratnam TT. Risk stratification in perforated duodenal ulcers. A prospective validation of predictive factors. *Ann Surg*. 1987;205(1):22-26.
<https://doi.org/10.1097/0000658-198701000-00005>
- Søreide K, Thorsen K and Søreide JA. Strategies to improve the outcome of emergency surgery for perforated peptic ulcer. *Br J Surg*. 2014;101(1):e51-e64.
<https://doi.org/10.1002/bjs.9368>
- Møller MH, Egebjerg MC, Adamsen S, Bendix J and Thomsen RW. The Peptic Ulcer Perforation (PULP) score: A predictor of mortality following peptic ulcer perforation. A cohort study. *Acta Anaesthesiol Scand*. 2012;56(5):655-662.
<https://doi.org/10.1111/j.1399-6576.2011.02609.x>
- Singh R, Kumar N, Bhattacharya A and Vajifdar H. Preoperative predictors of mortality in adult patients with perforation peritonitis. *Indian J Crit Care Med*. 2011;15(3):157-163.
<https://doi.org/10.4103/0972-5229.84897>
- Hermansson M, von Holstein CS and Zilling T. Surgical approach and prognostic factors after peptic ulcer perforation. *Eur J Surg*. 1999;165(6):566-572.
<https://doi.org/10.1080/110241599750006479>
- Rajesh V, Chandra SS and Smile SR. Risk factors predicting operative mortality in perforated peptic ulcer disease. *Trop Gastroenterol*. 2003;24(3):148-150.
- Chalya PL, Mabula JB, Koy M, McHembe MD, Jaka HM, Kabangila R, et al. Clinical profile and outcome of surgical treatment of perforated peptic ulcers in Northwestern Tanzania: A tertiary hospital experience. *World J Emerg Surg*. 2011;6:31.
<https://doi.org/10.1186/1749-7922-6-31>
- Lee FY, Leung KL, Lai BS, Ng SS, Dexter S and Lau WY. Predicting mortality and morbidity of patients operated on for perforated peptic ulcers. *Arch Surg*. 2001;136(1):90-94.
<https://doi.org/10.1001/archsurg.136.1.90>
- Anbalakan K, Chua D, Pandya GJ and Shelat VG. Five year experience in management of perforated peptic ulcer and validation of common mortality risk prediction models-are existing models sufficient? A retrospective cohort study. *Int J Surg*. 2015;14:38-44.
<https://doi.org/10.1016/j.ijssu.2014.12.022>
- Nichakankitti N and Athigakunagorn J. The accuracy of prognostic scoring systems for post-operative morbidity and mortality in patients with perforated peptic ulcer. *Int Surg J*. 2016;3(1):286-290.
<https://doi.org/10.18203/2349-2902.isj20160244>
- Gulzar JS, Paruthy SB and Arya SV. Improving outcome in perforated peptic ulcer emergency surgery by Boey scoring. *Int Surg J*. 2016;3(4):2120-2128.
<https://doi.org/10.18203/2349-2902.isj20163585>
- Thorsen K, Doreide JA and Søreide K. What is the best predictor of mortality in perforated peptic ulcer disease? A population-based, multivariable regression analysis including three clinical scoring systems. *J Gastrointest Surg*. 2014;18(7):1261-1268.
<https://doi.org/10.1007/s11605-014-2485-5>
- Unver M, Firat Ö, Ünalp ÖV, Uğuz A, Gümüş T, Sezer TO, et al. Prognostic factors in peptic ulcer perforations: A retrospective 14-year study. *Surg Int*. 2015;100(5):942-948.
<https://doi.org/10.9738/intsurg-d-14-00187.1>
- Lau JY, Sung J, Hill C, Henderson C, Howden CW and Metz DC. Systematic review of the epidemiology of complicated peptic ulcer disease: Incidence, recurrence, risk factors and mortality. *Digestion*. 2011;84(2):102-113.
<https://doi.org/10.1159/000323958>
- Thorsen K, Glomsaker TB, Von Meer A, Søreide K and Søreide JA. Trends in diagnosis and surgical management of patients with perforated peptic ulcer. *J Gastrointest Surg*. 2011;15(8):1329-1335.
<https://doi.org/10.1007/s11605-011-1482-1>
- Kocer B, Sürmeli S, Solak C, Unal B, Bozkurt B, Yildirim O, et al. Factors affecting mortality and morbidity in patients with peptic ulcer perforation. *J Gastroenterol Hepatol*. 2007;22(4):565-570.
<https://doi.org/10.1111/j.1440-1746.2006.04500.x>
- Chandra SS and Kumar SS. Definitive or conservative surgery for perforated gastric ulcer?--An unresolved problem. *Int J Surg*. 2009;7(2):136-139.
<https://doi.org/10.1016/j.ijssu.2008.12.037>
- Bas G, Eryilmaz R, Okan I and Sahin M. Risk factors of morbidity and mortality in patients with perforated peptic ulcer. *Acta Chir Belg*. 2008;108(4):424-427.
<https://doi.org/10.1080/00015458.2008.11680254>
- Buck DL, Vester-Andersen M, Moller MH and Danish Clinical Register of Emergency Surgery. Surgical delay is a critical determinant of survival in perforated peptic ulcer. *Br J Surg*. 2013;100(8):1045-1049.
<https://doi.org/10.1002/bjs.9175>
- Li CH, Chang WH, Shih SC, Lin SC and Bair MJ. Perforated

- peptic ulcer in southeastern Taiwan. *J Gastroenterol Hepatol.* 2010;25(9):1530-1536.
<https://doi.org/10.1111/j.1440-1746.2010.06348.x>
27. Evans JP and Smith R. Predicting poor outcome in perforated peptic ulcer disease. *Aust N Z J Surg.* 1997;67(11):792-795.
<https://doi.org/10.1111/j.1445-2197.1997.tb04582.x>
 28. Cheng M, Li W and Cheung MT. Early outcome after emergency gastrectomy for complicated peptic ulcer disease. *Hong Kong Med J.* 2012;18(4):291-298.
 29. Khan PS, Dar LA and Hayat H. Predictors of mortality and morbidity in peritonitis in a developing country. *Ulus Cerrahi Derg.* 2013;29(3):124-130.
<https://doi.org/10.5152/UCD.2013.1955>
 30. Lohsiriwat V, Preventivate S and Lohsiriwat D. Perforated peptic ulcer: Clinical presentation, surgical outcomes, and the accuracy of the Boey scoring system in predicting postoperative morbidity and mortality. *World J Surg.* 2009;33(1):80-85.
<https://doi.org/10.1007/s00268-008-9796-1>
 31. Mak PH, Campbell RC, Irwin MG and American Society of Anesthesiologists. The ASA Physical Status Classification: Inter-observer consistency. *American Society of Anesthesiologists. Anaesth Intensive Care.* 2002;30(5):633-640.
<https://doi.org/10.1177/0310057X0203000516>
 32. Aronson WL, McAuliffe MS and Miller K. Variability in the American Society of Anesthesiologists physical status classification scale. *AANA J.* 2003;71(4):265-274.
 33. Thorsen K, Soreide JA and Soreide K. Scoring systems for outcome prediction in patients with perforated peptic ulcer. *Scand J Trauma Resusc Emerg Med.* 2013;21:25.
<https://doi.org/10.1186/1757-7241-21-25>
 34. Møller MH, Vester-Andersen M and Thomsen RW. Long-term mortality following peptic ulcer perforation in the PULP trial. A nationwide follow-up study. *Scand J Gastroenterol.* 2013;48(2):168-175.
<https://doi.org/10.3109/00365521.2012.746393>
 35. Mishra A, Sharma D and Raina VK. A simplified prognostic scoring system for peptic ulcer perforation in developing countries. *Indian J Gastroenterol.* 2003;22(2):49-53.
 36. Møller MH, Adamsen S, Wøjdemann M and Møller AM. Perforated peptic ulcer: How to improve outcome? *Scand J Gastroenterol.* 2009;44(1):15-22.
<https://doi.org/10.1080/00365520802307997>

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MBS- Definition of intellectual content, literature survey, implementation of study protocol, manuscript revision; **M-** Concept, design, clinical protocol, manuscript preparation and manuscript review; **VKD-** Design of study, literature survey, data collection, data analysis, statistical analysis and interpretation, manuscript preparation.

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