

## Original Research Article

# East Surgical Ward Enteric Perforation score: a new statistically valid scoring criteria for decision between repair or ileostomy in patients with peritonitis due to enteric perforation

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### ABSTRACT

**Background:** Enteric fever leading to enteric perforation is very common surgical emergency in the developing nations. The two surgical solutions used worldwide are to repair or exteriorize the perforation as ileostomy. The aim of the study was to setup and validate a statistically reliable scoring system for decision between repair and ileostomy in patients with peritonitis due to enteric perforation.

**Methods:** It was an observational cross-sectional study done at East Surgical Ward of Mayo Hospital, Lahore. 256 patients were selected by consecutive non-probability sampling after ethical approval. The duration of study was 2 years from 1st August to 2018 to 30th July 2020. Patients with age more than 13 years presented in emergency department with diagnosis of peritonitis due to enteric perforation were included. A preformed scoring criterion named as EAST Surgical Ward Enteric Perforation (ESWEP) Score was set by giving each variable a score of 1 to 3. Cut-off value between repair and ileostomy was observed.

**Results:** 142 (55.4%) patients were male and 114 (44.5%) were female. Male to female ratio was 1: 1.24. The average age of patients is about 37 years with SD of  $\pm 9.67$  years. ROC curve showed cut-off of pre-operative ESWEP score of 4 (sensitivity 78%, specificity of 88%), per operative score of 7 (sensitivity 96%, specificity of 85%) and total ESWEP score of 11 (sensitivity 94%, specificity of 88%).

**Conclusions:** ESWEP score is new score which helps in standardization of operative procedure done for the patients with peritonitis due to enteric perforation.

**Keywords:** Enteric, Ileostomy, Peritonitis, Repair, Score

## INTRODUCTION

Enteric fever also known as typhoid fever is caused by a gram-negative bacillus salmonella typhi and is transmitted to human by feco-oral route.<sup>1</sup> It has infected approximately 21.6 million people across the globe and expected mortality is about 200,000 people per year out of which 80% people belong to South Asian countries including Pakistan, India and Bangladesh.<sup>2</sup> Limited access to clean drinking water, poor social and economic status and huge

population are factors which makes enteric fever endemic in this area.<sup>3</sup>

Uncomplicated enteric fever is treated by antibiotics while if left untreated results in devastating complications like intestinal perforation and gastrointestinal bleeding. These complications usually occur during second to third week of disease and has the mortality of 10-20%.<sup>4</sup> Several surgical solutions have been applied in the treatment of enteric perforation which include primary repair of the perforation, simple repair of the perforation with proximal

diversion, resection of disease segment and end to end anastomosis of healthy gut, bypass the perforation as ileotransverse anastomosis and exteriorizing the perforation as loop ileostomy or resection of disease gut and exteriorizing as double barrel ileostomy.<sup>5,6</sup>

The decision between repair of enteric perforation and making stoma is always a question of confusion among surgeons.<sup>7</sup> On one hand many surgeons follow the general parameters which favor stoma formation for example huge peritoneal spillage, tachycardia, hypovolemia, oliguria and decreased oxygen saturation, while on other hand surgeons use the personal experience and level of expertise while taking this decision.<sup>8</sup> On one hand ileostomy affects the patient's quality of life and needs another operation of reversal of ileostomy sometime later while leakage of repair is also a disaster for patient and ultimately ileostomy is the answer.<sup>9</sup> In order to eliminate the confusion between repair and ileostomy in patients with peritonitis due to enteric perforation and to make a standard criterion across the globe, we devised and assessed the statistically validation of a new score named as ESWEP score.

**METHODS**

It was an observational cross-sectional study, done at East Surgical Ward of Mayo hospital Lahore which is the

teaching hospital of King Edward Medical University, Lahore, Pakistan.

Ethical approval was taken from Institutional Review Board of King Edward Medical University, Lahore, Pakistan. The duration of study was 2 years, from 1<sup>st</sup> August 2018 to 30<sup>th</sup> July 2020. 256 patients were selected in this study by consecutive non- probability sampling.

All patients of both genders with age more than 13 years, presented in the emergency department with the clinical diagnosis of enteric perforation were selected in this study. All other patients with peritonitis due to any other cause were excluded from the study. The pre-operative diagnosis of enteric perforation was made by taking detailed history in the background of negative history about cough and family history or close contact with tuberculosis carriers to eliminate the pre-operative diagnosis of tuberculous perforation. Diagnosis of perforation was made by observing free air under the right hemidiaphragm in the erect chest X-ray posteroanterior view. Consent of laparotomy was taken from all patients along with consent of ileostomy formation. Other routine blood tests like complete blood count, liver function tests, renal function tests, blood grouping and cross matching and screening for hepatitis B and C was done pre-operatively. The ESWEP score consisted of 2 parts (Figure 1).

PRE-OPERATIVE SCORE		
PARAMETERS	VALUE	SCORE
1. Age of the patient	More than 50 years	Score 1
2. Pre-operative vitals	Pulse > 100 beats/minute	Score 1
	MAP < 80 mmhg	Score 1
	RR > 30/ minute	Score 1
	Respiratory alkalosis/acidosis	Score 1
3. Laboratory investigations	Hb < 8 g/dl	Score 1
	TLC > 12 x 10 <sup>9</sup> / L	Score 1
	Serum Albumin < 3 g/dL	Score 1
	Serum Creatinine > 1 mg/dL	Score 1
4. Urine output	Less than 0.5ml/kg/hour	Score 1
5. Immunocompromised status	Diabetic	Score 1
	HIV/Hepatitis B/Hepatitis C	Score 1
	Cardiac disease	Score 1
6. Duration of Symptoms	More than 48 hours	Score 1

PER OPERATIVE SCORE		
PARAMETERS	VALUE	SCORE
1. Perforation size	More than 1 cm	Score 1
2. No of perforations	More than 1	Score 1
3. Peritoneal spillage	Less than 500 ml	Score 1
	500 to 1000 ml	Score 2
	More than 1000 ml	Score 3
4. Anesthesia duration	Less than 1 hour	Score 1
	More than 1 hour	Score 2
5. Per operative vitals	Pulse > 100beats/min	Score 1
	MAP < 80 mmhg	Score 1
6. Per operative urine output	Less than 0.5ml/kg/hour	Score 1
7. Condition of small gut	Inflamed/diseased	Score 1
8. Length of segment involved	More than half feet	Score 1

<b>Total Pre-operative score = 14</b>	<b>Total Per operative score = 12</b>
<b>Total ESWEP Score = 26</b>	<b>Procedure done =</b>

**Figure 1: ESWEP score.**

1<sup>st</sup> part consisted of pre-operative score which was assessed before operation. It consisted of 14 variables each consisting of 1 score. 2<sup>nd</sup> part consisted of per operative score which was consisted of operative findings. Per-operative score consisted of 8 variables with score of 12. Total score was sum of pre-operative and per operative scores. After getting the filled scoring proforma of all the 256 patients, the trend of pre and per operative scoring systems was assessed and a cut-off score was determined between repair and ileostomy.

Demographic profile like name age and sex were recorded. All the included patients were explained about the nature of research and written informed consent was obtained. All the information obtained will be collected through a designed performa. Data will be analysed using SPSS version 26.0. Qualitative statistics were determined as frequency and percentages. Quantitative correlations among variables were determined by application of Chi square test. Cut-off value was assessed by receiver operative characteristics (ROC) curves with highest sensitivity and specificity values. P value less than 0.05 was considered significant.

**RESULTS**

The age groups of patients included in this study is described in Table 1. The male to female ratio of patients is almost same that is 1: 1.24 which shows that male and females suffered almost equally by enteric perforation. The most common age group affected from peritonitis due

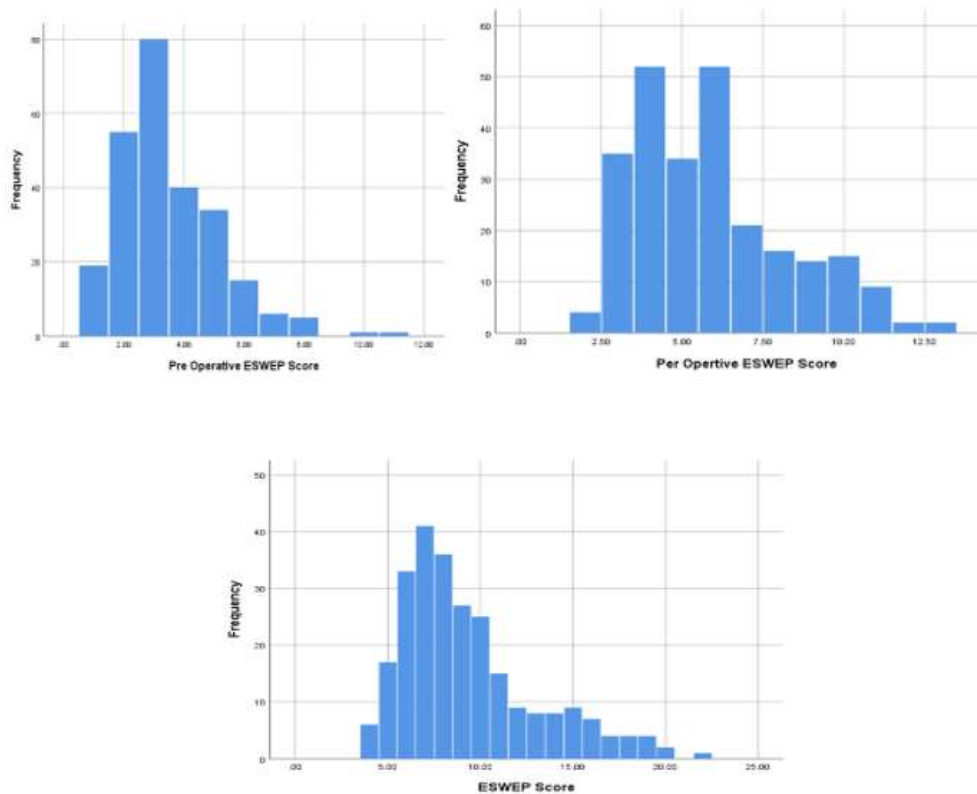
to enteric perforation is between 20 to 30 years of age. The average age of patients is about 37 years with SD of ±9 years.

**Table 1: Age distribution of patients included in this study.**

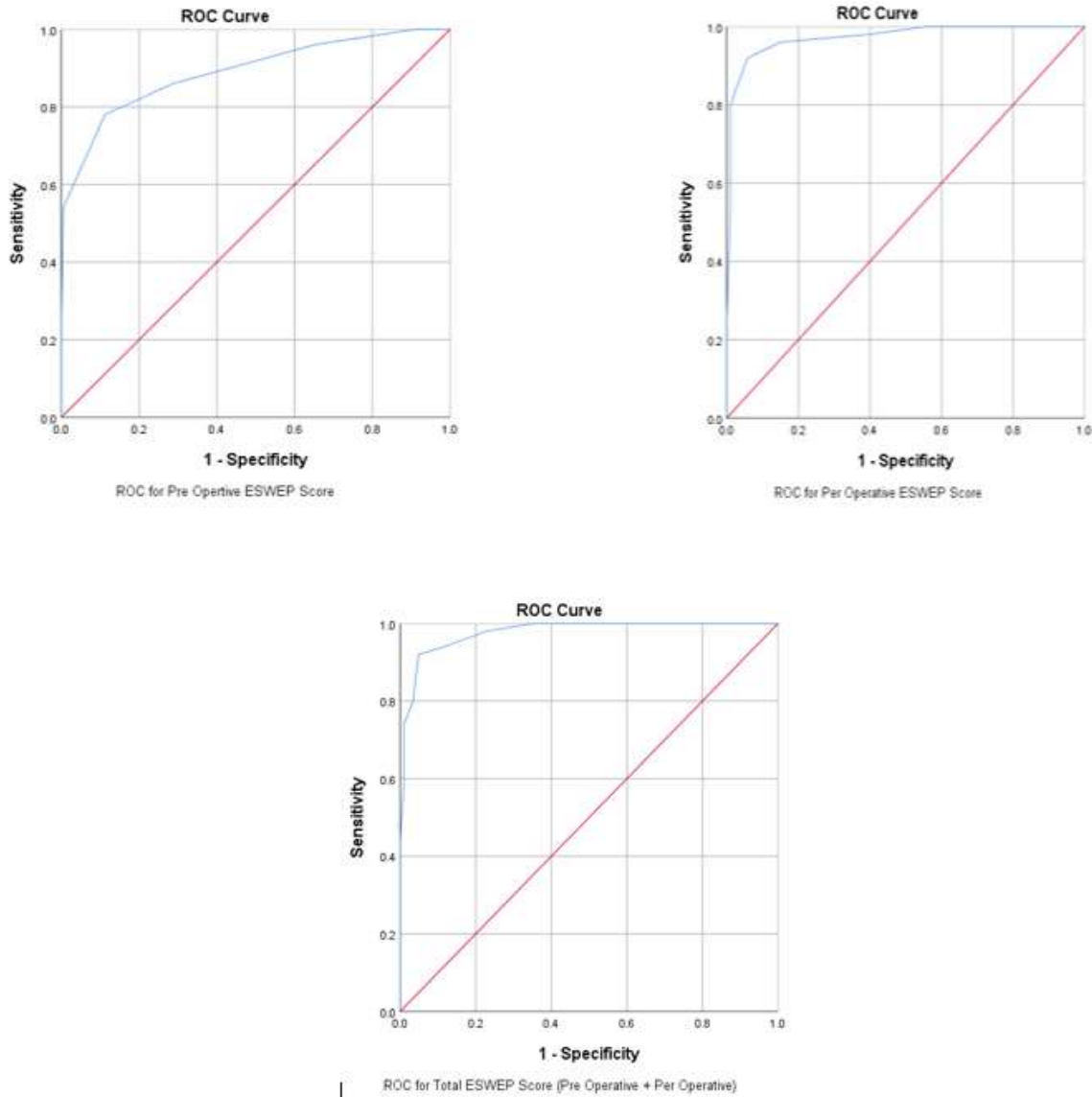
Variables	N	%
<b>Age (years)</b>		
13-20	32	12.5
20-30	95	37.1
30-40	62	24.2
40-50	31	12.1
50-60	25	9.76
60-70	11	4.29
Total	256	
<b>Gender</b>		
Male	142	55.4
Female	114	44.5

Figure 2 shows the mean pre-operative, per operative and total ESWEP score. The mean pre-operative score was 3.48 with standard deviation of ±1.67. The mean per operative score was 5.87 with standard deviation of ±2.39 and mean total ESWEP score was 9.3 with standard deviation of ±3.67.

Figure 3 shows ROC curves for pre-operative, per operative and total ESWEP scores.



**Figure 2: Graphs showing frequency of pre-operative, per-operative and total ESWEP scores.**



**Figure 3: ROC curves of pre-operative, per- operative and total ESWEP scores.**

## DISCUSSION

In last two decades several scoring systems are invented to assess the severity of peritonitis and sepsis. These are general scores which can be applied on every patient of peritonitis due to any cause. APACHE (Acute physiological and chronic health evaluation) scoring system is found useful in patients with perforated peritonitis due to any cause but its simplified form called SAPS 1 (Simplified acute physiology score) is not found useful in literature.<sup>10</sup>

APACHE II is found helpful in surgical patients with intraabdominal infections while APACHE III has no proven role in this regard. MOF score (Multiple organ failure) is used to assess the degree of organ dysfunction and sepsis score is used to assess the degree of sepsis. MPI (Mannheim prognostic index) is also used in literature to

assess the prognosis of disease.<sup>11,12</sup> The data of enteric fever disease burden and severity in South Asia is not promising. Majority of the data present is from small scale studies which often focus on disease incidence in urban areas.<sup>13</sup> In one study done in Karachi, Pakistan in 2016, passive surveillance at two hospitals used to estimate the annual serological incidence rate of typhoid to be 710 to 100,000 whereas annual incidence of blood culture confirmed cases were 170 per 100,000.<sup>14</sup> This scarcity of data leads to poor understanding of impact of disease in Pakistan and thus hampering the effective control methods and prevention. The decision between repair and ileostomy is based on different parameters used across the globe. Surgeon's expertise is one of the important factors.<sup>15</sup> Some surgeons prefer to do repair in all ileal perforations irrespective of the outcome while many safe surgeons prefer ileostomy. Although ileostomy is a safe decision but stoma care would be a social, mental and economic trauma

to the patient which needed another operation.<sup>16</sup> All the scoring variables included in this study are those scoring which are reported in literature to consider while deciding for primary repair or exteriorizing the perforation as ileostomy. All variables have been given 1 score except volume of peritonitis and duration of surgery which are graded. Many studies kept the option of enteric perforation repair for single perforation while ileostomy for multiple perforations.<sup>17</sup> On the other hand, many surgeons make into account per operative pulse, blood pressure and urine output in deciding repair of perforation or ileostomy.<sup>18</sup> According to study done by Goel et al delayed presentation of patient, peritonitis more than 1 l and multiple perforations are factors which favours ileostomy formation.<sup>19</sup> To categorize the effect of peritonitis on type of procedure, in this study we have divided peritonitis into 3 levels with peritonitis more than 1 litre is given 3 points. Also, the presentation of patient after 48 hours of onset of pain is given 1 score.

Another study done by Kamble et al size and number of intestinal perforations are significant factors in causing mortality of the patients.<sup>20</sup> Another study done by Hameed et al also showed the significance of size of intestinal perforation in prognosis of patients with peritonitis.<sup>21</sup> The peritoneal spillage of intestinal contents was also found to be a significant factor as mentioned by various literature. In a study done by Hodonou et al amount of peritoneal fluid (p value=0.001) and perforation number (p value=0.0009) and surgery time (p value=0.02) were important predictive factors in prognosis of non-traumatic small bowel perforation peritonitis.<sup>22</sup>

The limitations of this study included single centre study and applicability of this scoring criteria only to the patients with peritonitis due to enteric perforation only. More studies with large sample size and multicentred evaluation of this score will help in modification of ESWEF score. Further studies are also needed to see the effectiveness of this scoring system to all the cases of peritonitis due to any cause.

## CONCLUSION

ESWEF score is a new statistically validated score which would help the surgeons in standardizing the decision between repair and ileostomy in patients with peritonitis due to enteric perforation.

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