Original Article

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Mannheim Peritonitis Index Scoring System as Predictor of Prognosis in Acute Peritonitis

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Abstract

Background and Objectives: With the advances that are being made in many areas of medicine, the surgeon must be familiar with infectious diseases of the peritoneal cavity which has increased in severity and complexity. Objective of my study was to study the validity of a scoring system, presently being studied worldwide along the following lines: 1. Analysis of various causes of acute peritonitis with respect to morbidity and mortality. 2. Mannheim peritonitis index scoring system as a predictor of prognosis in acute peritonitis. 3. To assess the role of laparoscopy in acute peritonitis. *Methods:* All patients above the age of 18 year diagnosed with acute peritonitis and admitted to MVJMC & RH, Surgical Ward or who develop features of peritonitis due to various causes excluding obstetric and gynecological causes and those secondary to dialysis, admitted between the period November 2014 to July 2016. *Results:* In our study duodenal perforation formed 65.4% of cases and mortality attributed to it was only 0.9%. Overall mortality was 4.5%. MPI score predicted both morbidity and mortality accurately, patients with MPI score < 26 had no mortality but who above 26, mortality was around 20% which is statistically significant ($p < 0.001$). *Interpretation and Conclusion:* MPI score predicted mortality & morbidity well. It helped in 1. Determining morbidity pre operatively. 2. Duration of hospital stay. 3. Surgery can be safely done irrespective of scores. 4. Duration of peritonitis < 24 hour and its outcome on post operative complications. 5. Score above 20, managed well in ICU where adequate monitoring and facilities available and its impact on prognosis.

Keywords: Manheim; Peritonitis; Perforation; Complications.

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Introduction

- With the advances that are being made in many areas of medicine, the surgeon must be familiar with infectious diseases of the peritoneal cavity which has increased in severity and complexity.
- In addition to the surgical management of secondary peritonitis from gastro intestinal perforation, the practicing surgeon may be called in to manage patient with cirrhosis with infected ascitic fluid as well as patients undergoing peritoneal dialysis with infected dialysis fluid.. Peritonitis continues to be one of the major infectious problems confronting the surgeons.
- Its causes vary from the one requiring immediate surgical intervention to that requiring conservative management. Its accurate diagnosis and management is a challenge to every surgeon.

Aims and Objectives of Study

Acute peritonitis is one of the most common surgical emergencies. The management of acute peritonitis is a surgical challenge with high morbidity and mortality.

Aims of My Study Were as Follows

- Analysis of various causes of acute peritonitis

with respect to morbidity and mortality.

- Mannheim peritonitis index scoring system as a predictor of prognosis in acute peritonitis.

Materials and Methods

Our study was conducted in MVJMC & RH on all patients diagnosed as peritonitis and admitted in surgical ward between November 2014 to July 2016.

Methodology

The study being prospective study, all patients admitted to surgical wards as above were considered according to inclusion and exclusion criteria.

Definitions Employed for Study

Peritonitis

acute suppurative inflammation of the peritoneal cavity, arising as a consequence of primary disease of the abdominal hollow visceral perforation, blunt or penetrating trauma or due to any other pathology within the peritoneal spaces.

Shock

Clinical sign of reduced peripheral perfusion and any two of the following.

- Systolic B.P. of no more than 90 mmHg
- Heart rate of at least 100 beats per minute
- Urine output of less than 80 ml/4 hrs
- Use of pressors to maintain BP for at least ≥1 hr.
- *Multiple Organ Failure:* Failure of any two or more of the following system.

(i) *Renal*: Blood urea ≥50 mg/dl. and / or serum creatinine ≥ 2 mg/dl.

(ii) *Hepatic:* Serum bilirubin ≥ 2 mg/dl

(iii) *Lung*: 5 or more days of ventilatory support. Or PO2 < 50 mm Hg and PCO2 > 50 mmHg Or F1O2 ≥0.4

(iv) Shock

(v) *Intestinal Obstruction*: Profound paralytic ileus ≥ 24 hr .

Sample Size

Total number of causes studied – 110

Inclusion Exclusion Criteria

All patients who came with features of peritonitis detected by imaging were included in the study.

Exclusion Criteria

Patients with gynecological peritonitis, peritonitis secondary to peritoneal dialysis were excluded.

Statistical Analysis

- Descriptive and inferential statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean ± SD (Min-Max) and results on categorical measurements are presented in Number (%).
- Significance is assessed at 5% level of significance.
- Chi-square/ Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more groups.

Significant Figures

+ Suggestive significance (P value: 0.05<P<0.10)

* Moderately significant (P value:0.01<P ≤ 0.05)

** Strongly significant (P value : P ≤ 0.01)

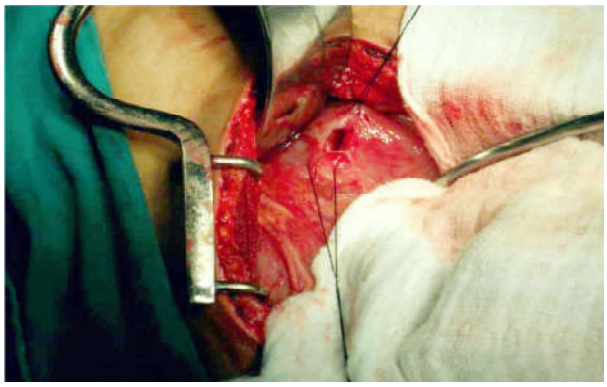


Fig. 1: Case of duodenal perforation being repaired

Fig. 2: A case of liver abscess in right lobe got drained

Fig. 3: A case of Ileal perforation

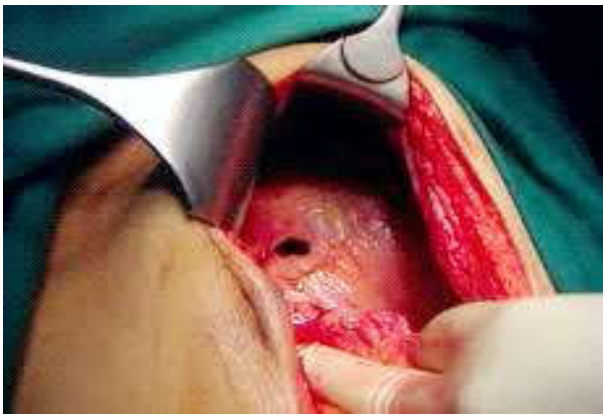


Fig. 4: A case of gastric perforation

Results

Patients with acute peritonitis admitted in MVJMC & RH were studied from November 2014 to July 2016, meeting the inclusion criteria, total number of cases studied were 110.

Patient Factors Studied

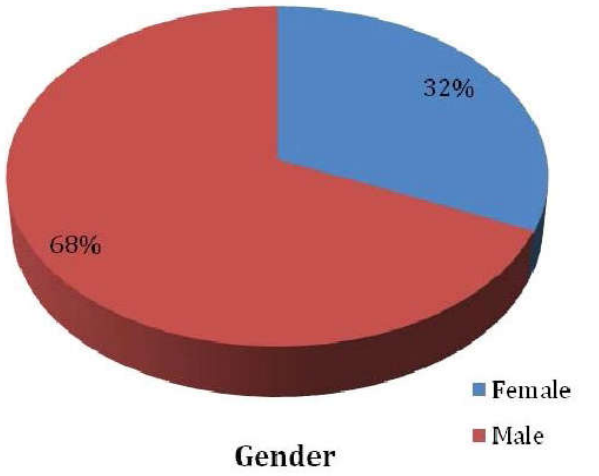
Age

Age in years	No. of patients	%
<20	1	0.9
20-30	30	27.3
31-40	42	38.2
41-50	20	18.2
51-60	11	10.0
>60	6	5.5
Total	110	100.0

The patients with age ranging from 18 years – 85 years were studied. Patients with maximum age were in middle age (31-40 years)- 42 patients. The mortality rate was also seen in the same middle age group (31-50).

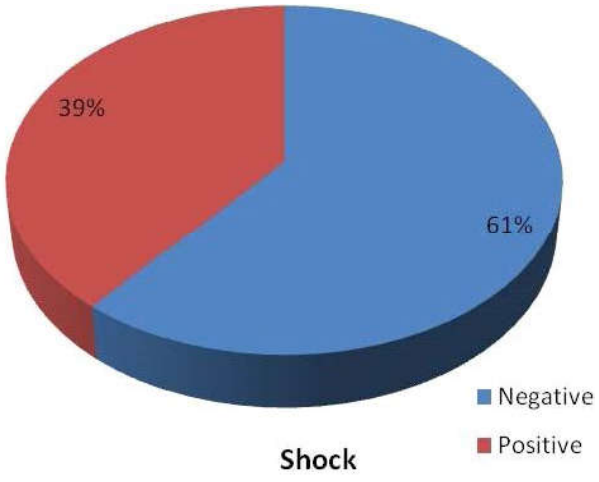
Sex

Gender	No. of Patients	%
Female	35	31.8
Male	75	68.2
Total	110	100.0



Majority of patients in our study were males-75 (68.2%) and in our study the mortality was seen only in male patients comprising 4.5 %. Female patients were 35 and no mortality occurred in them.

Effect of shock on mortality	
Shock	%
Negative	60.9
Positive	39.1
Total	100

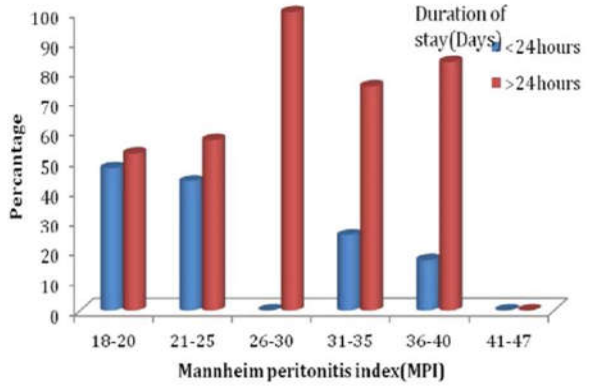


In our study 43 patients (39.1%) presented with shock on admission. Mortality was observed in only 5 patients but they were all in state of shock. Mortality was not seen in any patient with peritonitis who didn't present with shock.

Time of Presentation

- Patients who were included in the study presented with pain abdomen and features of peritonitis ranging in the duration from one day to seven days.
- Maximum patients presented were in time span of 1-2 day(70%). Mortality was observed in patients who presented late ranging from 3-7 day, two patients who presented on 3rd day (1.8%) and two who presented on 7th day (1.8%) and one who presented on 5th day of pain abdomen.

Duration of pain	No. of patients	%
1-2	77	70.0
3-4	19	17.3
5-7	14	12.7
Total	110	100.0



- In our study the minimum score was 18 and maximum was 39, with maximum possible score are 47.

Maximum patients were in the rage 21-25(40%) followed by 18-20(38.2%) range.

- Mortality was observed in 5 patients in whom scores were> 26.40. There were no mortality in the range of 18-20, and 20-25. Of the 5 patients who died, two mortalities that is 1.8% were in the range of 26-30 (5.5%) and two (1.8%) in the range of 31-35 (10.9%) and one in the range of 36-40 (5.5%).
- If we take MPI score of 26 as middle value so it was observed that mortality was seen in the group above this value (21.9%).

Complications	No. of patients (n=110)	%
Nil	53	42.9
Yes	63	57.1
• Thrombotic	25	22.7
• Pulmonary	21	19
• Wound sepsis	7	6.4
• Intra abdominal abscess	3	2.7
• Burst abdomen	1	0.9
• Renal	6	5.4

Out of 110 patients 63 presented with complications with majority of patients having thrombotic complications as many as 25 patients, out of which 19 < 50 years and 6 above 50 year. Pulmonary complications were ranked second about 21 patients developed pulmonary complications out of 16 were less than 50 years and 5 above 50 years. Wound sepsis and intra abdominal abscess was entirely seen in age group less than 50 years with wound sepsis seen in 7 patients and intra abdominal abscess in 3 cases. Surprisingly one case developed burst abdomen who was also way less than 50 years. Lesser complications were encountered in above 50. Six patients had renal complications out of which 5 died.

Discussion

Peritonitis is a serious and fatal complication if not treated on time.

In general patients in extremes of age group are more prone to morbidity and mortality. In our study patients were grouped to ages < 50 years and more than 50 years as it is a important factor in the scoring system of MPI. 63 patients out of 110 developed complications, contrary to the statement in our study more complications were observed in younger age group with fewer in elderly.

Similar study done by Prajakt et al20 showed maximum patients were in age group of 21-30 and 31-40, a finding similar to our study.

a. Age

Age in years	No complications	Complications	Total
<50 years	49(83.1%)	46(80.7%)	89(80.9%)
>50 years	9(16.9%)	11(19.2%)	21(19.1%)
Total	53(100%)	63(100%)	110(100%)

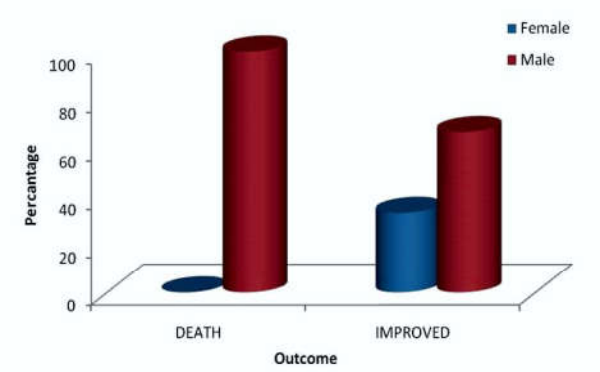
b. Sex

Duration of Stay with respect to Gender

In our study most of the patients were males, with

male to female ratio of more than 1:2

Mortality was seen only in males in our study.



Study of Disease Process

Mortality VS. Time of Presentation

Duration of perforations from the time of presentation seemed to have major impact. Out of 42 patients who presented on day 3, 2 died, whereas out of 3 patients who presented on day 7, 2 died, from this it shows defiantly that delay in presentation is related to mortality.

Mortality Vs. Type of Perforations

In our study majority of cases of peritonitis were due to duodenal perforations, 72 out 110 forming 65.5% of the cases, although they contributed 0.9% to mortality. Second in line comes acute intestinal obstruction 11 cases forming 10% and contributed 0.9% to mortality. Acute pancreatitis patients constituted 2.7% of the cases and mortality attributed to it was 1.8%. Ileal perforation formed also 2.7% of cases but ileal perforation death was only one case (0.9%).

Effect of Shock on Mortality

Shock is systemic manifestation due to loss of fluid, electrolytes, septicemia and organ failure. In agreement with most studies, we had high mortality.

MPI also gave seven risk points to multi organ failure a culmination of shock and other systemic manifestations.

Effect of Alcohol and Smoking on Mortality

Alcohol and smoking greatly affect the outcome, in comparing the P value we see it moderately significant in the patients who presented with complications, thus it proves to be a significant factor on outcome. 26.5% patients developed complications as compared to 16.4% who didn't consume alcohol. On the contrary fewer complications were seen in the smoker group as about 39.1% only.

Conclusion

- The prospective study was done on 110 patients in MVJMC & RH, Hoskote.

Various factors affecting both mortality and morbidity in peritonitis patients were studied.

- Extremes of age didn't have adverse effect on the outcome in comparison to younger age group 30-40.
- The impact of sex outcome could not be conclusively proved, as mortality was seen only in male patients in our study.
- Type and extent of peritoneal contamination seem to have bearing on

mortality. Patients with diffuse peritonitis, faecal contamination do worse.

- Associated factors like diabetes, cardiovascular problems add to mortality, hydration status, level of haemoglobin.

There is wide scope for use of Mannheim peritonitis index. It helps in >Determining the risk of patient preoperatively.

- ICU monitoring of all patients with MPI score above 20 defiantly added to better observation and monitoring.
- Aggressive, newer modalities of treatment need to be tried in high score patients to improve mortality.
- to compare efficacy of various treatment can be accurately compared by taking into consideration their effect on mortality in respect to their scores. This helps to reduce wide variations in mortality that is seen most studies.
- Cases of peritonitis carry a high mortality which can be reduced by early diagnosis, risk stratification, appropriate treatment based on risk score.
- Delayed presentation which has important effect on both mortality and morbidity.
- Peritonitis and its sequel management involves lots of skill, expensive modalities of monitoring and treatment which has to be utilized judiciously based on risk stratification.

Summary

- Study was done on 110 patients in MVJMC &

RH, Hoskote to find out the prognostic factors influencing peritonitis.

- Duodenal perforation formed 65.5% (72) of the patients and only 0.9% (one case) of mortality.
- Even though acute pancreatitis, acute intestinal obstruction and ileal perforation formed small proportion of cases, there mortality was 1.8%, 0.9% and 0.9 % respectively.
- Patients who were ≤ 50 years did considerably well than older patient in relation to duration of stay and complications but mortality was seen in this age group only.
- MPI score accurately predicted mortality and morbidity rates
- Patients whose MPI was ≤ 26 had no mortality as compared to those > 26 in which mortality was 4.5% out of 22.9% which was statistically significant (P<0.001).
- Various components of scoring system like age > 50, duration of perforation, effect of peritoneal contamination, shock on day 1 has been separately studied and found have significant impact on mortality and morbidity.
- Delay in perforation of more than 24 hours seem to affect prognosis but mortality was seen only with delay of > 72 hours(2.7%),but presentation after a week had grievous prognosis, mortality 66%.

Based on our study, patients can be grouped into 2 groups.

Survivor group : Age ≤ 50 yrs, MPI ≤ 26, , peritonitis duration< 24 hours.

Mortality groups (high risk group) Age > 50, MPI > 26, peritonitis duration > 24 hours.

Patients with shorter hospital stay had fewer complications as compared to those who stayed for more than a week while longer group had more serious complications and more number of complications per patient

- Patients who presented with in 24 hour from onset of peritonitis had fewer post operative complications(10 patients, 9%) as compared to those who presented later(39 cases, 35.4%), with thrombotic complications most common 22.7% followed by pulmonary 18.2%.

Duration of stay was shorter in early presenters ranging from 4 to 15 days as compared to late onset presenter some of whom stayed for approximately a month

- In the mortality group , multi organ failure was responsible for the culminative effect of death along with other factors .

Discussion

Do We Really Need Scoring System?

The complex nature of surgical infections and the multifaceted aspects of treatment, and the complexity of ICU support make evaluation of new diagnostic and therapeutic advances in this field very difficult sometimes. Therefore scoring systems that provide objective descriptions of the patient's condition at specific points in the disease process aid our understanding of these problems [3].

The commonly tried scoring systems are:

Mannheim peritonitis index

Sepsis score of Elebute and Stoner

APACHE II score.

All of the systems are mainly concerned to predict death in patients with surgical infections. Most of the scoring systems are inappropriate for use in therapeutic decisions concerning individual patients.

Mannheim Peritonitis Index (MPI)

MPI, was originally derived from data collected from 1253 patients with peritonitis treated between 1963 and 1979, and was developed by discriminant analysis of 17 possible risk factors, by Wacha 13 , 8 of these were of prognostic relevance and is currently employed widely for predicting mortality from peritonitis. The information is collected at the time of admission and first Laparotomy.

Advantage of MPI

- It is one of the easiest scores to apply.
- The determination of risk factor is available during operation.
- Surgeon can know about all the possible outcome and the appropriate management can be decided.

Disadvantages

- This index does not include the possibility of eradicating the sources of inflammation.
- It is a one time score, therefore post operative complications may hamper the results.
- This index assigns peritonitis originating from colon to be a low risk. Most of the colonic

performance are usually secondary to malignancy, this may not be applicable uniformly.

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Proforma

- Name: Age: Sex: I.P. No.: Unit:
- Religion:
- Occupation: Address:
- Date of Admission: Date of Discharge:
- Date of surgery:
- Date of Expiry:
- HISTORY
- Complaints:
- 1. PAIN: - Time of onset & Date
- - Mode of onset
- - Site of pain
- - Shifting of pain
- - Migration of pain
- - Referred pain - Character of pain
- - Aggravating factors.
- - Reliving factor.
- 2. VOMITING: - Relation to pain
- - Frequency
- - Amount
- - Co lour
- Contents
- - Character of the act: Projective : Effortless.

- 3. BOWELS: - Last evacuation
- - Constipated / Normal
- - Diarrhea
- - Dysentery
- - History of passing worms.
- 4. DISTENSION: - Duration
- - Location
- - Relation to pain
- - Whether accompanied by borborygmi.
- 5. FEVER: - Duration
- - Relation to pain
- - Character
- - Whether associated with chills and rigors
-
- - History of treatment taken if any
- 6. OTHER COMPLAINS:
- II. PAST HISTORY
- -Diabetes
- - Hypertension
- - T.B.
- - Others
- III. PREVIOUS HISTORY
- 1. Of Similar complaints
- 2 Haemetemesis -
- - Colour
- - Frequency
- - Amount
- 3. Treatment for Peptic ulcer: surgery or medical.
- 4. Ingestion of drugs: Steroids Aspirin
- NSAIDS
- Purgatives
- Others
- IV. PERSONAL HISTORY
- - Diet
- - Smoking
- - Alcohol
- - Menstrual history
- V. FAMILY HISTORY
- - Peptic ulcer
- - Tuberculosis.
- - Typhoid.

- - IBD.
- VI. GENERAL EXAMINATION
- I General Condition
- Good
- Fair
- Bad
- Appearance
- Attitude
- Build and nourishment
- Level of consciousness
- Temperature
- Tongue
- Rashes on the body
-
- 2. Pulse
- 3. Blood pressure
- 4. Respiration
- - Rate
- - Rhythm.
- VII. LOCAL EXAMINATION
- 1. Inspection
- - Distension
- - Flanks
- - Contour of the abdomen
- - Movement with respiration – N / "!
- - Visible peristalsis - + / -
- - Skin
- - Umbilicus
- - Operation scars
- - Hernial orifices
- 2. Palpation
- - Tenderness – Localised
- - Generalized
- - Quadrant
- - Rebound tenderness -+ / -
- - Rigidity
- - Temperature '! / N / "!
- - Muscular rigidity : Localized Generalized
- - Mass per Abdomen - + / -
- 3. Percussion
- - Liver dullness '! Present / Obliterated

- \- Free fluid '! Present / Absent
- \- Shifting dullness '! Present / Absent
- 4. Auscultation
- \- Bowel sounds
- \- Normal
- \- Hyper active
- \- Paralysis
- \- Absent
- \- Frequency
- \- Character
-
- 5. Other relevant examination
- \- P.R.
- \- P.V.
- 6. Other systems.
- \- Respiratory system
- \- Cardiovascular system
- \- Nervous system
-
- Diagnosis:
-
-
- VIII. INVESTIGATION
- a. Radiological: Plan X-ray Abdomen Gas under diaphragm
- Paralytic ileus
- Ground glass
- CXR
- U/S
- CT SCAN
- Others
- b. Blood
- Hb % TC:
- Blood urea RBS/FBS
- S. Creatinine
- LFT's – Bilirubin - SGOT/SGPT
- c. Urine : Albumin
- Sugar :
- Micros :
- Culture
- d. Stool : Naked eye appearance :
- Ova :

- Cyst :
- Occult blood :
- Culture
- e. Diagnostic tap of peritoneal fluid
- - Transudate
- - Exudate
- - Fecal
- - Haemorrhagic
- f. Biopsy from the edge of the perforation.
-
- g. Others:
- IX. DIAGNOSIS
- 1. Duodenal perforation
- 2. Enteric perforation
- 3. Tubercular
- 4. Appendicular
- 5. Traumatic.
- 6. Malignant
- 7. Non specific Heal perforation
- 8. Others.
- X. SCORING SYSTEM
- Mannheim peritonitis index Risk factor Score
-
- 1. Age > 50 5
- 2. Female 5
- 3. Organ failure 7
- 4. Malignancy 4
- 5. Pre-operative duration of peritonitis (> 24 hrs) 4
- 6. Origin of sepsis not colonic 4
- 7. Diffuse gen. Peritonitis 6
- 8. Exudate
- Clear 0
- Cloudy / purulent 6
- Feacal 12
- Max 47
- XI. SURGICLA PROCEDURE
- i. Sample closure + peritoneal toilet
- ii. Closure with proximal by pass
- iii. Resection and anastomosis
- iv. Suturing with exteriorization

- v. Definitive surgery vi. Drainage only
- vii. Peritoneal toilet only viii. Antiobiotics used.
- XII POST OPERATICE MANAGEMENT
- - Posture in bad
- - Intraveneous fluids
- - Blood transfusion
- - Antibiotics
- - Other drugs
- - Gastric aspiration
- - Oral fluids
- - Removal of drains.
-
- XIII. Complications
- 1. General
- - Pulmonary
- - Renal
- - Cardiac
- - Toxaemia
- - Thrombotic
- - Agranulocytosis
- 2. Local
- - Stitch abscess
- - Wound sepsis
- - Intestinal obstruction
- - Pelvic abscess
- - Paralytic ileus
- - Subdiaphragmatic abscess
- - Faecal fistula
- - Burst abdomen
- XIV. TREATMENT COMPLICATIONS
-
-
- XV. CONDITIONS AT THE TIME OF DISCHARGE
- Improved
- Worse
- Death
- Otherwise
-
-
- XVI. CAUSE OF DEATH