“Enteric Manifestations Management, Introspection.”

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METHODS: The Varieties Of Clinico-Pathological Manifestations Variants Studied As: CATEGORY(A); Fever, Pain, Inflammation Of Terminal Ileum & Adjoining Viscera. CATEGORY (B): Includes Almost All Cases Of Enteric Perforation Peritonitis, Of Different Disease Duration, In Varying Clinico-Pathological Stages & Associated Toxicaemia.


CONCLUSION: Salmonellosis Manifestations, Amongst Commonest Clinical Practice Dilemmas, Demand Discrete Clinico-Investigatory Assessmet For Implementing The Needed ‘Treatment Plan’ For Maximal ‘Over All Result Outcome’, In Discussed Variable Circumstances.

KEY WORDS: 1. Enteric (Typhoid) Infections; Epidemiology, Distribution
2. Severity Of Infections; Changing Strains, Systemic Complications
3. Medical Therapy Appropriation
4. Surgical Intervention; Treatment Modalities Discretion.

I: INTRODUCTION’


Bacteriology: Culture Characteristics: **Serotype: D** Group Of Salmonella, Gram-negative, Rod Non-spore, Flagellate. Antigens,Located In The Cell Capsule;  **H** (Flagellar Antigen),O (Somatic Or Cell Wall Antigen),Vi (Polysaccharide Virulence)  
**Diagnosed:** By Variably Different Titres Of “Widal Test”, By Calibrating Endotoxin Levels & A Variety Of Plasms.

**Resistance:** Live 2-3 weeks in water, 1-2 months in stool. Die out quickly in summer.  Resistance To drying and cooling Render Authenticity Of “Widal Test”.  

Emerging Gram-Negative Enteric Infections Include: Vibrios; Vibrio Cholera, Non-O1 V Cholerae (Excluding V Cholerae O139), Vibrio Parahaemolyticus, Vibrio Vulnificus, Nontyphoidal Salmonella Species, Shiga Toxin–Producing Escherichia Coli(STEC), Campylobacter, Yersinia Enterocolitica, Unusual Enteric Gram-Negative Bacteria; Aeromonas Species-Aeromonas Caviae (Predominant), A.Hydrophila &A Veronii, Plesiomonas Shigelloides & Other Mixed Sp.Variants.[1,2,3]  

**EPIDEMIOLOGY:** Continues To Be A Global Health Problem,  
• Areas With A High Incidence Include Asia, Africa And Latin America  
• Affects About 6000000 People With More Than 600000 Deaths A Year, 80% In Asia.  
• Sporadic Occur Usually, Sometimes Have Epidemic Outbreaks,With An Estimated 16–33 Million Cases Of Typhoid Fever Annually Resulting In 216,000 Deaths In Endemic Areas,  
   The **World Health Organization** Identifies Typhoid As A Serious Public Health Problem.Its Incidence Is Highest In Children And Young Adults Between 5 And 19 Years Age. Control Of Infection Has Been Achieved In Europe And North America By Effective Public Health Measures, But Africa, South East And South Central Asia, Continue To Bear The Burden Of The Disease, Principally Because Many Communities Still Fall Short Of Standards For Drinking Water, Hygiene And Sanitation.

The Incidence Of Typhoid Fever In The United States, Has Markedly Decreased Since 1920s(>35,000 Cases), To Latest (Approximately 400 Cases, Mostly Traveller To Endemic Areas), As Reported Annually.

[Figure-2]

**GEOGRAPHICAL DISTRIBUTION(PREVALENCE)**

**WHO** Report  
**Source Of Infection:** Body Discharges From Incubation(More In 2–4 Weeks After Onset & About 2–5% For >3 Months.)  
**Chronic Carrier** eg **Typhoid Mary**  
**Transmission:** Fecal-Oral Route, Close Contact With Patients Or Carriers, Contaminated Water And Food, Flies And Cockroaches.  
**PATHOGENESIS:** Gastrointestinal Tract Host-pathogen Interactions, With The Amount Of Bacilli Infection (>10⁵ bacteria), Ingested Orally Crossing Stomach Barrier (Some Eliminated), Enter The Small Intestine, Penetrate The Mucus Layer, Enter Mononuclear Phagocytes Of Ileal Peyer's Patches And Mesenteric Lymph Nodes, Proliferate In Mononuclear Phagocytes.  
**Spread To Blood:** Initial Bacteremia (Incubation Period), Enter Spleen, Liver And Bone Marrow(Reticulo-endothelial System)-Further Proliferation Occurs, Resultant Large Bacterial Load Enter Blood Again, Second Bacteremia, Followed By Recovery.
**Clinical Manifestations:**

**Incubation Period:** 3~60 Days (7~14).

**The Initial Period (Early Stage):** First Week, Insidious Onset, Fever Up To 39~40°C in 5~7 Days, Chills, & Other Constitutional Symptoms.


**Relapse:** Serum Positive S.Typhi After 1~3 Weeks Of Temperature Down To Normal, Symptom And Signs Reappear Indicating Incomplete Eradication Of Bacteria, Some Times Relapses Occur More Than Once.

**The Fastigium Stage:** Second And Third Weeks, Sustained High Fever (Partly Remittent Or Irregular), Lasting 10~14 Days.

**Gastro-intestinal Symptoms, Neuropsychiatric Manifestations, Circulatory System:** Relative Bradycardia Or Dicrotic Pulse, Toxic Myocarditis (Seen In 2-3 Weeks), Usually Severe Toxemia.

**Splenomegaly, Hepatomegaly:** Toxic Hepatitis (Common 1-3 Weeks, ALT Elevated, Get Better In 2-3 Weeks).

**Bronchitis, Bronchopneumonia:** Seen In Early Stages.

**Roseola:** 30% Cases, Maculopapular Rash, Faint Pale Color, Slightly Raised, Round Or Lenticular, Fade On Pressure, 2-4 Mm In Diameter, Less Than 10 In Number On The Trunk, Disappear In 2-3 Days.

**[27,28]** Changing Species / SubSpecies Strains Variety & Their Sensitivity To Anti-Biotics, Presence Of Debilitating Diseases, Malignancy, HIV Immuno Compromised Status Render ‘Salmonellosis’ Control Difficult. Discrete Surgical Observation, Intervention Are Necessitated, In Several Differently Variable Clinico-Pathological Manifestations Of Disease Process. [4,5,6]

**Diagnosis**

**Laboratory Findings**

**Routine Examinations:** WBC-Normal Or Decreased, Leukopenia Esp. Specially Eosinophilic Corresponding To Diseases Improvement & Relapse. Low Platelet Count.

**Bacteriological Examinations:**

**Blood Culture:** Most Commonly Use, 80~90% Positivity During The First 2 Weeks, 50% In 3rd Week, Not Easy In 4th Week, Re-positive When Relapse And Recrudescence.

**Bone Marrow Culture:** The Most Sensitive Test, Specially In PreTreated Patients.

**Urine And Stool (Rectal Swab) Cultures:** Increase The Diagnostic Yield, But Positive Less Frequently. Stool Culture Better In 3~4 Weeks. Elisa Urine Test.

**Fluorescent Antibody Study:** For Substances Specific To Typhoid Bacteria.

**Duodenal String Test:** Bile Culture, Esp. Useful For Carriers Diagnosis.

**Rose Spots:** Not Used Routinely.
Peritoneal Aspirate C&S: Simple, Safe, Comparatively Easy To Perform With Better Specificity, Due To Consideration Of Complete Peritoneal Environment From Initial Contamination By Predominant Facultative Gram-Negative Organisms eg *Escherichia Coli* And Klebsiella, Eventually Obligating Anaerobes From Colon As Dominant Bacteroides Species.

**SeroLogic Tests (Widal Test):** Five Types Of Antigens: Somatic Antigen(O), Flagella(H) Antigen And Paratyphoid Fever Flagella(A,B,C).

Antigen. Antibody Reaction Appear During First Week, 70% Positive In 3–4 Weeks And Can Prolong To Several Months. In Some Cases, Antibodies Appear Slowly, Or Remain At A Low Level, While In 10–30% Cases, Don't Appear At All.

**Interpretations:** "O" Agglutinin Antibody Titer ≥1:80 And "H" ≥1:160 Or "O" 4 Times Higher Supports A Diagnosis Of Typhoid Fever. "O" Rises Alone, Not "H" - Early Of The Disease. Only "H" Positive, But "O" Negative - Often Nonspecifically Elevated By Immunization Or Previous Infections Or Anamnestic Reaction

**Antibody Level Maybe Lower In Early Used Antibiotics Cases.** Some Cross Reaction Between Group “D” And “A”.

False Positive In Some Infectious Diseases. Some Positive In Blood Culture, But Negative In Vidal Test.

'VI' (1:40) Often Useful For Carrier Diagnosis.

**Molecular Biological Tests:** DNA Probe Or Polymerase Chain Reaction (PCR); Identification Of Salmonella Typhi DNA By PCR With 100% Sensitivity And Specificity Is Promising Gold Standard If Affordable. [7,8,9]

**DIFFERENTIAL DIAGNOSIS:** Viral infections, Malaria, Leptospirosis, Epidemic Louse-Borne typhus, Tuberculosis, Septicemia Of Gram-Negative Bacilli, Typhus, Recent Swine Dysentery Infections Etc.

**PARATYPOID FEVER A,B,C:** Caused By Salmonella Paratyphoid A,B,C Respectively. Similar To Typhoid Fever In Epidemiology, Pathogenesis, Pathology, Clinical Manifestations, Diagnosis, Treatment And Prophylaxis.

**ParaTyphoid A,B:** Incubation Period 2~15days, In General, 8~10 Days, Milder In Severity Fewer In Complications, Better In Prognosis, Relapse More Common In Paratyphoid A, Treatment Same As In Typhoid Fever.

**ParaTyphoid C:** Always Sudden Onset, Rapid Rise Of Temperature, Cl. Presentations -- Septicemia, Gastroenteritis And Enteric Fever, Complications -- Arthritis, Abscess Formation, Cholecystitis, Pulmonary Complications Are Common, Intestinal Hemorrhage And Perforation, Less Common Than Typhoid Fever. [61,62]

**COMPLICATIONS**

1) **INTESTINAL HEMORRHAGE:** Commonly Appear During 2–3 Weeks, Usually Precipitated By Unsuitable Food, Diarrhoea Etc. Mild And Serious Bleeding(In 2–8%), Ensuing Shock Is Followed By Dark Or Fresh Blood In The Stool.

2) **INTESTINAL PERFORATION:** [29,30,31,32,33]

**Pathogenesis:**

Essential Lesion; Proliferation Of RES (Reticuloendothelial System), Specific Changes In Lymphoid Aggregates Of Peyer’s Patch Of The Terminal Ileum And Mesenteric Lymph Nodes, “Typhoid Nodules” Formation.

**Most Characteristic Lesion:** Mucosal Ulceration In The Region Of The Peyer’s Patch Of The Small Intestine (Extending From The Lamina Propria To The Submucosa) In Stages:

Hyperplasia (1st Week); Swelling Lymphoid Tissue And Proliferation Of Macrophages.

Necrosis (2nd Week); Lymph Nodes Or Solitary Follicles Necrosis.

Ulceration (3rd Week); Necrotic Tissue Shedding And Ulcer Formation Leading To Intestinal Hemorrhage, Perforation.

Healing (From 4th Week); As Ulcer Healing. If No Cicatrices No Contraction.

The Process Leading To Tissue Damage Is Probably Multifactorial, Involving Both Bacterial Factors And Host Inflammatory Response, With The Significant ‘Treatment Appropriation Factor’.

The Sanarelli-Shwartzman’s Reaction, 1937, Provides Insight To Basic Mechanism. Gut Macrophages Activation Occurs By Salmonella typhii Directly By Toll Like Receptors Or Indirectly Via Antigen Presenting Cells.

**The First Gut Exposures** Sensitizes The Macrophages, Initiating Release Of Damaging Cytokines Such As Tumor Necrosis Factor-Alpha. At Second Exposure, Pathological Changes Are Not Just Restricted To Perforation Sites.
TYPHOID LESIONS HISTOPATHOLOGY

A: Typhoid nodule; Macrophages Containing Bacteria, Red Blood Cells, And Nuclear Debris From Small Nodular Aggregates In Peyer’s Patches

B: Typhoid Ulceration

The Diseased Gut Is Characterized By Diffuse Nonspecific Enterocolitis With Changes Of Intestinal And Mesenteric Lymphatic Tissue. Acute And Chronic Inflammatory Cells Are Involved With Predominance Of CD68+ Leucocytes (Macrophages), And CD3+ T Lymphocytes At Perforation Sites.

[Figure-5] INTESTINAL PEYER’S PATCHES

Reports Of Peyer’s Patches Involvement, In TP Is Debated, As Current Evidences Suggest The Mechanism Of Intestinal Injury Complicating Enteric Fever To Be Immunologically Mediated, Through Release Of Cytokines From Macrophages.

Site: Terminal 40 Cm Of Ileum - 72%-78% ; Jejunum, Caeicum, Colon And Gallbladder To Lesser Degree, Rarely Duodenal And Appendiceal Perforations Cases. Perforations May Be Multiple (3%-40%) Especially In Younger Children.


Hepatosplenomegaly Common (As Significant TP Predictor UnClear)


Prognosis: TP Occurs In 0.6%-4.9% To 10%-33% With About 25% Mortality. Fully Developed Immune System In Prevalence Age Group 5 - 30 Years, Supports Less Morbidity & Mortality, Compared To Paediatric Age Group. [34,35,36,37,38,39]

(3) OTHER COMPLICATIONS: Cytokines And Other Mediators Released By Immune Cells In Response To Infection Cause Local And Systemic Inflammation. The Cytokine Response With Potential Of Self-Perpetuation (Even After Successful Control Of Infection Source) Lead To Systemic Cellular Injury And Multiple-Systems Organ Failure, eg Toxic Encephalopathy, Hemolytic Uremic Syndrome, Acute Cholecystitis, Meningitis, Nephritis, Toxic Myocarditis Etc.

II. ‘AIMS/OBJECTIVES’

By More Than (2) Decades, MultiCentric Clinical Observational Study, In The Variable Resources Availability Circumstances, Various Aspects Of Comprehensive “Management Guideline Plans”, Practically Acceptable In Prevailing Situations, Achieving Maximal Result Outcomes, Are Summarized As -

(1) Medical (2) Surgical
(3) Non-Surgical / Minimally Invasive Management Methodologies.
MEDICAL MANAGEMENT METHODOLOGY

With Emphasis Upon Meticulous Use Of Appropriate Anti-Microbials Preferably In Accordance With C&S (Blood, Urine +/- Peritoneal Aspirate) & Needed Intensive Supportive Measures.

Definitive Treatment Of Typhoid (Enteric) Fever Is Based On ‘Susceptibility’.

As A General Principle Of Antimicrobial Treatment, ‘Intermediate Susceptibility’ Should Be Regarded As Equivalent To Resistance.

Between 1999 And 2006, 13% Of S Typhi Isolates Collected In The United States Were ‘Multidrug Resistant’. A Significant Number Of Strains From Africa And The Indian Subcontinent Are MDR. South Asia, East Asia, Eastern Europe, Middle East, Sub-Saharan Africa, South America, Southeast Asia Or Unknown ‘Geographic Origin’. Have ‘Demonstrable Variations’ Of Strain, Severity & Resistance.

Nalidixic-Acid-Resistant STyphi (NARST) Strains (Ciprofloxacin Resistant), Either Chromosomally Or Plasmid Encoded, Are Observed In Asia.[10,11,12,13]

TYPHOID:ANTI-MICROBIAL THERAPY[14,15,16,17,18,19,20]

Antipyretics: The Pyrexia Can Be Managed With Tepid Baths And Sponging. Salicylates And Antipyretics Should Be Avoided, Because They Cause Severe Sweating And Lower The Blood Pressure.

TABLE I

TYPHOID:ANTI-MICROBIAL THERAPY

(Drug Dosage Route, Duration In Days, Mg/Kg/Day Schedules)

<table>
<thead>
<tr>
<th>FIRST-LINE</th>
<th>SECOND-LINE</th>
<th>OTHER ANTIBIOTICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chloramphenicol 500 mg Qid 50 mg/kg in Oral, IV antibiotics: 4 doses</td>
<td>Ciprofloxacin 500 mg bid/200 mg bid Oral/IV antibiotics: for 10-14 days (Fluoroquinolones)</td>
<td>Aztreonam 1 gm/bid-qid 50-70 IM mg/kg: 2.4 5-7</td>
</tr>
<tr>
<td>Trimethoprim- 160/800 mg bid 4-20 mg/kg: Oral, IV</td>
<td>Norfloxacin 400 mg bid for 10 days Oral</td>
<td>Imipenem IV</td>
</tr>
<tr>
<td>Sulphamethoxazole In 2 doses</td>
<td>Pefloxacin 400 mg bid for 10 days Oral, IV</td>
<td>Azithromycin 1 gm OD 5-10 mg/kg: 1 5 Oral</td>
</tr>
<tr>
<td>Ampicillin /Amoxicillin 1000-2000 mg qid Oral, IM, IV 50-100 mg/kg:In 4 doses</td>
<td>Ofloxacin 400 mg bid for 14 days Oral</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Levofloxacin 500 mg bid for 14 days</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cefalosporins Ceftriaxone 1-2 gm bid 50-75 mg/kg: In IM, IV 1-2 doses</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cefotaxime 1 gm/bid-qid 80 mg/kg: IM, IV in 2 doses for 14 days</td>
<td></td>
</tr>
<tr>
<td></td>
<td>For 7-10 days</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cefoperazone 1-2 gm bid 50-100 mg/kg: IM, IV in 2 doses 14 days</td>
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</tr>
<tr>
<td></td>
<td>Cefixime 200-400 mg od/bid Oral 10 mg/kg: in 1-2 doses for 14 days</td>
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</tbody>
</table>

Note: The Combination Of Azithromycin And Fluoroquinolones Is Not Recommended, Because It May Cause QT Prolongation And Is Relatively Contraindicated.

‘NHS’ Recommends : Medications In Accordance To Blood Culture.

Supportive Measures; Are Important In The Management Of Typhoid Fever, Such As Oral Or Intravenous Hydration, Tepid Baths And Sponging And Appropriate Nutrition And Blood Transfusions, As Need.[21]

Therapeutic Strategies Will Have To Take Into Account The Local Antibiotic Sensitivity Patterns Of S. Typhi While Refining Treatment. [23]

Role Of Gluco-Corticoids; Reported Studies, Advocating Gluco-Corticoid Use(Conventional Dosage Regime), For Severe Typhoid Disease Management, Especially For CNS Symptoms, Severe Toxiccaemia & Resultant Profound Septicaemia Patients Category.

Although,Reported Significant CFS Improvement & No Adverse Effects During Wide Experience Of Corticosteroid Treatment, Except The Potential For Masking Intestinal Perforation, Corticosteroids Use Should Be Best Reserved For Severe Illness Patients.


TYPHOID CARRIERS’ MANAGEMENT

‘Chronic Carrier’; Patients Who Continues To Discharge S. Typhi In Either Urine Or Stool For Longer Than 1 Year. Treated By - Ampicillin 100mg/Kg, Tid /Qid Oral, Amoxycillin+ 30 Mg/Kg Oral, Probenecid Co- Trimoxazole 4-20mg/Kg Bid Oral, Ciprofloxacin 1500 Mg Bid Oral, Norfloxacin 800 Mg Bid Oral, For Needed Durations.
Long-Term Suppressive Antimicrobial Therapy is considered for patients with persistent carriage without identified anatomic abnormality, or relapse after cholecystectomy. In cases of anatomic abnormality (e.g., chronic cholecystitis, biliary stones), as carrier state eradication is non-achievable, by antibiotic therapy alone, surgical correction (cholecystectomy) is mandatory, as eliminates carrier state in 85% cases & is especially recommended for professional occupations e.g., food handlers and health care providers.

An effective, well-tolerated typhoid vaccine could help control both endemic and epidemic disease.[24,25,26] Reported safe yet cautious co-administration with other vaccines relevant for international travelers (yellow fever, hepatitis-A), including live vaccines against polio, cholera or measles, mumps, and rubella (MMR) combination & routine childhood immunization programmes vaccines.

### TABLE-2

<table>
<thead>
<tr>
<th>VACCINE</th>
<th>ROUTE, DOSAGE</th>
<th>REVACCINATION</th>
<th>OTHER DETAILS</th>
</tr>
</thead>
<tbody>
<tr>
<td>(I)</td>
<td>Subcutaneous 0.5 ML, 2 Times 1-4 Weeks Apart</td>
<td>1-2 Years, (Depending Upon Risk)</td>
<td>First Available, Still In Use In Some Developing Countries, Due To High Reactogenicity (Fever &amp; Systemic Reactions), Needs Replacement by Newer Availability (WHO).</td>
</tr>
<tr>
<td>Killed, Whole Cell; Phenol-Inactivated Vaccine (Shot)</td>
<td>At Least 2 Weeks Before Travel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(II)</td>
<td>Subcutaneous 0.5 ml, 7 Days Before Travel</td>
<td>2-3 years, (Depending Upon Risk)</td>
<td>First Licensed, 1994, USA, Recommended For Age &gt;2 Years, Storage temperature 2-8 ºc, Minimal Local &amp; No Serious Side-Effects, Safe For HIV Infected Individuals (As Protective Antibodies Induction Is In Direct Correlation To CD4 Positive T-Cells Levels).</td>
</tr>
<tr>
<td>Live; Attenuated S. Typhi Strain VI CPS (Ty2 S-Purified VI capsular Polysaccharide)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(III)</td>
<td>Oral, Lyophilized Vaccine- (Enteric Coated capsules&gt;5 Years) Or Liquid Suspension (From 2 Years Age). One Capsule On Days 1, 2, 3, 4, 5, 6, 7 (3 Or 4 Doses Regime Variations US, Canada, Europe), Last Dose At Least 1 Week Before Travel</td>
<td>3-5-7 Years, (Depending Upon Risk)</td>
<td>First Licensed; Europe, 1983 And USA, 1989. Remarkably Well Tolerated Low Rates Of Adverse Events</td>
</tr>
<tr>
<td>Oral, Live Attenuated, Purified Vi Capsular Polysaccharide Vaccine Ty21a (Chemically Mutated Multiple Genes Ty2 Strain Of S. Typhi Including The Genes For Vi Production)</td>
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</tbody>
</table>

**Safety Precautions:**

*Inactivated Typhoid Vaccine (Shot):* Children >2 Years Age, Severe Reaction To Previous Dose (Severe Allergy To Vaccine Component), Moderate Or Severe Illness At The Scheduled Time (Wait Till Recovery).

*Oral Vaccine:* Swallow (*Not To Chew*) About An Hour Before Meal With Cold Or Lukewarm Drink. Each Of These Vaccines Offer 55% To 85% Protection For 3 To 5-7 Years. The Overall Side Effects Are Variable & Not Very Significant.

*Other Vaccines:* TAB Vaccine (Inactivated Salmonella), Used For The Second Commonest Enteric Fever In Asia, Caused By *S. Paratyphi* A, Reported Strong Reactogenicity. New *S. Paratyphi* A Vaccine (Composed Of The Surface O-Specific Polysaccharide Conjugated With Tetanus Toxoid), Recorded To Be Safe And Immunogenic. Vi-rEPA : New Vi Conjugate Candidate Vaccine Bound To (*rEPA*) Non-Toxic Recombinant *Pseudomonas Aeruginosa* Exotoxin A (Reported Enhanced Immunogenicity) & Three live attenuated candidate vaccines Are In Evaluation Process.

**III. ‘METHODS’**

Enteric Fever Patients Need Observation, Interference, Intervention By Surgeons, In Several Differently Variable ‘Clinico-Pathological Manifestations’, The Varieties Of ‘Variants’ Are Grouped As:
“Enteric Manifestations Management, An Introspection.”

“CATEGORY (A)”
Includes Clinical Presentations: Pain In The Lower Abdomen, Similar To Appendicitis, PID, Tubo-Ovarian Diseases Etc. Clinical History: Fever; About >3 Weeks Duration, Clinical Exam: Localized Tenderness & ‘Signs Of Peritonism’
Laboratory Investigations: Suggestive Of Salmonellosis, While Competent USG May Reveal Infective, Inflammatory Changes Of Terminal Ileum With Exclusion Of Appendicular, T.O Pathology, PID, Rt. Urolithiasis, Crystalluria & Other Causes Of Abdominal Pain.
The Meticulous Treatment Plan Includes: Monitored Oral Intake, IV Fluids Supplementation, Proper Antibiotics Including AnaeroBs In Adequate Dosages, Duration, Antipyretic, Anti-Inflammatory, Analgesic Combinations, Proper AntiAcid As Needed(?APD Status ? Nausea, Vomitting), B-Complex & Other Nutritional Supplements.
Majority Of These Patients Recover Less Then A Week’s Time, Discharged With Domiciliary Treatment & FUC Advise For Review With Suggested Investigations, Till Clinico-Diagnostic Disease Clearance.
The Discusssed Category Being One Of The Important Examples Of Proper Timely Dx & Subsequent Methodical Tt. Plan, Avoiding Occurrence Of TP & Variable Complications.

“CATEGORY (B)”
Includes Almost All Cases Of ‘Enteric Perforation Peritonitis’, Of Different Disease Duration, In Varying Clinico-Pathological Stages & Associated Toxaemia, Septicaemia, Shock Status.
USG Whole Abdomen (Full Bladder); Variable Amount Free Fluid Peritoneum, Intestinal Loops Status & Other Associated Pathologies eg Gall Bladder Biliary Diseases Etc.
Laboratory Investigations; Widal Test Serology Confirm Various Different Types & Severities Enteric Infection, Blood C&S And Peritoneal Aspirate C&S (Specimen Obtained From Radio-Diagnostic Guided Aspiration & Or Exploratory Laparotomy) C&S Being Important Dx Tools Of Immense Therapeutic Result Outcome Advantage By Minimizing Disease Process Morbidity & Mortality.

Concomitantly Performed: HaemoGram, Urine, Blood Sugar Profile, Renal Function Tests, S. Amylase, Lipase, S. Electrolytes, Needed LFTs, HIV For Aids, HBSAg & Other Available Specific Serological Tests.
In Cognizance With, Available Cl. History Of Known Medical Illnesses With Previous Tt. Details Etc. & Patient’s General Condition, As Recorded Vital Parameters (GC, Pulse, BP, Resp., Temp, Anaemia, Hydration Level Clinically In Consideration Of Urine Out Put, SpO2 Levels). Vehement Conservative Measures Immediately Initiated,
(Preferably In Well Equipped ICUs) Include:
(A) Gastro-Intestinal Decompression: R.T Aspiration, Continuous Drainage With
   (2) Hourly Aspiration
   Umbilical Level Abd. Girth Measurements, ? Lump Monitoring
   Enemas Are Usually Avoided In Acute Surgical Abdomen Conditions.
(B) Intensive Fluid Resuscitation: Correction Of Circulating Volume & Electrolyte Imbalance Supplementation Of Fluid Losses By Adequate Rations Of Appropriate Fluids In Consideration Of Vitals Monitoring, Intake/OutPut Charts, S. Electrolytes, Other Laboratory & Electronic Monitors Available.
(C) Medications: Appropriate Antibiotics (Broad Spectrum, Aminoglycoside, Anaerob AntiMicrobial Combination) In Adequate Dosage, Duration, In View Of Bacterial Flora, Epidemiology, C&S Reports (Blood, Urine, Peritoneal Aspirate Etc.), Is The Most Important Aspect Of Tt.
   Antacids(PPI, H2 Receptor Blockers Etc.)
   Analgesic, Anti-Inflammatory & ? AntiPyretics.
   B-Complex & Other Nutritional Supplements.
(D) Other Supportive Measures:


With Supportive Therapy Initiated, In Collaboration With PreAnaesthetic Check-Up, Prospects Of The Differing Extents Surgical Procedures, Are Meticulously Assessed, Evaluated & Discussed Finalized With Patient / Attendants For Their ‘Consent’ & Compliances.

With Discrete PreOperative & Or PerOperative Assessment, Appropriate Surgical Procedure Is Performed Amongst, [51,52,53,54,55,56,57]


Ileostomies Of Different Types: With Subsequent Elective Repairs.

Ileostomy Indications: Multiple Enteric Perforations At Different Levels Of Bowels, Rendering Simultaneous Closure Difficult Due To Multiplicity, Sites & Inflamed Infective Bowel Lengths With Jeopardized Viability.

Loop / Double-Barrel / Tube Ileostomy Has The Advantage Of Extra-Peritoneal Closure & Intra-Peritoneal Deposition, Without The Need Of II Stage Exploratory Laparotomy, As Needed For End-Ileostomy Cases.

However, During The Recent Course Of Present Study, Several Case With Variable Lengths & Viability Status Of Bowel, Due To Infection Inflammation Process Status, Have Been Successfully Treated Avoiding Ileostomy, By Maximal Dosage Regime Of Inj. Ceftriaxone 6-8 Gms /Day & Concomittant Use Of Inj. Oflox:800 Mgmts /Day Dosage & Anaerobs Anti-Micobials, Post-Operatively. Recently Useful Role Of AzithroMycin For Enteric Fever, Has Been Recommended (WHO).
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**ILEOSTOMIES VARIETIES**

**ILEOSTOMY SITE LOCALIZATION**

**LOOP ILEOSTOMY & LOOP END ILEOSTOMY**

**CONTIENT ILEOSTOMY**

**FIGURE-7**

**ENTERIC PERFORATION-SURGICAL PROCEDURES**

**T-Tube Ileostomy For Caecal And Colonic Perforation:** Wedge Resection And Simple Closure (Usually Sufficient For Commonest Occurring Solitary Caecal Perforation), Simple Closure And Ileostomy And Partial Colectomy With Colostomy. [40,41,42,43,44,45] **In Children:** Anatomically Narrow Terminal Ileum Compounded By Typhoid Enteritis, Cause Additional Challenges To The Security Of Repair.

**The InAdequacy Of Single Operation To Control ‘Source Control’,** In Patients With Secondary Peritonitis & The Recommended Yet Debated Role Of Ileostomy, As A First Line Operation Is Recommended In Severe Peritoneal Contamination Circumstances. With Advantages Of Enhanced Intestinal Decompression, Early Ileus Resolution & Enteral Feeding With Improved Healing, The Risk Of Re-Perforation Is Further Reduced By Combining Ileostomy With Resection. [46,47,48]

**Laprostomies:** Open/Closed Or Mesh Varieties, Sometimes Performed To Avoid Abdominal Compartment Syndrome (ACS) Etc.

**Laparoscopy:** "Definitive Role As New Procedure.

**Useful Role Of Cholecystectomy:** To Avoid Recurrence, Dissemination Of Disease. [58,59,60]

**FIGURE-8**

**LOOP ILEOSTOMY CLOSURE**

Muco-cutaneous Junction

Stapler Anastomosis

Mobilization: Excision

Suture Anastomosis

**LOOP ILEOSTOMY:**

Extra-Peritoneal Closure

ADVANTAGE OF AVOIDING RE-EXPLORATORY LAPROTOMY
CONSERVATIVE (NON-SURGICAL) MANAGEMENT METHODOLOGY

Indications: Perforation Peritonitis Cases, With Solitary/Multiple Perforations, With/Without Localized Peritonitis Adhesions, Involved Highly Inflamed Bowel Loops Of Different Lengths.


2. Severely Disturbed Hydration Status, To The Extent Of Oliguria/Anuria (ARF ↔ CRF), Derailed Renal Function Tests Non Reversible By Initial Intensive Fluid Therapy & Other Measures.


[FIGURE-9]

RADIO-DIAGNOSTIC (USG, CT …) GUIDANCE: POSTURAL SUPPORT ASSISTED, PERITONEAL DRAINAGE PROCEDURES


Comparative Statistical Analysis Evaluation Of Discussed Methodology, Demonstrated, Comparative Better Result Outcomes, In Regards To Mortality & Morbidity, Of Severe Enteric Disease Cases eg Old Enteric Peritonitis, With Associated Medical Problems.

IV RESULTS

The Historical LandMark Of ‘Chlamphenicol Discovery’ 1948, Followed By Gradual Improvement In The Understanding Of The Disease Pathogenesis And Progress In Areas Of Supportive And Surgical Care Led To Decline In Disease Morbidity & Mortality, Of Differing Statistical Extents, In Various Global Regions.


The Inferences Of The Present Study, A Comparative Statistical Analysis, Based Upon Clinico-Investigatory Assessment & OverAll Result Outcomes, Suggestive, “Overall Treatment Result Outcome Determinants”, Are Categorized As-

• Properly Timed Appropriate Surgical (Non/Minimally Invasive/ Open) Procedures, Competent Surgery-Anaesthesia Team, Minimizing & Dealing Involved Eventualities, In Well Equipped ‘Intensive Care Units’,
  With ‘Needed Supportive Measures’.

• Discretion For ?Operative Procedure Performed, In Appropriation Of Pt’s GC & Septicaemia Parametres.

• **Associated Medical Problems** Esp. HIV [74], Malignancy Etc., Previous Surgery, Paediatric Pts, Disease Duration & Previous Treatment Efficacy.

**In Accordance With Available Methods:** [73] Acute Physiologic And Chronic Health Evaluation II (Apache II) And Mannheim Peritonitis Index (MPI);

The Evaluated ‘Potential Risk Factors’ Include-
- **General Condition** ; Age (>40 Years)
- **Associated Medical Problems**, Chr. Debilitating Diseases Previous Surgery, Drug Allergy.
- **Disease Duration & Previous Treatment Efficacy, ? Use Of Steroids**
- **Type & Virulence Of Infection**, Peritoneal Contamination Dependent Upon Duration, Number, Location And Size Of Perforation, Compounded By Systemic And Metabolic Effects Of Pre-Existing Fever.
- **Septicaemia:** Vitals: High Fever >38.5°C, CVS, Respiratory Status, Urine Out Put: Oliguria, Anuria, Treatment Resistant ( ) U.O
- **Laboratory Indices:**- Hemoglobin Level <8 G/Dl, Elevated ESR, TLC, DLC; Leucocytosis-Absolute, Relative, Leukopenia<3,000WBC/µl. - Renal Function Tests; Ureaemia, Uricareaemia, ( ) S.Creatinine Values, Ratios - Liver Function Tests; Hepatosplenomegaly ? Hepato- Biliary Affections, Elevated Transaminase Levels >1.5 Times Normal Values.
- **Available Resources Circumstances:**
  - Laboratory Facilities; Especially For Comparative Monitoring For Serum Electrolytes, Renal Function Tests, Blood Sugar Levels Etc.
  - Proper Well Equipped Operation Theatre; Within Acceptable Asepsis Norms

**Experienced Surgical Team** With Competent Anaesthesia Support, To Minimize OverAll Surgery-Anaesthesia Trauma Stress By Optimal Timings & Dealing Involved Eventualities. Facilities For Other Supportive Therapies

V. **‘CONCLUSION’**


1. **Medical** (Meticulous Proper ?Appropriate Antibiotics Use, In Adequate Dose Duration, In Accordance With C&S-Peritoneal Aspirate & Or Blood)
2. **Non / Minimal Invasive Radio-Diagnostic Guided Postural Drainages**
3. **Meticulously Performed Judicious Surgical Procedures**, In Conjunction With Other Intensive Supportive Measures,

Hold The ‘Keys To Success’ For Typhoid Fever Progression, Perforation Management.

[75] ‘Over All Disease Control Strategies’, In Consideration Of Global Region Prevalence, Need To Aim Towards, Prevention Of Infection By Safe, Economical Yet Practically Achievable Measures Including Safe Water, Food Safety, Hygiene, Sanitation, Health Education & Vaccination Programmes.

**‘ACKNOWLEDGEMENTS’**

With Special Gratitude And Thanks,
For All The ‘Study Material Resources’ Consulted & Every Involved Personnel In The Surgical/Anaesthesia, Para-Medical Staff Team Especially Laboratory & Radio-Diagnostics Personnels,
For Constant Co-Operation ThroughOut, Managing Thousands Of Patients, In Available Resources Circumstances, SomeTimes In Very Difficult Situations, During Last More Than (2) Decades.
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