

Typhoid and Paratyphoid Fever in Children

Review of Symptoms and Therapy in 165 Cases

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ALTHOUGH the prognosis in typhoid and paratyphoid fevers has improved considerably with the advent of antibiotics, recent medical literature lacks clinical reports of large series of cases. This paper describes our considerable experience with hospitalized pediatric patients, and may serve an instructive purpose. Our experience with infant cases is the subject of a future report.

Case Material

We reviewed the data from 165 consecutive children hospitalized with typhoid or paratyphoid fevers over a 14-year period at the Nemazee Hospital, Shiraz, Iran. All diagnoses were based on positive blood cultures, or on serologic titers against the somatic typhoid O antigen rising to over 1:160, or both. Treated ambulatory patients were excluded from the analysis because of the incompleteness of clinical records.

Age distribution was as follows:

Years	Patients
2-4	40
4-6	38
6-14	87

Sex distribution, 102 boys and 63 girls for a male-female ratio of 1:6.

Ninety-one of our 165 patients came from Shiraz (population 100,000) or other urban communities in central Iran; 74 were from neighboring rural areas. A total of 121 were from poor socioeconomic backgrounds; the water supply in 83 homes was deemed unsani-

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TABLE 1. *Symptoms in 165 Children with Typhoid or Paratyphoid Fever*

Symptom	No. Patients	Per Cent of Total Patients
Vomiting	65	40.6
Headaches	63	39.3
Abdominal pain	59	36.8
Anorexia	59	36.8
Constipation	49	30.1
Cough	45	28.1
Chills	43	26.8
Diarrhea	33	20.6
Pain in back or extremities	15	9.3
Sweating	13	8.1
Epistaxis	7	4.3

tary. Only six had had previous typhoid-paratyphoid immunization.

The nutritional status was rated as adequate to good in only 53 of the 165 children; 88 fell below the third percentile for weight, and 42 were below the third percentile for both height and weight.

Clinical Features

All but 13 patients were actually ill on admission. The duration of symptoms before admission was less than two days in eight; two to seven days in 50; seven to 14 days in 56; and more than two weeks in 51. The average duration of illness before admission was 14 days—the shortest being ten hours, and the longest, 90 days. Ninety-three had received some antimicrobial therapy prior to hospitalization.

Thirty-seven children had no fever at the time of hospitalization, but 23 of these subsequently experienced a febrile course. The fever was remittent in 70 cases, and irregular

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TABLE 2. *Signs in 165 Children with Typhoid Paratyphoid Fever*

Sign	No. Patients	Per Cent of Total Patients
Splenomegaly	51	31.8
Abdominal distention	30	18.7
Lethargy	18	11.2
Dehydration	18	11.2
Nuchal rigidity	15	9.3
Rose spots	14	8.7
Sensorium disturbances (Irritability, confusion, debrium and stupor)	11	6.8
Abdominal rigidity	9	5.6
Coma	8	5
Jaundice	8	5
Congested throat	6	3
Convulsion	3	1.8
Opisthotonus	3	1.8
Trismus	1	0.6

or intermittent in the others. Relative bradycardia was found in nine patients. Tables 1 and 2 summarize the symptoms and signs in order of frequency.

Laboratory Findings

The 61 cases with positive blood culture included *Salmonella typhosa* in 31, *S. paratyphi* A in 32 and *S. paratyphi* B in eight. Stool cultures were taken in every patient, but only five were positive; three grew *S. paratyphi* A and two showed *S. paratyphi* B. A total of 138 patients showed rising serologic titers of 1:160 or higher against the somatic O antigen; titers against flagellar H antigen were inconsistent.

Total leukocyte counts were above 10,000/cu. mm. in 41 patients and greater than 15,000/cu. mm. in 12, with a range of 2,000

TABLE 3. *Typhoid and Paratyphoid Patients with Associated Complications*

Complication	No. Patients	Per Cent of Total Patients	Remarks
Pneumonia	12	7.5	All received penicillin and streptomycin in addition to chloramphenicol
Hemolytic anemia	11	6.8	Four had erythrocyte G-6-PD deficiency
Intestinal perforation	2	1.2	One admitted 30 days, the other 10 days after onset of illness; both had laparotomy and closure of perforation
Gastrointestinal hemorrhage	2	1.2	One hospitalized within 7 days, the other within 10 hours of onset of illness
Renal involvement	2	1.2	Both had albumin, red blood cells and casts in urine
Hepatic involvement	2	1.2	Liver biopsy in one patient revealed findings compatible with acute hepatitis; liver function tests were severely disturbed in both
Metastatic abscesses	2	1.2	Both due to <i>S. paratyphi</i> . A which grew from cultures of abscess—one in the elbow and the other at the left mandibular angle
Septic arthritis	1	6	<i>S. typhosa</i> grew from pus in the right hip joint
Osteomyelitis	1	0.6	Involvement of left femur; no organism grew from drainage fluid
Keratitis	1	0.6	The patient, a well-nourished 2½-year-old boy, had been ill for one week prior to admission
Traumatic rupture of spleen	1	0.6	Patient also had pneumonia and pleural effusion; successful splenectomy performed
TOTAL	37	22.7	

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TABLE 4. 20 Fatal Cases Among 165 Children with Typhoid and Paratyphoid Fevers

Age (yr.)	Sex	Duration of Illness before Admission (days)	Duration of Illness from Onset to Death (days)	Nutritional Status	Antibiotics before Admission	Cause of Death	Remarks
6	M	20	22	Poor	—	Perforation	Closure of perforation
10	M	6	14	Good	+	Perforation	Closure of perforation
8	M	20	21	Fair	+	Perforation	Closure of perforation
10	F	16	20	Poor	—	Perforation	Closure of perforation
14	M	7	15	Poor	—	Perforation	Closure of perforation
10	M	11	25	Poor	—	Perforation	Resection of ileum
12	M	10	30	Poor	—	Perforation	Closure of perforation
13	M	3	20	Poor	—	Perforation	Closure of perforation
4	M	8	14	Poor	—	Gastrointestinal hemorrhage	
3	M	8	28	Poor	—	Gastrointestinal hemorrhage	Autopsy revealed bleeding in renal pelvis and in stomach
2½	F	9	33	Poor	+	Cardiovascular collapse	
6	M	7	16	Poor	—	Cardiovascular collapse	
14	M	7	10	Poor	+	Cardiovascular collapse	Electrolyte disturbances
4	M	8	18	Poor	—	Hepatitis	Liver function severely disturbed
3	F	10	19	Good	—	? Encephalitis	Comatose through out hospital course; cerebrospinal fluid normal
4	M	9	11	Poor	+	Meningoencephalitis	Protein increased 7 and neutrophils and 3 lymphocytes present in cerebrospinal fluid
3½	M	20	21	Poor	+	Hemolysis	Electrolyte disturbances
14	M	15	21	Poor	—	Hemolysis	Uremia
4½	F	3	15	Good	—	? Tetanus	Trismus and convulsions with normal cerebrospinal fluid
4	M	15	22	Poor	+	Pneumonia	Electrolyte disturbances

to 46,000/cu. mm. Eosinophils were absent in all but eight children, but this was of no prognostic significance. Admission hemoglobin levels were below 10 Gm./100 ml. in 55 patients.

Lumbar punctures were performed in 35 children with nuchal rigidity or other central nervous system signs. The cerebrospinal fluid was abnormal in one child who died with clinical and laboratory evidence of encephalitis. Twelve had radiologic evidence of pneumonia, but salmonella organisms were not present in any nasopharyngeal cultures.

Treatment

One hundred forty-three patients recovered on chloramphenicol, 100 mg./Kg./24 hours, and three improved on ampicillin therapy. Sixteen patients received penicillin and streptomycin in addition to chloramphenicol because of associated complications. Forty-four required blood transfusions.

Of 151 febrile children, defervescence occurred within 48 hours in 25, within five days in 67 and within seven days in 20; 21 patients remained febrile for more than one week. The average duration of fever after admission for

patients who recovered was 4.7 days. It disappeared by lysis in 78 cases, by crisis in all others.

Corticosteroids were also used in two cases, one with hepatitis and the other with encephalitis; there was no apparent effect on the clinical evolution of the symptoms.

Prognosis

Table 3 summarizes complications in order of frequency. There were 20 deaths, for a mortality rate of 12.5 per cent; Table 4 summarizes the fatal cases.

Discussion

Our group was highly selected—only seriously ill children requiring hospitalization were included in this study. Our high frequency of complications and relatively high mortality rate reflect this fact. The majority of our patients had come long distances to Shiraz seeking medical care; thus, the disease was frequently in advanced stages when the children arrived.

The temperature curve generally was not characteristic, although a remittent type was frequent, and deferevescence was commonly by lysis. Bradycardia, rarely observed, cannot be considered a reliable index for exclusion of the disease.

Clinical manifestations in our patients resemble the experience of others with some notable exceptions: our relatively high frequency of rose spots and intestinal perforation or hemorrhage is in contrast to the experience of Indian authors;¹ our low incidence of cardiovascular collapse, however, is similar to their findings and to those in an African population.²

Leukocytosis was observed in about one-quarter of our patients, but anemia was common, perhaps reflecting the pre-illness nutritional status among our socioeconomically deprived patients. The high frequency of overt hemolysis (11 patients) probably reflects the high incidence of erythrocyte glucose-6-phosphate dehydrogenase deficiency among Iranians;³ enzyme assays proved this enzyme deficiency in four cases. The association between G-6-PD deficiency and hemolysis resulting from drug administration and infection is well known,⁴ and is under current investigation at our facility.

Our high incidence of pneumonic infiltrates is probably due to the poor condition of the children which facilitated secondary bacterial invasion.

Chloramphenicol treatment was generally successful resulting in rapid improvement within an average of five days. Corticosteroids in two desperately ill patients failed to prevent fatal outcome. Our high mortality rate compared to that of others⁵ may also be due to the far advanced disease state among our patients before hospital admission.

References

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Sounds Like LSD

BOYS USING TOBACCO.—A strong and sensible writer says a good, sharp thing, and a true one, too, for boys who use tobacco. It tends to softening and weakening of the bones, and it greatly injures the brain, the spinal marrow and the whole nervous fluid.

A boy who smokes early and frequently, or in any way uses large quantities of tobacco, is never

known to make a man of much energy, and generally lacks muscular and physical as well as mental power. We would particularly warn boys who want to be anything in the world, to shun tobacco as a most baneful poison. It injures the teeth. It produces an unhealthy state of the throat and lungs, hurts the stomach and blasts the brain and nerves. —*Arthur's Home Magazine, April 1867.*