Typhoid ileal perforation in children in Benin city

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ABSTRACT

Background: Typhoid ileal perforation is a common complication of typhoid fever, a multi-systemic infection, which is endemic in many developing countries. **Objective:** This study reviews and compares the incidence, morbidity and mortality at the University of Benin Teaching Hospital with other referral centres located in areas with similar socioeconomic and population status. **Materials and Methods:** The incidence, morbidity and mortality of typhoid ileal perforation in children treated among Edo People at the University of Benin Teaching Hospital, Nigeria, in the period from 1993 to 2007 were retrospectively studied and compared with centres in localities of similar socioeconomic and population status. **Results:** Twelve children, all of middle class parents who resided in suburban community with poor water supply and substandard sewage disposal, accounted for 70.6% patients with typhoid ileal perforation managed over 15 years while 29.4% occurred in adults. The children comprised seven males and five females (M/F ratio 1.4:1), aged between five and 13 (average 9) years. This number seen over 15 years in this centre was extremely low when compared with other referral centres; as many as 191 patients were seen over 10 months in one of the centres. The few patients seen were traced to cultural beliefs in Benin City, which influenced proper sewage disposal by the about four million Edo people, especially those living in rural areas. Consequently, no child from the rural area with clean natural water supply or urban areas with pipe born water supply where sewages are disposed of properly had typhoid perforation. Unacceptably high morbidity (100%) and mortality (75%) due to late referrals were recorded in comparison with other centres. **Conclusion:** Proper sewage disposal may have influenced the low incidence in this centre but early referral is advocated so as to reduce the high associated morbidity and mortality.

Key words: Children, ileal perforation, morbidity, mortality. typhoid

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INTRODUCTION

Typhoid fever is a multi-systemic infection which is transmitted through the feco-oral route by ingestion of contaminated food and / or water.[1] The infection is endemic in many developing countries such as Nigeria due to poor sewage disposal system, inadequate water supply and unhygienic environment.[1-3] The enteric involvement often results in ulceration of the Peyer's patches at the terminal ileum, which may progress to gut perforation. Typhoid ileal perforation is the commonest complication of typhoid fever associated with life threatening morbidities that require aggressive resuscitation and prompt surgical intervention.[1-5]

Although reported incidences are higher in developing compared to developed countries, current findings suggest seasonal variations in incidence within the same locality, variations in endemicity between different localities in a developing country as well as variations in endemicity between different developing countries.[2,3,6-8] The incidence and endemicity of typhoid fever is not known in all the local regions of Nigeria due to poor infectious disease database and the poor health seeking attitudes of the people who may prefer to patronize unorthodox practitioners with resultant low usage of orthodox medical healthcare facilities. The prevalence of typhoid ileal perforation, which cannot be managed at the primary and secondary healthcare facilities or by unorthodox means, may be accepted as a reflection of the endemicity of the disease in a locality.[2-8]

This 15-year retrospective study is based on children managed with typhoid ileal perforation among Edo People at the University of Benin Teaching Hospital. We seek to review and compare the incidence, morbidity and mortality in this centre with some other referral centres located in areas with similar socioeconomic and population status within and outside Nigeria.

MATERIALS AND METHODS

The University of Benin Teaching Hospital is a tertiary

hospital located in Benin City, Edo State in the South-South Geopolitical Zone of Nigeria. It serves as a referral hospital to about four million people of the State. Children diagnosed with typhoid ileal perforation were referred to the paediatric surgical centre of the hospital during the period. Detail history and documentation of source of water supply, sewage disposal system and environmental hygiene of confirmed cases were routine in the centre. This retrospective study is based on children treated with typhoid ileal perforation at the centre in the period from January 1993 and December 2007.

Data extracted from the case files and analysed using Statistical Package for the Social Sciences (SPSS) version 11 (SPSS, Chicago, 111) included age, place of residence, source of water supply, sewage disposal system, duration of illness before presentation, presenting signs and symptoms, clinical state on arrival, diagnosis, intraoperative findings, postoperative morbidity and outcome. Only cases of typhoid ileal perforation confirmed at operation have been included in the study. One child who was referred with suspected typhoid perforation was discharged against medical advice before surgery due to financial constraint. He was, therefore, excluded from the study. The incidence, pre / postoperative morbidity and mortality recorded were compared with those of some similar studies in other referral teaching hospitals in Nigeria and countries of similar socioeconomic and population status. The results are presented in simple tables and percentages.

RESULTS

Twelve children who accounted for 70.6% of 17 patients (five adults) with typhoid ileal perforation were managed in the centre over 15 years. They comprised seven males and five females with a male female ratio 1.4:1 who were aged between 5 and 13 (average 9) years. All belonged to middle class families and resided in suburban community with poor water supply and substandard sewage disposal systems. No children from rural areas with access to clean natural water supply (streams/springs) or those of urban areas with pipe born water supply and excellent sewage disposal systems were seen with typhoid perforation during the period. Eight (66.7%) of the children were indigenes who resided in the State while the remaining four (33.3%) were referred from neighbouring states on account of the illness.

An average duration of illness before presentation was 15.7 (range 5 to 32) days. Presenting signs and symptoms included fever, headache, abdominal pain/tenderness, distension, jaundice, diarrhoea, nausea/vomiting, anorexia, dehydration and weight loss which failed to respond to treatment by general practitioners. No child presented to the centre directly, as all of them were referred after failure to respond to treatment. Therefore, the time of typhoid ileal perforation was difficult to determine as they arrived after significant deterioration in clinical parameter. However, a combination of clinical, radiological and laboratory investigations findings on arrival were highly in keeping with gut perforation with bacterial peritonitis.

Table 1 shows the age, gender, morbidity and outcome of typhoid ileal perforation. All the perforations were located on the terminal ileum. Two (16.7%) children had single perforation, five (41.7%), multiple and five (41.7%) slough of the terminal ileum with significant faecal peritoneal contamination. Those with single perforation had excision of the edges of the perforation with primary double layer closures while the remaining children had resection and primary ileo-ileal anastomosis with proximal stoma created in two children. All the patients had antibiotics comprising amoxicillin and metronidazole, on arrival, but this was changed after operative confirmation of typhoid ileal perforation to pefloxacin/metronidazole, pefloxacin/gentamicin or augmentin/metronidazole based on sensitivity pattern from the laboratory. Hourly urinary output monitor, anti shock fluid regimen using 20 ml / kg of normal saline or ringers lactate administered over an hour, and assessment of sensorium were adhered to because majority of the children were in shock on arrival. This was followed by 100% maintenance fluid regimen while urea and electrolytes were corrected based on laboratory results with adequate maintenance added. In spite of this, the postoperative period was eventful in all the children as life threatening morbidity including wound infection, sepsis, endotoxic shock, enterocutaneous fistula, burst abdomen, typhoid psychosis, nutritional problems, fluid/electrolytes problem, respiratory complications and multiple organs failure were recorded as shown in Table 1.

Consequently, nine (75%) deaths were recorded, which occurred within three weeks of treatment while three (25%), comprising two girls and a boy, survived and were hospitalized for an average duration of two months. Among those who survived, following typhoid ileal necrosis, the two girls aged six and 12 years had postoperative anterior abdominal wall fasciitis that healed with resultant incisinal hernia, which was repaired a year after [Figure 1]. The only boy who

Table 1: Age, gender, duration of illness, postoperative morbidity and outcome of typhoid perforation

Age (years)	Sex	Duration of symptoms (days)	Perforation	Postop morbidity	Outcome
8	M	22	Multiple	Wound infection, enterocutaneous fistula	Died
5	F	15	Wide slough	Sepsis, endotoxic shock	Died
9	M	28	Single	Wound infection enterocutneous fistula, nutritional, sepsis	Died
12	F	17	Ileal necrosis	Anterior abdominal wall fasciatis	Incisional hernia, survived
7	M	32	Multiple	Nutritional, anaemia, sepsis, enterocutaneous fistula.	Died
11	M	5	Multiple	Enterocutaneous fistula, sepsis, nutritional.	Reoperated, survived
10	F	9	Multiple	Fistula, psychosis, nutritional	Died
13	M	17	Wide slough	Sepsis, multiple organs failure	Died
6	F	12	Wide slough	Wound infection, sepsis	Incisional hernia, survived
8	F	10	Single	Sepsis, multiple organs failure	Died
7.5	M	16	Multiple	Endotoxic shock, burst abdomen	Died
12	M	15	Ileal necrosis	Burst abdomen	Died

survived was an 11- year-old with multiple typhoid ileal perforations who had postoperative enterocutaneous fistula that failed to undergo spontaneous closure after three months of nonoperative treatment. He survived, however, after a successful surgical closure.



Figure 1: Dressing of postoperative anterior abdominal wall fasciatis following surgical management of typhoid ileal perforation in a 12-year-old girl. She survived but had incisional hernia, which was successfully repaired a year after.

As shown in Table 2, the incidence, postoperative morbidity and mortality following typhoid ileal perforation over 15 years in this study was compared with other studies done during the last 15 years in other referral hospitals in Nigeria and some countries of similar socioeconomic status. The lowest number of 12 children in 15 years (0.8 per year) was recorded in this centre located among Edo people of Southern Nigeria but associated morbidity (100%) and mortality (75%) were unacceptably higher than other centres.

DISCUSSION

This study conducted in a centre located in a densely populated Edo State revealed a low incidence but high morbidity and mortality following typhoid ileal perforation, which is at variance with reports from other studies in centres located in similar

Table 2: Incidence, postoperative morbidity and mortality of typhoid ileal perforation in present study and other studies in referral centres in similar localities within and outside Nigeria

Authors	Place of study	Years of study	Number of patients	Postoperative morbidity (%)	Mortality (%)
Rahman *et al.*	Western Nigeria	1984-1999	106	56	23.8
Ameh EA	Northern Nigeria	1989-1998	64	53	39
Uba *et al.*	Central Nigeria	1996-2005	184	—	22.8
Ekenze *et al*	Eastern Nigeria	2001-2006	83	90.2	25
Oheneh-Yeboah M	Ghana	2002-2005	248	49.3	10.9
Ekenze *et al.*	Eastern Nigeria	1995-2004	89	46.1	19.9
Edino *et al.*	Northwestern Nigeria	2004-2006	53	49.1	15.1
Kouame *et al.*	Cote d'Ivoire	1995-1998	64	88.1	34
Saxe *et al.*	Togo	Jan-Oct 2003	191	58.6	16
Ahmed *et al.*	Pakistan	1998-2000	31	—	12.5
Meier *et al.*	Western Nigeria	1994-1997	75	29.3	20
Honorio-Horna *et al.*	Peru	1996-2000	126	80.2	19.8
Present study	Southern Nigeria	1993-2007	12	100	75

localities.[1-14] The causative organism (*Salmonella typhi*) is passed into the environment via the faeces of sufferer and carrier.[1] Improper disposal of salmonella laden faeces results in food and water contamination, especially in areas with poor water supply and among people of poor environment / body hygiene as is prevalent in many developing countries.[1-3] Ingestion of such contaminated water and or food liberates the bacteria in the gut where they invade the bowel wall through Peyer's patches in the terminal ileum culminating in typhoid fever, a multisystemic disease. This cycle of transmission has been broken in developed countries due to excellent hygiene and environmental sanitation. The endemicity of typhoid fever may, therefore, be a reflection of the sanitary habit of the people as reported earlier.[2,3]

Typhoid ileal perforation is the commonest complication which occurs as a result of extension of Peyer's patches ulceration following the bacterial invasion. The prevalence of typhoid perforation has earlier been reported as an indication of the endemicity of typhoid fever in any locality.[2-8] The exact time of ileal perforation was not known in this study although this is usually reported to occur at the third week of infection.[1,15] Earlier studies[1-5] show that ileal perforation occurred much earlier in developing countries and a range of one to two weeks of symptoms before ileal perforation were reported, which agreed with 15 days mean duration of illness before presentation with perforation in this study. The reason for earlier perforation in developing countries is unclear. With perforation, ileal contents with bacteria, especially *Escherichia coli,* leak into the peritoneal cavity with consequent generalized peritonitis.[1]

The lowest number of children with typhoid ileal perforation was recorded in this study on a comparative analysis with other studies[2-4,6,8-14] from referral centres in similar localities. The reason for this is not known but could be due to the influence of cultural practice on the Edo people, which regards it a taboo for the faeces passed by one person to be seen by another. Body contact, directly or indirectly, with faecal matter is also regarded as defilement. Consequently, an average Edo person imbibes sewage disposal systems which may be better than those of people of other cultures, as seen when results were compared. It is seen that Edo people, including children, even in the rural areas where toilet facilities are situated far from residential areas, wash hands thoroughly after defecation. Perhaps this is confirmed in this study because no child from rural areas where this practice is still fully embraced, and who have access to clean natural source of water supply (streams/springs) presented with typhoid perforation during the period. Of the children, treated four (33.3%) were referred from other States (different cultural settings) while the remaining eight (66.7%) were among those living in suburban communities with poorer water and sewage disposal systems. No case was also seen among urban children with potable water supply and adequate hygiene as also reported by other authors.[1] Colonic perforation and children less than five years with typhoid ileal perforation were also not seen in this study unlike other studies in which they accounted for a large percentage.[9,16]

Despite the lower incidence, however, this study recorded the highest pre/postoperative morbidity (100%) and mortality (75%) in comparison with others.[2-4,6,8-14] Again, the reason for this is not clear but previous authors[1] reported that the morbidity and mortality following typhoid ileal perforation was a direct effect of the immunity of the people and the virulence of the bacteria. Immunity on the other hand was reported as a reflection of the endemicity of the disease with persons in endemic regions having more resistance to the disease and a higher chance of survival. This may be the scenario in this study as all the complications recorded in other studies were exaggerated with attendant unacceptably high mortality. Moreover, the late referral of the children with the majority in shock on arrival may have significantly influenced the poor outcome recorded in this study. Nevertheless, the fewness of children treated in this series may not support a concrete conclusion. Late referral of children was due to low index of suspicion as no case was correctly diagnosed before presentation. This allowed for significant deterioration in clinical parameters before referral as similarly reported by others.[17,18] The three survivors in this series had a protracted illness and were hospitalised for an average of two months, which is at variance with other studies where hospitalisation duration ranged between two and three weeks.[1-14] Various chemotherapeutic agents including chloramphenicol, amoxicillin, augmentin, and the quinolones as well as various surgical options have been described for the management of typhoid perforation. The superiority of one regimen over the other was difficult to see in this and other studies.[19-23]

Is typhoid fever without perforation similarly low, did people in the sub region have alternative means of treating typhoid perforation, did majority of the children die in rural centres before referrals and do Edo people have higher resistance against typhoid ileal perforation? These are limitations of this study which

require further research.

In conclusion, despite the low incidence of typhoid ileal perforation there was unacceptably high morbidity and mortality in this centre. The low incidence may have been due to cultural beliefs which resulted in proper sewage disposal, and the poorer outcome may be due to the low immunity of the people and late referral of affected children. There is a need to encourage beneficial practice of the people as well as a need for medical practitioners in the locality to be suspicious of typhoid perforation in children with fever and abdominal pain. Early referral with prompt and adequate management of affected children will reduce associated morbidity and increase the chance of survival.

REFERENCES

1. Archampong EQ, Tandoh JF, Nwanko FA, Badoe EA, Foli AK, Akande B, *et al*. Surgical problems of enteric fever. 2nd ed. Principles and Practice of Surgery Including Pathology in the Tropics In: Badoe EA, Archampong EQ, Jaja MO, editors. Ghana: Ghana publishing corporation; 1994. p. 602-4.
2. Ameh EA. Typhoid ileal perforation in children: A scourge in developing countries. Ann Trop Paediatr 1999;19:267-72.
3. Uba AF, Chirdan LB, Ituen AM, Mohammed AM. Typhoid intestinal perforation in children: A continuing scourge in a developing country. Pediatr Surg Int 2007;23:33-9.
4. Rahman GA, Abubakar AM, Johnson AW, Adeniran JO. Typhoid ileal perforation in Nigerian children: An analysis of 106 operative cases. Pediatr Surg Int 2001;17:628-30.
5. Archibong AE, Ikpi EE, Enakirerhi G, Okoronkwo C. Typhoid enteric perforation in children in Calabar, Nigeria. J Med Lab Sci 2003;12:41-2.
6. Oheneh-Yeboah M. Postoperative complications after surgery for typhoid ileal perforation in adults in Kumasi. West Afr J Med 2007;26:32-6.
7. Abantanga FA. Complications of typhoid perforation of the ileum in children after surgery. East Afr Med J 1997;74:800-2.
8. Kouame J, Kouadio L, Turquin HT. Typhoid ileal perforation: Surgical experience of 64 cases. Acta Chir Belg 2004;104:445-7.
9. Ekenze SO, Ikefuna AN. Typhoid intestinal perforation under 5 years of age. Ann Trop Paediatr 2008;28:53-8.
10. Ekenze SO, Okoro PE, Amah CC, Ezike HA, Ikefuna AN. Typhoid ileal perforation: Analysis of morbidity and mortality in 89 children. Niger J Clin Pract 2008;11:58-62.
11. Edino ST, Yakubu AA, Mohammed AZ, Abubakar IS. Prognostic factor in typhoid ileal perforation: A propective study of 53 cases. J Natl Med Assoc 2007;99:1042-5.
12. Saxe JM, Cropsey R. Is operative management effective in treatment of perforated typhoid? Am J Surg 2005;189:342-4.
13. Ahmed HN, Naiz MP, Amin MA, Khan MH, Parhar AB. Typhoid perforation still a common problem: Situation in Parkistan in comparison to other countries of low human development. J Pak Med Assoc 2006;56:230-2.
14. Meier DE, Tarpley JL. Typhoid intestinal perforation in Nigerian children. World J Surg 1998;22:319-23.
15. Atamanalp SS, Aydinli B, Oztuk G, Oren D, Basoglu M, Yildirgan MI. Typhoid intestinal perforations: Twenty-six year experience. World J Surg 2007;31:1883-8.
16. Chang YT, Lin JY, Huang YS. Typhoid colonic perforation in children. World J Surg 2006;30:242-7.
17. Adesunkanmi AR, Ajao OG. The prognostic factors in typhoid ileal perforation: A prospective study of 50 patients. J R Coll Surg Edinb 1997;42:395-9.
18. Honorio-Horna CE, Diaz-Plasencia J, Yan-Quiroz E, Burgos-Chavez O, Ramos-Dominquez CP. Morbidity and mortality risk factors in patients with ileal typhoid perforation. Rev Gastroenterol Peru 2006;26:25-33.
19. Adesunkanmi AR, Ajao OG. Typhoid ileal perforation: The value of delayed primary closure of abdominal wounds. Afr J Med Med Sci 1996;25:311-5.
20. Javaid K, Dab RH, Rathore AH, Ahmad G. Typhoid perforation treated with and without metronidazole along with chloramphenicol, gentamycin. J Pak Med Assoc 1996;46:49-50.
21. Williams SJ 2nd. Validation of aggressive surgical approach to intestinal typhoid perforation: A 'new' and useful physical sign of peritonitis. Am J Surg 2006;191:566.
22. Mock C, Visser L, Denno D, Maier R. Aggressive fluid resuscitation and broad spectrum antibiotics decrease mortality from ileal perforation. Trop Doct 1995;25:115-7.
23. Ameh EA, Dogo PM, Attah MM, Nmadu PT. Comparison of three operations for typhoid perforation. Br J Surg 1997;84:558-9.

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