



Clinical case

Intussusception in children: epidemiological, diagnostic and therapeutic aspect in Côte d'Ivoire

Aspects épidémiologiques, cliniques et thérapeutiques de l'invagination intestinale de l'enfant en Côte d'Ivoire

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Résumé

Contexte : la surveillance de la survenue de l'invagination intestinale aiguë chez les enfants a débuté depuis l'implémentation du vaccin contre le Rotavirus en Côte d'Ivoire. Cette étude visait à décrire les caractéristiques épidémiologiques des intussusceptions chez les enfants, en période pré et post-vaccination, en Côte d'Ivoire.

Méthodologie : les données sur l'intussusception pré-vaccinale étaient rétrospectives et les données post-vaccinales étaient prospectives. Sur les deux périodes, les principales données épidémiologiques avaient concerné, le total des cas enrôlés, et, le sex-ratio, l'âge, la répartition saisonnière, le taux de chirurgie et de désinvagination radiologique pour le traitement, et le taux de mortalité. En période pré-vaccinale nous avons étudiés l'infection associée. Dans la période post-vaccinale, le statut socio-économique des parents, le délai entre l'admission dans le premier établissement et l'admission dans l'établissement de surveillance, le délai entre l'apparition des symptômes et l'admission dans l'établissement de surveillance, les critères diagnostiques d'invagination (cliniques,

échographiques et chirurgicaux) ont également été étudiés.

Résultats : un total de 44 intussusceptions a été enrôlé dans la période pré-vaccinale sur 11 ans, et 48 cas ont été enrôlés dans une période de surveillance de 2 ans et 6 mois. La fréquence annuelle de l'intussusception pré-vaccinale était de 3,8. Au cours de la période post-vaccinale, le nombre moyen de jours entre l'admission dans le premier établissement et l'admission dans l'établissement de surveillance était de 3,29 jours, allant de 0 à 14 jours. Le nombre moyen de jours entre l'admission dans le premier établissement et l'admission dans l'établissement de surveillance était de 3,29 jours [0-14 jours]. Le diagnostic était échographique dans 100%. En période pré-vaccinale le traitement était chirurgical dans tous les cas. Dans la période post-vaccinale, la chirurgie avait été pratiquée dans 96 % des cas contre 4 % de désinvagination radiologique. La résection intestinale était indiquée dans 41,66 %. Le taux de mortalité était respectivement de 15 % et 12,5% en période pré et post-vaccinale.

Conclusion : la surveillance de l'invagination après

l'introduction du vaccin contre le Rotavirus en Côte d'Ivoire a amélioré le suivi des données sur l'invagination. Le traitement résolument chirurgical reste encore pourvoyeur d'une mortalité postopératoire élevée. Le renforcement de la surveillance peut être utile à la prise en charge précoce de l'invagination intestinale dans notre contexte.

Mots-clés : Enfants ; Diagnostic ; Épidémiologie, invagination intestinale ; Traitement.

Abstract

Background: Intussusception monitoring data are collecting since the Rotavirus vaccine implementation. This study aimed to describe epidemiologic characteristics of the intussusceptions in children, in pre and post-vaccine periods, in Cote d'Ivoire.

Methodology: Pre-vaccine intussusception data were retrospective, and post vaccine data were prospective.

In the two periods, the main epidemiology data had concerned, the total cases enrolled, and, the sex distribution with the sex ratio, the age, the average age, the seasonal distribution, the rate of surgery and enema for the treatment, and the mortalities rates. Particular data in pre-vaccine period involved the associated infection. In post vaccine period particular data involved parents socio economic status and, the average number of day between admission to first facility and admission to surveillance facility, the average number of days between symptom onset and admission to surveillance facility. The proportions of the symptom, the enema, the ultrasound, and surgery for intussusception diagnosis were also estimated.

Results: A total of 44 intussusceptions were enrolled in pre vaccine period over 11 years, and 48 cases were enrolled in 2 years and 6 months' period of surveillance. Pre-vaccine intussusception annual frequency was 3,8 hospitalizations per year. In the post vaccine period, average of days between admission to first facility and admission to surveillance facility was 3,29 days, range to 0-14 days. Ultrasound done the diagnosis in 100%.

Surgery was requiring in the treatment of all the cases before vaccine implementation. In post vaccine period

surgery had been performed in 96% cases versus 4% enema for intussusception reduction. Intestinal resection was indicated in 41,66%. The death rate was respectively 15% and 12,5% in pre and post vaccine period.

Conclusion: Post vaccine intussusception surveillance in Cote d'Ivoire had improved intussusception data monitoring. Surgical procedure with intestinal resection remains the main treatment with a high post-operative death. Strengthening surveillance may be helpful in intussusception early diagnosis, for an enema with lower mortality.

Keywords: Children; Diagnosis; Epidemiology, Intussusception; Treatment.

Introduction

Intussusception is the invagination of one intestine segment at the more distal portion leading to bowel obstruction resulting in intestinal ischemia and possibly perforation [1]. Intussusception is the common cause of paediatric surgical emergency [2,3,4]. The incidence has a variable distribution according to the age, which is higher in infants aged between 0 to 11 months [5]. Regional variability is also seen with the median (range) annual incidence of 34 (13–56) intussusception hospital admissions per 100 000 aged <1 year from in Africa to 90 (9–380) in the Western Pacific region [6].

The pathogenesis is not clearly elucidated and considered as an idiopathic condition, however some contributing factors are described. Previous studies had reported that pathological lead points, such as Meckel's diverticulum, duplication, polyp and tumours, can lead to recurrent intussusception in children (7). Some rare causes as Burkett's lymphoma or Ebola virus had been observed in intussusception pathogenesis (8,9). In 2013, WHO recommended introduction of rotavirus vaccines in all immunization programs (10). Thereafter, Cote d'Ivoire government adopted the guidance of the global vaccine action plan (GVAP) 2011-2020 which

recommends the introduction of new vaccines in national programs. The Rotavirus vaccine has been introduced in the national vaccination programs on the 6th of March 2017. Nevertheless, rotavirus vaccination may be associated with serious side effects like intussusception (11). Before, vaccine implementation, a retrospective monocentric data of intussusception has been performed at the pediatric surgery department at the teaching hospital of Yopougon (Abidjan; Cote d'Ivoire). Since the vaccine implementation, this department ensures a permanent intussusception monitoring based on the individual data collecting form. This study aimed to describe epidemiologic characteristics of the intussusceptions for children, pre and post-vaccine periods, in Cote d'Ivoire.

Methodology

The intussusception epidemiology data was collected in two periods. The first period was the pre-vaccine data over 11 years starting January 2004 to December 2015. The data was collected from the medical record of the children admitted for intussusception at the general pediatric surgery in the teaching hospital of Yopougon in the north of Abidjan: Cote d'Ivoire.

In this previous report, epidemiologic data were related to the total number of the patient, the age and the average age, the sex-ratio, the annual frequency, the seasonal distribution, the distribution according to the age at the admission. The proportion of associated infections was estimated, and proportions of their etiology has been calculated. The rates according to the surgical procedures for the treatment and the mortality were calculated.

The second period involved the post-vaccine data based on the individual collecting data form. Twenty general and pediatric surgeons, and 50 pediatricians have been trained for collect data on the intussusception collecting data form. The sentinel site of intussusception is at the teaching hospital of Yopougon at the north of Abidjan. Nineteen regional and district hospitals were also involved in surveillance.

All children eligible for RotaTeq vaccination were under surveillance for intussusception. The cases of intussusception were defined according to Brighton criteria. The surveillance began since March, 6th date of implementation of Rotateq in Cote d'Ivoire.

The data was collected using Epi info 7.0 Software. Forty height patients were enrolled over 28 months of surveillance. Post-vaccine epidemiology data reviewed included the sex ratio, the age, the average age, and the average of the weight. Trends of admission according to the month over the surveillance were estimated. The parents' socio economic status was evaluated using the data form check list according to the employment status, the room and the number of dependents, electricity bill; radio; television; refrigerator; bicycle; motorcycle; car; telephone, and computer in the house. We calculated the number of children transferred from another facility, the average number of days between admission to first facility and admission to surveillance facility, the average number of days between symptom onset and admission to surveillance facility. The proportions of the symptom, the enema, the ultrasound, and surgery for intussusception diagnosis were estimated. The outcome was evaluated with the proportions of the patient discharged, the patient transferred, and the death rate.

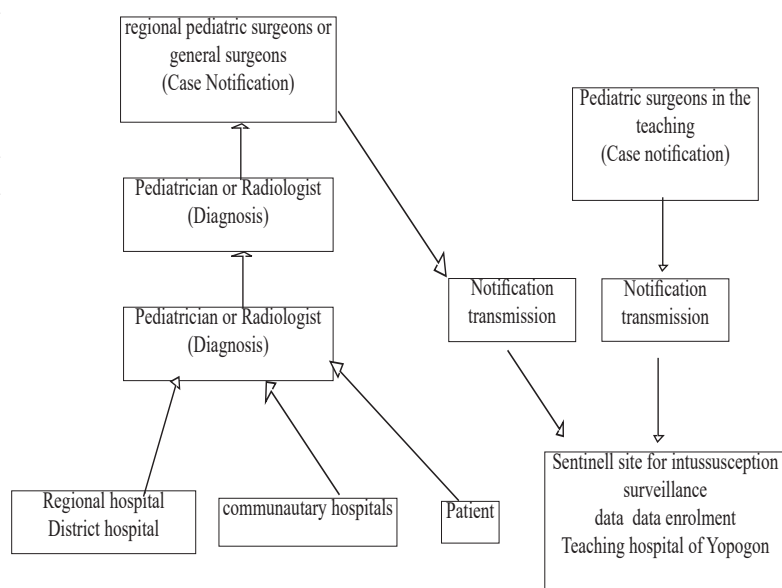


Figure 1 : Cases notifications circuit from the others surveillance sites to the sentinel site.

Results

Retrospective data of intussusception January 2004 to December 2015

Forty-four intussusceptions were treated over 11 years, the annual frequency was 3.8, with more cases in April (figure2).

The sex ratio was 2,3 and, the average age was 12 months, ranging from 5 to 30 months (figure3).

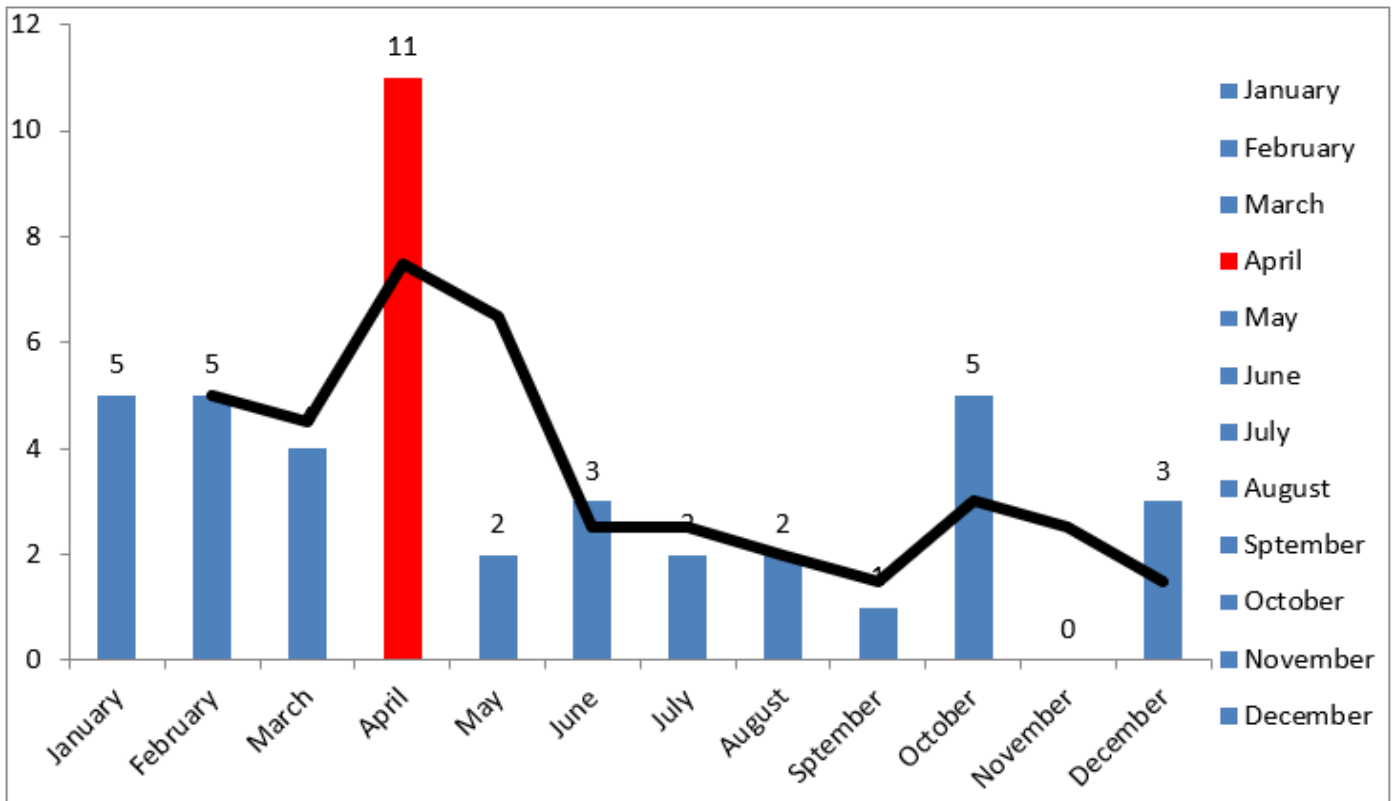


Figure 2: Cumulative intussusception incidence according to the month of admission over the eleven years: there were more cases in April.

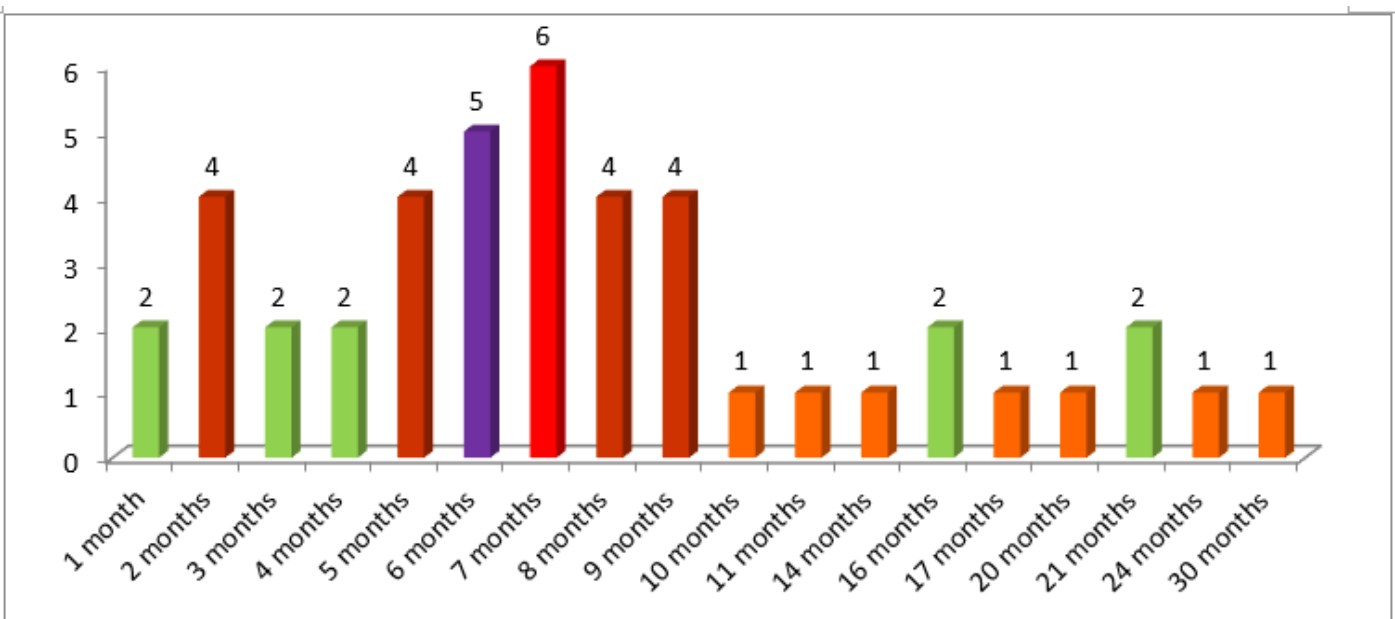


Figure 3: Intussusceptions distribution according the age of admission : Intussusception are common at 5 months age to 9 months with a peak at 7 months.

Infections were associated to the intussusception at the admission in 48,3%, with 63% gastro enteritis and 32% rhino-pharyngitis. All the cases required surgery, complete reduction has been performed in 61% and, intestinal resection with colostomy in 31%. The mortality rate was 15%.

Prospective data since intussusception surveillance March 26th, 2017.

A total of 48 patients treated for intussusception (figure 4). The data concerning socio economic status of the parents are summaries in table 1.

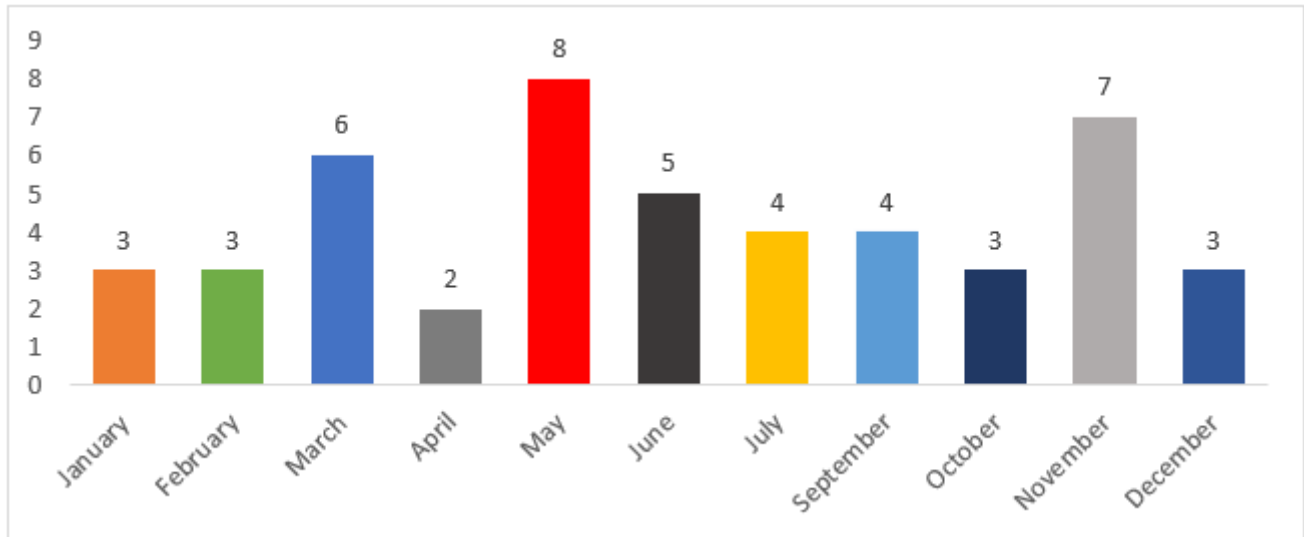


Figure 4: Trends of the forty height cases of intussusception admissions according the months over the period of surveillance, the trends was higher in May.

Table 1: Socio economic status of the parents

Criteria	N (%)
Employment	45(93,6%)
Room	Average number of the room 3 range 1 to 6
People	Average number of people 5,6 range 3 to 12
Electricity	42(87,50%)
Radio	26(54,16%)
Television	43(89,58%)
Refrigerator	28(58,33%)
Bicycle	19(39,58%)
Motorcycle	6(12,5%)
Car	11(23,92%)
Telephone (mobile phone)	42(86,95%)
Computer	24(50%)

The median age was 5 months (table 2). The sex ratio was 1,66. The average number of day between symptom onset and admission to surveillance facility was 4,5 days (0-15 days). The average number of days between admission to first facility and admission to surveillance facility was 3,29 days (0-14 days). The diagnosis, treatment and outcome was summarises in table 2.

Table 2: Sociodemographic, diagnosis, and treatment characteristics of intussusception cases

	N= (%)
Age distribution	
0-2 months	3 (6,25%)
3-5 months	20 (41,67%)
6-8 months	18 (37,5%)
9-11 months	7 (14,58%)
Diagnosis of Intussusception*	
Clinical diagnosis	48 (100%)
Enema	2 (4)
Ultrasound	48(100%)
Surgery	46 (96)
Treatment of Intussusception	
Enema	2 (4%)
Surgery	46 (96 %)
Intestinal resection	20 (41,66%)
Outcome	
Discharged home	42 (87,5%)
Transferred	0%
Died	6 (12,5 %)

Discussion

The pre and post vaccine epidemiology data of intussusception confirm the male predominance this condition, the sex ratio was 2,3 in the previous data and 1,66 in the current data. Male had higher risk of intussusception [3,4,12, 13]. The average age was 7 months range 5 to 9 months (Figure 2). The average age can vary, the average age in Iran was found to be 19,57 months [3].

The intussusception admissions rate fluctuated throughout the surveillance period. Trends of intussusception hospitalization were higher in April (Figure 2), but these trends were not confirmed in the post-vaccine period, admissions were higher in May (Figure 4). In Ethiopia, the highest peak was in the month of June (14), while in Zimbabwe the peak incidence was in September [15]. The fluctuation in the rate of admission may be associated with the meteorological factors, such as the increase of the mean temperature [12]. In Cote d'Ivoire, the rainy season goes from April to July, and the temperature becomes

cooler than the month of February which is much warmer.

The socio-economic status impacts patient treatment and management outcome as there is no universal medical insurance in Cote d'Ivoire and patients are responsible for their own medical costs. This result in intussusception mortality rates remaining high with 15% in the pre-vaccine period and 12,5% at intussusception surveillance. Several other factors negatively impact the outcome. First, the delay at diagnosis, the average number of days between symptom onset and admission to surveillance facility is too long, 4,5 days. The delayed diagnosis is common in Africa, at the University College Hospital, Ibadan, Nigeria, patients who presented within the first 24 h of onset of symptoms were 25,5% while the majority presented between 2- and 3-days post onset of symptoms [16]. The delay at diagnosis compromised the vascular supply of the bowel, leading to ischemia and perforation [1]. In Cameroon, a prolapsed ileocolic intussusception diagnosed 5 days after the onset of symptom caused a necrosed intussusceptum [17]. Intestinal perforation required surgery with

intestinal resection in most intussusception cases in Africa [16,17]. In the pre-vaccine data, surgery was required in 100% cases with 31% intestinal resection versus 96% surgery with 41,66% intestinal resection in the surveillance period. The delay caused hydro electrolytic disorder with hypovolemia and sepsis as a result of the intestinal perforation that may be due to multivisceral defects. With an intensive resuscitation, the immediate post operative period can be uneventful, but overwhelming sepsis could increase the risk of death [17].

Early disease diagnosis in developed countries allows enema to be the primary treatment of the intussusception. Enema was performed in two patients presented at the first 24h of onset of symptom. Ultrasound-guided hydrostatic reduction (UGHR) implementation is recommended because it is most suitable alternative for the treatment of childhood intussusception [18,19]. UGHR would be a safe procedure in which the operative reduction was achieved with no mortality reported, however, intestinal perforation can occur during the reduction (19). Routine intussusception surveillance since vaccine implementation, had enhanced data enrolment however we lose data. There is a poor notification cases from the district and regional hospital. We did an audit of the poor data with a national supervision, and the main observation was the lack of awareness among physicians about the surveillance of intussusception in all the regional and district hospital. The physicians who had been trained for intussusception surveillance did not relay the awareness about surveillance procedures. The cases notification is better in the sentinel site than in the other teaching hospital sites because some of pediatric surgeons do not know how to use the notification form. We advise completion of the case notification form done before surgery, preferably during the emergency care but surgeons forget it. In the sentinel site, the cases are mainly applied by the data managers who are not always on duty at the time of admission to surveillance facility. This showed that the case notification is not yet a routine activity for the surgeons as their primary

objective might be patient management. We hope to enhance quality of data by training all the surgeons of the teaching hospital to apply the notification form. We also need to decrease the poor notification from the regional hospitals with awareness and training at their respective their hospitals, and may be enhance the sharing of the notification forms with computer and scanner dotation in the regional et district hospitals.

Conclusion

The routine intussusception surveillance in Cote d'Ivoire has improved intussusception data monitoring. We surely lose data because of the poor collaboration of the regional hospitals. To improve data quality, we need all the physicians in the teaching and regional hospitals to have updated information, awareness and training. The mortality rate remains high, possibly because of the delay of the diagnosis which leads to aggressive surgical procedure with intestinal resection. Mortality rate also remains high this may be because total parenteral nutrition requiring to improve intestinal resection prognosis.

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Conflict of interest : None

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