Seasonal variation of primary small intestinal volvulus in North Western Ethiopia

K Ghebrat MD
Associate Professor of surgery
Department of Surgery
Gondar College of Medical Sciences,
P.O.Box 196, Gondar, ETHIOPIA.

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Primary small bowel volvulus is one of the commonest causes of small intestinal obstruction in parts of Africa[1,2]. Some authors have reported that its occurrence has some seasonal variations though their findings were inconclusive[1,3,7]. A retrospective study was undertaken over a period of 8 years at the Gondar College of Medical Sciences Hospital in which the seasonal pattern of small bowel volvulus presentation was analysed. It was observed that the prevalence was significantly higher during the months of June through October (winter and spring) than during the months of November to May (autumn and summer)(chi-square, $p<0.001$). With the month of November as a baseline, the study revealed a chi-square for linear trend of 35.54 ($p<0.001$) with an increasing odds ratio for subsequent months.

Although the reasons for the seasonal variations are uncertain, the seasonal activities of the young farmers, who are more commonly affected, may be responsible[1,3].

Introduction

Small bowel volvulus is the commonest cause of small intestinal obstruction in our region[1,3]. Its diagnosis is based only on the intra-operative findings for its clinical presentation is the same as that of other causes of small bowel obstruction[3]. Hence its preoperative diagnostic accuracy is usually low[1,4,5,6]. At times, especially during the onset of the illness, it may simulate intestinal parasitosis, a relatively less dangerous abdominal condition. This can lull a health worker who is at the first line of the health care system where diagnostic facilities are scarce. This may result in a delay of diagnosis and treatment of the disease. This therefore calls for a high index of suspicion, which is the mainstay of early diagnosis of primary small intestinal volvulus[1,3]. Knowledge of the epidemiology and temporal characteristics of the disease helps to have the required high index of suspicion so as to institute prompt management.

Previous studies done in Ethiopia and elsewhere have traced some seasonal variation in the occurrence of primary small bowel volvulus. However those studies were all of short duration and therefore inconclusive[1,3,7].

The purpose of this study was to establish whether there was any significant seasonal variation of the occurrence of the small bowel volvulus presenting at the Gondar College of Medical Sciences Hospital in North Western Ethiopia.

Patients and methods

A retrospective study of the monthly emergency admissions at the Gondar Medical Sciences Hospital from July 1990 to August 1998 was undertaken. The Hospital is a referral centre for the North Western region of Ethiopia. Information was retrieved from the registration book of the operating theatre and the patients' records. All the emergency cases were recorded by their months of admission for the eight consecutive study years. Admissions due to primary small intestinal volvulus were categorized and their monthly admission pattern noted. Primary small volvulus was diagnosed at laparotomy if torsion of the mesentery resulted in a closed loop obstruction of the ileum and/or jejunum with no obvious anatomical causes.

A computer statistical package Epi - Info version 5 was used to analyse the data. An ordinary chi-square test and chi-square for linear trend were applied for analysis of the data. The extended Mantel-Haenszel chi-square and p-value was the output in the analysis for linear trend. A p-value less than 0.005 was taken as a reasonable indication of the trend in the odds of successive levels compared with the base line. On the basis of the previous observations[1,3] and the fact that it is the month with the least number of admissions next to the month with higher admissions of primary small volvulus cases, the month of December was considered as a base line for the monthly trend analysis. For the same reason autumn was considered as a base line for the seasonal trend analysis.

Results

In the eight-years period, admissions for primary small bowel volvulus were more during the rainy seasons, that is, through June to October.

Table 1 Total emergency and primary small intestinal admissions at Gondar Hospital

Month	Total no. of emergencies	Small bowel volvulus
January	488	7
February	566	6
March	527	5
April	547	7
May	557	6
June	537	12
July	509	12
August	593	21
September	480	24
October	423	20
November	444	7
December	516	6

Admissions reached the peak at the end of the rainy season that is August, September and October. This variation, apparently independent of the total number of emergency admissions, is shown in Table 1.

the linear trend in proportion revealed an increasing odds ratio of the subsequent month with a chi-square for trend of 35.54 ($p<0.001$). In this region, months of December, January and February constitute autumn; March, April and

Table 2 Seasonal variation of primary small bowel volvulus at Gondar Hospital 1990-1999

Season	Small bowel volvulus cases	Other emergencies	Odds ratio (@)
Autumn *	19	1551	1
Summer **	18	1613	0.91
Winter ***	45	1594	2.30
Spring ****	51	1296	3.21

p-value for trend test <0.001.

*Autumn (December, January, February) **Summer (March, April, May)
*** Winter (June, July, August) **** Spring (September, October, November)

Statistical analysis of the results:

The ratio of patients admitted with primary small intestinal volvulus to the emergency surgical admissions month by month, was not constant throughout the year. A chi-square was used for goodness of fit ($p<0.001$).

When the five consecutive months in which admissions for primary small bowel volvulus were high (June, July, August, September and October) were compared with the five consecutive months in which the admissions for the same condition were low (November, December, January, February and March) or (January, February, March, April and May), the difference was highly significant. The data was analysed using a four fold chi-square test: *chi-square 31.02, d.f =1, p<0.001 for January - May; chi-square 27.71, d.f =1, p<0.001 for November - March.*

Taking the admissions of the month of November as a base line, a monthly analysis for

May, summer; June, July and August winter; while September, October and November are in the spring season (Table 2). The admissions were significantly higher in winter and spring than in autumn and summer (chi-square $p<0.001$). When autumn was taken as a base line, the chi-square for the linear trend for autumn, summer, winter and spring was found to be 25.38, $p<0.001$ with an increasing odds ratio of the subsequent season.

Discussion

Primary small intestinal volvulus was found to be more commonly seen in the winter and spring seasons in North Western Ethiopia. This confirmed the findings in previous studies[1,3]. The most conspicuous climatic feature of this part of Ethiopia, a tropical mountain, is a change of a along dry season to a stormy one[8]. Most of the precipitation falls in the form of rain from June to September[8]. Since little irrigation is practised and the basis of the economy is mainly agriculture, the farmers in the region do plough

down their fields using animals, broadcast sowing, and cover the seeds with a ploughshare and weed during this season[8]. Except for the weeding, almost all the activities require the erect posture of the body. The underlying process that perpetuates the observed seasonal pattern of primary small intestinal volvulus is still not fully understood. The theoretical mechanism of the development of the primary small intestinal volvulus requires strong peristalsis, tense, firm abdominal muscles, physical activity in upright positions and a feeding pattern of very bulky meals taken at long intervals[1,7]. Previously reports from our region revealed that our patients with primary small intestinal volvulus were mainly young, male adult farmers, who performed hard manual work in an erect posture[1,3]. Thus, the seasonal variations in the activities of these young farmers might be one of the reasons for the seasonality of the disease. In the North Western Ethiopia, harvesting, thrashing and winnowing are activities of the dry season. The cutting of fields is done by a sickle, threshing with animals and beating, and winnowing with a stick[8]. The reason why these activities that involve the body at different postures, usually non-erect, are not equally associated with the development of primary volvulus of the small intestine requires further exploration.

In addition to the above mentioned factors, a rapid filling of the small intestine with large quantities of poorly digestible food containing cellulose and rich in cereals is also considered as the other reason for the development of primary small intestinal volvulus. The most important food crops in the region are cereals and pulses and the diet of the population is composed of cereals, legumes and vegetables [3,8,9]. Even though this study has not explored the dietary pattern of the patients during the different seasons of the year, the fact that the people in the region consume mainly cereals and the temporal variation in its availability might be a contributing factor to the seasonal pattern of the disease. However, a further study is required to determine the possible determinants of primary volvulus of the small intestine. This may help in identifying interventional methods that may prevent the disease by changing the life-style as well as work pattern of the farmers.

Having a high index of suspicion of primary volvulus of the small intestinal in a young farmer who presents with abdominal pain during the winter and spring seasons in North Western region of Ethiopia is helpful in early diagnosis and treatment of the problem. Hence, knowledge of the temporal characteristics of the disease is vital in having this index of suspicion of the disease so as to reduce its morbidity and mortality.

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