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RISK FACTORS FOR RUPTURED UTERUS IN MULAGO HOSPITAL KAMPALA, UGANDA

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ABSTRACT

Objective: To determine the risk factors for ruptured uterus.
Design: A case control study.
Setting: Mulago Hospital labour wards, Kampala, Uganda.
Subjects: Fifty two women with ruptured uterus were recruited between 15th November
2001 and 30th November 2002 and were compared with 500 mothers with normal
delivery.
Results: The predictors for ruptured uterus were low socio-economic (OR 2.5, 95% CI
1.2-7.1), residing more than ten kilometres from Mulago hospital (OR 6.7,95% CI 2.1-
21.2). Delivery by Caesarean section in previous pregnancy (OR 22.3,95% CI 9.2-54.2)
delivery of babies weighing more than 3500 grams (OR 2.4, 95% CI 1.2-7.2) and testing
HIV positive (OR 3.2,95% CI 1.5-7.2).
Conclusion: Uterine rupture is still common in our society and is associated with severe
maternal morbidity and mortality. There is need for women to use maternity units
during pregnancy and delivery, to monitor labour using a partograph and timely
intervention of delivery will prevent uterine rupture.

INTRODUCTION

Ruptured uterus is the most devastating complication
of obstructed labour to both the mother and the
foetus (1-4). When the obstruction is not relieved in
time, it will end in a ruptured uterus. In primigravidae
the uterus will usually give up and may not rupture
although some primigravidae have ruptured their
uterii (5).

Uterine rupture can be spontaneous when
there is no predisposing factor. It may be traumatic as
a result of use of oxytocics for induction of labour or
in manoeuvres like internal podalic version. It may
also follow dehiscence of a scarred uterus after
previous Caesarean section or myomectomy (2,3,6).
Some authors have reported spontaneous rupture of
uterus as the most common cause of ruptured uterus
(7,8) but others have reported rupture of scarred
uterus as the most common (8).

The causes of uterine rupture are obstructed
labour, use of oxytocics and trauma (3,6,9). Rupture
of uterus in a typical obstructed labour is due to
excessive contraction of upper uterine muscles
resulting into over stretching and thinning of the
lower segment muscles. As the contraction of the
uterine muscles continues to force the foetus through
the obstruction, it exerts pressure on the thin lower
uterine segment resulting into rupture of uterus.

The incidence of ruptured uterus varies from
country to country and is common where maternity
services are poor (6,9,10) and ranges from 1 in 157
deliveries to 1 in 865 deliveries (2,6,11-13), Other
studies have reported a lower incidence in developed
countries of 1 in1000 deliveries or less and majority
occurring in women with previous scar (14).

The predisposing factors for ruptured uterus
are maternal such as in prolonged labour or previous
operations on the uterus. Foetal causes are
malpresentation or malposition of the foetus, big
baby and abnormalities of the foetus like
hydrocephalus and hydropis foetalis. The mode of
delivery can also lead to uterine rupture. This can
occur during vacuum extraction or forceps delivery
or use of fundal pressure during breech delivery.

Induction or augmentation of labour using oxytocics has been shown to predispose a woman to ruptured uterus (2-4,15).

In one study, women on oxytocics were three times more likely to develop uterine rupture compared to those who were not (4), and in another study it was four and half times more likely (15). In a population study of uterine rupture among women who delivered under an obstetrician or family doctor in consultation with the obstetrician in the province of Nova Scotia in Canada, augmentation and induction of labour contributed to 43% of complete rupture of the uterus and 40% of scar dehiscence in women who are on trial of scar (14). Other predictors of uterine rupture reported include increasing age and parity which may be as a result of uterine muscle scaring leading to weakening of uterine wall muscles and resulting in rupture during child birth (6).

With the increasing rate of Caesarean sections in developing countries and inadequate accessibility of emergency obstetric care, the rates of rupture of scarred uterus may be on the rise (6,9). Repeat Caesarean sections in Africa will increase the burden on maternal health services available (6,16). This may compromise the quality of maternity care and may increase maternal morbidity and mortality. The major objective of this study therefore was to study the risk factors of uterine rupture so as to reduce the maternal morbidity and mortality associated with this condition.

MATERIALS AND METHODS

Study design: This was part of a case-control study of risk factors for severe maternal morbidity conducted in Mulago hospital Uganda between 15th November 2001 and 30th November 2002. The risk factors for uterine rupture were studied. The results of the case controlled study are reported elsewhere.
Setting: Mulago hospital labour wards.
Study population: Women who had come to deliver in Mulago hospital.
Selection of cases and controls: Cases were women who were pregnant or delivered after 24 weeks gestation up to puerperium and had ruptured uterus diagnosed both by clinical examination and at laparatomy. They were selected consecutively until the sample size was achieved. Controls were selected from women who had a gestation of 24 weeks or more who delivered live babies at Mulago hospital. Controls must have had a normal vaginal delivery to a singleton live baby, not had an episiotomy or tear of more than first degree, and had normal blood loss. Both cases and controls lived 15 km or less from the hospital.

The cases and controls were recruited daily. The controls were recruited using computer generated numbers, where two women were selected every day if they satisfied selection criteria.

The cases and controls selected were interviewed about their socio-demographic characteristics, social and family history, gynaecological, medical conditions and past and present obstetric performance. Those who were too sick their spouses or first relatives were interviewed and later when the patients improved were interviewed at discharge. At discharge or death the clinical record files were reviewed and information on management was extracted. All cases and controls had their blood examined for HIV using Determine test (Abbott Laboratories, Abbott Park, IL). This was an immunochromatographic test for qualitative detection of HIV-1/2. The test was performed by applying 50ul of serum to the test pad at the bottom of the strip.

Analysis: The data collected were checked, coded and double entered using Epi-Info 6.04 software. The data were cleaned and transferred to stata 8. The exposures of interest were socio-demographic factors, medical diseases, past and present obstetric performances and laboratory investigations.

Univariate analysis: The fifty two cases of ruptured uterus were compared with the 500 controls of normal delivery. The numbers and percentages of cases and controls at each level of exposure were presented. Chi square test was used to compare the proportions.

Logistic regression: Factors found to be of importance in univariate analyses were entered into a multivariate logistic regression model. Age was included in this model so as to be consistent with other studies. Logistic regression was used to establish the strength of association between exposure variables and ruptured uterus. Logistic regression uses the log odds ratio and all associations are presented as adjusted odds ratios with corresponding 95% confidence intervals. Odds ratio of greater than one represents an increased risk of rupture uterus in that exposure compared to base line category.

RESULTS

The causes of the 52 cases of ruptured uterus were cephalo pelvic disproportion (33%) previous scar (37%) malpresentation of foetus (15%), big baby (10%), retained second twin (4%) and hydrocephalus (1%). There was no ruptured uterus due to oxytocic induction or augmentation. Six (12%) patients had ruptured uterus involving the bladder. The treatments offered were sub total hysterectomy in 44 (85%), repair of uterus and bilateral tubal ligation in five(10%), and repair of uterus only for three (6%).

Twenty one (40%) patients had puerperal infection post operatively which resulted in prolonged hospital stay. One (2%) patient had

developed vesico vaginal fistula at discharge. Out of 52 cases of ruptured uterus three died of haemorrhage and uraemic shock making case specific fatality of 6%. These 52 cases of ruptured uterus were compared to the 500 controls in the following analyses.

Characteristics of cases and controls (Table 1): Patients with ruptured uterus lived much further a way from hospital than the controls with 70% cases compared to 33% controls living more than five kilometres from Mulago hospital (P <0.00).

Table1

Socio-demographic characteristics of cases of ruptured uterus and controls

Characteristic	Stratum	Cases No. (%)		Controls No. (%)		Crude Odds ratio (95% CI)		P-value
Distance from	0-5	18	34.5	408	81.6	1.0	-	
home to Mulago	6-10	22	44.5	81	16.2	2.9	1.5-5.6	0.00
(Kms)	11-15	13	24.5	11	2.2	8.6	3.8-19.3	
Distance to nearest	0-5	46	86.8	491	98.2	1.0	-	
health unit (Kms)	>5	7	13.2	9	1.8	8.3	3.0-23.3	0.00
Age (years)	14-19	5	9.4	155	31.0	0.1	0.0-0.4	0.00
	20-29	36	67.9	262	52.4	1.0	-	
	30+	12	22.7	83	16.6	0.	0.6-1.9	
Marital status	Married	48	90.6	425	85.0	1.0	-	
	Single	5	9.4	75	15.0	0.6	0.2-1.5	0.28
Tribe	Bantu	43	81.1	454	90.8	1.0	-	
	Nilotics	10	18.9	46	9.2	2.4	1.1-5.0	0.00
Religion	Protestant	14	26.4	141	28.2	1.0	-	
	Catholic	21	39.6	173	34.6	1.2	0.6-2.5	
	Muslim	13	24.5	160	32.0	0.8	0.4-1.8	0.82
	Seventh day	2	3.8	5	1.0	4.0	0.7-22.7	
	Saved	3	5.2	21	4.2	1.4	0.4-5.4	
Education level of	No schooling	5	9.4	22	5.0	0.8	0.4-1.4	0.24
patient	Primary	26	49.1	277	55.4	1.0	-	
	Secondary	22	41.5	186	37.2	1.9	0.7-5.6	
	College	0	-	15	3.0			
Patients job	Employed	10	18.9	128	25.6	1.0	-	
	Peasant	43	81.13	372	74.4	1.2	0.6-2.6	0.07
Spouse job	Commerce	9	17.0	205	41.0	1.0	-	
	Professional	10	18.9	106	21.2	0.6	0.1-5.0	
	Peasant	23	64.1	189	37.8	0.7	0.1-5.2	0.89
Type of house	Brick, plastered	31	58.5	417	83.4	1.0	-	
	Brick only	16	30.2	69	13.8	3.6	1.1-11.6	
	Mud only	6	11.3	14	2.8	2.8	1.4-5.3	0.00
Need to request	Yes	15	28.3	47	9.4	3.2	1.6-3.2	0.00
permission to visit	No	38	71.7	453	90.6	1.0	-	

Table 1 Continues
Health unit/hospital

Who gives permission to attend health unit/hospital	Spouse	13	92.1	42	88.5	1.0	-	
	Other	2	7.9	5	11.5	0.4	0.1-1.8	0.26
Who pays for treatment	Self and spouse	47	90.3	403	80.6	1.0	-	
	Others	5	9.7	97	19.4	1.8	0.8-4.2	0.07

The mean age for cases was 25.1(SD=4.7) and controls 23.4(SD=5.7). (P <0.003). Only 9% cases compared to 31% controls were below 20 years of age. Majority of the cases (81%) and controls (91%) were grouped as Bantus and Nilotics were in 20% cases and in 9% controls (P< 0.002).

The cases who lived in brick, plastered and iron or tiled roofed houses were 59% compared to the controls 83% and those who lived in mud with iron roof or no iron roof houses were 11% in the cases and 3% controls(P< 0.002). The mothers with ruptured uterus were more likely to ask for permission to visit a health unit compared to controls (p<0.00).

Past and present obstetric performance (Table 2): The factors that were associated with rupture of the uterus were being on labour for more than 18 hours in the previous delivery (P <0.021), delivery by Caesarean section in previous pregnancy (P < 0.001), referral from a lower health unit (P <0.001), delivery of a baby weighing over 3500 grams (P <0.02) and being HIV positive (P <0.003). Being a primigravidae was protective (P<0.021).

Table 2
Characteristics of past and current pregnancy outcome of ruptured uterus and controls

Characteristic	Stratum	Cases No. (%)		Controls No. (%)		Crude Odds ratio (95% CI)		P-value
Labour lasting	Yes	14	30.4	77	22.0	2.0	1.0-3.8	0.02
more than 18hours	No	32	69.6	273	78.0	1.0	-	
Still birth	Yes	5	10.9	25	7.1	0.9	0.3-2.4	0.81
	No	41	89.1	325	92.9	1.0	-	
Previous Caesarean	Yes	19	41.3	15	4.0	18.7	7.7-40.9	0.00
section	No	27	58.7	335	96.0	1.0	-	0.00
Current pregnancy								
Number of	1	7	13.2	150	30.0	0.3	0.1-0.7	0.00
pregnancy	2-4	40	75.5	237	47.4	1.0	-	
	5-14	6	11.3	113	22.6	0.5	0.2-1.3	
Birth spacing	1-36	27	59.6	216	61.9	1.0	-	
In months	37-60	8	17.0	91	26.0	0.7	0.3-1.6	0.04
	>60	11	23.4	43	12.1	2.0	1.0-4.4	
Attended antenatal	Yes	48	90.6	485	97.0	1.0	-	
care	No	5	9.4	15	3.0	3.4	1.2-9.7	0.02
Referral from other	Yes	27	50.9	84	16.8	5.1	2.9-9.3	0.00
centres	No	26	49.1	416	83.2	1.0	-	
Use of partograph	Yes	1	1.9	44	8.8	1.0	-	0.11
	No	51	98.1	456	91.2	0.2	0.0-1.5	
Length of labour	≤18	12	23.1	435	87.2	1.0	-	0.00
First stage in hours	>18	40	76.9	65	12.8	22.2	10.6-47.6	

Table 2 Continues

Sex of baby	Female	25	47.2	252	50.2	1.0 -		
	Male	28	52.8	248	49.6	1.1 0.6-1.9		0.10
Birth weight	< 2500	3	5.9	13	2.6	1.1 0.3-3.7		0.02
in kilograms	2500-3500	28	54.9	317	63.4	1.0 -		
	>3500	20	39.2	170	34.0	2.2 1.2-4.0		
Laboratory results								
HIV status	Negative	43	81.1	455	91.0	1.0 -		
	Positive	10	18.9	45	9.0	2.4 1.1-4.2		0.03
Syphilis	Negative	46	86.8	454	90.8	1.0 -		
	Positive	7	13.2	46	9.2	1.5 0.6-3.5		0.94

Adjusted odds ratio for risk factors for ruptured uterus: Table 3 presents a summary of the adjusted odds ratios for factors found to be independently significantly related to the outcome. The factors used for adjustment are presented as footnotes.

Table 3
Risk factors for ruptured uterus

Variable	Stratum	Cases No. (%)		Controls No. (%)		Crude odds ratio (95% CI)	Adjusted odds ratio (95%CI)	P-value
Distance from home	0-5	18	34.0	333	66.0	1.0	1.0 -	0.00
to Mulago (Km)	6-10	22	41.5	139	27.8	2.9 1.5- 5.6	2.0 1.0- 4.2[a]	
	11-15	13	24.5	28	5.6	8.6 3.8-19.3	6.7 2.1- 21.2[a]	
Age (years)	14-19	5	9.4	155	31.0	0.1 0.0-0.4	0.1 0.0-0.4[a]	0.00
	20-29	36	67.9	262	52.4	1.0 -	1.0 -	
	30+	12	22.7	83	16.6	0.9 0.6-1.9	0.8 0.4-1.8[a]	
Tribe	Bantu	42	80.8	454	90.8	1.0 -	1.0 -	0.01
	others	10	19.2	46	9.2	2.4 1.1-5.0	2.4 1.0- 5.4[a]	
Type of house	Brick, plastered	31	58.5	417	82.6	1.0 -	1.0 -	0.05
	Brick only	16	30.2	69	14.6	3.6 1.1- 11.6	2.5 1.2-7.1[a]	
	Mud only	6	11.3	14	2.8	2.6 1.4- 5.3	2.00.5-7.4[a]	
Requesting for	Yes	38	71.70	453	90.6	1.0 -	2.5 1.2-5.4[a]	0.02
permission to visit health unit	No	15	28.3	47	9.4	3.2 1.6-3.2	1.0 -	
Who pays for	Self and spouse	47	90.3	460	92.0	1.0 -	2.2 1.1- 4.3[a]	0.01
treatment	Others	5	9.7	40	8.0	1.8 0.8-4.2	1.0 -	
Previous labour	Yes	14	30.4	77	22.0	2.0 1.0-3.8	2.3 1.5 - 4.9[a]	0.07
lasting more than 18hours	No	27	69.6	273	78.0	1.0 -	1.0 -	
Previous Caesarean	Yes	19	41.3	15	1.0	18.6 7.7-40.9	22.3 9.2-54.2[a]	0.00
section	No	27	58.7	355	99.0	1.0 -	1.0 -	
Number of	1	7	13.2	150	30.0	0.3 0.1- 0.7	0.1 0.1-0.5 [a]	0.00
pregnancies	2-5	40	75.5	272	54.4	1.0 -	1.0 -	
	6-14	6	11.3	78	15.6	0.52 0.21-1.27	0.6 0.3-1.3 [c]	

Table 3 continues

Birth spacing (months)	1-36	28	59.6	195	61.9	1.0 -		1.0 -		0.02
	37-60	8	17.0	82	26.0	0.7	0.3- 1.6	0.9 0.4-2.0 [C]		
	>60	11	23.4	38	12.1	2.0	0.9- 4.4	3.4 1.4- 8.1 [C]		
Antenal care	Yes	48	90.6	485	97.0	1.0 -		1.0 -		0.00
attendance	No	5	9.4	15	3.0	3.4 1.2-9.7		4.7 1.6-13.7 [C]		
Referral	Yes	27	50.9	84	16.8	5.1 2.9-9.3		3.4 1.8- 6.8 [C]		0.00
	No	26	49.1	416	83.2	1.0 -		1.0 -		
Bleeding in labour	Yes	20	37.7	6	1.2	49.8 18.7-98.4		27.9 10.6-120.3 [C]		0.00
	No	33	62.3	493	98.8	1.0 -		1.0 -		
Length of labour first	≤18	12	23.1	435	87.2	1.0 -		1.0 -		0.00
stage in hours	>18	40	76.9	65	12.8	22.2 10.6-47.6		32.1 4.6-165.4 [C]		
Birth weight (grams)	< 2500	3	5.9	35	7.0	1.1 0.3-3.7		1.7 0.46-6.0 [C]		0.05
	2500-3500	28	54.9	350	70.0	1.0 -		1.0 -		
	>3500	20	39.2	115	23.0	2.2 1.2-4.0		2.4 1.2-4.7 [C]		
HIV status	Negative	43	81.1	455	91.0	1.0 -		1.0 -		0.02
	Positive	10	18.9	45	9.0	2.4 1.1- 4.2		3.2 1.5-7.2 [C]		

[a]   Adjusted for age, type of house, the distance from home to Mulago hospital, permission to attend health unit, and person paying for hospital upkeep and transport.

[C]   Adjusted for age, type of house, the distance from home to Mulago hospital, permission to attend health unit, and person paying for hospital upkeep and previous length of labour and previous delivery by Caesarean section.

The teenagers were associated with less risk of developing ruptured uterus compared to those aged twenty to twenty nine years (OR 0.1,95% 0.0-0.4). The women who lived between over ten and fifteen kilometres from Mulago hospital had seven times greater risk of developing ruptured uterus.(OR 6.7, 95% CI 2.1-21.2), while those who lived between just over five and ten kilometres were associated with twice the risk of developing ruptured uterus (OR 2.0, 95%CI 1.0-4.2).

There are two major tribal grouping in Uganda the Bantu and Nilotics. The study showed Nilotics were associated with increased risk of developing ruptured uterus (OR 2.4, 95% CI 1.0-5.4). Patients with previous history of prolonged labour (over 18 hours) were associated with the risk of developing ruptured uterus (OR 2.3, 95% CI 1.5-4.9). Those who had delivered by Caesarean section in previous pregnancy were associated with increased risk of ruptured uterus (OR 22.3, (95% CI 9.2-54.2).

The primigravidae were at a less risk of getting ruptured uterus (OR 0.2, 95% CI 0.1-0.5). The patients who were referred were associated with an increased risk of getting ruptured uterus(OR 3.4, 95% CI 1.8 - 6.8). The women who delivered babies weighing more than 3500grammes were more likely to have ruptured uterus (OR 2.4,95% CI 1.2-4.7).

The women who tested HIV positive were associated with an increased risk of getting ruptured uterus (OR 3.2,95% CI 1.5-7.2). Other factors independently associated with ruptured uterus were requesting for permission to visit a health unit(OR 2.5,95% CI 1.2-5.4), birth spacing of more than 60 months (OR 3.4, 95% CI 1.4-8.1), non attendance of antenatal care (OR 4.7,95% CI 1.6 -13.7), first stage of labour of more than 18 hours (OR 3.2,95% CI 4.6-165.4) and bleeding during the present pregnancy(OR 27.9,95% CI 10.6-120.3).

DISCUSSION

Uterine rupture is one of the most serious obstetric emergencies which carry serious consequences to the mother and foetus. It is one of the main causes of maternal death in sub-Saharan Africa (6).

The causes of ruptured uterus in our study were: cephalo pelvic disproportion (33%), previous scar (37%), malpresentation of the foetus (15%), big baby (10%) and others (5%) and are similar to reported causes in other developing countries (3,6,13). Six (12%) of patients had uterine rupture involving the bladder and this was similar with what was reported in Ethiopia and Nigeria of 14% (9).

The majority of controls were young and below thirty years of age. Teenage women were associated with less risk of developing ruptured uterus and so was nulliparity. In primigravidae when mechanical obstruction to labour occurs, the uterine contractions gradually weaken and stop but in multigravidae contractions continue until delivery or rupture of the uterus (17). But some women reported to be primigravidae (13.2%) ruptured their uterii in this study. Other studies have reported similar findings (6,8,11,12).

The further the patient lived away from Mulago hospital the more likely to develop ruptured uterus. Indeed those who lived between more than ten and fifteen kilometres had seven fold greater risk of developing ruptured uterus. Over 50% cases of ruptured uterus were referred to Mulago hospital and this was associated with thrice the risk of developing ruptured uterus after adjusting for confounders. These patients laboured outside the hospital and when they had failed then were referred to Mulago hospital. It is possible that the patients were referred earlier but the lack of transport component in referral system delayed their arrival at the hospital in time. This was similar to results from Mbale regional hospital in Uganda (18) and in Ghana (19). This may also suggest that peripheral maternity units' quality of care was low and referred patients when already in obstructed labour.

The patients who lived in low quality houses and those who couldn't afford to pay for their upkeep in hospital had doubling risk of developing ruptured uterus. This was similar to what was reported that low education status and low socio-economic status were risk factors for ruptured uterus (9).

Women who gave a history of previous labour lasting more than 18 hours were associated with twice the risk of developing ruptured uterus after adjusting for confounders. This was likely to be associated with previous scar because women labouring for more than 18 hours were more likely to have delivered by Caesarean section. The main draw back with such information is the recall and measurement bias of 18 hours in labour. Indeed patients who delivered by Caesarean section in previous pregnancy had twenty two fold greater risk of developing ruptured uterus after adjusting for confounders. This result was similar to what Lao and Leung (20) found of thirty times greater risk in a previous scar. Many studies have reported increased risk of ruptured uterus in previous Caesarean section scar (1,7,10,13). Some authors have demonstrated , increased risk of rupture with increasing number of Caesarean sections.

Birth spacing of more than five years was associated with thrice the risk after adjusting for confounders of ruptured uterus. The possible explanation for this could be that those women who

had previous Caesarean section could have had puerperal infection had some degree of sub fertility and when they got pregnant the scar was weak and ruptured. Puerperal infection or puerperal fever is associated with a weak Caesarean scar (15), however studies done on trial of scar have found a short interval of less than 18 months associated with three times increased risk of ruptured uterus (15) but this was not demonstrated in the study because of small numbers of mothers with previous scar in that category.

In this study women who did not attend antenatal clinics were associated an increased risk of five times of developing ruptured uterus compared to those who had antenatal care after adjusting for confounders. Similar results have been reported in Kenya (6) , Ethiopia (2) and in Nigeria (9).

Women who delivered babies weighing more than 3500 grams were associated with twice the risk of having ruptured uterus compared to those who delivered 2500 to 3500 grams. Big babies cause obstructed labour and when delivery is not terminated in time results into ruptured uterus.

HIV was associated with thrice the risk of uterine rupture after adjusting for confounders. The possible reason is that the cases were asymptomatic HIV in the previous delivery by Caesarean section and could have had poor uterine wound healing due to sub-clinical infection and in the present pregnancy the uterus ruptured because of scar weakness. This is a possible reason but we didn't have information of the patient's previous HIV status. This finding needs to be investigated further in this era of HIV, however current thinking is that HIV positive women are best delivered by Caesarean section.

In conclusion uterine rupture is still common in our society and is associated with severe maternal morbidity and mortality. There is need for women to use maternity units during pregnancy and delivery to monitor labour using a partograph and timely intervention of delivery will prevent uterine rupture.

ACKNOWLEDGEMENTS

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RISK FACTORS FOR SEVERE POST PARTUM HAEMORRHAGE IN MULAGO HOSPITAL, KAMPALA, UGANDA

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ABSTRACT

Objective: To determine the risk factors for severe postpartum haemorrhage.

Design: A case control study.

Setting: Mulago hospital labour wards, Kampala, Uganda.

Subjects: One hundred and six mothers with severe postpartum haemorrhage were recruited between 15th November 2001 and 30th November 2002 and were compared with 500 women who had normal delivery.

Results: The predictors for postpartum haemorrhage were co-existing hypertension (O.R 9.3, 95%CI: 1.7-51.7), chronic anaemia (OR 17.3,95% CI: 9.5-31.7), low socio economic background (OR 5.3,95% CI:3.0,9.2), past history of postpartum haemorrhage(OR 3.6,95% CI:1.1-11.8), previous delivery by Caesarean section(OR 7.5,95% CI:3.5-14.3), long birth interval of more than sixty months (OR 5.2,95% CI:2.1-13.0), prolonged third stage (OR 49.1,95% CI:8.8-342.8)and non use of oxytocics (OR 4.3%, 95%CI:1.2-15.3).

Conclusion: Severe postpartum haemorrhage is common in our environment and is associated with a high maternal morbidity and mortality. The determinants of postpartum haemorrhage are useful in identifying mothers at risk and together with the services of a skilled birth attendant at delivery will prevent postpartum haemorrhage and reduce the maternal morbidity and mortality associated with this condition. In our study, the following risk factors were identified: pre-existing hypertension, chronic anaemia, low socio-economic background, history of postpartum haemorrhage, previous delivery by Caesarean section, long birth interval of more than sixty months, prolonged third stage and non use of oxytocics were found to be significant.

INTRODUCTION

Post-partum haemorrhage is a leading cause of maternal deaths world wide and especially in developing countries (1-3). It affects about 5-15% of women after child birth (2,4,5). The causes are uterine atony which contributes over 80% (6), retained placenta or placental fragments, tears in the genital tract including rupture of the uterus and coagulation failure (6,7).

Major blood loss of 1000mls occurs more in 5% of deliveries (6). The risk factors are variable but even women without risk factors can also encounter post partum haemorrhage.

In the United States, using a criterion of a decline of ten units of haematocrit or more as a definition of postpartum haemorrhage Coombs et al (4) found the rate to be 2.8% in vaginal deliveries. After regression analysis, prolonged third stage of labour, pre-eclampsia, previous history of post partum haemorrhage, twin pregnancy and arrest of descent of presenting part were also suitable predictors (4).

Stones analysed women who delivered in the United Kingdom and used the loss of 1000mls of blood as a definition of post partum haemorrhage. He found a rate of 1.3% and the risk factors included placenta abruption, placenta praevia, multiple pregnancies and obesity, but not multiparity (8).

In Zimbabwe, a criterion of loss of more than 600mls of blood was used. The predictors were low parity, advanced maternal age and antenatal hospitalisation for anaemia. Similarly multiparity was not a risk factor (9).

This phenomenon seems to be associated more with increasing age than multiparity. Other workers have found prolonged second and third stage of labour to be associated with over four fold risk, and non use of oxytocics was associated with six fold risk (10). Prevention, early detection and recognition of postpartum haemorrhage with prompt management is key to reducing maternal morbidity and mortality (3,11). The risk management is only effective in places where women attend antenatal care and are delivered by a skilled delivery attendant. The quality of care a woman receives while in labour plays a role in the causation of post partum haemorrhage. A survey of quality of care in three French regions found that sub-standard care had contributed more than three times the risk of post partum haemorrhage (12).

In Africa and in Uganda in particular neglected care leads to obstructed labour. Delivery at home with traditional birth attendants and failures in the referral system predisposes women to post partum haemorrhage (13). It has been argued that however good the healthcare facilities are, unless women come and use them, morbidity and mortality cannot be reduced.

Post partum haemorrhage remains the major cause of maternal morbidity and mortality in Uganda and the risk factors have not been well documented. Therefore the prime objective of this study was to determine the risk factors for postpartum haemorrhage at the Mulago hospital, Kampala.

MATERIALS AND METHODS

Design: This was part of a case-control study of risk factors for severe maternal morbidity conducted in Mulago hospital, Uganda between 15th November 2001 and 30th November 2002. The risk factors for severe post partum haemorrhage were studied. The results of the case-control study are reported elsewhere.

Setting: Mulago hospital labour wards.

Study population: Women who had come to deliver at the Mulago hospital.

Sample size calculation: The sample size of 106 mothers was calculated using James Schelesseman's formula using a prevalence of postpartum haemorrhage of 0.64% which was found in a study in Burkina Faso. The sample size had a power of 80%, at 95% confidence interval to detect an odds ratio of two. These were compared to 500 normal deliveries.

Selection of cases and controls: Severe post partum haemorrhage was defined as vaginal bleeding after delivery of more than 500ml, or any amount of vaginal bleeding with either two of the following: an episode of shock with a systolic blood pressure of 90mmhg or less, a pulse rate of 100 beats per minute or more with a small volume, a need for intravenous therapy of two or more units of blood, and an intravenous therapy of fluids of two or more litres. Both cases and controls lived 15 kilometres or less from Mulago hospital and consented to the study.

Controls were selected from women who delivered live babies at Mulago hospital during the study period. They must have had a normal vaginal delivery to a singleton live baby, not had an episiotomy or tear of more than first degree, and had a normal blood loss.

The cases and controls were recruited daily. The controls were recruited using computer generated numbers, where two women were selected daily if they satisfied inclusion criteria.

They were interviewed about their socio demographic characteristics, social and family history, gynaecological operations, blood transfusion, medical conditions and past and present obstetric performance. Those who were too sick, their spouses or first relatives were interviewed and later when the patients improved were interviewed at discharge. At discharge or death the clinical record files were reviewed and information on management was extracted. All cases and controls had their blood examined for Human Immunodeficiency Virus (HIV) using Determine test (Abbott Laboratories, Abbott Park, IL). This was an immunochromatographic test for qualitative detection of HIV -1/2. The test was performed by applying 50ul of serum to the test pad at the bottom of the strip. All the mothers had voluntary counselling for HIV before blood was withdrawn.

The data collected were checked, coded and double entered using Epi-Info 6.04 software. The data were cleaned and transferred to stata 8. The exposures of interest were socio-demographic factors, medical diseases, past and present obstetric performances and laboratory investigations.

Univariate analysis: The 106 cases of post partum haemorrhage were compared with the 500 controls who had normal delivery. The numbers and percentages of cases and controls at each level of exposure are presented. Chi square test was used to compare the proportions.

Logistic regression: Logistic regression was used to establish the strength of association between exposure variables and post partum haemorrhage. The results are presented as adjusted odds ratio with 95% confidence intervals.

RESULTS

In our study, the factors predisposing to postpartum haemorrhage were: uterine atony (45.0%), tears in the genital tract (22%), coagulation failure (16%), and retained placenta (17%).

Socio-demographic characteristics of cases and controls (Table 1): The majority of women (85%) studied were below the age of thirty years. The mean age of cases was 23.8 (SD=5.7years) and this was similar to controls whose mean age was 23.4(SD =5.7 years).The cases stayed further away from Mulago hospital compared to controls. The controls were less likely to ask for permission to visit hospital than the cases. In both cases and controls the spouses or the women themselves paid for the treatment.

The past and current obstetric performance of cases and controls (Table 2): The cases and controls had similar mean parity of 2.1 (SD=0.31) with a range of one to eleven. The cases were more likely to have delivered by Caesarean section previously, had a birth spacing of more than sixty months, not attended antenatal clinic, to have not known what to do after an episode of vaginal bleeding and to have had hypertension during the present pregnancy compared to controls. The cases were also more likely have bled during labour, had an induction or augmentation of labour, had a prolonged third stage of labour and they were more likely to have referred from lower levels of health care compared to controls.

Table 1
Socio-demographic characteristics of postpartum haemorrhage cases and controls

Characteristic	Stratum	Cases No. (%)		Controls No. (%)		Crude Odds ratio (95%CI)		P-value
Distance from home	0-5	54	50.5	408	81.6	1.0	-	
to Mulago (kms)	6-10	36	34.3	81	16.2	3.4	2.1-5.5	0.00
	11-15	16	15.2	11	2.2	11.2	4.9-25.4	
Age (years)	14-19	32	30.2	155	31.0	0.9	0.6-1.5	
	20-29	58	54.7	262	52.4	1.0	-	0.94
	30+	16	15.1	83	16.6	1.0	0.4-2.0	
Marital status	Married	87	82.5	425	85.0	1.0	-	
	Single	19	17.9	75	15.0	1.3	0.7-2.2	0.31
Education level of	No schooling	6	5.7	22	4.4	1.4	0.5-3.7	
patient	Primary	58	54.7	277	55.4	2.1	0.8-5.7	
	Secondary	36	34.0	186	37.2	1.0	-	0.64
	College	6	5.7	15	3.0	1.1	0.7-1.7	
Patients job	Commerce	28	26.4	114	22.8	1.3	0.8-2.2	
	Professional	6	5.7	14	2.8	1.9	0.7-5.4	0.31
	Peasant	72	67.9	372	74.4	1.0	-	
Spouse job	Commerce	64	62.1	205	41.0	1.0	-	
	Professional	24	21.4	106	21.2	1.0	0.6-1.8	0.44
	Peasant	18	16.5	189	37.8	0.7	0.4-1.3	
Type of house	Brick, plastered	44	41.5	417	83.4	1.0	-	
	Brick only	51	48.1	69	13.8	6.9	4.3-11.1	0.00
	Mud only	11	10.4	14	2.8	7.5	3.2-17.4	
Need to request	Yes	76	71.4	453	90.6	3.8	2.3-6.4	
permission to visit	No	30	28.6	47	9.4	1.0	-	0.00
health unit/hospital								
Who pays for	Self and spouse	84	80.0	403	80.6	1.0	-	
treatment	Others	21	20.0	97	19.4	1.0	2.7-7.4	0.00

Table 2

Characteristics and outcome of cases and controls of past and the current pregnancy

Characteristic	Stratum	Cases No. (%)	Controls No. (%)	Crude Odds ratio (95%CI)	P-value
Previous Caesarean	Yes	15 21. 7	15 4.0	6.2 2.6-12.4	0.00
section*	No	54 78.3	335 96.0	1.0 -	
Post partum	Yes	6 8.7	14 4.0	2.1 0.8-5.6	0.14
haemorrhage*	No	63 91.3	336 96.0	1.0 -	
Retained placenta*	Yes	3 4.3	9 12.6	0.5 0.4- 6.0	0.67
	No	66 95.6	342 97.4	1.0 -	
Number of pregnancy	1	37 34.9	150 30.0	1.2 0.7-1.9	0.40
	2-4	57 53.8	237 47.4	1.0 -	
	5-14	12 11.3	113 22.6	0.7 0.4-1.4	
Birth spacing	1-36	37 53.2	216 61.9	1.0 -	
in months in	37-60	14 21.0	91 26.0	0.9 0.5-1.9	0.03
multigravida	>60	18 25.8	43 12.1	2.5 1.2-5.0	
Attended antenatal	Yes	92 86.8	485 97.0	1.0 -	0.00
care	No	14 13.2	15 3.0	4.9 2.9-10.5	
Booking time for	<28	58 63.0	332 68.6	1.0 -	0.23
antenatal (weeks)	28-36	34 37.0	153 31.4	1.3 0.8-2.1	
Response to vaginal	Go to hospital	82 77.4	481 96.2	1.0 -	0.00
bleeding during	Don't know	24 22.6	19 3.8	7.4 3.9-14.1	
pregnancy					
Bleeding during this	Yes	4 3.8	3 0.6	6.5 1.4-29.5	0.03
pregnancy	No	102 96.2	497 99.4	1.0 -	
Hypertension in this	Yes	10 9.4	7 1.4	7.5 2.8-9.7	0.00
pregnancy	No	96 90.6	493 98.6	1.0 -	
Anaemia in this	Yes	5 4.7	4 0.8	3.5 0.8-16.4	0.12
pregnancy	No	101 95.3	496 99.2	1.0 -	
Admission to hospital	Yes	10 90.6	469 93.8	1.6 0.7-3.3	
	No	96 9.4	31 6.2	1.0 -	0.25
Referral from other	Yes	59 55.7	84 16.8	6.1 4.0-9.7	0.00
centres	No	47 44.3	416 83.2	1.0 -	
Premature rupture of	Yes	3 2.8	111 22.3	1.3 0.8-2.1	0.27
membranes	No	103 97.2	386 77.7	1.0 -	
Bleeding in labour	Yes	21 19.8	6 1.20	20.3 8.0-51.8	0.00
	No	85 80.2	493 98.8	1.0 -	
Type of labour	Normal	68 64.2	496 99.2	1.0 -	
	Induced or augmented	38 35.8	4 0.8	69.2 20.7-240.6	0.00
Use of partograph	Yes	11 10.4	44 8.8	1.0 -	
	No	95 89.6	456 91.2	1.2 0.6-2.4	0.61
Length of first stage	≤ 18	13 12.3	77 22.0	1.0 -	0.03
in hours	> 18	93 87.7	273 78.0	0.6 0.3-1.0	

Table 2 continues

Length of second	≤ 60	71	86.2	474	94.8	1.0 -	
stage in minutes	>60	11	13.8	26	5.2	2.9 0.9-9.3	0.07
Length of third stage	<26	84	79.2	494	98.8	1.0 -	
in minutes	>25	22	20.8	6	1.2	28.3 6.6-78.9	0.00
Birth weight	< 2500	13	12.8	13	2.6	5.0 2.2-11.4	
in kilograms	2500-3500	63	62.4	317	63.4	1.0 -	0.00
	>3500	25	24.8	170	34.0	0.7 0.4-1.2	
	missing	5					
Given oxytocics	Yes	85	80.2	489	97.8	1.0 -	
	No	21	19.8	11	2.2	3.2 1.1-8.8	0.03

* Past obstetric history

Laboratory results (Table 3): Thirteen percent of cases were HIV positive compared to 9% of controls (P=0.30).

Adjusted analyses (Table 3): Several factors which were influential in the study were put in a model as described in the methods. Age was included in this model because is a known risk factor. All factors that were significant in the socio-demographic characteristics were selected together with age. These were adjusted against all other factors in social, family and medical history. Influential factors from this model were adjusted against past obstetric outcome and then the significant ones were adjusted against current obstetric outcome. The risk

factors for severe postpartum haemorrhage were living more than five kilometres from Mulago hospital, staying in poor quality houses, requesting permission to visit a health unit and depending on others to pay for payment of medical bills. Other risk factors were pre-existing hypertension, development of hypertension during pregnancy, history of postpartum haemorrhage, previous delivery by Caesarean section, birth spacing of more than five years and non attendance of antenatal clinic. Other factors that were significantly associated with postpartum haemorrhage were induction or augmentation of labour, referral from a lower health unit, prolonged third stage of labour and non use of oxytocics.

Table 3
Risk factors for partum haemorrhage

Variabe	Stratum	Cases		Controls		Crude odds ratio	Adjusted odds	P-value
		No.	(%)	No.	(%)	(95% CI)	(95% CI)	
Distance from home	0-5	53	50.5	333	66.0	1.0 -	1.0 -	
to Mulago (kms)	5.1-10	36	34.3	139	27.8	3.4 2.1-5.5	2.0 1.0-3.7 [a]	0.00
	>10	16	15.2	28	5.6	7.7 3.7-14.5	4.8 1.9-7.7 [a]	
Type of house	Brick,plastered	44	41.5	417	83.4	1.0 -	1.0 -	
	Brick only	51	48.1	69	13.8	6.9 4.3-11.1	5.3 3.0-9.2 [a]	0.00
	Mud only	11	10.4	14	2.8	7.5 3.2-17.4	3.3 1.1-9.9 [a]	
Requesting for	Yes	79	71.7	453	90.6	4.4 2.7-7.4	3.2 1.7-9.2 [a]	0.00
permission to visit	No	30	28.3	47	9.4	1.0 -	1.0 -	
health unit								
Who pays for	Self and spouse	84	80.0	460	92.0	1.0 -	1.0 -	
treatment	Others	21	20.1	40	8.0	2.8 1.6-5.0	3.6 1.8-7.2 [a]	0.00
Type of transport	Taxi or public	84	80.0	476	95.2	1.0 -	1.0 -	0.01
to hospital	Personal	21	20.0	24	4.8	5.0 2.6-9.3	2.8 1.3-6.1 [a]	
Existing	Yes	4	3.8	2	0.4	9.8 1.8-54.0	9.3 1.7-51.7 [a]	0.01
hypertension	No	102	96.2	498	99.6	1.0 -	1.0 -	

Table 3 Continues

Previous PPH	Yes	20 14.0	14 4.0	2.1 0.8-5.6	3.6 1.1-11.8 [b]	0.03
	No	123 86.1	336 96.0	1.0 -	1.0 -	
Previous Caesarean	Yes	15 21.7	15 4.0	6.2 2.6-12.4	7.5 3.5-14.3 [b]	0.00
	No	54 78.3	335 96.0	1.0 -	1.0 -	
Birth spacing in	<37	33 53.2	195 61.9	1.0 -	-	0.00
months	37-60	13 21.0	82 26.0	0.9 0.5-1.9	1.3 0.6-3.0 [c]	0.00
	>60	18 25.8	38 12.1	1.5 1.2-5.0	5.2 2.1-13.0 [c]	
Antenatal care	Yes	92 86.8	485 97.0	4.9 2.9-10.5	4.7 1.8-12.4 [c]	
	No	14 13.2	15 3.0	1.0 -	1.0 -	0.00
Bleeding in labour	Yes	21 19.8	6 1.20	20.3 8.0-51.8	31.5 10.6-93.3 [c]	0.00
	No	85 80.2	493 98.2	1.0 -	1.0 -	
Type of labour	Normal	68 64.4	496 99.2	1.0 -	1.0 -	0.00
	Induced/ augmented	38 35.8	4 0.8	17.1 4.3-67.5	18.4 3.6-93.5 [c]	
Having hypertension	Yes	10 9.0	7 9.0	7.5 2.8-20.2	3.1 1.0-10.5 [c]	0.01
during pregnancy	No	93 90.3	490 88.5	1.0 -	1.0 -	
Having anaemia in	Yes	5 4.7	4 0.8	3.5 0.8-16.3	6.1 1.1-35.4 [c]	0.05
pregnancy	No	101 95.3	496 99.2	1.0 -	1.0 -	
Admission to	Yes	10 9.4	31 6.2	1.6 0.8-3.3	2.7 1.2-6.5 [c]	0.02
hospital	No	96 90.6	469 93.8	1.0 -	1.0 -	
Referral	Yes	59 55.7	111 22.3	6.1 3.97-9.7	6.5 3.8-11.2 [c]	0.00
	No	47 44.3	386 77.7	1.0 -	1.0 -	
Length of third stage	<25	82 79.3	494 98.8	1.0 -	1.0 -	90.00
in minutes	≥25	22 20.7	6 1.2	28.3 6.6-78.9	49.1 8.8-342.8 [c]	
	Missing	2				
Level of delivery	Midwife	51 48.1	482 96.4	1.0 -	1.0 -	0.00
attendant	Doctor	49 46.2	18 3.6	34.9 17.4-70.2	65.6 26.8-267.9 [c]	
	TBA	6 5.7	0			
Birth weight in	<2500	13 12.8	317 63.4	5.1 2.2-11.4	6.1 2.2-16.7 [c]	
grams	2500-3500	63 62.4	13 3.0	1.0 -	1.0 -	0.00
	>3500	25 24.8	170 34.0	0.7 0.4-1.2	0.8 0.4-1.4 [c]	
Given oxytocics	Yes	84 80.8	489 97.8	1.0 -	1.0 -	0.00
	No	20 19.2	11 2.2	3.2 1.1-28.9	4.3 1.2-15.3 [c]	
	Missing	2				

a: All were adjusted for distance from home to Mulago hospital, patients job, type of house they were living in, transport used to hospital, person paying for treatment, age and asking for permission and family hypertension.

b: Adjusted for distance from home to Mulago hospital, patients job, type of house they were living in, transport used to hospital, person paying for treatment, age, asking for permission, family hypertension and existing hypertension.

c: Adjusted for distance for factors for distance from home to Mulago hospital, patients job,type of house they were living in, transport used to hospital, person paying for treatment, age, asking for permission, family hypertension and existing hypertension, previous scar and previous PPH.

DISCUSSION

Post partum haemorrhage is the leading cause of maternal morbidity and mortality in developing countries (1). It contributed 19.1% as a primary cause of severe maternal morbidity in our study.

Patients who lived in poor quality houses had a five fold increased risk and those who depended on others for financial help while in hospital were associated with a four fold increased risk of postpartum haemorrhage after adjusting for co-founders. The women of low socio-economic class were at risk because this may be related to their poor health seeking behaviour. Women who asked for permission to attend health unit or hospital had a trebling risk of developing severe postpartum haemorrhage. Asking for permission causes delays of the mother to reach health unit/hospital and may encourage them to deliver at home and present to hospital with postpartum haemorrhage.

Patients with chronic hypertension had nine times greater risk of developing severe post partum haemorrhage and those diagnosed with hypertension during pregnancy were associated with a trebling of the risk after controlling for confounders. Hypertension predisposes to pre-eclampsia and abruption placenta which are risk factors for postpartum postpartum haemorrhage (3,5,14-16). In our study the women with a past history of post partum haemorrhage were associated with quadrupling risk of developing severe postpartum haemorrhage after controlling for confounders. This was similar to Hall's finding of three fold increase (17). Previous history of postpartum haemorrhage seems to be a good predictor of subsequent development of postpartum haemorrhage, but the limitation is that it is subjective (18) and there is a recall bias in women who are multiparous.

Women who delivered by Caesarean section in their previous pregnancy had an eight fold greater risk of developing postpartum haemorrhage after adjusting for confounders. Even after adjusting for the mode of delivery the effect still persisted. The reason may be because it associated with recurrent factors such as ante partum haemorrhage and hypertension and also prolonged labour and its complications which are risk factors for postpartum haemorrhage.

Women who had a birth interval of more than five years had a five fold greater risk of developing postpartum haemorrhage after adjusting for confounders. Prolonged birth interval is associated with an increasing age and low parity (9, 17) and conditions such as pre eclampsia and ante partum haemorrhage (10,20) which are known risk factors for postpartum haemorrhage.

Patients who did not attend antenatal care had five fold risk of developing post partum haemorrhage. This has been shown to be a risk factor (13) but one study in Nigeria did not show this relationship (20). This association may be a reflection of the health seeking behaviour of these women in that they come to hospital only when delivery has failed or they have developed a complication.

Bleeding in labour was associated with thirty fold greater risk of developing severe postpartum haemorrhage after controlling for confounders. This is because bleeding during labour is associated with ante partum haemorrhage or ruptured uterus which are known risk factors (3-5,10,15). Referred patients to Mulago hospital had seven times risk of developing severe postpartum haemorrhage. This was because women labour out of hospital and are referred only when they have failed to deliver or have developed complications. Similar results have been reported by other workers (13,19).

Women who had induced or augmented labour had an increased risk of eighteen times of developing postpartum haemorrhage. Induction and augmentation of labour are risk factors (4, 16). Women who did not get oxytocics soon after delivery of the baby were associated with quadrupling risk of developing postpartum haemorrhage. Most of these patients were referred and this may suggest lack of skill in the management of third stage of labour or lack of oxytocics or syringes for administering the drug. Indeed the active management of third stage has been demonstrated to reduce the incidence of postpartum haemorrhage (15, 16,18,21).

Those who stayed in third stage of labour for twenty five minutes or more were forty nine times likely to get postpartum haemorrhage after adjusting for confounders. The loss of blood increases by more than three fold if the third stage lasts between thirty and sixty minutes (21) and this predisposes to postpartum haemorrhage (9,10,16).

In conclussion, the predictors for postpartum haemorrhage can be used to identify women at risk during the antenatal period. But the hall mark in preventing this condition lies in the active management of labour, using skilled attendants at delivery and use of oxytocics during third stage of labour. This will reduce the maternal morbidity and mortality associated with it.

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PICA PRACTICES OF PREGNANT WOMEN IN NAIROBI, KENYA

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ABSTRACT

Objectives: To establish the prevalence of pica behaviour during pregnancy; to identify the substances commonly ingested and their prevalence; and to determine the characteristics of women who reported practising pica.

Design: Descriptive, cross sectional study involving use of questionnaire administered in interview format.

Setting: Pumwani Maternity Hospital, Nairobi, Kenya.

Subjects: One hundred and seventy one antenatal women with a mean age of 28.1 ($\pm$7.3) years. Subjects were selected based on availability; accessibility and willingness to participate in the study.

Results: Seven hundred and ninety three (74.0%) participants reported practising pica regularly on daily basis. Pica prevalence categorised by substances ingested was as follows: soft stones (*odowa*); 89.8%; soil, 61.2%; and others, 9.6% and no pica, 26.0%. Majority of women who reported practising pica (62.5%) ingested more than one substance. Most women who practised pica reported having experienced strong cravings prior to ingestion of pica items, childhood pica, pica before pregnancy, pica in previous pregnancy and a history of pica in family members and significant others in the community.

Conclusions: Pica prevalence was significantly high among the subjects indicating that pica in pregnancy might be more common and independent in Kenya than health care providers assume or observe. There is need to routinely screen pregnant women for pica during antenatal visits as this will provide a more systematic and a less expensive way of establishing its epidemiological status. A nation-wide investigation of pica prevalence is also recommended in order to establish pica prevalence at national level and among different socio-economic groups. Further studies are also needed to establish possible health consequences of pica on mother and child.

INTRODUCTION

Many pregnant women have been observed to develop strong bizarre cravings, for and repeatedly ingest items that are not culturally accepted food substances during pregnancy. This phenomenon is referred to as pica (which is Latin word for magpie, a bird notorious for eating almost anything).

The term pica has been described as an eating disorder characterised by the persistent ingestion of non-nutritive substances for a period of at least one month at an age in which this behaviour is developmentally inappropriate (1).

The patterns of ingestion are referred to as "phagias" (2) such as geophagia: eating soil, clay,

sand or chalk; lithophagia: eating stone; pagophagia: eating ice or freezer frosts; plumbophagia: eating lead; amylophagia: eating laundry starch; coprophagia: eating faeces (2) and so on.

Evidence from studies carried out in different parts of the world has established pica practices during pregnancy to be a world-wide phenomenon (3-7) and the nature of substances ingested to vary in type and extent in different parts of the world. The more commonly reported ingested substances include clay, soil, sand, ice blocks, freezer frosts, laundry starch, and corn starch. Other reported pica substances include ashes, cigarette butts, stones, pebbles, soap, baking soda, baking powder, baby powder, raw potatoes, lead, burnt match heads, vinyl

gloves, latex gloves, faeces, plastic, pencil erasers, hair, finger nails, pieces of papers, paint chips, plaster, coal, chalk, plastic bulbs, coffee grounds, charcoal, soot, needles, coins, screws, thumbtacks, glue, buttons, toothpaste and cloth (2-4). Going by the above lists, it seems that no substance is immune from the imagination of pregnant women with pica propensity.

Globally, the available literature shows that the prevalence rate of pica varies from place to place and has been reported to range from 0 to 68% depending on the characteristics of the population studied (4). In a study involving 553 urban pregnant, otherwise healthy African-American women, Edwards et al (5) reported that 8.1% of their respondents practiced pagophagia, no geophagia was reported. A similar low prevalence rate (8.8%) involving geophagia and pagophagia was documented by al-Kanhal and Bani (8) in a study involving 321 pregnant Saudi Arabian women. Other investigators who reported low pica prevalence rates included Smulian et al (4) who documented 14.4% prevalence in a sample of 125 women from rural obstetric population in Columbus, USA; and Walker et al (9) who recorded 2.2% and 1.6% prevalence rates respectively among the Indian and Caucasian pregnant women.

Some studies carried out in Western societies reported high prevalence rates in their subjects. Corbett et al (10), for example, recorded 38.0% prevalence in a study involving 128 antenatal women in Greenville, USA. They documented that African-American women reported practising pica more often than other ethnic groups in their study. Also, about 8.6% of their respondents reported practising polyphagia, that is, ingestion of more than one substance. Similar rates were recorded by Simpson et al (6) whose study revealed a prevalence of 44% and 31% pica respectively in two groups of low-income women born in Mexico.

Highest pica prevalence rates involving mainly geophagia were reported in studies carried out in African countries. Walker et al (11) reported a 38.3% and 44% pica prevalence rates respectively among the urban and rural South African pregnant women in their study. Tayie and Lartey (12) reported 48% geophagia with clay eating forming the major form of pica in a sample of Ghanaian pregnant women studied. In Nigeria, Sule and Madugu (7) documented a 50% pica prevalence among the pregnant women studied in Zaria.

In Kenya, the only published works on pica prevalence in pregnancy have been those of Giessler et al (13, 14) which investigated geophagia in pregnant women attending antenatal clinic at Kilifi District Hospital in Coast Province, Kenya at different times. In one of the studies (13) involving 275 pregnant women, 56% reported eating soil regularly and in the later study (14) involving 52 pregnant women, 73% reported practising geophagia on regular basis. These studies specifically investigated geophagia and found it to be a common practice among the study population. In the two studies (13, 14) the investigators however did not attempt to identify other substances ingested by pregnant women in this society.

Lithophagia is another form of pica that is reportedly being practised by both pregnant and non pregnant women in Kenya. This involves eating 'odowa', a light yellow soft stone reportedly dug out from excavation sites at Kajulu hills in Kisumu District and cut out into chips (odowa chips) for consumption. Ajanja (15) in a newspaper documentary reported that "odowa" eating has spread to major towns in Kenya and beyond and that the stones are sold at the roadsides, in the markets and shopping malls. According to the local people their is a believe that the soft stones increase the woman's strength during labour hence pregnant women take them as iron supplement and as a tonic. The practice of "odowa" eating in Kenya has however not been investigated empirically.

The present study has been inspired by the apparent scarcity of empirical studies on pica prevalence during pregnancy in the country. It is hoped that the present study will supply the baseline data.

MATERIALS AND METHODS

This was a descriptive, cross sectional study conducted at Pumwani Maternity Hospital (PMH) Nairobi, Kenya, between September 2004 and February 2005. A signed approval for the study was obtained from the Pumwani Maternity Hospital Research and Ethics Committee. PMH has a capacity of 350 beds and 100 cots. The average number of antenatal mothers from Monday to Friday is about 60 per day.

The study used a convenience sample of 1071 low income pregnant women who were recruited during their antenatal visit. Selection of subjects was based on availability, accessibility, willingness to participate, and absence of obvious physical and emotional distress. Women experiencing pains or bleeding or in early stage of labour or in any other physical or emotional discomfort were excluded from the study. The purpose of the study was explained to available pregnant women who attended antenatal clinic from Monday to Friday every week during the

eight weeks data collection period. The volunteers who gave a verbal consent or signed a consent statement to participate in the study were interviewed consecutively until the desired sample size was reached. Subjects were interviewed before or after they had been attended to by the nursing or medical staff .

Convenience sampling method was adopted for the study because pica prevalence was not known since it had not been explored in Kenya and so could not be estimated. Thus, the present study is considered a very preliminary one in the area of pica prevalence in Kenya. In addition, the nature of the population studied was another determinant factor in the choice of the sampling method adopted for the study. The population was constituted of pregnant women who made antenatal visits once in several weeks or even in months and whose stay in the clinic lasts only a couple of hours. This made it difficult to keep accurate track of them. It therefore makes more sense to interview the available volunteers as they come and go.

The instrument for data collection was a questionnaire designed and validated by the investigator through pilot testing involving ten pregnant mothers at Kenyatta National Hospital (KNH), Nairobi. The questionnaire contained twenty questions, which were mainly open ended with few closed ended items designed to address the objectives set for the study. The questionnaire was administered in an interview format to all eligible participants who voluntarily consented to be involved in the study after the purpose of the study was explained to them.

RESULTS

Data were collected from 1071 pregnant women during the eight weeks period of data collection. All data were collected at nominal level and were either listed or categorised in groups and results presented in frequencies and percentages.

Socio-demographic profile: The majority 860 (80.3%) of respondents were within the age range of 20 - 39 years and with a mean age of 28.1 (±7.3) years. More than half 665 (62.1%) were married and a similar proportion 674 (62.9%) were multiparous. One hundred and thirty nine (13.0%) were teenagers and some were multiparous. About 624 (58.3%) constituted of those respondents who either attempted various levels of primary education without completion 250 (23.3%); and those who completed primary education 374 (34.9%). About 215 (20.19%) dropped out of secondary school and 96 (9.0%) completed secondary education. Sixty nine (6.4%) had no formal education; 65 (6.1%)

had college education and only two (0.2%) had university education. About one fifth, 229 (21.4%) of the respondents were not working and were either housewives or students; 337 (35.2%) were engaged in petty trading; while 231 (21.6%) were peasant farmers; and the rest, 234 (21.8%) were mostly engaged in different categories of low paid jobs (Table 1).

Table 1

Socio-demographic characteristics of respondents
(n = 1071)

Characteristic	Frequency	(%)
Age (years)		
15 - 19	139	13.0
20 - 29	614	57.3
30 - 39	246	23.0
40 - 49	72	6.7
Marital Status		
Single (never been married)	352	32.9
Married	665	62.1
Separated/Divorced (widowed)	54	5.0
Parity		
Primiparous	297	27.7
Multiparous	774	72.3
Highest Educational Level		
No formal education	69	6.4
Attempted primary education	250	23.3
Completed primary education	374	34.9
Attempted secondary education	215	20.1
Completed secondary education	96	9.0
College	65	6.1
University	2	0.2
Occupation		
Not working (e.g. house wife, student, etc)	229	21.4
Petty trading	377	35.2
Farming (peasant farmers)	231	22.6
Hair dressing	89	8.3
Clerical officers	47	4.4
Teaching	38	3.5
Others*	60	5.6

*Others included shop attendants 17(1.6%); hospital attendants 14(1.3%); hotel/bar attendants 9(0.8%); office attendants 9(0.8%); babysitting/ house helps 6(0.6%); community midwives 3(0.3%); and police constables 2(0.2%).

Prevalence of pica: Results on pica prevalence show that a total of 793 (74.0%) participants reported practicing pica regularly during pregnancy. About one third of this number, 266 (24.8%) reported practicing pica without experiencing any form of cravings while 527 (49.2%) reported experiencing strong cravings together with pica. Sixty one (5.7%) participants reported experiencing cravings regularly but without ingesting the craved substances, while 217 (20.3%) denied any experience of cravings or pica during pregnancy (Table 2).

Table 2

Prevalence of pica during pregnancy as reported by respondents (n = 1071)

Incidence of pica	Frequency	(%)
Absence of cravings with pica	266	24.8
Cravings with pica	527	49.2
Cravings without pica	61	5.7
Absence of cravings without pica	217	20.3

Substances ingested: Pica prevalence categorised by substances ingested as reported by respondents was as follows: soft stones (odowa) (89.8%); soil (red soil, anthill soil, dried mud / clay) (61.23%); charcoal and ash (burnt sugar cane wastes) (6.9%); ice blocks (0.8%); pieces of paper (0.6%); soap powder (0.5%), inhaling the odour emanating from human excreta (0.5%); and inhaling the odour from husbands' dirty work clothes (0.3%) (Table 3). More than half of the women who practiced pica, 496 (62.5%) reported ingesting more than one substance (polyphagia) either together at a time or interchangeably.

Table 3

Substances ingested reported by respondents (*n = 793)

Substance	Frequency	(%)
Soft stones (odowa)	712	89.8
Soil (red soil, anthill soil, dried mud/clay)	485	61.2
Charcoal	40	5.0
Ash (burnt sugar cane wastes)	15	1.9
Ice blocks	6	0.8
Paper (pieces of paper)	5	0.6
Soap powder (detergent)	4	0.5
Faeces (inhaling the odour)	4	0.5
Dirty clothes (inhaling the odour)	2	0.3

*Categories not exclusive

Rate of ingestion: Majority of women 643 (81.1%) reported ingesting the substances between two and three times with average ingestion rate of 2.4 times daily (Table 4).

Table 4

Frequency of ingesting pica substances reported by respondents (n=793)

Number of times per day	Frequency	(%)
Once a day	89	11.2
2-3 times	643	81.1
> 3 times	61	7.7

Sources of pica substances: A major source of procurement of pica substances was through purchase (98.6%) from roadsides, markets, shopping malls and kiosks. Other sources included immediate environment such as ground (30.1%), termiteria or anthill nests (23.2%), walls of mud houses (22.8%), and others such as refrigerators, deep freezers, and so on (6.1 %) (Table 5).

Table 5

Source of pica substances reported by respondents (*n=793)

Source	Frequency	(%)
Purchase (from shops, markets, roadsides, etc)	782	98.6
Ground (for red soil)	239	30.1
Temiteria (anthill nests)	184	23.2
Walls of mud houses	181	22.8
Others	48	61

*Categories not exclusive.

Characteristics of women who reported practicing pica: Majority of women who practiced pica also reported experiencing cravings or compulsion to ingest pica substances, 527 (66.5%); childhood pica, 348 (43.9%); pica before pregnancy, 400 (50.4%); pica in previous pregnancy 425 (56.3%); pica in family members 616 (77.7%); and pica in other members of the community (such as friends and neighbours) 386 (48.7%).

Table 6

Characteristics of women who reported practising pica
(*n = 793)

Characteristic	Frequency	(%)
Cravings	527	66.5
Childhood pica	348	43.9
Pica before pregnancy	400	50.4
Pica in previous pregnancy	425	56.3
Pica in family members	616	77.7
Pica in friends/neighbours etc	386	48.7

*Categories not exclusive

DISCUSSION

The present study was conducted primarily to investigate the prevalence of pica behaviour during pregnancy and to identify the substances commonly ingested and their prevalence and sources. Further, the study explored the characteristics of women practicing pica, which may have influenced their behaviour.

Majority of the respondents (70.3%) were below the age of 30 years, and most of them were married and multiparous. This finding is not surprising because in African traditional society, it is a common practice for female children who are educationally disadvantaged to marry and have children earlier than those women who have opportunity to go to school and pursue higher education.

The respondents were also mostly of low socio economic status (Table 1). These findings were not surprising because the Pumwani Maternity Hospital was established to provide integrated maternity services to the low income members of the society at affordable costs. Besides, the Pumwani estate where the maternity hospital is situated is mainly inhabited by low income people.

As regards pica prevalence, the present study has established both the presence as well as a high prevalence of pica behaviour in the pregnant women studied. More than two thirds (74.0%) of the respondents reported practicing pica regularly on daily basis. These findings corroborate the findings of other studies carried out in Kenya (13-15) and other parts of Africa (7, 11, 12) and Western societies (3,6) which reported both the existence as well as high prevalence of pica during pregnancy among their respective study subjects.

The results on pica prevalence is however inconsistent with what was documented by Smulian et al (4) that the prevalence of pica during pregnancy range between 0 and 68% depending on the characteristics of the population studied. The findings from the present study revealed a higher prevalence rate (74.0%) and are suggestive that pica prevalence is neither static nor declining but increasing.

Further breakdown of the findings show that not all respondents who reported experiencing cravings ingested the craved substance(s). About 61 (5.7%) women admitted experiencing the strong urge to ingest one substance or the other occasionally or regularly as the case may be but were able to restrain themselves from ingesting the craved items through various means. Twenty five (41.0%) women said that they controlled the urge by purposely determining not to ingest the craved items, 21 (34.4%) said they controlled by eating biscuits or similar items, and 15 (24.6%) claimed to achieve control by lying down quietly and refusing to get up until the urge subsided. This finding is encouraging as it is suggestive that one can still control the urge irrespective of how strong it may be. It shows that women who practiced pica could be assisted through effective intervention measures to overcome this behaviour. This finding is in congruence with certain tenets of Rogerian client-centred theory of human behaviour which see human organism as capable of self-direction and self-regulation if he is assisted to develop insight into (his) problems or circumstances. The findings also reveal that a substantial number, 266 (24.8%) of respondents who practised pica denied experiencing any form of craving or urge at any point in time prior to their ingestion of pica items. It is possible that this group of respondents practised pica out of personal habit, cultural beliefs, or what they believe to benefit from the ingested substances.

The finding is perhaps suggestive that these women lack adequate information as regards their nutritional and health needs and how to meet them during pregnancy. This group of respondents may no doubt benefit from health education and counselling.

Substances reported to be ingested as presented on Table 3 are consistent with most of the commonly reported pica items in literature (2-4) except soft stones that was mentioned as one of the less frequently ingested items. This result shows that pica substances have not changed but may be increasing in number.

The results show that eating soft stones or lithophagia (89.9%) is more commonly practised and thus constitutes a major form of pica practised by pregnant women involved in this study. This finding differed from the results reported from studies carried out in Kenya (13,14) and other parts of Africa (2, 7,11,12), which reported that soil eating (geophagia) was the most common form of pica practised during pregnancy in these societies.

The findings on the other hand confirms Ajanja's (15) assertions in his documentary that 'odowa' eating has so much spread in the past few years among both pregnant and non pregnant women that it has established itself as a consumer product in major cities in Kenya and beyond. The high prevalence of 'odowa' eating (89.9%) among the respondents has substantiated these assertions.

The results also did not confirm the results of studies conducted in Western societies (3, 5), which reported that pagophagia (eating ice and freezer frosts) was the most common form of pica among the population of pregnant women studied. In present study, only six women (0.8%) reported ingesting ice blocks. The prevalence of ice eating may be low because the study population constituted mostly of women of low income group who may not afford refrigerators or deep freezers.

Interestingly four women (0.5%) reported enjoying inhaling odour from faeces (human excreta) and two other women (0.3%) reported inhaling odour from husband's dirty work clothes. These findings may be a case of olfactory craving of pregnancy described by Cooksey (16) as the ingesting more than one substance involving particularly soft stones and soil either together or alternatively on regular basis. When probed further, the reasons given by respondents for ingesting more than one substance included physical availability ingesting more than one substance involving particularly soft stones and soil either together or alternatively on regular basis. When probed further, the reasons given by respondents for ingesting more than one substance included physical availability of the substance at the time of need and availability in terms of monetary cost, cultural beliefs, and perceived benefit or effect derived from the substance after ingestion. Many women explained that even though they preferred soft stones to soil because they are more hygienically prepared and safer and also have more micronutrients ("something") that make baby and mother stronger during labour, soil is more readily available and cheaper to procure, and at times, it is obtained free without any monetary cost. They also explained that soil particularly those obtained from walls of mud houses or temiteria when sprinkled with water or when rain drizzles on it emits a characteristic or peculiar aromatic odour which gives a palatable texture or taste in the mouth when ingested. Based on the foregoing reasons, majority of respondents ingest soft stones alongside soil. This finding is in line with Corbett *et al* (10) study which reported that eleven women one out of the 49 who practiced pica were polyphagous, although the prevalence of polyphagia

reported in their study was low, their sample size of 128 was also smaller than the sample used in this study.

Part of the results also shows that the rate of ingesting the pica substances was high (Table 4). The majority reported ingesting the substances between two and three times daily. The mean ingestion rate for the sample was 2.4 times per day. Although the quantity of the substances ingested at a time or per day was not determined in this study, this result calls for concern since ingesting any of the identified substances at that rate on regular basis could lead to serious health problems and complications. Literature on pica has, for example, shown that complications, such as helminthic infestations, iron deficiency anaemia and intestinal obstruction may occur from pica involving soil and soft stones (13,17-19), mercury poisoning from paper pica (18) and so on. The reasons for the high rate of ingestion may be due to cultural beliefs and practices, poverty, perceived benefits and other external influences such as advertising and promoting the "benefits" of soft stones by the market interest driven dealers. It may also be possible that these substances were eaten at this rate out of habit to satisfy their cravings which some of the respondents described as "too compelling and powerful to resist".

The findings on the sources of pica substances reported by the respondents (Table 5) show that the pica materials are readily available and accessible in the respondents' environment. It is possible that the high accessibility to pica substances has positive influence on the prevalence and persistence of pica behaviour among the respondents. This is saying that if the substances are not readily available or are difficult to procure, one would expect a decline in pica behaviour.

On the pica practitioners characteristics, the findings reveal that majority of women who practiced pica reported experiencing one or combinations of the following: persistent urge to ingest pica substances (cravings), childhood pica, pica before pregnancy, pica during previous pregnancy, and presence of pica in family members, and other significant persons such as friends or neighbours who practiced pica during pregnancy or in non pregnant state. It appears these factors exert multiple influences on pica behaviour. For women experiencing persistent craving, the urge may be too overpowering for most women to control or resist thus leading to repeated ingestion's with greater risk to health. It is likely that women with a history of childhood pica, pica before pregnancy and pica in previous pregnancy have developed habitual tendency from past experience towards

pica. Psychological literature particularly psychoanalytic theories, on human behaviours are replete with theoretical postulations that early or childhood experiences tend to persist to influence later behaviour. There is also a possibility that significant others such as family members, friends and neighbours have great influence on human behaviours. This is likely to be due to family, peers and community shared habits and tendencies. This study supports the findings from other studies on characteristics of women with pica behaviour (4, 6, 7). The findings also substantiate the observations made by other researchers that pica is most commonly practiced among people from low socio-economic backgrounds and who live in rural communities (5, 6,11). Majority of respondents in the present study were of low socio economic status as can be seen from their socio-demographic profiles (Table 1).

Although Pumwani Maternity Hospital is situated in Nairobi, the capital of Kenya, the Pumwani estate could be described as an urban slum because it is mostly inhabited by low-income group of the population.

In conclussion the present study has established that pica exists and at a high prevalence rate among the study subjects. The most common forms of pica were lithophagia and geophagia, which may occur singly or together in one person. Pica behaviour was highly influenced by both intrinsic (personal) and external factors. The high pica prevalence in this study is indicative that pica behaviour might be more common and widespread in this society than healthcare providers realise.

The implication of the findings of this study is that if this practice is not stopped or controlled the trend will continue with subsequent generations as a result of reinforcement, modelling and learning.

This study is not without limitation. It was conducted on low income pregnant women at PMH so the findings are limited to that population. Nonetheless, the study has provided baseline data for further research on pica practices and related issues among pregnant women in Kenya. There is need for nation-wide cross socio-cultural study on pica prevalence involving pregnant women from different socio-economic background in order to establish pica prevalence at national level and among different socio-economic groups. Such further studies may discover other pica substances this study did not identify. There is also need for further studies to establish possible health consequences on mother and child associated with (specific) pica practices

during pregnancy. Finally, there is also need to routinely screen pregnant women for pica during antenatal visits. This will provide a more systematic and a less expensive way of establishing its epidemiology status among pregnant women in Kenya.

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ONE-STAGE TREATMENT OF LEFT-SIDED LARGE BOWEL EMERGENCIES

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ABSTRACT

Objective: To evaluate the safety and benefits of left-sided colectomy and primary anastomosis without intraoperative colonic irrigation in the management of patients with colorectal emergencies.

Design: Prospective descriptive analysis of patients with emergency left-sided colonic and rectal lesions requiring resection and primary anastomosis.

Setting: A hospital based cohort over a five and a half year period at Jos University Teaching Hospital, Jos, Nigeria.

Subjects: A total of 42 patients with left sided and rectal emergency lesions. Their ages ranged from 9-65 years with a mean of 43.1 years.

Intervention: Twenty patients had sigmoid colectomy and primary colorectal anastomosis for sigmoid volvulus. Two patients with compound sigmoid volvulus had sigmoid colectomy as well as ileal resection and primary colorectal and ileoileal anastomosis. Transverse colectomy and primary colocolic anastomosis was carried out in six patients who had transverse colon tumour from gastric neoplasia. These six patients had in addition distal partial gastrectomy and gastrojejunal anastomosis to remove the primary gastric neoplasia. One patient had transverse colectomy and another four left hemicolectomy and primary colocolic anastomosis for trauma. Left colectomy and colocolic anastomosis was performed in three patients with left colon tumour while anterior resection and colorectal anastomosis for rectosigmoid cancer was carried out in six patients.

Main outcome measures: Manual decompression of the colon is as good as antegrade colonic irrigation in the management of left-sided large bowel emergency conditions in selected patients when undertaken by dedicated experienced surgeons.

Results: There was one clinical anastomostic leak presenting as enteric fistula on the sixth postoperative day. The discharge was bilious and occurred in a patient with gastric mesenchymal stromal tumour who had distal partial gastrectomy and gastrojejunal anastomosis. He had no features of generalised peritonitis nor residual intra-abdominal abscesses. The fistula was managed non-operatively. A 12% wound infection rate was recorded. All infections were superficial and healed with conservative measures. We had no mortality in our series. The hospital stay ranged from 6 to 21 days with a mean of 7.5 days.

Conclusion: Manual decompression of the colon alone is as good as colonic irrigation in the management of left-sided large bowel emergencies. However, on-table antegrade colonic irrigation should be reserved for the loaded colon that may interfere with the use of a stapling instrument, when the resection margins are limited as in low anterior resections and when left-side colonic emergencies are undertaken by non-dedicated, less experienced surgeons.

INTRODUCTION

Anastomotic leakage is the main complication after resection of the left colon in an emergency setting. It has been established that anastomotic dehiscence is caused by faecal load (1-4). There has been a trend towards one-stage primary resection and anastomosis (5-8). This is now widely regarded as a safe alternative to the traditional method of staged defunctioning colostomy and resection, even in the elderly (9-10). However, in all these reported series, on-table antegrade colonic lavage was performed to decompress and clean the proximal colon. While decompression

may be desirable (to decrease distension, facilitates abdominal closure and improve colonic blood supply), several reports have stressed that colonic lavage is unnecessary for ensuring the integrity of the anastomosis (11-14). Furthermore, on-table antegrade colonic lavage prolong the operating time, increases the risk of contamination and infection in the operating field and intraoperative hypothermia. In a retrospective review of the literature, it has been shown that the healing of anastomosis is conditioned by many local, systemic and technical factors rather than the faecal load (15-18). Consequently, there has been a change of attitude for us regarding the necessity of on-table antegrade colonic lavage before anastomosis in colorectal surgery.

In this study, we prospectively analysed outcomes of operations in terms of wound infection, anastomotic failure and postoperative mortality in a consecutive series of patients who underwent colorectal resection and primary anastomosis after manual decompression of the bowel only and report our experience with this method.

MATERIALS AND METHODS

Between January 2000 and May 2006, data were collected on consecutive series of patients who underwent emergency colorectal surgery without on-table antegrade colonic lavage in a general surgery unit in a tertiary referral health centre.

All patients admitted to the care of a surgeon who were found at surgery to have lesion necessitating resection and primary anastomosis of the colon and upper rectum were eligible for inclusion in the study. Prophylactic parenteral antibiotics (gentamycin 80mg, ampicillin 500mg and metronidazole 500mg) were given intravenously to all patients after induction of anaesthesia, with two further doses administered every eight hours in those with viable bowel after the procedure and for five days in those with infarcted bowel. Laparotomies were performed through a midline incision. The colon was mobilised and decompressed as described previously (12) after an initial exploration. The bowel was divided between non-crushing clamps just proximal to the lesion and the colonic contents were milked into a container after exteriorising the colon from the operating field. The bowel ends were cleansed with swabs soaked in aqueous chlorhexidine. Decompression was considered completed when the small intestine and

proximal colon contain no further air or fluid to be milked out. In case of faecal spill and those having the procedure for colonic trauma, the abdominal or pelvic cavity was locally washed out with saline.

In patients with sigmoid volvulus, gaseous distension of the large bowel was relieved by foley catheter aspiration after manual untwisting of the torted sigmoid to relieve the obstruction. The large bowel was palpated after decompression for synchronous tumours and adenomas in patients with large bowel cancers. Anastomosis were made end-to-end with an inner continuous layer of 3/0 vicryl and an outer interrupted sero-muscular layer of 3/0 silk. In all the anastomosis, colonic ends were trimmed until there was free bleeding before such anastomoses were effected. Diverting ileostomies or colostomies were never used. Drains were not routinely used. The abdominal wall was closed in one layer with monofilament nylon I. The clinical course and postoperative complications were carefully documented. The endpoints of the study were wound infection, anastomotic leakage and death. Wound infection was defined as discharge of pus from the wound or a positive culture at any time. Anastomotic leakage was defined as a fistula from the abdominal wound, the drain tract or the vagina, or an intraperitoneal abscess or peritonitis along with an anastomotic dehiscence as seen by radiology, colonoscopy or laparotomy. No effort was made to screen for asymptomatic leakage. Mortality was defined as in-hospital death.

RESULTS

A total of 42 patients were prospectively studied and none was excluded from the analysis. Their ages ranged from 9 to 65 years (mean 43.1 years). There were 36 males and six females (Table 1). Sigmoid volvulus (n = 22) was the most common diagnosis, followed by colonic tumour (n = 9); secondary transverse colonic metastatic tumour from both adenocarcinoma and gastric mesenchymal stromal tumour (n = 6) and colonic trauma (n = 5) (Table 2). All obstructing colonic lesions with the exception of a nine year old boy with colonic polyp and gastric cancers were proven histologically to be adeno-carcinomas and gastric mesenchymal stromal tumours (Table 2). Procedures carried out in all the patients as well as the morbidity are indicated in Table 3.

Table 1

Age distribution in years

Age Range	Sex		Total
	Male	Female	
1 - 10	2	0	2
11 - 20	4	0	4
21 - 30	5	0	5
31 - 40	6	1	7
41 - 50	10	3	13
51 - 60	7	1	8
61 - 70	2	1	3
71 - 80	0	0	0
Total	36	6	42

Table 2

Indications for colonic resection and primary anastomosis

Disease	Number
Sigmoid volvulus	22
Colonic tumour	9 (8 adenocarcinoma, 1 polyp)
Secondary transverse colonic tumour from cancer of the stomach	6 (3 adnocarcinoma and 3 gastric mesenchymal stromal tumour
Colonic trauma	5

Table 3

Operative procedures, morbidity and mortality

Disease	Procedures performed	No. of patients	Wound infection	Anastomotic dehiscence	Deaths
Sigmoid volvulus	Single resection and primary anastomosis	20	2	0	0
	Double resection with primary ileoileal and colorectal anastomosis	2	0	0	0
Colonic tumour	Colectomy and primary anastomosis	9	2	0	0
Secondary colonic tumour anastomosis from gastric cancer	Transverse colectomy and primary colocolic and distal partial gastrectomy and gastrojejunal anastomosis	6	1	1	0
Colonic trauma	Transverse colonic and colocolic anastomosis	1	0	0	0
	Left hemi-colectomy and colorectal anastomosis	4	0	0	0
TOTAL		42	5	1	0

Hospital stay ranged from 6 days to 21 days with mean 7.5 days. One 43-year-old patient who had transverse colectomy and colocolic anastomosis; and distal partial gastrectomy and gastrojejunal anastomosis for gastric mesenchymal stromal tumour developed an enteric fistula. The discharge from the proximal end of the laparotomy wound noticed six days after the procedure was bilious. He had no features of peritonitis. Trans-abdominal ultrasonography revealed no intra-abdominal abscess. He was managed conservatively with good outcome. He was discharged after a total of 21 days. Superficial wound infection occurred in five patients (12%); none of these required further surgery. We had no mortality in our series.

DISCUSSION

The optimal management of emergency lesions of the left colon is still a controversial matter. Patients with left-sided colonic emergency lesions are treated traditionally by multi-stage procedures. This approach has disadvantages: multiple admissions, prolonged hospital stays and increased operative risks. Some patients do not get to complete the course of treatment and many temporary colostomies are never close (19). Furthermore, colostomy causes psychological problems and additional cost in terms of materials and frequent medical examinations.

The ideal treatment of emergency left-sided large bowel lesions is primary resection and anastomosis because it avoids a stoma and is associated with low postoperative mortality and morbidity (20). Subtotal colectomy by ileo-sigmoid and ileorectal anastomosis introduced in the eighties to overcome the problem associated with staged procedures has the additional advantages of relieving the obstruction, removing the dilated colon containing the lesion and synchronous lesion. However, this procedure suffers the disadvantage of increased bowel motion. The description of on-table antegrade colonic lavage in 1980 by Dudley and Radcliffe changed the attitude to colonic anastomosis and has been regarded as a safe alternative to multi-staged options even in the elderly. Intraoperative on-table antegrade colonic lavage reduces the amount of faeces brought into contact with the anastomosis and decompresses the colon, thus relieving the postoperative risk of anastomotic dehiscence. Decompression is beneficial in decreasing distension, facilitates abdominal closure and improves colonic blood supply. However, there is some evidence that complete cleaning of the colon of faecal matter is not necessary for ensuring anastomotic integrity (15-18). Furthermore, colonic lavage takes more time, is associated with more risk of spillage and contamination because it uses several litres of solution for irrigation and in a third world setting disposable drainage bag and anaesthetic scavenger tubes may not be readily available (13,22,23) Our experiences with the forty two cases has demonstrated that exclusion of bowel preparation during emergency surgery of the left colon was not associated with an increased anastomotic failure or wound infection rates. The wound infections did not vary much between the different procedures and pathologies. The bilious discharge from the proximal

part of the laparotomy wound in the patient with gastric mesenchymal stromal tumour who had distal partial gastrectomy and gastrojejunal anastomosis resulted from either duodenal stump leakage or gastrojejunal anastomotic leak. This complication which is unrelated to colonic anastomosis healed with conservative management. Identification of synchronous colonic cancer (5%) and polyps in patients with unprepared bowel may pose challenges to a surgeon. Such polyps can be palpated and differentiated from local faeces by gently shifting stool aside. However, colonic irrigation may be necessary when intra-operative colonoscopy and careful palpation of colonic tumours are needed for the evaluation of tumour less than 2.0cm.

Our experience in this series of patients does not differ from the views expressed by others in the literature (12,13,20,22,23). Manual decompression of the proximal colon without irrigation is as safe as colonic irrigation in one-stage management of left-sided large bowel emergencies. Although the present study shows relatively few complications after colorectal surgery without colonic irrigation, we wish to state that a surgeon of the consultant cadre performed all operations. It is the view of the authors that a safe colorectal or colocolic anastomosis depends on good blood supply and meticulous techniques paying attention to details with respect to placement of sutures without tension; and not a well prepared colon. Since lavage is cumbersome, costly and time consuming and possibly increases the risk of spillage and contamination, colonic decompression without lavage and anastomosis for left-sided colonic emergencies is recommended.

On-table antegrade colonic lavage should, however, be reserved for the following: Colonic tumours (<2.0cm) that are difficult to palpate and may require intra-operative colonoscopy, when the loaded colon may interfere with the use of a stapling instrument, when resection margins are limited as in low anterior resections and when left-sided colonic emergencies are undertaken by non- dedicated less experienced surgeons.

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PSYCHIATRIC MORBIDITY AMONG SEXUALLY ABUSED CHILDREN AND ADOLESCENTS

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ABSTRACT

Objectives: To describe the social demographic profile and identify psychiatric morbidity in sexually abused children and adolescents.

Design: A Cross-sectional descriptive survey.

Setting: Nairobi Women's Hospital (NWH) Gender Violence Recovery Centre (GVRC), Hurlingham, Nairobi- Kenya.

Subjects: A sample of 61 sexually abused children and adolescents aged 7-17 years.

Results: Eighty two percent of the survivors were sexually abused by acquaintances such as neighbours, caregivers and parents. Ninety percent of the sampled group were females. Abuse occurred in both single and both parent families and regardless of the guardian/ parental economic status. Sixty six percent of the survivors' parents were abusing psychoactive substances. Sexual abuse variables and most of the social demographic variables did not predict either presence or absence of psychiatric morbidity. Only 66% of the abuse came to the notice of the child's caregiver within the first 48 hours. On the socio demographic profile, the only factor that showed a statistical significant difference in predicting presence or absence of psychiatric morbidity was the family's way of sorting out their disagreements (p = 0.045). The prevalence of psychiatric morbidity among the subjects studied as measured by the Diagnostic Statistical Manual Text Revision (DSM IV-TR) was found to be 69%. Eight different types of DSM IV- TR diagnoses were made. Twenty nine percent of the AXIS-I DSMIV-TR diagnoses were co-morbidities (Multiple DSM IV- TR diagnoses).

Conclusions: The psychiatric morbidity prevalence is comparable to that found in other studies. Sexual abuse occurred regardless of the social demographic variables. Family's way of sorting out disagreement predicted presence or absence of psychiatric morbidity among the study subjects. Majority (82%) of the sexual abusers were acquaintances to the study subjects.

Recommendations: It is recommended that all children and adolescents who have been sexually abused be evaluated for psychiatric morbidity regardless of their social demographic and abuse profiles and that all parents and care givers, be sensitised on childhood sexual abuse and the fact that majority of the perpetrators are acquaintances to the subjects. Families need to be sensitised on their role on prevention and reduction of psychiatric morbidity among children and adolescents in general.

INTRODUCTION

Internationally all forms of child abuse are covered in the United Nation's Convention on the rights of the child (1) which states that: "The state shall protect the child from all forms of maltreatment by parents or others responsible for child care and establish appropriate social programmes for the prevention of child abuse and treatment of victims (Article 19); Children shall have the right to protection from the use of narcotic and psychotropic drugs and from being involved in their production and distribution (Article 33) ;The child shall be protected from work that threatens their health;

education or development. The state shall set minimum ages for employment and regulate working conditions (Article 32); the state shall protect children from sexual exploitation, prostitution and involvement in pornography (Article 34).

Over the period covering 2003 to 2005, the number of sexually abused children and adolescents reporting to the Nairobi Women's Hospital and elsewhere (2-5) in the Republic of Kenya has been increasing. Despite this, no studies have been done to assess the psychiatric morbidity among such survivors at the hospital or at the community level. It was therefore found necessary to conduct this study.

MATERIALS AND METHODS

This was a cross-sectional descriptive survey. The sample size was based on the number of the survivors reporting to the hospital at the time of the study. Approval of the study was given by the department of psychiatry, University of Nairobi and clearance given by the Ethics Research Committee (ERC) of Kenyatta National Hospital. The Board of directors of Nairobi Women's Hospital gave approval for the study to be conducted in their hospital.

All respondents were explained the purpose of the research and the consent of their parents /

guardians obtained. Confidentiality was assured. The inclusion criteria was any sexually abused child or adolescent aged 7-17 years reporting to NWH who was willing to participate in the study and whose parent's/guardian's gave consent. All survivors confirmed to be in need of long-term psychiatric services were referred to the hospitals' psychiatric services for follow-up.

A consecutive sample of 61 survivors meeting the above inclusion criteria was interviewed using a structured social demographic questionnaire developed by the authors and a sexual assault profile questionnaire adapted from Jodi *et al* (6). The sample was also subjected to a DSM IV-TR guided psychiatric evaluation for the purpose of making a DSM-IV TR diagnosis. Data was analysed using the Statistical Package for Social Sciences (SPSS) version 12. The level of statistical significance was held at $p < 0.05$.

RESULTS

Out of the 61 subjects studied, the male to female ratio was 1:9; the mean age was 11.1 years; (sd =3.3) the median age 11 years and the mode 7 years.

The other social demographic features were as shown in Table 1.

Table 1

Social demographic variables versus PM or NPM

Variable	Frequency	(%)	PM	NPM	X^2	df	p-value
Age group (years)							
7-12	46	75	34	12	2.234	1	0.99
13-17	15	25	8	7			
Sex							
Male	*6*	*10*	*4*	*2*	*0.015*	*1*	*1.00*
Female	55	90	38	17			
Place of abuse							
Nairobi	31	51	20	11	0.553	1	0.582
Outside Nairobi	30	49	22	8			
Number of siblings							
≤ 3	41	67.8	29	12	0.206	1	0.770
> 3	20	32.8	31	7			
School attendance							
Yes	48	80	33	15	0.553	1	0.582
No	12	20	8	4			
Who brought the child up?							
Both parents	32	52.5%	21	11	0.327	1	0.593
Others	29	47.5	21	8			

Whether child knew both parents							
Both	46	75	31	15	0.18	1	0.757
One parent	15	25	11	4			
Whether parents were alive							
Yes	38	68	26	12	0.17	1	1.0
No	18	32	12	6			
Whether child had a step parent							
Yes	8	14.5	7	1	1.48	1	0.41
No	47	85.5	3	1			
Parental marital status							
Married	31	51	20	11	0.553	1	0.58
Not married	30	49	22	8			
Occupation of caregiver							
Unskilled	38	65.5	26	12	0.015	1	1.5
Skilled	20	34.5	14	6			
Daily parent / guardians income							
$\leq 1\ \$$	16	26.7	11	5	0.16	1	1.0
$\geq 1\ \$$	44	73.3	31	13			
Family's history of mental illness							
Yes	17	29	11	6	0.70	1	0.511
No	42	71	29	13			
Parent/ guardians use of substances of abuse							
Yes	39	66	29	13	0.135	1	0.771
No	20	34	14	5			
Family's way of sorting out disagreements							
Well	23	38	12	11	4.789	1	*0.045
Not well	38	62	30	8			
Whether a parent had experienced similar trauma							
No	37	61	26	11	0.088	1	0.784
Don't know	24	39	16	8			

df = Degrees of freedom.

* Indicates that the p-value is statistically significant

On the socio demographic profile, the only factor that showed a significant difference in predicting presence or absence of psychiatric morbidity was how the family sorted out their disagreements (p-value of 0.045)

"SORTING OUT DISAGREEMENTS WELL" in this study constituted the authoritative – reciprocal parent-child relationship while "NOT SORTING OUT DISAGREEMENTS WELL"constituted the authoritarian, indulgent-neglectful or the indulgent permissive parent child relationship.

PM = Psychiatric morbidity

NPM = No psychiatric morbidity

Table 2
DSM 1V-TR diagnoses

Code	Diagnosis	Frequency	% of total pm
311	Depressive disorder not otherwise specified	24	41
308.3	Acute stress disorder	14	23
309.81	Post traumatic stress disorder (PTSD)	13	22
300.4	Dysthymic disorder	3	5
313.81	Oppositional defiant disorder	2	3
314.01	Attention deficit hyperactivity disorder	1	2
296.4x	Bipolar 1 disorder	1	2
312.81	Conduct disorder	1	2
	Total	59	100

The prevalence of psychiatric morbidity among the subjects studied as measured by the DSM IV-TR was found to be 69%. Nine DSMIV-TR diagnoses were made (Table 2).

Twenty nine percent of the AXIS-I DSMIV-TR diagnoses were co-morbidities (Multiple DSM IV-TR diagnosis) (Table 3).

Table 3

Co-morbidities (Multiple DSM 1V-TR diagnoses)

Code	Diagnosis	Frequency
308.3	Acute stress disorder with	
311	Depressive disorder not otherwise specified	8
309.81	Post traumatic stress disorder with	
311	Depressive disorder not otherwise specified	3
309.81	Post traumatic stress disorder with	
300.4	Dysthymia	2
311	Suicidal ideation with	
309.81	Depressive disorder not otherwise specified and	
	Post traumatic stress disorder	2
309.81	Post traumatic stress disorder with	
313.81	Oppositional defiant disorder	1
308.3	Suicidal ideation with	
311	Acute stress disorder and	
	Depressive disorder not otherwise specified	1
	Total	17

Table 4
Sexual abuse profile versus PM or NPM

Variable	Frequency	(%)	PM	NPM	X²	df	p-value
Acts performed by the perpetrator							
Vaginal/anal penetration	55	90	38	17	1		
Others	6	10	4	2		0.015	1.00
Whether the perpetrator used any force							
Yes	56	92	38	18	0.316	1	1.00
No	5	8	4	1			
Duration of abusive incidents recorded							
≤ than a day	39	26	64	13	0.241	1	0.424
> a day	22	36	16	6			
Extend of the physical injury the child sustained							
No injury	4	7	3	1	0.075	1	1.00
Injury	57	93	39	18			
Delay between the last abuse and discovery (hours)							
48	40	66	27	13	0.099	1	1.00
> 48	21	34	15	6			
Acts performed by the child during the abuse							
No acts	54	89	37	17	0.024	1	1.00
Any acts	7	11	5	2			
Coping strategies used							
Making efforts to resist	28	46	19	9	0.024	1	1.00
Passively submitting & denial	33	54	23	10			
How the child perceived the abuse							
Unpleasant	61	100	not			1	
Pleasant	0	0	valid				
Attribution of responsibility of abuse							
No responsibility to self	50	82	33	17	0.052	1	0.476
Some responsibility to self	11	18	9	2			
Whether child's caregiver was supportive							
Yes	38	62	25	13	0.441	1	0.578
No	23	38	17	6			

- None of the sexual abuse profile showed a statistically significance difference in predicting presence or absence of PM.

DISCUSSION

The DSM IV-TR psychiatric morbidity prevalence of 69% is comparable to that found by Merry *et al.* of 63.5% (7) in Auckland school of medicine (A study carried out to assess psychiatric status of sexually abused children aged 4—16 years 12 months after the disclosure of recent sexual abuse in 1994). In this study, depression disorders (Minor depressive disorder and dysthymia) were the most prevalent disorders (46%) followed by anxiety disorders (ASD and PTSD) (45%). Merry *et al* (7) using DSM III found anxiety disorder to be leading (30.3%) and depressive disorders to be 12%. Onyancha – Nyambuto (4) though studying adults found a DSM IV-TR prevalence of 74% among sexually assaulted adults at the same hospital.

On the social demographic profile, majority (75%) of the sample were in the 7 – 12 years age group while 25% were in the 13 – 17 year age group. The finding in the present study could be because some of the abused adolescents may not be reporting all cases of sexual abuse. Majority (90%) of those abused were girls.

About half (53%) of the children and adolescents were abused by an acquaintance (known but not in a position of trust for example neighbour). Ten percent were abused by a parental caregiver (biological) while 5% were abused by a parental caregiver non-biological. Only 18% were abused by strangers. Beitchman *et al.* (8) in his review of 42 studies found that a biological or stepfather as a perpetrator was associated with increased psychiatric morbidity.

Seventy one percent of the interviewed children and adolescent families had no history of mental illness while only 29% had history of mental illness. However it was noted that 66% of the parents of the abused children and adolescents used substances of abuse. This differs with Beitchman *et al* review (8) that indicated that there was increased psychopathology in sexually abused children's families. It was also noted that in the present study, family history of mental illness was not related to presence or absence of psychiatric morbidity (Table 1). Healther *et al*. (9) identified mother's depression as a risk factor for increased psychiatric morbidity whereas Merry *et al*. (7) concluded that mother's mental status and general health could predict presence or absence of psychiatric morbidity in sexually abused children and adolescents. This difference could be explained by the fact that in the society that the present study was done, medical evaluation is not easily available to everybody and also by the fact that mental illness is stigmatised and so parents might not have made honest disclosures.

None of the survivors' parents had a history of being sexually abused. However 39% of the survivors were not aware whether either of their parents had or had not been sexually abused. This variable did not seem to affect presence or absence of psychiatric morbidity. This differs with Healther *et al*. (9) study that identified mother's sexual abuse history as a risk factor for psychiatric morbidity. The authors' explanation for this is that in the setup the present study was carried, sexual assault is not openly discussed and so there might have been an under-reporting of mothers history of sexual abuse.

Of importance to note is the fact that on the socio demographic profile, the only factor that showed a statistically significant difference in predicting presence or absence of psychiatric morbidity was how the family sorted out their disagreements (p= 0.045) "Sorting out disagreements well" in this study constituted the authoritative – reciprocal parent-child relationship while "Not sorting out disagreements well "constituted the authoritarian, indulgent-neglectful or the indulgent permissive parent child relationship(10). Research has shown that the latter has been associated with low self-reliance, poor impulse control, aggression and social withdrawal.

Majority (90%) of the abused children and adolescents were subjected to vaginal or anal penetration. However this variable was not associated with either increased or decreased psychiatric morbidity. This differs with study by Beitchman *et al* (8), which associated invasive acts (involving vaginal or anal penetration) with increased psychiatric morbidity.

Majority (93%) sustained injuries ranging from mild to severe injuries. Seven percent of the survivors sustained no injury after the abuse. However the extent of physical injuries sustained did not predict presence or absence of psychiatric morbidity in this study. This concurs with findings by Merry *et al*. (7).

It was noted that 66% of the abuse was discovered within 48 hours after the last abuse while 36% was discovered later. This variable did not determine presence or absence of psychiatric morbidity. This differs with other studies (8), which associated longer duration of abuse before discovery with increased psychiatric morbidity. However efforts should be made to increase the percentage of discovery within the first 48 hours as this has an implication on the post exposure prophylaxis against HIV / AIDS.

Sixty two percent of the mothers or care givers reacted supportively after discovering the abuse while only 37% reacted negatively (unsupportive). This variable did not predict presence or absence of psychiatric morbidity. However efforts need to be done to encourage all mothers and caregivers to be supportive in case of an abuse.

Majority (91%) of the perpetrators used either verbal or physical force. Only 8% did not use force. However this was not associated with either increased or decreased psychiatric morbidity. This differs with Beitchman *et al*. (8) review that showered that use of force tended to predict increased psychiatric morbidity.

None of the sexual abuse profile variables used in the present study predicted presence or absence of psychiatric morbidity. This concurs with Merry *et al*. (7) study. However, Beitchman *et al*. review (8) found abuse variables like longer duration of abuse, use of force, and penetration to have negative effects.

In conclusion, the psychiatric morbidity prevalence was comparable to that found by Merry *et al*. (7). Sexual abuse occurred regardless of the social demographic variables. Family's way of sorting out disagreement predicted presence or absence of psychiatric morbidity among the study subjects. Majority (82%) of the sexual abusers were acquaintances to those sexually abused.

We recommended that all children and adolescents who have been sexually abused be evaluated for psychiatric morbidity regardless of their social demographic and abuse profiles and that all parents and care givers, be sensitised on childhood sexual abuse and the fact that majority of the perpetrators are acquaintances. Families need to be sensitised on their role on prevention and reduction of psychiatric morbidity among children and adolescents in general.

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A REVIEW OF ELECTROENCEPHALOGRAMS DONE AT THE KENYATTA NATIONAL HOSPITAL, NAIROBI

J. O. JOWI, Z. P. KIDIGA and M. G. GITAU

ABSTRACT

Background: Electroencephalogram based studies done elsewhere suggest that epileptiform activity originates predominantly from the left cortical hemisphere. There is evidence that partial epilepsies (focal spike and wave epileptiform discharges on tracings) connotes focal; secondary structural cortical dysfunction. Studies seeking similar findings have not been done locally.

Objective: To review electroencephalograms (EEGs) done at Kenyatta National Hospital (KNH); looking for various types of epileptiform discharges and their cerebral cortex of origin.

Design: Retrospective observational study.

Setting: Kenyatta National Hospital, Nairobi, Kenya- from January 1986 to June 2004

Results: A total 10431 EEG records were reviewed. Ninety Eight percent of referrals for EEG evaluation was for clinical differential diagnosis of epilepsy. Abnormal EEGs comprised 32.2% of the study population. Epileptiform abnormalities (i.e. focal spike and wave, generalized spike and wave and 3Hz spike and wave) discharges accounted for 75.2% of all abnormal EEG waveform discharges. Of the epileptiform abnormalities, focal spike and wave discharges comprised 71%. Focal spike and wave discharge implies a possible secondary aetiology of epilepsy. The left cerebral hemisphere was the origin of 49.8% of focal spike and wave epileptiform EEG discharges. Multifocal loci in cerebral cortices (i.e. frontal, temporal and parietal) were the foci of origin of abnormal EEG waveforms in 69.9% of recordings.

Conclusion: Focal spike and wave epileptiform discharges, with attendant likely secondary aetiology of epilepsy is predominantly evident in this study. It contrasts findings from western literature. The left cerebral hemisphere is more epileptogenic as is noted in other studies.

INTRODUCTION

The electroencephalogram (EEG) was developed in the 1920's and has since continued to play a pivotal role in evaluation and management of patients with epilepsy and epileptic syndromes (1). It can, however, effectively only be used to support a clinical diagnosis of epilepsy. Electroencephalograms are also used to assess the depth of anaesthesia, evaluate patients in intensive care unit and assess brain death (2, 3).

Focal epileptiform EEG activity has significant clinical connotation; presenting clinically as partial epilepsy. It may herald features of focal (secondary) cortical disorders. Partial ictal slowing of background frequencies is typical and may be lateralised or localised to a particular cerebral cortex (4, 5, 6).

Such secondary pathology, if identified, would shade light into the quality of perinatal and maternal health care standards.

Scalp EEG recording during partial seizures of mesial temporal lobe origin shows regional fronto-temporal ictal pattern in the hemisphere of onset in 50-80% of seizures. The number of patients with localising features in scalp EEG of extra temporal seizures is less than for temporal lobe onsets, 30% for frontal lobe seizures and less than 10% for parietal lobe seizures.

Less than 20% of occipital lobe seizures show regional localisation. Localisation of seizure activity onset is invaluable in epilepsy surgery. The yield of localisation is enhanced by placement of cortical surface and deep-seated (i.e. sphenoid) electrodes (7).

Periodic Lateralised Epileptiform Discharges (PLEDs) pattern is self-explanatory by its name. The complexes usually repeat at 1-2 seconds intervals and consist of spikes, polyspikes, or sharp waves followed by slow waves. Periodic Lateralized Epileptiform Discharges usually overlie an area of acute structural brain lesion such as herpes encephalitis or infarct (3, 8-10).

There are, however, pitfalls in the interpretation of EEGs. They may be insensitive, non-specific with artefactural and physiological waveforms that may resemble epileptiform discharges (spike and wave) (11). It is therefore very important to correlate clinical features with the EEG pattern observed.

Large population based studies show an incidence of 0.5-4% of normal persons with abnormal EEGs (1). Prevalence of epileptiform activity is higher in patients with cerebral tumour, cranial surgery, congenital birth injury, mental retardation and central nervous system infection amongst many disease conditions (1).

Routine, scalp, awake inter-ictal EEG recording is commonly done at Kenyatta National Hospital. The inter-ictal EEG recording may be normal in patients with epilepsy. Various techniques are applied to augment the yield of pick up of abnormality in the EEG recordings. These include hyperventilation, photic stimulation, sleep deprivation, continuous ambulatory EEG monitoring, video telemetry recording and implantation of EEG electrodes deep in specific areas of the brain.

Specific triggers in rare types of reflex epilepsies such as reading, gelastic, eating, photosensitive and musicogenic epilepsies have been applied (12, 13). Complementary techniques such as magneto-encephalography combined with magnetic resonance imaging and EEG analysis are now available but largely confined to specific research centers (14-16) These complementary techniques are still not available at The Kenyatta National Hospital.

Electroencephalogram based studies done elsewhere have suggested that epileptiform activity originates predominantly from the left cortical hemisphere. There is evidence that partial epilepsies (focal spike and wave epileptiform discharges on EEG tracings) connotes focal; secondary structural cortical dysfunction. Studies seeking similar findings have not been done locally.

A study was done at The Kenyatta National Hospital; EEG Unit (17) that looked at data in the period 1985-1987. It evaluated the reasons for referral of patients for EEG study, the positivity rate of the EEG tracings age and gender distribution.

Our study followed up on this (study period being January 1988 to June 2004) and had broader aims and objectives. We analysed data for various parameters ranging from age, gender, pattern of EEG tracings, cerebral hemisphere and cortex lobe of origin of the epileptiform EEG discharges.

MATERIALS AND METHODS

An 18 Channel Nihon-Kohden electroencephalograph machine was used in all the recordings. Common average referential and longitudinal and transverse bipolar montages were used in all examinations.

A total of 10,431 consecutive records of EEG reports over the study period were reviewed and analysed for various parameters ranging from age, gender, pattern of EEG tracings, cerebral hemisphere and cortex lobe of origin of the epileptiform EEG discharges. We looked at report data and tracings as on record. We studied some representative epileptiform EEG tracings which are shown in text. Like any retrospective study, the drawback here was that information obtained is dependent on recorded data. Proportions and frequencies were used to analyse data

RESULTS

A total of 10,431, EEG records were reviewed. There were 5,678 (54.4%) males and 4,550 (43.6%) females (M: F ratio 1.2:1) in the study population. In two hundred and three (1.9%) records, no indication of gender was noted.

Table 1

Age and gender distribution of the study population

Age Group (years)	Gender			
	Male	Female	Not Indicated	Total
0-4	1174	774	37	1985
5-9	806	514	29	1349
10-14	1005	857	38	1900
15-19	621	756	28	1405
20-24	501	438	19	958
25-29	332	290	18	640
30-34	274	189	11	474
35-39	192	137	3	332
40-44	160	117	3	280
45-49	85	77	1	163
50-54	57	59	2	118
55-59	53	43	2	98
60-64	40	26	2	68
65-69	27	25	1	53
70-74	19	36	1	56
75-79	16	8	0	24
80+	21	22	0	43
Not Indicated	295	182	8	485
Total	5678	4550	203	10431

The main referral base for EEG study was the Kenyatta National Hospital; 7643 (73.3%). The rest of the referrals came from health facilities as far as 400 kilometres away.

Hyperventilation augmentation technique was the commonest one carried out. It was done in 7098 (68%) of the cases. In 22% of the cases it was not carried out for various reasons such as cardiac disease, respiratory disease and in children. In 10% of the cases there was no indication as to whether hyperventilation was applied or not.

Standard Awake inter-ictal EEG recording was the commonest mode of examination, done in 83.1% of the cases. Sleep EEG recording was done in 15.3% of cases. In 1.6% of cases no indication was made as to whether the recording was a sleep recording or a wake one.

Of the 10,431 EEG records reviewed, 7068 (67.8%) were normal and 3363 (32.2%) were abnormal. Normal EEG tracings are usually destroyed after twelve months of storage. The abnormal EEG tracings/records were further analysed.

Table 2 shows the distribution pattern of the abnormal waveforms verses age group. Overall, epileptiform abnormalities (Focal Spike and Wake)(FSW) (Figure 1).

Figure 1
Focal Spike and Wave EEG (FSW) Complexes.
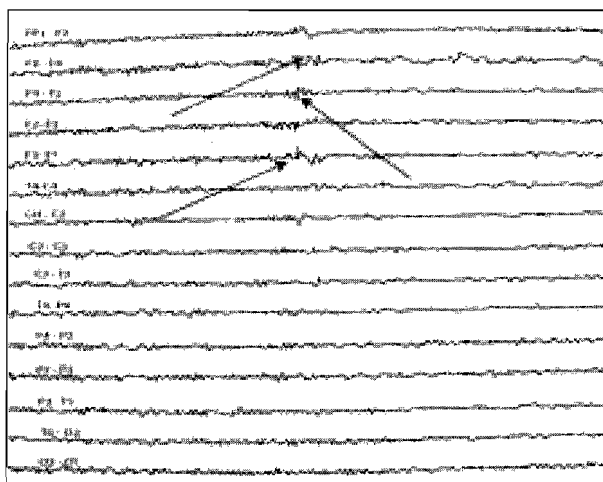
Generalised Spike and Wave (GSW) Figure 2 and 3Hz-spike and wave (3Hz) Figure 3 were more common (75.2%) as compared to other wave discharge abnormalities.

Table 2
Shows the distribution of abnormal EEG waveforms by age group

Age group (years)	FSW	NSSW	GSW	3Hz	Hyps	PLEDs	BS	ECS	SSp	Total
0-4	223	92	162	14	16	0	0	0	1	508
5-9	243	120	112	59	17	4	1	0	1	557
10-14	353	138	98	64	20	2	1	0	0	676
15-19	284	95	61	26	9	0	0	0	0	475
20-24	183	57	44	8	0	0	1	0	0	293
25-29	118	38	19	2	0	0	0	0	0	177
30-34	76	36	11	2	0	0	0	0	0	125
35-39	65	32	2	0	0	0	0	0	0	99
40-44	72	27	3	0	0	0	0	0	0	102
45-49	26	16	3	0	0	0	0	0	0	45
50-54	16	11	2	1	0	0	0	0	0	30
55-59	28	8	1	0	0	0	0	0	0	37
60-64	15	7	1	0	0	0	0	0	0	23
65-69	9	11	0	0	0	0	0	0	0	20
70-74	8	13	0	0	0	0	0	0	0	21
75-79	4	6	0	0	0	0	0	0	0	10
80+	9	4	1	0	0	0	0	0	0	14
Age not indicated	63	44	35	4	2	0	1	2	0	151
Total	1795	755	555	180	64	6	4	2	2	3363

FSW= Focal Spike and Wave, NSSW=Non Specific Slow Wave,GSW=Generalised Spike and Wave, 3Hz=3Hz-Spike and Wave, Hyps=Hypsarrthymias, PLEDs=Periodic Lateralized Epileptiform Discharges, BS=Burst Suppression,ECS=Electroconvulsive Silence and SSp=Sylvian Spikes

Figure 2

Generalised Spike and Wave (GSW) EEG tracings

Figure 3

3Hz Spike and Wave (3Hz) EEG complexes
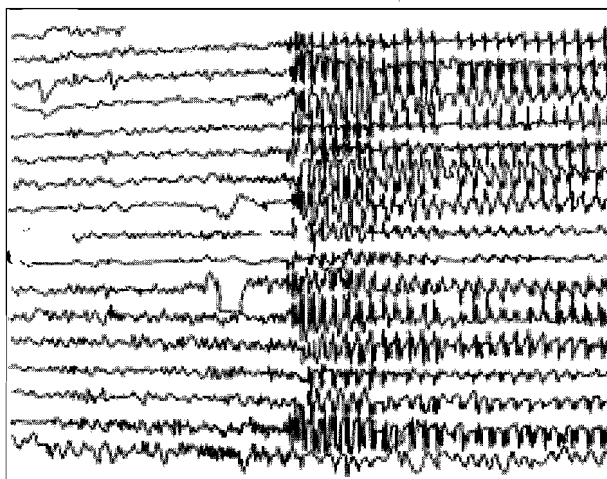
These other EEG waveform abnormalities included Non-Specific Slow Waves (NSSW), Periodic Lateralized Epileptiform Discharges(PLEDs), Burst Suppression(BS), Electroconvulsive Silence (ECS), Hypsarrthymias (Hyps) and Sylvian Spikes (SSp); all comprising 24.8% of the abnormal tracings.

The study showed that of the epileptiform abnormalities i.e. FSW+GSW+3Hz; Focal spike and wave discharge was the more common one comprising 71% of the group.

The FSW epileptiform abnormalities on EEG tracings originated from the left cerebral hemisphere in 49.8% and the right cerebral hemisphere in 40.3% (Table3).

Table 3

Cerebral hemisphere origin of the Focal Spike and Wave EEG discharges

Cerebral Hemisphere	Frequency	(%)
Left	894	49.8
Right	723	40.3
Bifrontal	26	1.4
Central	10	0.6
Not Indicated	142	7.9
Total	1795	100

Multifocal cerebral cortex (temporal/frontal/parietal) origin of focal spike and wave discharges was seen in 69.9% of tracings as compared to primarily occipital cortex in 3%, primarily central in 0.7% and primarily parietal cortex in 0.6% Table4.

Table 4

Cerebral cortical lobe of origin of the abnormal EEG waveforms

Cerebral Cortex Lobe	Frequency	(%)
Multifocal(frontal+ Temporal+Parietal)	1255	69.9
Primarily Occipital	54	3.0
Primarily Central	13	0.7
Primarily Parietal	10	0.6
Parietal/Occipital/Central	9	0.5
Not Indicated	454	25.4
Total	1795	100

Focal spike and wave epileptiform discharges was seen in 61% in age group 5-19 years.

DISCUSSION

Epilepsy is a common neurological disorder worldwide (18, 19). The electro-encephalogram is an invaluable tool in diagnosis and management of patients with epilepsy. It aids in diagnosis and classification of epileptic seizure types and syndromes (1).

This study reviewed 10,431 EEG reports done over a seventeen year period. About three quarters (73.3%) of referrals for EEG evaluation came from the hospital itself while the remaining were referrals from other public health institutions as far as 400 kilometers away in all corners of the republic. Male to female ratio was 1.2:1; favorably compares with the earlier study (17) of M: F ratio of 1.5:1.

Hyperventilation as an augmentation technique was used in 68% of the cases and only 15.3% had sleep EEG recording. Other techniques such as photic stimulation were hardly done; ambulatory EEG recording and Video-EEG Telemetry recording were not available.

About one third (32.2%) of the EEG recordings were abnormal. This compares to 36% in the earlier study (17). The study population predominantly comprised patients with clinical epilepsy as noted on the request forms; only 2% of the referrals for EEG were due to other diagnoses like stroke, post head injury headaches, suspected brain tumour, drug toxicities, encephalitis and coma in intensive care unit. In this study, as with the earlier study (17) epilepsy was found to be the commonest reason for referral for EEG. In the earlier study the highest positivity of EEG reporting was found to be for sub-acute sclerosing pan-encephalitis (17). Our study concentrated on the various forms of epileptiform discharges.

Of the abnormal EEG tracings, epileptiform abnormalities (focal spike and wave, generalised spike and wave and 3Hz spike and wave) were seen in 75.2% of cases. Focal spike and wave epileptiform discharges was seen in 61% in age group 5-19 years in this study. Focal spike and wave epileptiform discharges presumably signify secondary aetiology for the epilepsy (20). Studies from developed countries indicate that the age group 5-19 years significantly has primary generalised epilepsy (generalised spike and wave epileptiform discharges) (18, 19). Our finding is in contrast. This finding therefore raises fundamental questions about the etiology of aepilepsy in this age group. It would be important to look at issues like perinatal care, early childhood infections and infestations, malaria, meningitis, encephalitis, HIV/AIDS and head trauma as possible insults to the young brains with resultant secondary epilepsy.

The left hemisphere was significantly more epileptogenic, a finding confirmed by other studies (21-26). Occipital lobe is very rare as an origin of epileptogenic discharges (4). This study confirms the same. Further studies are needed to explain these findings.

In conclussion, the study shows that in those with epileptiform EEG discharges, focal spike and wave is the commonest finding. There is therefore need to do prospective clinical studies to evaluate the correlation between focal spike and wave epileptiform discharges, phenomenological presentation of seizures and seizure aetiologies. The left cerebral hemisphere is more epileptogenic. The occipital lobe is a rare origin of epileptogenic discharges.

We recommend that there is need for studies to explain why focal spike and wave discharges are more prevalent. There is need for studies to explain why the left hemisphere is more epileptogenic.

ACKNOWLEDGEMENT

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PSEUDOXANTHOMA ELASTICUM IN A PATIENT WITH SICKLE CELL DISEASE: CASE REPORT

A.M. ADAM and M C. MARITIM

SUMMARY

An 18 year female sickler (HbSS) presented with repeated history of epistaxis and bleeding gums. Features consistent with *pseudoxanthoma elasticum* were observed, such as hyper-extensile redundant skin folds in the neck, axilla, inguinal areas and abdomen. The skin biopsy showed swollen, clumped and fragmented elastic fibres and calcium deposits in the deep and mid reticular dermis, consistent with *pseudoxanthoma elasticum*. This is a well recognised complication of sickle cell disease which has not been described in Kenya.

INTRODUCTION

Sickle cell haemoglobinopathy and *pseudoxanthoma elasticum* are both hereditary diseases. *pseudoxanthoma elasticum* (PXE) is a rare hereditary connective tissue disorder; characterised by generalised degeneration of the elastic fibers with a broad phenotypic expression. Its prevalence in the general population ranges between 1/70,000 and 1/160,000 (1). The age of onset is variable but averages 13 years. The clinical picture consists mainly of cutaneous, ocular, and vascular manifestations; skin histopathology reveals swollen, irregularly clumped and multiple fragmented elastic fibers in the middle and deep reticular dermis, with secondary calcium deposition (2).

The typical cutaneous lesions are small yellowish papules or larger coalescent plaques with an appearance similar to plucked chicken skin. More severely affected skin results in hanging redundant folds. Skin lesions develop mainly at areas of flexion, such as the neck, axillae, antecubital and popliteal fossae, inguinal areas and periumbilical region. Mucous membranes, mainly of the inner aspects of the lower lip may also be affected (1,2).

Angioid streaks are the characteristic ocular manifestations, occurring in 80% of patients with PXE (3). They are fundoscopic findings, caused by breaks of the elastic lamina of the Bruch membrane, with secondary changes of the retinal pigment epithelium and choriocapillaries. Angioid streaks are initially seen during the third or fourth decade of life, usually later than the skin manifestations and occasionally without the typical cutaneous lesions. They appear as single or multiple, assymetrical, bilateral, dark, red, brown, or grey bands radiating from the optic disk (4).

Vascular manifestations in PXE are caused by degeneration of the elastic lamina of the arterial wall, often with calciun deposition. The gastrointestinal, cerebral, coronary, renal and extremity arteries are usually involved (5,6).

On the other hand, sickle cell anaemia is caused by a point mutation in the ß-globin chain of haemoglobin, replacing the amino acid glutamic acid with the less polar amino acid valine at the sixth position of the ß-chain. The association of two wild type α - globin sub-units with two mutant ß-globin subunits forms haemoglobin S, which polymerises under low oxygen conditions causing distortion of red blood cells and a tendency for them to lose their elasticity. The clinical manifestation and complications are due to this defect.

Erythrocytes are quite elastic, which allows the cells to deform to pass through capillaries. Often a cycle occurs because as the cells sickle, they cause a region of low oxygen concentration which causes more red blood cells to sickle. Repeated episodes of sickling causes loss of this elasticity and the cells fail to return to normal shape when oxygen concentration increases. This causes tissue hypoxia which causes

further sickling and the abnormal shaped erythrocytes are removed from circulation causing a haemolytic anaemia.

Therefore the natural history and complications include painful crisis, haemolytic crisis, sequeatration crisis, aplastic crisis, priapism, gall stones, obstructive jaundice, stroke, osteomyelitis, auto-splenectomy, stunted growth and decreased life span.

A PXE-like syndrome with cutaneous, ocular and vascular manifestations has been described in patients with thalassaemia and sickle cell disease. It is an acquired condition and age-dependent with generally late onset in the second decade of life (7-9). Here a case of PXE in a sickle cell anaemia patient is reported.

CASE REPORT

History: Patient J I was an 18 year old female, who at the age of two years manifested clinical features of sickle cell disease. She was followed up in haematology clinic of Kenyatta National Hospital (KNH).

She was readmitted to KNH on 16th March 2006, with complaints of left knee and back pain, yellowless of the eyes, chills, vomiting for five days, epistaxis and bleeding gums for one day on 16th March 2006. The knee pain was not associated with joint swelling. The stools were dark brown and urine dark yellow in colour. There was no pruritus initially but developed one week after admission. She had postprandial vomiting, but no epigastric nor right upper quadrant pain.

There was no history of haematemesis nor melena stools. No history of recent travel out of Nairobi. There was no visual disturbance and no history suggestive of intermittent claudication nor of angina pectoris. She had two previous admissions in KNH Paediatric ward in 1995 and subsequently in painful crisis related to the SCD, some of them with bleeding tendencies at the rate of 0 to 1 per year. She had been transfused about 12 units of blood and was on folic acid supplements with no known drug allergy.

She was first referred to KNH Paediatric dermatology clinic at nine years of age when during an admission an erythematous skin lesions confined to the neck, abdomen and few areas on the arms was observed. A dermatological opinion which was sought revealed a diagnosis of non-specific cutaneous syndrome. She has not yet attained menarche.

She is first born among two siblings from different fathers. Her mother who was a single parent died of malaria in 1993. She lived with her maternal grandfather and aunt in the suburbs of Nairobi. She left school in class eight due to lack of fees. Her sibling was 16 years and had already attained menarche.

There is no other family member with SCD, chronic liver disease or dermatological condition.

Examination: She was sick looking young girl, febrile with a temperature of 37.8°C, deep jaundiced, moderately dehydrated, pale but no lymphadenopathy, nor oral ulcers. She had good dental hygiene and dentition. Her pulse rate was 96b/min regular, normal character, respiratory rate of 18/min, BP-130/90mmHg. Her body weight was 39kg, height 1.64m, with body mass index of 14.5kg/m^2 (severely underweight). There was no bossing of the skull nor malar prominence. Her skin had multiple papules 1mm-4mm in diameter, a few coalesced to form plaques, all round the neck, axilla and groin. The skin was lax and redundant in the neck, axilla, anterior abdominal wall and groin. The surface was rough. There was no petechiae nor ecchymosis (Figures 1 and 2).
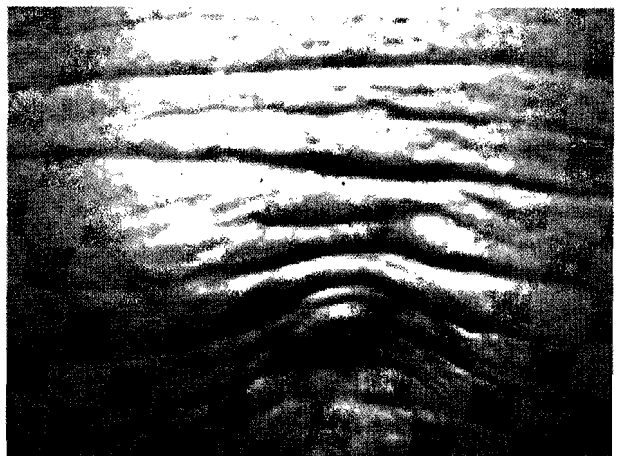
Figure 1
Redundant skin over the neck

Figure 2
Redundant skin with prominent skin folds over the anterior abdominal wall

The visual acuity was 6/6 bilaterally with comma shaped capillaries on bulbar conjuctiva and sludge phenomenon. On fundoscopy the Cup-disc ratio 0.3 both eyes. There was dull macula reflex with granular appearance (peau d'orange) in both eyes. There was no angioid streaks, nor neovascularisation.

The liver span was 14cm, extending 4cm below the costal margin. It was smooth and Murphy's sign was negative. The spleen was not palpable. The apex beat was not displaced and the rest of the cardiac examination was normal. There were no carotid bruits. The ankle-brachial index was 0.96 bilaterally. The rest of the examination was normal except for the secondary sexual characteristics which were grossly abnormal:-
- axillary hair - None
- pubic hair - Tanner I (None)
- breasts - Tanner IV

The working diagnoses were sepsis, painful crisis and bleeding disorder in a sickler with clinical features of *pseudoxanthoma elasticum*. She was investigated along these lines.

Investigations: Hb ranged between 6.8 to 8.9 gm/l, normochromic normocytic. The WBC was 15,000/cumm with 87% neutrophils. The platelet count was normal. A septic screen and blood slides for malaria parasites were negative. An activated prothrombin time, and prothrombin time index [108%, INR0.93] were normal. Total bilirubin 45.5, umol/l (direct 19.0) AST 80.8, ALT 31.6, ALP 610.2 u.l, total protein 83.3g/l albumin 51.2g/l. BUN, creatinine, electrolytes were normal. Uric acid was 770umol/l. urinalysis was normal. Elisa for Human Immunodefeciency Virus, hepatitis B and hepatitis C viruses were all negative. Screening serology for syphilis was also negative. Haemoglobin electrophoresis revealed HbSS.

Abdominal ultrasound scan showed a large liver; no dilated ducts seen, no spleen, innumerable minute mobile gall bladder calculi. Murphy's sign negative; enlarged hyper-reflective kidneys. Carotid doppler revealed normal doppler waveforms and diameters. The liver biopsy revealed features of hepatitis - periportal and lobular; no dilated bile ducts. The skin biopsy showed swollen, clumped and fragmented elastic fibres and calcium deposits in the deep and mid reticular dermis which were consist with *pseudoxanthoma elasticum*.

Treatment: She was put on intravenous ceftriaxone 1 gm o.d, paracetamol 1 gm t.d.s folic acid 5 mg o.d.

and was transfused two units of blood. She did not require phytomenadione. Her fever and bleeding resolved and she was discharged home after a week.

Her visits to haematology clinic were few and far between and she did not meet the criteria to warrant hydroxyurea which is standard practice at Kenyatta National Hospital, where all patients who meet the criteria are given hydroxyurea. It is also standard practice to give them pneumococcal and hepatitis B vaccinations but because of her poor compliance she had missed these. However this shortcoming has since been corrected.

DISCUSSION

The first manifestation of a potential elastic tissue defect in haemoglobinopathies described was angioid streaks. These were first described in the 1950s by Paton, Geeraets and Guerry in sickle cell disease (8,19). Since then there has been many papers published on this association. The first report of extensive diffuse connective tissue disorder, of the pseudoxanthoma type was by Lippman *et al* in1985. They described seven sicklers with extensive connective tissue disorder including mitral valve prolapse (9). It has also been described in thalassemia major (7,20).

This is the first report of PXE-like syndrome in Kenya with classical skin manifestations with a positive skin biopsy. Although it is possible that the two may occur coincidentally this is unlikely because of the late presentation and the time correlation between the progression of her sickle cell disease and gradual changes seen in the skin as documented in the file. The skin changes were initially non-specific but later became classical, hence the late diagnosis. She had also the bleeding disorder associated with this syndrome. The bleeding was not due to liver disease because the relevant coagulation test was normal and her serum albumin was also normal.

This was a complication of long standing sickle cell disease as she manifested many other late complications such as the delayed development of secondary sexual characteristics. Hepatitis is also a known complication of pseudoxanthoma (2). *Pseudoxanthoma elasticum* unconnected with a haemoglobinopathy had not been described in Kenya. In ß-thalassemia and SCD, it is believed that the elastic tissue abnormalities are acquired, despite their clinical, structural and cytochemical resemblance to inherited PXE.

It is not known how this syndrome develops in haemoglobinopathies. Several theories have been put forward to explain the development of this

complication. Elastic tissue injury in these patients may be the result of an oxidative process; induced by the combined and interactive effect of different factors. Plasma membrane micro-particles, derived from the oxidative damage of red cell membrane by the effect of denatured haemoglobin products and free iron are considered to elicit inflammatory and oxidative reactions (10-13). The unbound fractions of haemoglobin and haem, which exceed the binding capacity of haptoglobin and haemopexin in context of chronic haemolysis, also have powerful oxidative properties (14). In sickling syndromes, an excessive free radical production follows the post-occlusive tissue reperfusion (14). Iron overload has a central role in multiple organ injury in these haemoglobinopathies. Unbound iron catalyses the formation of the most toxic hydroxyl radical through the Fenton and Haber-Weiss reactions, causing peroxidation of membrane lipids and proteins (15). The accumulated and prolonged effects of the above mechanisms may result in disturbance of elastin metabolism and structural deterioration of elastic fibres (15). Indirect evidence of increased and prolonged tissue injury in thalassemic and sickle patients includes activation of polymorphonuclear neutrophils and monocytes and the increased levels of neutrophil elastase and circulating cytokines (16-18).

The aim of this publication is to draw clinicians' attention to severe oxidative stress in sickle cell disease which can cause a different set of complications other than the common complications due to sickling.

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DIAGNOSTIC CHALLENGES OF INTESTINAL TUBERCULOSIS IN A PATIENT WITH CHRONIC DIARRHOEA: CASE REPORT

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SUMMARY

A case of intestinal tuberculosis affecting the jejunum (with perforations) and the colon is presented. The objective is to highlight the challenges medical practitioners face in making a timely diagnosis of intestinal tuberculosis. It also aims to raise awareness that chronic diarrhoea and weight loss are common symptoms of colonic tuberculosis. A 26 year old university student was admitted with a three month history of diarrhoea anorexia and weight loss having been seen and treated for typhoid in several hospitals without improvement. Colonoscopy and biopsy was non conclusive. He later developed subacute intestinal obstruction that did not respond to conservative treatment. Explorative laparotomy revealed jejunal perforations with localised absesses, peritoneal adhesions with caseous nodules and mesenteric lymphadenopathy. Histology of resected specimens was positive for mycobacterium tuberculosis.

INTRODUCTION

Intestinal tuberculosis is much more difficult to diagnose than pulmonary tuberculosis. One of the reasons is the low diagnostic yield of endoscopic biopsy specimens. Tuberculosis remains one of the most common problems affecting patients in developing countries where poor sanitary conditions, overcrowding and malnutrition are common. Intestinal tuberculosis can mimic any abdominal inflammatory disease and hence a high degree of suspicion is needed to avoid delays in diagnosis resulting in increased morbidity and mortality (1-10).

The prevalence of extra-pulmonary tuberculosis seems to be rising, particularly due to increased prevalence of acquired immuno deficiency syndrome (AIDS). The abdomen is involved in 11% of the cases (4, 5). In the abdomen, tuberculosis may affect the gastrointestinal tract, peritoneum lymph nodes and solid viscera.

CASE REPORT

A 26 year old male fifth year University of Nairobi veterinary medicine student presented to the casualty department of North Kinangop Mission Hospital on 25th August 2006. He gave a three month history of diarrhoea, epigastric discomfort and pain, anorexia and weight loss. He also complained of bloody diarrhoea on two occasions in the two weeks preceding the admission. The patient had been seen severally at the upper Kabete and main campus university clinics being treated for malaria, amoebiasis and typhoid without any improvement. Frustrated by lack of improvement he sought treatment at Nyeri provincial general hospital and was treated for typhoid with ciprofloxacin despite negative laboratory tests. He was single and denied contact with any person with chronic cough. He however recalled laboratory exposure to *mycobacterium bovis* and tuberculosis culture specimens while at the university microbiology laboratory a year prior to the admission. He did not have a family history of inflammatory bowel disease or bowel malignancy.

On physical examination he was wasted, dehydrated, and had no peripheral lymphadenopathy. His body temperature was 37.7°C and was pale but not jaundiced. His blood pressure was 130/70 mmhg. His abdomen was distended with visible peristaltic movements and tender on deep palpation of right and left lower quadrants. The bowel sounds were normal.

The initial test revealed hypochromic microcytic anaemia. The haemoglobin level was 9.0 g/dl. The white blood cell count was normal at 4.8 x10^9/l with 70.3% granulocytes and 25% Iymphocytes. The platelet count was 430x10^9/l and the erythrocyte sedimentation rate was raised at 46mm/hr. His liver function tests revealed a low albumin level of 27g/l and other parameters being normal. Renal function tests, stool microscopy and random blood sugar were normal. Elisa test for HIV was negative on two occasions.

Plain X-ray of the abdomen both erect and supine revealed multiple air fluid levels while the chest X-ray was normal. Colonoscopy revealed multiple ulcerations involving the caecum, descending and sigmoid colon. Histological examination of colonic biopsies revealed increased frequency of plasma cells, cryptitis, crypt abscesses and submucosal epithelial granulomas. No acid fast bacilli were detected. A histological diagnosis of benign ulceration and chronic colitis consistent with chronic inflammatory bowel disease was made. The patient was given a course of mesalazine 3g/day and metronidazole 400mg three times a day. No improvement was noted and instead he developed constipation which did not improve with colonic washouts and other conservative measures. His abdomen was distended with increased bowel sounds. Explorative laparotomy revealed multiple peritoneal caseous nodules with jejunal perforations and localised abscesses. 10 cm of jejunum was resected and end to end anastomosis done. Mesenteric Iymph node biopsy was done. Cultures from the biopsies yielded mycobacterium tuberculosis. Postoperatively he was then started on REHAZ-E (rifampicin, pyrazinamide, isoniazid, ethambutol) for six months and has shown marked improvement.

DISCUSSION

Abdominal tuberculosis denotes involvement of the gastrointestinal tract (GIT), peritoneum, Iymph nodes and solid organs i.e. Iiver, spleen and pancreas. The involvement of the gastrointestinal tract is seen in 65-78% of patients with abdominal tuberculosis (6). The common sites of involvement are the terminal ileum, and ileocaecal junction, followed by the colon and jejunum. Rarely tuberculosis may involve the stomach, duodenum and oesophagus. The intestinal lesions produced by tuberculosis are of three types ulcerative, hypertrophic and sticturous. Many patients may have associated nodal or peritoneal involvement. The peritoneal involvement may be adhesive or ascitic. Intestinal tuberculosis is more common among young adults.

The differentiation between intestinal tuberculosis and other chronic inflammatory bowel diseases based on clinical features, radiology, endoscopy and histology are often difficult as illustrated in this case report. It has been shown that chronic diarrhoea accounts for up to 40% of the initial presentation of intestinal tuberculosis, followed by abdominal pain and weight loss (10).

The colonoscopy features of colonic tuberculosis include erythema, mucosal nodules, ulcers, strictures and a deformed ileocaecal valve (8). These features are not specific and are also seen in Crohns disease. But the histological features are more diagnostic. Caseation if present will strongly suggest tuberculosis while central acute necrosis of granuloma may occasionally be seen in Crohns disease. The patient's chest X-ray showed no evidence of pulmonary tuberculosis which is not surprising since less than a half of the patients with abdominal tuberculosis have associated pulmonary tuberculosis and in one study the proportion was 19% (7) .

Other methods of diagnosing intestinal tuberculosis prior to explorative laparotomy have been described. These include sonographic detection of a thickening of the bowel wall in the ileum, caecum and colon in association with ascites. Also increased mesenteric thickness has been reported. Pathologically this mesenteric thickenings result from Iymphadenopathy, fat deposition and oedema due to Iymphatic obstruction, which makes it more echogenic. Over the years a number of reports have been published highlighting the wide spectrum of abnormalities demonstrated on computed tomography (CT) (9, 11).

The most common findings on CT highly suggestive of abdominal tuberculosis are high density ascites, Iymphadenopathy, bowel wall thickening and irregular soft tissue densities in the omental area (11, 12). Knowledge about the utility of magnetic resonance imaging (MRI) in abdominal tuberculosis is very limited. MRI when compared to CT added no more information to aid in the diagnosis.

Endoscopy is useful in diagnosis of GI tuberculosis where lesions are accessible. Endoscopic biopsy may not reveal granulomas in all cases as these lesions are submucosal. Multiple biopsies from the same site are advised to increase the yield. Endoscopic biopsy specimen may be subjected to polymerase chain reaction for detection of acid-fast bacilli (AFB).

This case report illustrates that the diagnosis of intestinal tuberculosis requires a high index of

suspicion. It also confirms that chronic diarrhoea is a common symptom of intestinal tuberculosis in immunocompetent patients. This case was probably due to laboratory exposure, in the university labs. Therapeutic trial of antitubercular treatment (ATT) is recommended by some authors in suspected cases of abdominal tuberculosis, when diagnosis can't be proved (14,15). However laparotomy is recommended where malignancy can't be ruled out with certainty. A mesenteric lymph node should be biopsied as caseation and granulomas are much more likely to be present in lymph nodes than intestinal wall lesions. Patients with intestinal obstruction due to strictures and hypertrophic lesions require surgical treatment.

Despite being a treatable disease, abdominal tuberculosis carries a mortality of 4-12% that is largely due to associated problems of malnutrition, anaemia, and hypoalbuminaemia and due to acute surgical complications. A high clinical index of suspicion and judicious use of diagnostic procedures can certainly help in timely diagnosis and treatment thus reducing of this curable but potentially lethal disease.

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