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Title: Sigmoid volvulus in Zambia: an abdominal emergency, retrospective analysis of 86 patients

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Topic: Abdominal emergency surgery, innovations in emergency care

Background: Acute sigmoid volvulus is one of the most common causes of mechanical intestinal obstruction in Africa, in 15% complicated by compound volvulus. Due to lack of endoscopic treatment options or presence of bowel necrosis emergency laparotomy is required. Literature shows large differences in mortality rates (0-27%) with higher rates in compound volvulus.

Aim: To evaluate the outcome of surgically treated patients with acute sigmoid volvulus in a rural African hospital.

Methods: Patients with simple sigmoid volvulus (SSV) and compound volvulus (CV) were included after emergency laparotomy at St. Francis Hospital Zambia: a rural, second level hospital without intensive care facilities. Patient characteristics, type of volvulus, ASA-score, per-operative findings, operation technique, morbidity, mortality and hospital stay were collected retrospectively.

Results: From March 2012 to September 2017 86 patients received emergency midline laparotomy for sigmoid volvulus. There were 76 men and 10 women, median age was 50 years (range 17-92). SSV was found in 72 (84%) patients; of those 8 (11% of SSV patients) had bowel necrosis. CV was found in 14 (16%) patients; of those 12 (86% of CV patients) had bowel necrosis. Primary sigmoid resection with anastomosis was done in 83 (97%) patients. Hartmann's procedure was done in three patients; two had SSV with necrosis and one CV and perforated colon (table 1).
24 (28%) patients had a total of 38 complications; major complications (Clavien-Dindo grade III-IV) were found in 13 patients. Ten (12%) of 86 patients died; 6 patients had SSV and 4 patients had CV. One patient with SSV died per-operatively because of cardiac arrest. Seven patients died postoperatively of sepsis; one of them had an anastomotic dehiscence. In two patients cause of death was unknown (table 2).

Discussion: In a rural African setting it is safe to perform sigmoid resection and primary anastomosis by emergency laparotomy in both SSV as CV. Congruent with literature, patients with CV are more likely to die compared to SSV. Sepsis is the most frequent cause of death. Improving postoperative care, including intensive care facilities, will be the key to better survival in these patients.

Table 1. Demography, ASA-classification, operation, mortality, morbidity and hospital stay

	Condition bowel	n	Male	Female	Age in years Median (range)	ASA classify-cation Median (range)	Operation		Mortality n (%)	Morbidity n (%)	Hospital stay in days Median (range)
							Resection + anastomosis	Resection colostomy			
Simple sigmoid volvulus	Viable sigmoid	63	56	7	51 (17-92)	IIE (IIE-IVE)	63*	0	3 (5%)	11 (17%)	4 (0-17)
	Sigmoid necrosis	8	6	2	63 (30-82)	IIIE (IIE-IVE)	7	2	2 (25%)	4 (50%)	6 (0-16)
	Unknown	1	1	0	28	-	-	-	1 (100%)	0 (0%)	6
Compound volvulus (ileosigmoid-knot)	Viable sigmoid + Viable ileum	2	2	0	52 (39-65)	IIIE (IIE-IVE)	1	1	1 (50%)	1 (50%)	7 (7)
	Necrosis sigmoid + Viable ileum	2	2	0	64 (61-66)	II ½ E (IIE-IIIE)	2	0	0 (0%)	2 (100%)	7 (6-8)
	Necrosis sigmoid + Necrosis ileum	5	5	0	48 (38-66)	IIIE (IIIE-IVE)	5	0	3 (60%)	2 (40%)	3 (0-13)
	Viable sigmoid + Necrosis ileum	5	4	1	33 (19-47)	III E (IIE-IVE)	5	0	0 (0%)	1 (20%)	5 (4-6)

* 31 of 63 patients with uncomplicated simple sigmoid volvulus underwent an infra-umbilical mini-laparotomy (incision 5-7cm), 1 of them died.
ASA = American society of Anesthesiologists, n = number of patients, % = percentage

Table 2. Mortality and potentially preventable death by improving postoperative care including intensive care facilities

Patient	Age	Sex	ASA-classification	Bowel necrosis		Diagnosis	Operation	Complication	Cause of death	Time (days) of death post operative	Potentially preventable death with improving postoperative care including ICU facilities
				Ileum	Sigmoid						
1	65	Male	IIIE	-	-	SSV	SR A	N/a	Peroperative death, unknown cause	0	N/a
2	38	Male	IIIE	-	-	SSV	SR A	Post operative ileus, anastomotic leak (Hartmann's procedure), superficial wound infection, bilateral pneumonia. Newly diagnosed HIV	Sepsis due to bilateral pneumonia	17	No
3	79	Male	IVE	-	+	SSV	H	Adhesions, re-laparotomy performed	Septic shock	16	No
4	82	Male	IIIE	-	+	SSV	SR A	Septic shock	Septic shock	0	Yes
5	56	Male	IIE	-	-	SSV	SR A	Distended abdomen	Unknown	4	Yes
6	28	Male	Unknown	Un-known	Un-known	SSV	SR A	Unknown	Unknown (missing data)	6	-
7	65	Male	IVE	-	-	CV	H	Hospital acquired pneumonia	Pneumosepsis	7	Yes
8	66	Male	IVE	+	+	CV	ISR A	Septic shock	Septic shock	0	Yes
9	49	Male	IVE	+	+	CV	ISR A	Septic shock	Septic shock	1	Yes
10	48	Male	IVE	+	+	CV	ISR A	Ongoing fluid loss intra-abdominal	Septic shock	3	Yes

Mortality rate simple sigmoid volvulus 8%; Mortality rate Compound Volvulus 29%
ASA= American society of Anesthesiologists, ICU = Intensive Care Unit, SSV=simple sigmoid volvulus, CV=compound volvulus, n/a= not applicable, ECG = Electrocardiography, SR= Sigmoid resection, A= anastomosis, H=Hartmann's procedure, ISR = Ileum and Sigmoid Resection