

Morbidity and Mortality of Emergency Hernia Surgery in Adults in Bujumbura: Analysis of Favourable Factors

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Abstract

Background: Abdominal parietal hernia, a temporary or permanent exit of viscera through an anatomically pre-existing zone of weakness, is a frequent pathology in surgery. So, the management of emergency hernias surgery should include some complications most often up after 30 days of the operation. **Aim:** To analyze the factors contributing to morbidity and mortality after 30 days of emergency hernia surgery in adults in the surgical departments of Bujumbura hospitals. **Methodology:** This is a prospective study over a period of one year that included all hernias operated on in emergency from January 2022 to February 2023. **Results:** During the period, 251 patients were admitted to the operating room for abdominal parietal hernias, including 49 for emergency hernia surgery. There were 43 men (87.76%) and 6 women (12.24%), *i.e.* a sex ratio of 7.1. The average age was 49.6 years, with extremes of 18 and 84 years. The occupation of strength (farmer, labourer, mechanic, mason, mason's helper) represented 75.51% of the cases. Inguino-scrotal hernia was preponderant (65.31%) followed by inguinal hernia (25.58%), umbilical hernia (4.08%); femoral hernia represented 4.08%. Hernial strangulation represented 89.80% and engorged hernia 10.20%. Morbidity was minor, 2.04% of complications (suppuration, hematoma, urinary retention). No deaths were found. Altemeir stage and occupation were statistically related to morbi-mortality of emergency hernia surgery in adults at 30 days postoperative ($p = 0.0028$ and $p = 0.0284$ respectively). **Conclusion:** Abdominal parietal hernias are frequent, dominated by groin hernias. The high frequency of

strangulation calls for awareness of cold hernia cures.

Keywords

Hernia, Strangulation, Herniorrhaphy, Morbidity, Mortality, Early

1. Introduction

Abdominal parietal hernia, the temporary or permanent exit of viscera through an anatomically pre-existing zone of weakness, is a frequent pathology in surgery [1]. It ranks second before vesicular lithiasis and after appendectomies in order of frequency [2]. Worldwide, the prevalence of strangulated hernias is estimated at 0.3% - 2.9% [3]. It is ten times more common in Africa than in Europe [3]. In Australia in 2019, 34% of 86 patients operated on for an abdominal hernia developed a post-operative complication [4]. In Pakistan in 2014, more than 50% of patients operated on for an abdominal hernia had a complicated hernia [5]. In Benin, hernia surgery accounted for 12.6% of operating theatre activity in 2013 [6]. It is a major surgical and public health problem, due to the direct cost of surgery and its complications, and the indirect costs associated with time off work [6]. Although it is a benign condition that is easy to diagnose clinically, it can become complicated and life-threatening [1]. Strangulation is this dreadful complication, which unfortunately is still a frequent reason for seeking care in Africa [7]. The treatment of choice is surgery, which must be initiated as a matter of urgency in the event of this complication [8]. Regular post-operative follow-up is necessary to identify factors associated with morbidity and mortality. In Burundi, there are no data on the factors associated with postoperative morbidity and mortality in adult emergency hernia surgery. The aim of this study was to analyse the factors favouring morbidity and mortality at 30 days following emergency hernia surgery in adults in the surgical departments of Bujumbura hospitals, and to analyse the results in the light of the literature.

2. Patients and Methods

Our prospective study was conducted at 8 Bujumbura hospitals: Kamenge University Hospital Center (CHUK), Kamenge Military Hospital (HMK), Prince Louis Rwagasore Clinic, Prince Régent Hospital, Police Hospital, BAHO Polyclinic, Tanganyika Care polyclinic and Bumerec Hospital, over a period of one year from March 1, 2022 to February 29, 2023. The study population comprised patients (adult men and women) who underwent emergency abdominal hernia surgery in the surgical departments of Bujumbura hospitals during the study period. We included in our study all adult patients undergoing emergency hernia surgery for strangulated or engorged abdominal parietal hernia (all types) in the surgical departments of Bujumbura hospitals during the study period. Patients undergoing elective or accelerated abdominal hernia surgery, strangulated incisional hernias and patients who failed to attend the follow-up consultation ap-

pointment on postoperative day 30 were not included. Data were collected on the basis of the patient's history and clinical examination from admission to day 30 post-operatively.

We have developed a questionnaire of five parameters including demographic data, Anamnesis data, clinical examination, factors associated with morbidity and mortality, complications related to surgical treatment.

The questionnaire has 20 items divided into five parameters. The first is Socio-demographic and clinical characteristics data with 4 items exploring patient identity (age, gender, etc.), date of admission, length of hospitalization and health care. The second parameter with 2 items exploring hernias risk factors and no risk factors; the third with 4 items exploring general status, conjunctiva, methods of clinical examination and type of hernia complications; the fourth with 6 items exploring incorrect hemostasis, bleeding disorder, failure to close the hernia sac, defect in wall reinforcement, insufficient asepsis and types of surgery according to Altemeir's classification; the fifth parameter with 4 items exploring intraoperative complications, early postoperative complications, late postoperative complications, medium and short-term complications.

Data were co-signed on a pre-established data collection form and processed using the following software: EPI INFO version 7.2.2.6, R version 3.5.0, EXCEL and WORD 2016. The Chi-square test and the Wald test were used. *A difference was considered significant when $p < 0.05$.*

3. Results

During the period of our study, 251 adult patients with abdominal hernia were admitted to the operating theatre, including 49 cases (19.52%) treated as emergencies. There were 43 men (87.76%) and 6 women (12.24%), giving a sex ratio of 7.1. The majority of cases in our study were operated on at the CHUK (85.29% of cases). The average age was 49.7 years with extremes of 18 and 84 years. The 50 and over age group was the most represented with 30.61% of cases. Farmers accounted for 51.02% of cases, and no occupation was reported for 8.16%. The patients lived in the city of Bujumbura in 38.78% of cases, followed by Bubanza with 9 cases (18.37%) (**Table 1**).

A heavy occupation (farmers, porters, mechanics, bricklayers, bricklayer's helpers) was found in 75.51% of cases, followed by abdominal hyper-pressure (constipation, chronic cough, prostatic dysuria) and a high age (>50 years) in 30.61%, 16.33%, 4.08% and 28.57% of cases respectively. No risk factor was found in 2.04% of cases (**Table 2**).

Abdominal pain and nausea were the main functional signs in our study, accounting for 100% of cases. The right inguino-scrotal hernia was the most frequent with 65.31% of cases. No cases of internal or lumbar hernia were found in our study (**Table 3**).

Of the 49 hernias admitted in emergency, 44 were strangulated (89.80% and 5 (10.20%) were engorged.

Autologous parietal repair was performed by the Bassini technique:

Table 1. Breakdown of patients by socio-demographic and clinical characteristics.

Characteristics		Number	Percentage
Age	<50 years	34	69.39
	>50 years	15	30.61
Sex	Male	43	87.76
	Female	6	12.24
Place of origin	Bujumbura Mairie	19	38.78
	Other Province	30	61.22
Profession	Forced labour (farmers, bricklayers, carpenters, mechanics)	37	75.51
	Other professions	12	24.49
Health facility	CHUK	33	67.35
	Other facilities	16	32.65
Clinic	Pain	49	100.00
	Nausea	49	100.00
	Vomiting	43	87.76
	Stopping matter and gas	29	59.18
Type of hernia complication	Strangulation	44	89.80
	Involvement	5	10.20

Table 2. Distribution of patients by risk factors for abdominal hernia.

Risk factors		Number	Percentage
Abdominal pressure	Constipation	15	30.61
	Chronic cough	8	16.33
	Prostatic dysuria	2	4.08
Heavy occupation (farmers, porters, mechanics, bricklayers, mason's helpers)		37	75.51
High age (>50 years)		14	28.57
Persistence of the peritoneo-vaginal canal		6	12.24
Smoking		6	12.24
Multiparity		4	8.16
History of hernia repair		3	6.12
Obesity		2	4.08
Uro-andrological history		2	4.08
Malnutrition		2	4.08
Asthma		1	2.04
No risk factors		1	2.04

Table 3. Distribution of patients according to hernia location.

	Location of hernia	Numbers	Percentage
Groin hernia	Right inguinal	8	16.3
	Left Inguinal	3	6.12
	Inguino-scrotal right	21	42.86
	Inguino-scrotal left	11	22.45
	Richter's hernia	2	4.08
	Femoral	2	4.08
Hernias of the anterior abdominal wall	Ombilical	2	4.08
	Spiegel's semi-moon line	1	2.04
	White line	1	2.04

Table 4. Distribution of patients according to factors influencing morbidity and mortality in relation to the Clavien-Dindon classification established at 30 days postoperatively.

Variables	Modalities	Total	%	Grade 0	Grade 1	p-value
Age	<50 years	34	69.39	22	12	0.2831
	>50 years	15	30.61	9	6	
Sex	Male	43	87.76	27	16	0.8536
	Female	6	12.24	4	2	
Type of hernia complication	Engulfment	5	10.20	5	0	0.0722
	Strangulation	44	89.80	26	18	
Stages of Altemeir	Clean	15	30.61	11	4	0.0028
	Clean contaminated (Suffering of the contents of the hernia sac)	27	55.10	20	7	
	Contaminated (digestive wound)	6	12.24	0	6	
	Dirty (necrosis of hernia sac contents)	1	2.04	0	1	
Profession	Farmers	25	51.02	15	10	0.0284
	Mason	3	6.12	0	3	
	Tradesman	3	6.12	3	0	
	Mechanic	3	6.12	2	1	
	Student	4	8.16	4	0	
	Office worker	3	6.12	2	1	
	Carrier	1	2.04	0	1	
	Without	4	8.16	2	2	

- ✓ Kelotomy;
- ✓ Isolation of the hernia sac;
- ✓ Verification of the vitality of the hernia sac contents;
- ✓ Reduction of the hernia.

Prosthetic repairs were not preferred because of the high infectious risk in this context.

According to Altemeier's classification, clean contaminated surgery was the most frequent with 55.10% of cases, contaminated surgery 12.24%. Anastomotic resection was performed in 3 patients (6.12%) and omentum resection in one patient (2.04%). Thirteen patients (26.53% of the cases) had a surgical site infection. Three patients (6.12% of cases) presented with acute retention of urine. Eight patients (16.33% of cases) had residual pain at 30 days postoperatively. Forty-eight patients (97.96%) had returned to work. There were no deaths at 30 days during our study period (**Table 4**).

In our study, the evaluation of the Clavien-Dindon classification found that the majority of postoperative complications did not require medical or surgical treatment (Clavien-Dindon Grade I classification). Altemeier stage and occupation were statistically related to morbi-mortality of emergency hernia surgery in adults at 30 days post-op ($p = 0.0028$ and $p = 0.0284$ respectively). The mean length of stay in hospital was 6.12 with extremes of 1 day and 33 days.

4. Discussion

The management of abdominal parietal hernias represents more than a quarter of the surgeon's activity in the operating theatre [9]. In our study, emergency surgical management of abdominal hernias represented 19.52% of all cases of hernia operated on during the study period. This result is higher than that of Konaté I *et al.* in Senegal in 2010, who found 15.3% of cases [10], and lower than that of Boukinda F *et al.* in Brazzaville, who found 79.4% of all hernias operated on [7]. This could be explained by the fact that the majority of our patients do not find a good referral for cold surgery. In our study, males predominated with 87.76% of cases against 12.24% of cases, *i.e.* a sex ratio of 7.1. Male predominance is a constant in all studies [10]. Our patients had a mean age of 49.6 years, identical to that found by Boukinda F *et al.* [7]; lower than the 50.5 years found by Konaté I *et al.* [10] and the 58 years found by Jacquet E *et al.* [11]. Kuubiere BC *et al.*, had over 90.7% of patients aged between 21 and 40 [12]. The inguino-scrotal variety of hernia was the most frequent, accounting for 65.31% of cases, as observed in all studies [13]. The frequency of other types of hernia varies from one author to another. In our study umbilical hernia represented 4.08%, inguinal hernia 22.45%, crural hernia 4.08% and lineaalba hernia 2.04%. Kuubiere BC *et al.* found that epigastric hernia represented more than 20% of parietal hernias, whereas umbilical hernia represented less than 3% [12]. For Ohene-Yeboah [12], groin hernia and incisional hernias were the most common; other types accounted for around 11%. Boukinda *et al.* found that groin hernias

(inguinal and femoral) accounted for more than 94% of hernias. Inguinal hernia was the second most common type of hernia [13]. Other types of hernia are extremely rare in emergencies [14]. Only one case of Spiegel's semi-lunar line hernia has been reported by the same authors [13]. For inguinal hernias, the right side was the most affected, as observed by all [15]. The proportion of strangulated hernias is high (89.80%); this is a peculiarity of African authors who still operate as many strangulated hernias [16]. Sakiye KA *et al.* operated more than half of patients with groin hernias (50.9%) in emergency for strangulation [14]. The precarious social conditions of patients, who have to pay for treatment, are one of the reasons why they only seek emergency treatment when complications arise. In our study, no hernia repair with mesh was carried out because of the high risk of infection in this context. Other authors have also found the same result [4]. With 2.04% complications and no deaths, we could say that the results were good, because for purely functional surgery, mortality should be zero, as in the series by Jacquet E *et al.*, [11] where the cure was carried out on an outpatient basis with effectively zero mortality. The morbidity reported in this study is higher than ours (over 10%). Dieng M *et al.* reported a morbidity (8.3%) [17] higher than ours. Altemeir stage and occupation ($p = 0.0028$ and $p = 0.0284$ respectively) were the statistically proven factors favouring morbidity and mortality in our study, unlike Arianna B *et al.* [18] and Bessa SS *et al.* [19] who found that only Altemeir stage was associated with morbidity and mortality. This result could be explained by the fact that men (many in our study) consulted late in relation to the onset of symptoms and arrived at hospital at an advanced stage of complications (necrosis of the hernial contents).

This result could also be explained by the fact that a large proportion of the patients in our study were referred by hospitals in the interior of the country due to a lack of competent staff, and arrived late. The average length of hospitalisation was 6.12 days, with extremes of 1 day and 33 days, in contrast to that found by Mark D [20] and Dieng M [17], which was 4 and 3.6 days respectively. This can be explained by the fact that the majority of patients were in poor general condition as a result of the hernia complication.

5. Conclusion

Abdominal parietal hernias are frequent and serious because of their unpredictable complications. Strangulation is a frequent complication. Risk factors are dominated by strenuous occupation, followed by abdominal hyperpressure. The Altemeir stage and occupation are statistically linked to the morbidity and mortality of emergency hernia surgery in adults ($p = 0.0028$ and $p = 0.0284$ respectively). People at risk should be made aware of the need to undergo cold surgery in order to avoid the serious consequences of strangulation.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Questionnaire

1.1. Socio-Demographic and Clinical Characteristics Data

- 1) Patient identity:
- ✓ Name and surname:
 - ✓ Age:
 - ✓ Gender: Male Female
 - ✓ Province:
 - ✓ Patient Phone number: Phone number of contact person:
- 2) Date of admission:
- 3) Length of hospitalization:
- 4) Health care: CHUK HMK CPLR HPRC HPNB HPK
BUMEREC POLYCLINIQUE BAHO

1.2. Anamnesis

➤ Hernia Risk Factors

- ✓ Smoking
 - ✓ Ascite
 - ✓ Asthma
 - ✓ Obesity
 - ✓ Multiparity
 - ✓ Emphysema
 - ✓ Abdominal hyperpressure:
 - Prostatitis dysuria
 - Constipation
 - COPD: Constructive Obstructive Pulmonary Disease
 - Chronic cough
 - ✓ High age
 - ✓ Prematurity
 - ✓ Peritoneal vaginal canal persistence
 - ✓ Malnutrition
 - ✓ Collagen disease
 - ✓ History of abdominal surgery
 - ✓ History of hernia cure
 - ✓ History of dismemberment
 - ✓ Uroandrologic history
 - ✓ Persistence du canal de Nuck
 - ✓ No risk factors
- #### ➤ Functional signs:
- Pain
 - Abdominal bloating
 - Nausea
 - Vomiting
 - Shutdown of materials and gases

- Incessant crying

1.3. Clinical Examination

- ✓ General status: 1) Good 2) Enough 3) Altered
- ✓ Conjunctiva: 1) Well coloured 2) Pallor of the conjunctiva 3) Icteric

❖ Inspection:

- Abdomen: 1) Distended 2) Normal 3) Flat
- Abdominal or inguinal swelling: Yes No

● Seat:

- 1) Umbilical
- 2) Spiegel
- 3) The white line
- 4) Right inguinal
- 5) Left inguinal
- 6) Femoral
- 7) Interparietal
- 8) Right Inguino-Scrotal
- 9) Left Inguino-Scrotal
- 10) Other

- Presence of scar: 1) Yes 2) No

If yes, what is the type?

- 1) Median laparotomy 2) Lateral 3) Inguinotomy

❖ Palpation:

- Normal
- Pain
- Mass

❖ Percussion:

- Tympanism
- Normal
- Dullness

❖ Type of Hernia Complications:

- Strangulation
- Infatuation

1.4. Factors Associated with Morbidity and Mortality

- ✓ Incorrect hemostasis
- ✓ Bleeding disorder
- ✓ Failure to close the hernia sac
- ✓ Defect in wall reinforcement
- ✓ Insufficient asepsis
- ✓ Type of surgery according to Altemeier's classification:
 - Clean
 - Contaminated

- Clean, contaminated
- Dirty

1.5. Complications Related to Surgical Treatment

1) Intraoperative complications

- Hemorrhages
- Section of the vas deferens or testicular vessels
- Nerve damage
- Bladder, colon or small bowel wound

2) Early postoperative complications

- Hematoma
- Infection
- Seroma or hydrocele
- Urine retention
- Ischemic orchitis

3) Late postoperative complications

- Residual pain
- Hydrocele
- Testicular atrophy

4) Medium and short-term complications:

Recurrence of the hernia

Death

Return to work (quality of life)

Clavien-Dindo classification:

- Grade
- Grade I
- Grade II
- Grade III
- Grade IV
- Grade V (Death)