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Management of penetrant abdominal wounds at the teaching university hospital of Brazzaville, Congo

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Abstract
The objectives are to evaluate the management of abdominal penetrating wounds, describe the epidemiological, diagnostic, therapeutic and evolutionary aspects. A retrospective study carried out from 1 January 2013 to 31 December 2016 in the digestive surgery department of the Brazzaville hospital and university center. All patients operated for a penetrating abdominal wound were identified. The variables studied were epidemiological, diagnostic, therapeutic and evolutionary. The results obtained that 34 cases were identified during the study period, including 32 men (94%) and 02 women (6%) with a sex ratio of 1/16. The mean age was 27.9 ± 10.23 years with extremes of 15 to 59 years. Students were the occupational category (23.5%). The majority of our patients (32.4%) came from the 6th arrondissement of Brazzaville, a growing crime area. The average time of consultation was 11.7 ± 22.39 hours with extremes from 30 minutes to 96 hours. Criminal assault was the most common occurrence (38.2%). The blade was the predominant vulnerable agent (82%). The left flank was the most represented seat (21%). The predominant eviscerated organ was hail (50%). The mean time to surgical management was 9.1 hours with extremes of 1 hour to 96 hours. Systematic laparotomy was therapeutic use in 88% of cases. The rate of white laparotomy was 21%. Hail was the most injured organ (38.2%). Excision-suture was the most successful gesture (61.8%). The results were simple in 76% of the cases and complicated in 24% of the cases. Parietal suppuration is the most common complication (63%). The average hospital stay was 8.38 ± 4.83 days with extremes of 3 and 29 days. In conclusion, penetrating abdominal wounds are unfrequent at the Teaching University Hospital of Brazzaville. Their care is still difficult in our context. The inadequacy of the means of emergency paraclinical investigations makes laparotomy, the therapeutic attitude of reference explaining the high rate of white laparotomy.

Keywords: penetrating wounds, abdomen, knife, laparotomy

Introduction
Penetrating abdominal wounds are solutions of continuity of the abdominal wall with peritoneal effusion. They are said to be perforating when they cause a lesion of the underlying abdominal visceral [1]. Penetrating abdominal wounds are a real public health problem in several countries [2]. Their frequency is variously reported throughout the world, depending on the circumstances of the occurrence. In the United States of America, it is estimated to be 70% of injuries with a majority of wounds per gun [3].

In Africa, the incidence of penetrating abdominal wounds is higher, especially in South Africa [4]. The prevalence of abdominal penetrating wounds has increased dramatically in recent years. This is linked to the increase in crime and conflict in urban areas [5].

In Congo-Brazzaville, Madzélé notes in 2002 over a period of 5 years reports a frequency of 1.6% [6]. Today, due to socio-armed conflicts, insecurity in urban and peri-urban areas, Congo is experiencing a rise in crime, especially in urban areas.

The present management of penetrating abdominal wounds is still subject to the displacement between two attitudes: systematic exploratory laparotomy and the non-operative attitude known as selective abstentionism or the armed expectation [6, 7]. Hence, the interest of this study which aims to evaluate the management of this category of patients.

The operational objectives are threefold: to determine the epidemiological aspects; describe the clinical and paraclinical aspects and then analyze the therapeutic and evolutionary modalities.

Patients and Methods
Nature, scope and period of study
This study analyzed retrospectively 34 cases of patients admitted consecutively between 1rst January 2013 and 31 December 2016 for penetrating abdominal wounds at the service of digestive surgery of the Teaching University Hospital of Brazzaville. Non-penetrating wounds were excluded.

Patients
The study population consisted of patients with medical records with usable information admitted for abdominal trauma by firearm or stabbing during the study period.

Data collection was based on a fact sheet. The diagnosis of abdominal penetrating wound was based on the existence of an abdominal wound with or without the presence of the vulnerable agent associated with any of the following: hemodynamic instability or radiological signs of hemoperitoneum; concept of abdominal trauma with a weapon or a firearm with an inlet; existence of clinical and / or paraclinic signs of peritonitis or perforation of a hollow organ; existence of evisceration, a flow of digestive fluid through the wound and an exit port.

Methods

The following parameters were collected on the data collection sheet:

- Age of patients divided by 5 years and sex;
- Patient category (civilian or military);
- Date of trauma and admission to service;
- State of consciousness of the wounded at admission;
- Topography of the inlet and / or outlet;
- Elements of the surgical treatment as well as the evolution after this treatment

Statistical analysis

The data was entered using Microsoft Excel 2010 for the calculation of the distribution frequencies of the various parameters and then transferred to the SPSS (Statistical Package for Social Sciences) version 17.0 software for appropriate analyzes. The quantitative variables were presented using the arithmetic mean with the standard deviation. The chi-square ($\chi 2$) and exact Fisher tests made it possible to establish the possible associations between different variables. The significance level of the tests was set at $p < 0.05$.

Results and Discussion

Frequency of admissions and sociodemographic characteristics of patients

In total, 34 cases of penetrating abdominal wounds were collected during the study period, representing a hospital frequency of 1.7%. The distribution of the annual frequency from 2013 to 2016 is illustrated in figure 1.

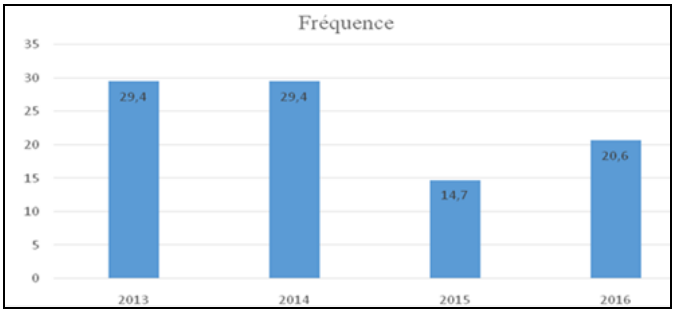

Fig 1: annual frequency of admissions

The study population consisted of 32 men (94%) and 2 women (6%), a sex ratio (M / F) of 16.0 (Figure 2).

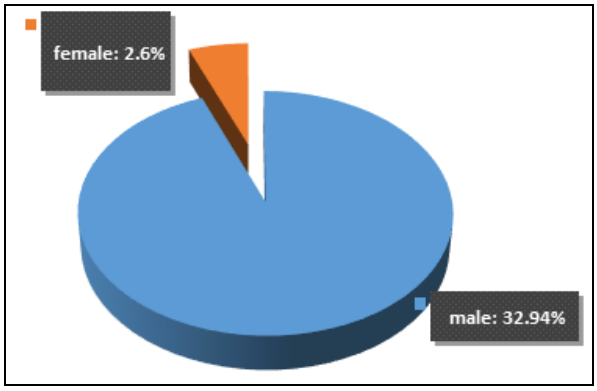

Fig 2: Distribution as function as sex

The mean age of the patients was 27.9 ± 10.2 (range: 15-59 years). Of these, 8 of the injured were students (23.5%); the others were in various occupations. Geographically, 32.4% of patients (n = 11) were from the 6th arrondissement of Brazzaville (Talangaï). Table 1 reports the distribution of patients according to the circumstance of occurrence. Among men, criminal assaults were the most common factor in the occurrence of trauma, with a frequency of 35.3% followed by brawls in drinking places or at football matches (26.5%). Hunting accidents accounted for 8.8% of cases, while the penetration frequency of lost bales, explosions, autolysis attempts and criminal prosecution was 5.9%, respectively. Trauma was associated with criminal assault (2.9%) and attempted autolysis (2.9%). Penetrating abdominal wounds are infrequent in hospital practice at the Teaching University Hospital of Brazzaville. Over a period of 4 years, the hospital frequency of 1.7%. Our frequency is higher than that of Kanté *et al.* [7] in Mali in 2013, 1.2% and Ayité *et al.* [9] in 1996, 0.73%. In the Democratic Republic of Congo, Sanduku *et al.* [10] in 2013 reported frequency peaks of 8% in 1997 (when the rebels came to power in Kinshasa) and 7.8% in 2005. However, it is much lower than reported by Zafar *et al.* [11] in United States of America and Monneuse *et al.* [3] in France. The average age of our patients was 27.9 ± 10.2, with extremes of 15 and 59 years.

Table 1: Distribution according to the occurrence

	Male		Female		Total	
	N	%	N	%	N	%
Hunting Accident	3	8,8			3	8,8
Criminal assault	12	35,3	1	2,9	13	38,2
Public road accident	1	2,9			1	2,9
Lost bullet	2	5,9			2	5,9
Family Conflict	2	5,9			2	5,9
Explosion	1	2,9			1	2,9
Brawl	9	26,5			9	26,5*
Attempted autolysis	1	2,9	1	2,9	2	5,9
Criminal prosecution	1	2,9			1	2,9
Total	32	94,1	2	5,9	34	100

The most affected age group is 20 to 29 years old. Our average age can be superimposed on data from the literature [7, 12, 13]. A study by Weesner *et al.* [14] report that it is young adults from disadvantaged social groups who are often the most vulnerable to trauma by firearms or stabs.

Penetrating abdominal wounds affect more men (94%) than women according to the literature [11, 15]. This masculine predominance could be explained by the greater exposure of men to night activities and to acts of vandalism or criminal behavior of young people. Our study reports more civilian than military casualties. Pupils followed by traders were the main victims. Our results are comparable to those of Kaboro [2] in 2007and Choua [12] in 2016 in Chad.

The large number of patients (32.4%) came from the 6th arrondissement (Brazzaville North) with a peak at 20 hours for criminal aggression. Benissa in Morocco in 2003 reported a frequency of 94% of penetrating abdominal wounds in relation to criminal aggression [16]. In 2013, Kanté and al. [7] report a schedule of penetrating abdominal wounds between 6 pm and 6 am.

Clinical features

In total, 76.5% of these attacks occurred at night with a peak frequency at 20 hours (figures 3 and 4).

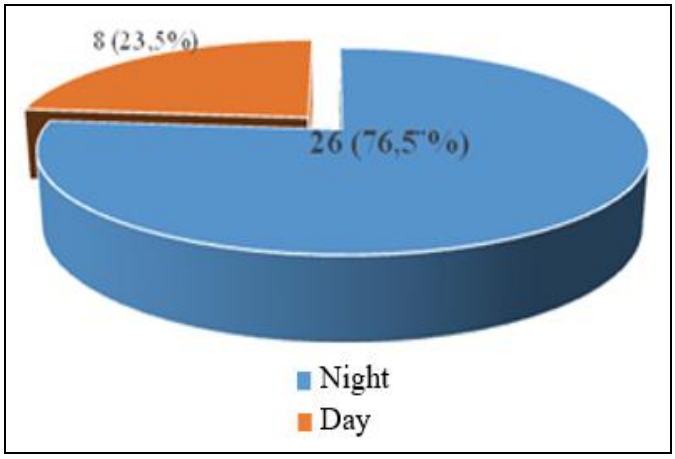

Fig 3: Distribution by period of occurrence

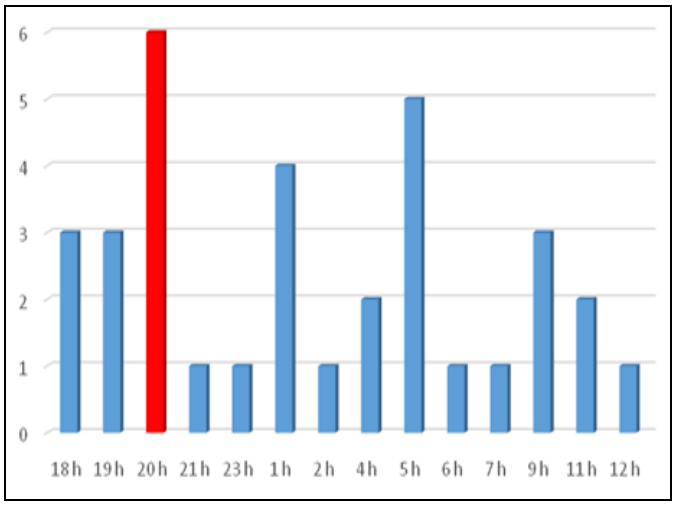

Fig 4: Distribution by time of occurrence

The most common causative or vulnerable agent was the knife. The maximum number of patients was admitted before 6 hours (table 2); the average time for consultation was 11.74 ± 22.39 hours with a median of 2 hours. Alcohol consumption was found in 32% of cases (n = 11), alcohol and tobacco in 21% of patients (n = 7). For psychiatric history, they were found in 3% of cases (n = 1).

Table 2: Distribution by admission times

Deadline for admission	Effective	Percentage (%)
< 6 h	24	71
6-24 h	6	18
> 24 h	4	12
Total	34	100

Diagnostically, the left hypochondrium was the most frequent seat of the portal of entry (table 3) and evisceration accounted for 29% of the cases.

Table 3: Distribution by gateway

Front door	N	%
right hypochondrium	1	3%
epigastric	3	9%
left hypochondrium	9	26%
right side	3	9%
umbilical region	4	12%
left flank	7	21%
right iliac fossa	5	15%
hypogastre	0	0%
left iliac fossa	1	3%
left iliac fossa	0	0%
left lumbar fossa	1	3%
Total	34	100%

Hail was the most eviscerated organ (figure 4). Finger exploration was performed in 21% of cases (n = 7) and pen scanning in one patient. In 12% of cases (n = 4), the vulnerable agent was highlighted at the inspection. Hemorrhagic discharge was detected in 24% of cases (n = 8) at the portal of entry. No patient presented with digestive hemorrhage. The entrance door was less than 5 cm in 74% of the cases, with an average of 3.76 ± 1.61 cm and extremes ranging from 1 cm to 8 cm. Of all patients, 29% (n = 10) had peritoneal irritation. Hemodynamic status was unstable in 26% (n = 9) and stable in 74% (n = 25). The associated extra-abdominal lesions were found in 29.4% of the patients, with predominant lesions in the pelvic limbs. Most of the patients were treated within 6 hours (Table 4).

Table 4: Support period

Time to take care of	Effective	Percentage (%)
1h - 6h	27	79,4
6h -12h	2	5,9
12h - 96h	5	14,7
Total	34	100

The mean time to surgical management was 9.14 ± 19.46 hours (range: 1 hour and 96 hours).

Paraclinic explorations

The blood analysis data were based on the hemogram, performed in 56% of the cases (n = 19); anemia was the most common biological anomaly (47% of cases). In addition, only 3 traumatized (9% of the cases) benefited from radiological investigations. Ultrasound showed a haemoperitoneum. Radiography of the abdomen without preparation was performed in 11 patients, i.e. a frequency of 32%. Pneumoperitoneum (9% of cases), a projectile (9% of cases), or a pneumoperitoneum-associated projectile (9% of the cases) were evaluated. It was normal in 64% of the cases (n = 22). Computed tomography was not performed in our study.

The easy acquisition of a knife (knife, bottle pieces), made her the most vulnerable agent encountered in our study. It is the most widely used in penetrating abdominal wounds according to the literature [17, 18, 19]. In the United States, penetrating abdominal wounds are the prerogative of firearms [11] because of the legal nature of weapon carrying.

Management

All patients underwent laparotomy, 88% (n = 30) of the patients were systematically treated, and the remaining cases, after selective abstention. The indication after selective abstentionism was peritoneal irritation. The haemorrhage was the most commonly encountered abdominal lesion (figure 5) followed by the hematoma (figures 6 and 7). White laparotomy was performed in 7 patients (21% of cases). In addition, 35.3% of the patients (n = 12) had a single visceral lesion and the others had multiple lesions (64.7% of the cases).

Fig 5: Evisceration of the hail

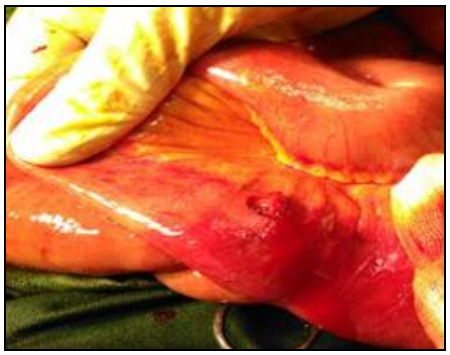

Fig 6: Grain wound

Fig 7: Mesenteric hematoma

The hail represented the most injured organ (Table 5). Excision-suturing was performed in 61.8% of cases (n = 21); resection-anastomosis in 10 patients (29.4% of cases); splenectomy in 8.8% of cases; nephrectomy and packing for a liver wound in 2.9% of cases.

Table 5: Distribution of Injured Organs

Injured Organ	Effective
Stomach	6
Liver	3
Hail	13
Colon	10
mesentery	4
Missed	4
Kidney	2
Pancreas	1
posterior parietal peritoneum	1
omentum	4

The mean hospital stay was 8.38 ± 4.83 days (range: 3-29 days). Morbidity and mortality was 24%; it involved 5 cases of parietal suppuration, 1 case of sepsis, 1 case of monoplegia and 1 case of death.

Our results indicated that 71% of patients were admitted to surgical emergencies within 6 hours. This delay in consultation can be explained by the lack of emergency medical assistance in our country. Patient transport is therefore not medicalized. This is contrary to that of other countries where the consultation period is less than 30 minutes [20].

The main entry point for penetrating abdominal wounds was the left hypochondrium in our study. It varies according to the literature [7, 12]. Because of its length and its moving nature, hail was the most eviscerated organ, followed by the great omentum. Our results are different from those of Kanté and al. [7] and Benissa and al. [16] which report a high epiplocal rate. Evisceration, peritoneal irritation, fluid flow through the portal of entry were the most common signs found in our study and in the literature [7].

Finger exploration was used in 21% of cases in our series and with the stylus once. Exploration with the stylus is considered dangerous and proscribed by some authors and deemed reliable by others when applied with caution [9].

The assessment of hemodynamic stability is crucial in the management of penetrating abdominal wounds because uncontrolled hemorrhage can lead to death in the short term. In our series, 26% of the patients presented an unstable hemodynamic state, justifying systematic emergency laparotomy. The occurrence of penetrating abdominal wounds is often associated with other lesions located either in the thorax, limb or skull [9, 12]. In our series, the extra-abdominal lesions were of great interest to the limbs (11.7%).

As for the diagnosis of penetrating abdominal wounds, it may be done or confirmed by certain imaging examinations, the purpose of which is to specify the lesional balance, to take the operative decision or not [21]. Computed tomography is the reference imaging test, with an estimated sensitivity of 80% [22]; followed by ultrasound and standard radiographs. In our series, no patient had a computed tomography because of its availability and cost. Ultrasound was only performed in 3 patients and x-ray of the abdomen without preparation in 32% of the cases. All patients underwent laparotomy either systematically or after selective abstention. Hail was the most affected organ in our series as described in the literature [12].

Our white laparotomy rate of 21%, although lower than those reported by other authors [3, 5, 7, 9], remains high. The high rate of laparotomy has led some authors to adopt a therapeutic algorithm, selective abstention or nonoperative treatment [17, 23]. Finally, morbidity is dominated by parietal suppuration as reported in the literature [3, 7].

Conclusion

Penetrating abdominal wounds are infrequent in hospital practice in the digestive surgery department of the Teaching University Hospital of Brazzaville. Their care is still difficult in our context. The inadequacy of the means of emergency para clinical investigations makes the laparotomy systematic, the therapeutic attitude of reference thus explaining the high

rate of white laparotomy.

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