

## Original Research Article

# Epidemiology, diagnostic and management of abdominal trauma in two hospitals in the city of Douala, Cameroon

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## ABSTRACT

**Background:** Abdominal trauma remains quite common in the general world and in developing countries in particular. The accidents in the public roads are the main cause and also the assumption of responsibility which remains questionable.

**Methods:** It was a descriptive longitudinal study, carried out from 31 December 2018 to 19 April 2019, in Laquintinie and General hospital in Douala, Cameroon. Patients admitted for abdominal trauma and treatment in the emergency department, operating theater and visceral surgery were included in the study.

**Results:** We found 21.2% (43 cases) of abdominal trauma in our series. Abdominal trauma mainly affected adults between 20 and 39 years old (27 cases, 63%) in our series. The male sex was most affected, with sex ratio of 3.3. Road accidents occupy the first place with 34.9% (15 cases). Wounds in our series represented 27.9% (12 cases) and contusions 72.1% (31 cases). In fact, Abdomen without preparation was performed in 7.0% (3 cases) of cases, abdominal ultrasound in 48.8% (21 cases) and abdominal CT scan in 25.6% of patients (11 cases). The organs affected in order were the spleen, small intestine, colon, stomach and liver. We recorded postoperative complications with a morbidity of 11.6% with a single case of parietal suppuration and no death.

**Conclusions:** In our context abdominal trauma remains quite frequent and concern particularly young people. The prevention of accidents on the public highway and the improvement of diagnostic and surveillance methods are the key for reducing this phenomenon leading to good management.

**Keywords:** Abdominal trauma, Epidemiology, Diagnostic, management, Cameroon

## INTRODUCTION

Trauma in general is one of the most common causes of morbidity and mortality, particularly among young people.<sup>1,2</sup> Severe abdominal trauma in adults accounts for 15-20% of traumatic injuries.<sup>3</sup> According to the literature, the most frequent cause of these injuries remains road accidents, followed by assaults.<sup>2,4</sup> These attacks of the

abdomen are isolated in 30 to 40% of cases and can be integrated in a context of multiple trauma.<sup>5</sup> The most common cause of death in patients who die early after severe trauma is haemorrhage (>80% of cases), death is considered preventable half of the time and the lesion location considered to be the cause of death is the abdomen in 53% of cases.<sup>6</sup> commonly injured organs are the spleen, bowels, stomach, and liver, with the least

frequently injured organs being the diaphragm and kidney. These injuries that could be blunt or penetrating require careful triaging for appropriate intervention because approximately 25% of such injuries require surgery.<sup>7,8</sup>

It is difficult to find studies that have been devoted to this pathology in Cameroon. This is the reason why we decided to study the epidemiological, clinical, therapeutic and evolutionary characteristics of abdominal trauma in two hospitals in the city of Douala.

## METHODS

This was a descriptive longitudinal study, which took place in 2 hospitals in the city of Douala, in particular at the Laquintinie Hospital and at the General Hospital, in the services of emergencies, operating theater and visceral surgery. Were included, all patients admitted for abdominal trauma and treatment in these health facilities from 31 December 2018 to 31 May 2019. After obtaining the authorizations, recruitment was done from patients presenting with an emergency digestive surgical presentation, and among them, were chosen those who had been received for abdominal trauma in our two study centers.

All the outlines of the study were explained to them in order to obtain their informed consent. Thus, were included in our study, patients of all ages and of both sexes who presented with confirmed abdominal trauma, and who had undergone surgery in one of our study centers.

In addition to those who did not give their consent, those patients who had gynecological and urological trauma were excluded.

A data collection sheet was designed and completed by the investigator. The variables sought were age, sex, patient complaints, hemodynamic parameters, different clinical and functional signs, biological and radiological data, different types of interventions and organs affected, postoperative follow-up. These parameters were analyzed using SPSS software version 23.0

This work had received an ethical clearance from the Ethics Committee of the University of Douala.

## RESULTS

### Epidemiology

#### Frequency

The figure below shows us that five aetiologies constituted the bulk of digestive surgical emergencies with appendicular syndrome in the lead (24.6%) followed by peritoneal syndromes and traumatic abdomens (respectively 22.7% and 21.2%). Bowel obstructions represented 18.2% of the target population, and strangulated hernias 13.3%.

#### Age and sex

Out of a total of 43 patients, the male sex was in the majority with 33 cases (70.7%), i.e. a sex ratio of M/F: 3.3 The average age was  $31.7 \pm 5.4$  years, with the extremes of 15 and 67 years. The 30-39 years old age group had the largest enrollment (17 cases, 39.5%) (Table 1).

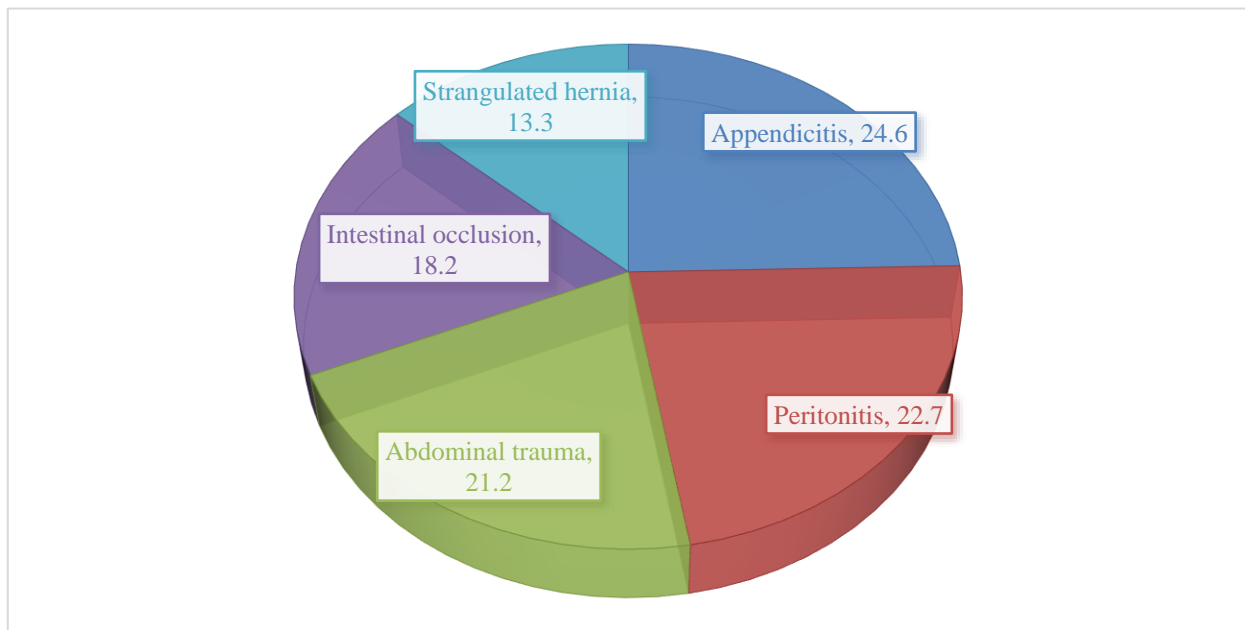


Figure 1: Distribution of clinical pictures in digestive emergencies.

**Table 1: Distribution according to age groups.**

Age group (years)	Effective (N)	Percentage (%)
10-19	6 (13,9)	13.9
20-29	10 (23,5)	23.5
30-39	17 (39,5)	39.5
40-49	8 (18,6)	18.6
50-59	1 (2,3)	2.3
60-69	1 (2,3)	2.3

**Clinical aspects**

*Symptoms*

As shown on Table 2, accident of the public road (APR) was the second reason for consultation in general (8.4%), and the main one (34.9%) in abdominal trauma. Then came abdominal pain and stab wounds, in 30.2% and 23.3% respectively.

**Table 2: Installation and location of pain.**

Variables	Effective (N)	Percentage (%)
<b>Reason of consultation</b>		
Post-APR trauma	15	34.9
Abdominal pain	13	30.2
Wound (firearm)	2	4.6
Wound (bladed weapon)	10	23.3
Shock brawl/aggression	2	4.6
Post-operative complication	1	2.3
<b>Mode d'installation</b>		
Brutal	40	93.0
Progressive	3	7.0
<b>Location of pain</b>		
Epigastrium	1	2.3
Right iliac fossa	1	2.3
Left iliac fossa	2	4.7
Left flank	3	6.9
Peri-umbilical	3	6.9
Right hypochondrium	3	6.9
Left hypochondrium	6	14.0
Hypogastrum	2	4.7
Generalised	13	30.2

*Hemodynamic parameters and functional signs*

Five patients (11.6%) had high blood pressure, and five others had hypotension on admission. 6.9% had hypothermia (<36.5°C). In 28 patients (65.1%), we observed tachycardia (>100 bpm), and 48.8% hyperventilated on admission (Table 3).

In abdominal trauma, the main functional signs associated with pain were dyspnea (in 20.9 of the cases), asthenia (11.6%) and vomiting (9.3%).

**Table 3: Hemodynamic parameters and functional signs.**

Variables	Effective (N)	Percentage (%)
<b>Hemodynamic parameters</b>		
<b>Blood pressure (mm Hg)</b>		
≤90/160	5	11.6
90/60-140/90	12	27.9
>140/90	5	11.6
<b>Temperature (°C)</b>		
<36.5	3	6.9
36.5-38.5	24	55.8
>38.5	16	37.2
<b>Pulse (bpm)</b>		
≤100 bpm	15	34.9
>100 bpm	28	65.1
<b>Respiratory rate (cpm)</b>		
≤20 cpm	22	51.2
>20 cpm	21	48.8
<b>Functional signs</b>		
Vomiting	4	9.3
Nausea	3	7.0
Dysphagia	3	7.0
Bloating	2	4.7
Diarrhea	1	2.3
Discontinuation of materials	3	7.0
Constipation	4	9.3
Anorexia	2	4.7
Urinary disorders	1	2.3
Asthenia	5	11.6
Dyspnea	9	20.9

*Clinical signs*

On inspection of patients, 27.9% had pale conjunctivae. Abdominal distension was present in 70.7% of cases. 58.1% of the patients presented with a meteorism, localized in 14% of cases, and diffuse in 46% (Table 4).

On palpation, 22 patients (44.9%) presented abdominal defense. The call of the umbilicus and Mc Burney's sign were the specific signs most often observed, in 11.6% and 46.5% of cases, respectively.

On auscultation, hydro-aeric noises were eliminated in 9.4% of cases.

On percussion, tympanism was perceived in 29.3% of cases. In the majority of cases (76.3%), the digital rectal examination was painless in the patients.

**Table 4: Distribution according to clinical signs.**

Variables	Effective (N)	Percentage (%)
<b>Conjunctiva</b>		
Colorful	31	72.1
Pale	12	27.9
Jaundice	3	7.0
<b>Oral cavity</b>		
Wet	36	85.7
Dried	6	14.3
Distended abdomen	29	70.7
<b>Meteorism</b>		
Localiwede	5	11.6
Diffuse	20	46.5
Absent	18	41.9
Defense	18	42.9
<b>Contracture</b>		
Diffuse	12	27.9
Localized	11	25.6
Depressible abdomen	27	65.9
Cry of the umbilicus	22	51.2
Blumberg	3	7.0
Rovsing	4	9.3
McBurney	3	7.0
<b>Hydro-air noise</b>		
Audible	39	90.7
Inaudible	4	9.3
<b>Percussion</b>		
Dullness	29	70.7
Tympanism	12	29.3
Rectal touch		
Paunless	29	76.3

**Paraclinic aspects**

Thrombocytosis (platelets>150 g/dl) was observed in 2.3% of cases. 13.9% of patients had hyponatremia.

**Biological data**

Among them, 18.6% presented with hyperleukocytosis (GB>10,000/mm<sup>3</sup>). 25.6% had a hemoglobin level below 10 g/dl.

Hypo and hyperkalaemia were observed in 16.3% and 2.3% of patients, respectively. 4.6% of patients had a CRP>6 mg/dl.

**Table 5: Distribution according to biological signs.**

Variables	Effective (N)	Percentage
<b>NFS</b>		
<b>White blood cells, M±Ecart-type (per mm<sup>3</sup>)</b>		
<4000	-	
4000-10,000	12	27.9
>10000	8	18.6
<b>Red cells, M±Ecart-type (M/mm<sup>3</sup>)</b>		
<4	16	37.2
>4	4	9.3
<b>Hemoglobin, M±Ecart-type (g/dl)</b>		
<10	11	25.6
>10	9	20.9
<b>Platelets, M±Ecart-type (g/dl)</b>		
<150	2	4.6

Continued.

Variables	Effective (N)	Percentage
150-450	17	39.5
>450	1	2.3
<b>Ionogram</b>		
<b>Sodium (mmol)</b>		
<135	6	13.9
135-145	15	34.9
>145	2	4.6
<b>Potassium (mmol)</b>		
<3,5	7	16.3
3,5-4,5	15	34.9
>4,5	1	2.3
<b>CRP (mg/dl)</b>		
<6	-	
>6	2	4.6

CRP- C-reactive protein.

**Table 6: Distribution according to radiological signs.**

Radiology	Effective (N)	Percentage
<b>AWP</b>	3	7.0
<b>IHDGC</b>	2	4.6
Aeocoly	2	4.6
Diffuse grisaille	1	2.3
<b>Abdomen ultrasound</b>	21	48.8
Hemoperitoneum	13	0.2
Hepatomegaly	4	9.3
Pneumoperitoneum	9	20.9
Splenomegaly	4	9.3
Splenic rupture/fracture	2	4.6
Subcapsular hematoma	2	4.6
<b>Abdominal scanner</b>	11	25.6
Hemoperitoneum	8	18.6
Fluid effusion	2	4.6
Aerocoly	3	7.0
Eventration des handles	2	4.6

IHDGC- Inter-hepato-diaphragmatic gas crescent; AWP- Abdomn without preparation

**Table 7: Distribution according to operative elements.**

Radiology	Effective (N)	Percentage
<b>Time to surgical intervention</b>		
< 12H	23	54.8
13-24H	13	30.2
25-48H	6	14.3
<b>Surgical technique</b>		
Laparotomy	42	97.7
laparoscopy	1	2.3
<b>Incision</b>		
Median (sub/supraumbilical)	42	97.7
Laparoscopic	1	2.3
<b>Anesthesia</b>		
Spinal anesthesia	3	7.0
General anesthesia	40	93.0

*Radiological signs*

As shown in Table 6, abdominal ultrasound was the most common exam required and performed by patients, 48.8% of the time. She observed hemoperitoneum in 30.2%, splenic affections in 18.5% (organomegaly, rupture, fracture, HSC) and pneumoperitoneum in 20.9% of cases. The abdominal CT scan was performed in 25.6% of patients, and explored the eventration in 4.6% of cases.

*Surgical intervention*

As it appears in Table 8, splenic affections (rupture, fracture, etc) were the most common (41.9%). In the majority of cases (16/18), a total splenectomy was

**Treatment**

*Operative elements*

Total of 84.8% of abdominal trauma cases were managed surgically within 24 hours. The laparotomy route was used 100% of the time. In one of them, she assisted with an initially laparoscopic approach. In 93% of cases, the anesthesia was general (Table 7).

performed, and in 2 cases a splenic suture+hemostasis was performed. Resection+anastomosis was the treatment of choice for traumatic intestinal lesions, and cures (simple or prosthetic) were prescribed for cases of evisceration.

**Table 8: Findings and surgical procedures.**

Variables	Effective (%)	Surgical intervention
<b>Spleen</b>	18 (41.9)	
Splenic burst	2 (4.7)	<ul style="list-style-type: none"> <li>• Splenectomy (16)</li> <li>• Splenic suture+hemostasis (2)</li> </ul>
Splenic fracture	10 (23.3)	
Splenic rupture	6 (14.0)	
<b>Stomach</b>	2 (4.7)	
Gastric injury	1 (2.3)	<ul style="list-style-type: none"> <li>• Gastric suture</li> </ul>
Omental evisceration	1 (2.3)	<ul style="list-style-type: none"> <li>• Evisceration treatment+suture</li> </ul>
<b>Small intestine</b>	15 (34.9)	
Duodenal perforation	1 (2.3)	<ul style="list-style-type: none"> <li>• Intestinal resection+anastomosis</li> </ul>
Jejunal perforation	5 (11.6)	
Ileal wound	2 (4.7)	
Mesenteric wound	2 (4.7)	<ul style="list-style-type: none"> <li>• Mesenteric suture</li> </ul>
Hail-colic evisceration	5 (11.6)	<ul style="list-style-type: none"> <li>• Evisceration treatment+suture</li> </ul>
<b>Colon</b>	7 (16.3)	
Sigmoid laceration	3 (7.0)	<ul style="list-style-type: none"> <li>• Resection/suture+anastomosis</li> </ul>
Post-operative eviscération	2 (4.7)	<ul style="list-style-type: none"> <li>• Evisceration treatment+washing</li> </ul>
Colonic perforation	1 (2.3)	<ul style="list-style-type: none"> <li>• Intestinal resection+anastomosis</li> </ul>
Giant eventration	1 (2.3)	<ul style="list-style-type: none"> <li>• Prosthetic treatment</li> </ul>
<b>Liver tumor rupture</b>	1 (2.3)	<ul style="list-style-type: none"> <li>• Arterial hemostasis</li> </ul>

*Post-operative treatment*

Postoperatively, the infusion of fluids was prescribed systematically in all patients. Saline 9/1000, glucose sera and ringer lactate were administered in 76.7%, 58.1 and 72.1% of cases, respectively. The combination ceftriaxone+metronidazole+gentamicin was used 74.4% (32 cases). Some patients have been given other antibiotics like ampicillin, amoxicillin+clavulanic acid and even ceftriaxone in a combination. The most commonly used analgesics were Trabar/Tramadol injection (76.7%), Acupan/Nefopam 20 mg/2 ml injection (74.4%) and Perfalgan 1 g injection (60.5%). A PPI was added therapeutically almost systematically (85.7%), as well as a low molecular weight heparin (LMWH) in 58.1%). Two patients (4.8%) received a transfusion during the postoperative period.

**Postoperative evolution**

A total of 5 patients (11.6%) with complications were noted. Parietal suppurations were recorded (1 case, 2.3%); suture release (1 case, 2.3%), paralytic ileus (1 case, 2.3%), 2 cases of anemia (4.6%).

**DISCUSSION**

We found 21.2% (43 cases) of abdominal trauma in our series. This rate is statistically higher than those found by Arnaud et al in Montpellier, Ibrahima et al in Dakar, Dembele et al in Mali, who found 3.67%, 4.34%, 3.70% respectively (p=0, 0102) cases of abdominal trauma.<sup>9-11</sup> In the literature, road accidents resulted in serious lesions, with that of the spleen in first position, the same as found in our study where the spleen was the organ most affected (in 41.9% of cases) followed by lesions of the gastrointestinal tract (39.6%).<sup>12-14</sup> This could be explained



by the upsurge in organized crime (physical assaults, armed conflicts) and accidents on the public highway (especially aboard motorcycle taxis) in our context.

Abdominal trauma in our series mainly affected adults between 20 and 39 years old, with 27 cases recorded (63%). This rate is close to the data in the literature, where the age group most exposed to abdominal trauma is that between 21 and 30 years old, as observed in the studies by Arnaud et al in Montpellier (40%), Ibrahim et al (57.14%).<sup>9,11</sup> Harouna et al on the other hand, observed a majority (35% of cases) in children (5-15 years), and Karim et al (39.5%) in 15-20 years.<sup>12,15</sup> These variations depend for each study on the traumatic causes in the patients.

The male sex was the most affected by abdominal trauma, in our series, with sex ratio of 3.3. Some authors have found a predominance of men, but with a much higher sex ratio. This is the case with Sambo et al (7.17:1), Kambire et al (13:1), Ntundu et al (5.5:1).<sup>2,4,16</sup> This predominance could be explained by the socio-professional activity of men, making them more exposed than women. Regarding the etiologies of abdominal trauma, road accidents occupy the first place with 34.9% of consultations. Sambo et al found 33.63%, Kambire et al- 53.6%, thus joining other authors in their publication.<sup>2,4,16-18</sup> This situation would be due to the state of the roads, alcohol consumption of drivers and the non-observance of road prevention measures.<sup>7,16</sup> Wounds in our series represented 27.9% (12 cases) and contusions 72.1% (31 cases). These data are also found by other authors such as Sambo et al (25.5% of wounds), Ntundu et al (3/4 of bruises), Kambire et al (9/1 cases were blunt trauma).<sup>2,4,16</sup> However, Raheerintanainaina et al found a predominance of wounds (58.2%) and Idriss et al found 80% of the penetrating diseases thus joining Gaudeuille in the Central African Republic and Mnguni in Durban in South Africa who had found respectively 75% and 90.2% of wounds due to the frequency of attacks by knives and firearms in large towns.<sup>19-22</sup> The predominance of bruises in our study could be explained by the high number of road accidents.

The lesional assessment was performed preoperatively by a certain number of patients in our series. In fact, AWP was performed in 7.0% of cases, abdominal ultrasound - 48.8% and abdominal CT scan in 25.6% of patients. These radiological examinations were sufficiently contributory because they made it possible to highlight cases of gas crescents under diaphragms, hemoperitoneum, ruptured spleen and other important signs. Raheerintanainaina et al state that 60.8% of patients were unable to financially access radiological explorations, while Kambire et al acknowledged that the lesion assessment in his series was mostly intraoperative.<sup>4,19</sup> This situation would either be due to either the poverty of the population, or also the lack of resources of the structures concerned.<sup>4,23</sup>

The organs affected in order were the spleen, small intestine, colon, stomach and liver in our series. Just as in our study the spleen, the hail and the colon occupy the 1st, the 2nd and the 3rd place, Kambire et al found exactly the same order with respectively 48%, 37% and 11.1% of the cases; we are joined by Sambo et al in whom the spleen and the small intestine were also the most frequently damaged organs with respectively 15% and 13% of cases.<sup>2,4</sup> However, certain authors such as Sani et al, Sanu et al and Raheerintanainaina et al find intestinal lesions (colic and/or hailstones) as a priority.<sup>19,24,25</sup> Regarding management, all of our patients were operated, unlike other authors. Sambo et al noted 33.67% of patients who had an abdominal contusion, not operated.<sup>2</sup> Kambire et al reported that surgical treatment concerned 27 of thier 28 patients, or 96.4% of cases, and Raheerintanainaina et al 91.8%.<sup>4,19</sup> These results that we found suggest that all the diagnostic and monitoring methods including MRI, CT and ultrasound were used systematically, some laparotomies could have been avoided.

We performed 16 splenectomies (37.2%) or exactly 16/18 cases of admitted spleen trauma, i.e. 89.5% of cases. This figure remains lower than that of certain authors such as Sambo et al with 17/18 splenectomies (94.44%).<sup>2</sup> These figures may be further reduced if radiological monitoring could be systematic because cases of spontaneous healing of major splenic lesions are contacted.<sup>26</sup> We recorded postoperative complications with a morbidity of 11.6% with a single case of parietal suppuration and no death. This morbidity is much lower than those of Ba et al (18.5%) and Kambire et al (17.8%), however higher than the rates of Sambo et al (8.16%) and Raheerintanainaina et al (3.6%).<sup>2,4,19,23</sup> But unlike these authors we have not recorded any deaths, whereas Kambire et al reported- 21.4%, Raheerintanainaina et al- 5.7%, and Sambo et al- 2.06%.<sup>2,4,19</sup>

### Limitations

During our study, we encountered some limitations. Several factors prevented us from having a much larger sample: the journey of patients from the operating room to sometimes anarchic hospitalization; the operative reports which are sometimes poorly or not completed by practitioners preventing us from having certain information in their entirety, the high cost of examinations to be performed by patients, sometimes hampering the diagnosis with certainty.

### CONCLUSION

Abdominal trauma remains quite frequent in our environment, representing 21.2% of abdominal emergencies. Road accidents are the main cause (34.9%). Young people in general remain the most affected with men, the sex largely most affected. The spleen is the organ most frequently shocked, hence the high rate of splenectomies performed. However, it is important that

all patients can benefit from the diagnosis as well as the monitoring offered by the various radiological methods. The incidence of postoperative complications remains high, despite the fact that we have not recorded any deaths.

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