Scientific Research Publishing

Surgical Science, 2023, 14, 405-413
https://www.scirp.org/journal/ss
ISSN Online: 2157-9415
ISSN Print: 2157-9407

Traumatic Digestive Perforation in the Hospital of Sikasso: Epidemio-Clinical and Therapeutic Aspects

Moussa Diassana[1*], Bathio Traoré[1], Aly Boubacar Diallo[1], Mamadou Bernad Coulibaly[1], Doh Sylla[1], Amadou Maiga[2], Aboubacar Karambé[2], Amadou Bah[2], Aboubacar Yoro Sidibé[2], Layes Touré[3], Ternan Traoré[3], Ousmane Dembelé[4], Salif Traoré[4], Moussa Kanté[5], Mamadou Sangaré[5], Kokoroba Sidibé[5], Youssouf Diakité[6], Mahamadou Coulibaly[7], Moro Sidibé[8], Soumaila Alama Traoré[9], Moussa Samaké[10], Nana Kadidia Fofana[11], Bakary Tientigui Dembélé[2]

[1]General Surgery Department of the Sikasso Hospital, Sikasso, Mali
[2]General Surgery Department CHU Gabriel-Touré, Bamako, Mali
[3]Traumatology Department of the Sikasso Hospital, Sikasso, Mali
[4]Urology Department of the Sikasso Hospital, Sikasso, Mali
[5]Anesthesia and Resuscitation Department of the Sikasso Hospital, Sikasso, Mali
[6]Odontostomatology Department, Sikasso Hospital, Sikasso, Mali
[7]Surgery Department, Koutiala Reference Center, Koutiala, Mlai
[8]Ophthalmology Department, Sikasso Hospital, Sikasso, Mali
[9]Gyneco-Obstetrics Department, Sikasso, Mali
[10]Surgery Department, Bamako District Hospital, Bamako, Mali
[11]Commune IV District Hospital, Bamako, Mali
Email: *surgeriesdiassana.m@yahoo.com

How to cite this paper: Diassana, M., Traoré, B., Diallo, A.B., Coulibaly, M.B., Sylla, D., Maiga, A., Karambé, A., Bah, A., Sidibé, A.Y., Touré, L., Traoré, T., Dembelé, O., Traoré, S., Kanté, M., Sangaré, M., Sidibé, K., Diakité, Y., Coulibaly, M., Sidibé, M., Traoré, S.A., Samaké, M., Fofana, N.K. and Dembélé, B.T. (2023) Traumatic Digestive Perforation in the Hospital of Sikasso: Epidemio-Clinical and Therapeutic Aspects. *Surgical Science*, **14**, 405-413.
https://doi.org/10.4236/ss.2023.146045

Received: March 17, 2023
Accepted: June 11, 2023
Published: June 14, 2023

Abstract

Traumatic digestive perforation is the pathological opening of the wall of a hollow organ of the digestive tract (esophagus, stomach, small intestine, large intestine, rectum, and extrahepatic bile ducts) following trauma. Injuries to the digestive viscera, especially from trauma, have been known since antiquity. Aristotle recognized that a slight blow can cause an intestinal injury. Perforation of a hollow organ of the digestive sphere results in peritonitis, which in this case is the consequence of an infection of the peritoneal cavity by spreading of the digestive contents. The aim of the work was to describe the epidemiological, clinical and therapeutic aspects of traumatic digestive perforation. **Patients and method:** The study was retrospective and descriptive from January 1, 2016 to December 31, 2020, in the general surgery department of the hospital of Sikasso (Mali). Patients operated for traumatic digestive perforation were included. **Results:** The clinical records of 42 patients were collected. Traumatic digestive perforations represented 12.3% of patients hospitalized for abdominal trauma. The average age of the patients was

26.6 years, with a sex ratio of 6:1. The most frequent etiology was road traffic accidents with 38% of patients. The average delay of consultation was 5 days. Abdominal pain was present in 38 patients, vomiting in 17 patients. On physical examination, the most frequent signs were abdominal contracture in 61.9% of patients, and disappearance of pre-hepatic dullness in 54.7% of patients. On rectal examination, the douglas was bulging and painful in 21 patients. X-ray of the abdomen without preparation showed pneumoperitoneum in 54.1% of patients. Excision, suture and peritoneal lavage were performed in 31 patients. The postoperative course was marked by parietal suppurations in 5 patients, a digestive fistula in 2 patients and 4 cases of death (9.5%). **Conclusion:** Traumatic digestive perforation is a frequent pathology in surgery. Road accident was the main cause. The treatment is essentially surgical.

Keywords

Perforation, Digestive, Traumatic, Sikasso (Mali)

1. Introduction

Traumatic digestive perforation is the pathological opening of the wall of a hollow organ of the digestive tract (esophagus, stomach, small intestine, large intestine, rectum and extrahepatic bile ducts) following trauma [1]. Traumatic origin of an abdominal viscus can be due to a penetrating wound (stabbing, firearm), to a contusion of the abdomen without wound (accident of the public road, work or sport) [2], or exceptionally constitute the complication of laparoscopy or laparotomy [3]. Lesions of the digestive viscera, especially traumatic, have been known since antiquity. Aristotle recognized that a slight blow can lead to intestinal damage [1]. Perforation of a hollow organ of the digestive sphere results in peritonitis, which is here the consequence of an infection of the peritoneal cavity by spreading of the digestive contents [4]. Peritonitis produces a state of hemodynamic shock maintained by the constitution of a third sector, a state of septic shock with poly-visceral failure and paralytic ileus favored by the production of bacterial toxins [4]. The frequency of traumatic digestive perforations has increased in developed countries due to the development of means of transport and weapons [4]. Mehmet [5] finds a frequency of 44.7% with a mortality of 2.6%, Sani [6] estimates them at 17.4%. The diagnosis is made from the signs of peritoneal irritation but also through the data of the morphological examinations in particular the signs of perforations of hollow organs. The aim of this work was to describe the epidemiological, clinical and therapeutic aspects of traumatic digestive perforations in Sikasso hospital.

2. Methodology

The study was retrospective and descriptive from January 1, 2016 to December 31, 2020. It was carried out in the general surgery department of Sikasso Hospital (Mali). All patients hospitalized in the department during the study period, in

whom the diagnosis of traumatic digestive perforation was carried on the basis of the clinical and paraclinical arguments were included in the study. We studied the following parameters: sociodemographic data (age, sex, sector of activity), clinical characteristics (signs of acute peritonitis and macroscopic aspects of intraoperative lesions). Paraclinical data: hemoglobinemia, hematocrit level, organic lesions were objectified on plain abdominal radiography, abdominal ultrasound and/or abdominal CT scan. The data entry was carried out on the EPI-INFO software version 7.2.3 Fr. To analyze our results, we used the student test and the Chi2 test for the comparison of the means, the difference is significant for a lower threshold or equal to 0.05 ($P \leq 0.05$).

3. Results

The clinical records of 42 patients were collected. The perforations traumatic digestive had represented 12.3% of patients hospitalized for abdominal trauma.

The average age was 26.6 years with a standard deviation of 15.0 and extremes of 8 and 80 years. The sex ratio was 6/1. The average consultation time was 5 days ± 5.0 with extremes of 6 hours and 30 days. The etiologies are summarized in Table 1.

The most frequently encountered etiology was a road accident 16 (38.4%).

The clinical signs are summarized in Table 2.

Abdominal pain was present in 38 patients, vomiting in 17 patients. On physical examination, the most frequent signs were abdominal contracture in 61.9% of patients, disappearance of pre-hepatic dullness in 54.7% of patients. On digital rectal examination, the Douglas fir was bulging and painful in 21 patients. Parietal lesions are summarized in Table 3.

Abdominal contusion 19 (45.2%) and penetrating wound of the abdomen 18 (42.8%) were the most represented.

The size of the penetrating wound was less than 2 cm in 13 patients and greater than 2 cm in 5 patients. The wound was linear in 11 patients, rounded in 4 patients, and arcuate in 3 patients. The patients were classified ASAI: 40 (95.2%), ASAII: 2 (4.8%). Abdominal X-ray without preparation showed pneumoperitoneum 40 (95.2%), fluid level 2 (4.8%). Abdominal ultrasound was performed in 32 (76.1%) of the patients, and revealed peritoneal effusions. Abdominal computed tomography was desirable, not performed due to its high cost. Anemia and hyper leukocytosis were found respectively in 4 (9.5%) and 34 (80.9%) on blood count. Resuscitation was pre- and post-operative based on the correction of hydro-electrolyte disorders and anemia. Preoperatively (2 to 6 hours), the patients received an average of 1 liter of solution based on physiological saline, 5% glucose serum, and Ringer's Lactate. The placement of the bladder tube and the nasogastric tube was systematic. Antibiotic therapy involved all patients, combining Cephalosporins, Metronidazole, Gentamycin. The abdominal approach was a midline above and below the umbilical, under general anesthesia and orotracheal intubation.

Table 4 summarizes the intraoperative lesions.

Table 1. Distribution of patients according to the etiology of the perforation.

Etiology	Effective	Percentage
Work accident	2	4.7
Penetrating stab wound	2	4.7
sports accident	5	11.9
Assault and injury (CB)	5	11.9
Fall from a height	6	14.2
Penetrating wound by goring	6	14.2
Public road accident (AVP)	**16**	**38.4**
Total	**42**	**100**

Table 2. Distribution of patients according to clinical signs.

Clinical signs	Effective	Percentage
Abdominal pain	**38**	**90.4**
Stopping materials and gases	5	12.0
Vomiting	17	40.7
Low blood pressure	3	7.3
Conjunctival pallor	4	9.4
Abdominal contracture	26	61.9
Disappearance of pre-hepatic dullness	23	54.7
Douglas bulge and pain	21	51.2

Table 3. Distribution of patients according to the type of parietal lesion.

Parietal lesions	Effective	Percentage
Penetrating wound	18	42.8
Non-penetrating wound	5	11.9
Abdominal bruise	19	45.2
Total	**42**	**100**

Table 4. Distribution of patients according to intraoperative diagnosis.

Intraoperative diagnosis	Effective	Percentage
gastric perforation	5	11.9
Duodenal perforation	1	2.3
Jejunal perforation	12	28.5
Ileal perforation	5	11.9
Colonic perforation	5	11.9
Rectal perforation	2	4.6
Peri-anal tear extending to the rectum	3	7.1
Total	**42**	**100**

Jejunal perforation was the most affected segment of the digestive tract 12 (28.5%).

The amount of aspirated effusion was less than 1000 ml for all patients. The effusion was diffuse in all quadrants of the abdomen. The peritoneal effusion was fecaloid 24 (57.1%), purulent 18 (42.9%). The intestinal loops were stuck together by false membranes in all patients. Ileal perforation was single for 33 (78.5%) patients and multiple for 9 (21.5%) patients. The diameter of the lesion was less than 1 cm for 21 (50%) patients and greater than 1 cm for 21 (50%) patients. The lesions were linear, rounded in the same proportions 19 (45.2%), arciform 3 (7.1%), punctiform 1 (2.3%). Excision-suture, toilet of the peritoneal cavity, drainage was performed in 31 (73.8%) patients. An end-to-end anastomosis resection was performed in 4 (9.5%) patients, an ileostomy in 6 (14.4%) patients, and excision-suture + perineal trimming in 1 (2.3%). Post-operative treatment consisted of the administration of antibiotics based on Ceftriaxone associated with Metronidazole and Gentamycin and readjusted according to the result of the antibiogram. The germ found in the cytobacteriological study was Escherichia Coli 18 (42.8%). The average duration of hospitalization was 10.5 days with extremes of 6 and 28 days. The postoperative course was complicated by parietal abscesses for 5 (11.9%) patients requiring local care, and a sample of pus for antibiogram. The 2 (4.6%) cases of low-flow digestive fistulas benefited from successful conservative treatment. We recorded 4 (9.5%) deaths. Three deaths were due to septic shock, and the last death to hypovolemic shock.

4. Discussion

Traumatic perforation of an abdominal viscus may be due to a penetrating wound (stab wound, firearm), contusion of the abdomen without a wound (accident on public roads, work and sport) [2], or exceptionally be a complication of laparoscopy or laparotomy [3]. Perforation of a hollow organ in the digestive tract results in peritonitis, which is here the consequence of an infection of the peritoneal cavity by spreading of the digestive contents [7]. The frequency of traumatic digestive perforations has increased in developed countries due to the development of means of transport and weapons [4]. The Sikasso region is located in the south of Mali, and its population is essentially rural. The defective road network and especially the proliferation of firearms and edged weapons contribute to the development of this pathology. The perforations traumatic digestive had represented 12.3% of abdominal injuries. This high frequency is found in African studies by Sani [6] in Niger, Dembélé [8] in Mali and Western studies by Kevin [9] in the USA. Young people are the most exposed to the phenomena of banditry and the vagaries of traffic, especially in a country where the highway code is poorly understood by the population with precarious roads associated with the incivility of drivers. The average age of 26.6 years found in this study corroborates with those of the authors Sani [6] 24 years old, Carlos [9] 29 years old, Sadullah [10] 29 years old. Male subjects were the most affected in this

study with a sex ratio of 6/1, this trend was observed by Brian [11] with a sex ratio of 2/1. The most incriminated etiologic was road accidents with 38.0% of cases. This rate varied from 62.8% to 66.7% in the series [12] [13]. Admission time is a factor that can influence the management and prognosis of the disease. The longer this delay, the more the abdomen becomes septic, which can change the type of surgical procedure (from a simple excision-suture of the perforation to a stoma) or which can lead to a state of life-threatening shock. This delay in this study was 5 days against 3 days for the Nigerian author [14]. The signs of traumatic digestive perforation are those of generalized acute peritonitis. Pain is a constant major functional sign in traumatic digestive perforations. Both in our study and in that of a Malagasy [15] and American [16] study, pain was the sign commonly encountered with a rate varying between 90% and 92.5%. Other functional signs such as vomiting, cessation of matter and gas were also reported in the literature at different frequencies. Arterial hypotension and conjunctival pallor were related to the severity of visceral lesions responsible for hemoperitoneum and peritoneal infection [17]. Conjunctival pallor was present in 9.4% of our patients against 51.6% for the author [18]. Arterial hypotension was found in 7.3% of our patients, against 51.6% for the author [18]. Both in our study and in that of a Malagasy [15] and American [16] study, pain was the sign commonly encountered with a rate varying between 90% and 92.5%. Other functional signs such as vomiting, cessation of matter and gas were also reported in the literature at different frequencies. Arterial hypotension and conjunctival pallor were related to the severity of visceral lesions responsible for hemoperitoneum and peritoneal infection [17]. Conjunctival pallor was present in 9.4% of our patients against 51.6% for the author [18]. Arterial hypotension was found in 7.3% of our patients, against 51.6% for the author [18]. Both in our study and in that of a Malagasy [15] and American [16] study, pain was the sign commonly encountered with a rate varying between 90% and 92.5%. Other functional signs such as vomiting, cessation of matter and gas were also reported in the literature at different frequencies. Arterial hypotension and conjunctival pallor were related to the severity of visceral lesions responsible for hemoperitoneum and peritoneal infection [17]. Conjunctival pallor was present in 9.4% of our patients against 51.6% for the author [18]. Arterial hypotension was found in 7.3% of our patients, against 51.6% for the author [18]. Pain was the sign commonly encountered with a rate varying between 90% and 92.5%. Other functional signs such as vomiting, cessation of matter and gas were also reported in the literature at different frequencies. Arterial hypotension and conjunctival pallor were related to the severity of visceral lesions responsible for hemoperitoneum and peritoneal infection [17]. Conjunctival pallor was present in 9.4% of our patients against 51.6% for the author [18]. Arterial hypotension was found in 7.3% of our patients, against 51.6% for the author [18]. Pain was the sign commonly encountered with a rate varying between 90% and 92.5%. Other functional signs such as vomiting, cessation of matter and gas were also reported in the literature at different frequen-

cies. Arterial hypotension and conjunctival pallor were related to the severity of visceral lesions responsible for hemoperitoneum and peritoneal infection [17]. Conjunctival pallor was present in 9.4% of our patients against 51.6% for the author [18]. Arterial hypotension was found in 7.3% of our patients, against 51.6% for the author [18]. And conjunctival pallor was related to the severity of visceral lesions responsible for hemoperitoneum and peritoneal infection [17]. Conjunctival pallor was present in 9.4% of our patients against 51.6% for the author [18]. Arterial hypotension was found in 7.3% of our patients, against 51.6% for the author [18]. And conjunctival pallor was related to the severity of visceral lesions responsible for hemoperitoneum and peritoneal infection [17]. Conjunctival pallor was present in 9.4% of our patients against 51.6% for the author [18]. Arterial hypotension was found in 7.3% of our patients, against 51.6% for the author [18]. Generalized abdominal contracture was present in 61.9% of our patients, close to 57% of patients in the study of Rakotoarivony [15]. Painful Douglas fir was present in 51.2% of patients, compared to 72% for Malagasy [15]. X-ray of the abdomen without preparation contributed to the diagnosis. This x-ray looks for the pneumoperitoneum but also indirect signs of intraperitoneal effusion (diffuse greyness, inter-handle spacing, air-fluid levels) [19]. In this study we found 57.1% of cases of pneumoperitoneum against respectively 20%, 40% reported in the series [15] [16]. Fluid levels are the expression of a paralytic ileus or a functional occlusion complicating any progressive peritonitis [19]. Our rate was 4.7% of hydro-aeric levels against 15% and 30% reported by the authors [15] [16]. The abdominal scanner not only makes it possible to make the diagnosis, to specify the seat, the type of lesion and to determine the prognosis. In this study, no patient performed this examination because of its high cost. In our context resuscitation increases the patient's chance of survival and must be pre- and post-operative. Preoperative resuscitation from 2 to 6 hours consisted of hydro-electrolyte intake, antibiotic therapy broad-spectrum probabilistic combining 3rd generation cephalosporin, metronidazole, and gentamycin. A transfusion was done in patients whose hemoglobin level was less than 10 g/dl before surgery. Therapeutic attitude depends on the peroperative observation made by the surgeon [15]. In our study suture excision was performed in 73.8% of patients. This result was similar to those reported by the authors [9] [10] respectively 75% and 65%. One-stage resection-anastomosis was performed in 9.52% of our patients. This rate was close to those of the authors [9] [10] 10% and 2.5%. The stoma was performed in 6 (14.28%) of our patients against 1.5% of the author [10]. The postoperative evolution of traumatic digestive perforations can be interspersed with complications, among them: parietal abscess 11.9%, and digestive fistula 4.6%. Morbidity in our series was 16.6%. This high frequency would be linked above all to the highly septic nature of the lesions, the precarious state of the patients and the delay in appropriate treatment. This rate corroborates with those found by the authors [20] [21] respectively 20% and 19.5%. Morbidity influences the hospital stay; this stay was 10.5

days on average in our study. This duration was close to that of the literature [22] which was 8.9 days. The prognosis of an abdominal trauma, whatever the circumstances of occurrence, is conditioned by the speed and accuracy of the lesion diagnosis, also by the therapeutic option and also by the associated lesions [7]. Our mortality rate was 9.5% compared to the author's 34.3% [21]. This high frequency of mortality would be due to the degree of penetration of the trauma, the severity of the injury, the presence of associated vascular lesion and the time taken for treatment. During the study, the problems encountered were a lack of health insurance for all due to a lack of will or financial means. Insufficient financial means for some patients to ensure proper care.

5. Conclusion

Traumatic digestive perforation is a frequent pathology in surgery. It remains today a difficult problem to solve because the diagnosis of perforation of traumatic hollow organ is difficult to establish at the first examination of the patient for lack of specific symptomatology. The road accident and armed assaults are the main causes. The treatment is essentially surgical. Prevention involves securing road traffic and vigorous repression of all acts of violence and banditry.

Conflicts of Interest

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

References

[1] Suter, M. and Kayoumi, A. (1992) Small Bowel and Colon Injury in Blunt Abdominal Trauma. *Medicine and Hygiene*, **50**, 2169-2174.

[2] D'Acremont, B. (1995) Hepato-Gastroenterology. Masson, Paris, 292 p.

[3] Maritano, J.Y. and Caillot, J.L. (2001) Acute Peritonitis. *Review of the Practitioner Paris*, **51**, 2141-2146.

[4] Gore, R.M. and Meyers, M.M. (1994) Text Book of Gastrointestinal Radiology. W.B. Sounders Company, Philadelphia, 13-529.

[5] Mehmet, U., Gurkan, Y., Bulent, C., Faruk, Y., Ismail, A. and Arslan, C. (2009) Effects of Additional Intra-Abdominal Organ Injuries in Patients with Penetrating Small Bowel Trauma on Morbidity and Mortality. *Turkish Journal of Trauma and Emergency Surgery*, **15**, 45-51.

[6] Sani, R., Ngo Bissemb, N.M., Illo, A., Souna, B., Baoua, B.M. and Bazira, L. (2004) The Abdominal Wound. File Review at the National Hospital of Niamey-Niger. *Médecine d'Afrique Noire*, **51**, 399-402.

[7] Chevalier, J.M. and Vitte, E. (2011) Trunk. Anatomy Volume 1. Medicine-Sciences. 2nd Edition, Flammarion, Paris, 492 p.

[8] Dembélé, B.-T., Togo, A., Diakité, I., *et al.* (2011) Perforations Traumatiques d'Organes Creux Intra-Abdominaux au CHU Gabriel-Touré. *Journal Africain d'Hépato-Gastroentérologie*, **5**, 290-292. https://doi.org/10.1007/s12157-011-0325-8

[9] Morales, C.H., Villegas, M.I., Villavicencio, R., González, G., Pérez, L.F., Peña, A.M.

and Vanegas, L.E. (2004) Intra-Abdominal Infection in Patients with Abdominal Trauma. *Archives of Surgery*, **139**, 1278-1285. https://doi.org/10.1001/archsurg.139.12.1278

[10] Girgin, S., Gedik, E., Uysal, E. and Taçyıldız, İ.H. (2009) Independent Risk Factors of Morbidity in Penetrating Colon Injuries. *Turkish Journal of Trauma & Emergency Surgery*, **15**, 232-238.

[11] Dunfee, B.L., Lucey, B.C. and Soto, J.A. (2008) Development of Renal Scars on CT after Abdominal Trauma: Does Grade of Injury Matter. *American Journal of Roentgenology*, **190**, 1174-1179. https://doi.org/10.2214/AJR.07.2478

[12] Gad, M.A., Saber, A., Farrag, S., Shams, M.E. and Ellabban, G.M. (2012) Incidence, Patterns, and Factors Predicting Mortality of Abdominal Injuries in Trauma Patients. *North American Journal of Medical Sciences*, **4**, 129-134. https://doi.org/10.4103/1947-2714.93889

[13] Tan, K.-K., Liu, J.Z.-Y., Vijayan, A. and Chiu, M.-T. (2012) Gastrointestinal Tract Perforation Following Blunt Abdominal Trauma: An Institution's Experience. *European Journal of Trauma and Emergency Surgery*, **38**, 43-47. https://doi.org/10.1007/s00068-011-0118-1

[14] Sule, A.Z., Kidmas, A.T., Awani, K., Uba, F. and Misauno, M. (2007) Gastrointestinal Perforation Following Blunt Abdominal Trauma. *East African Medical Journal*, **84**, 429-433. https://doi.org/10.4314/eamj.v84i9.9552

[15] Rakotoarivony, S.T., Rakotomena, S.D., Rakoto-Ratsimba, H.N. and Randriamiarana, J.M. (2008) Epidemiological Aspects of Abdominal Trauma by Traffic Accident at the University Hospital Center of Antananarivo. *Tropical Journal of Surgery*, **2**, 18-21.

[16] Nicholas, J.M., Rix, E.P., Easley, K.A., Feliciano, D.V., Ingram, W.L., Parry, N.G., Rozycki, G.S., Salomone, J.P. and Tiremblay, L.N. (2003) Changing Patterns in the Management of Penetrating Abdominal Trauma: The More Things Change, the More They Stay the Same. *The Journal of Trauma: Injury, Infection, and Critical Care*, **55**, 1095-1110. https://doi.org/10.1097/01.TA.0000101067.52018.42

[17] Le Treut, Y.P. (1993) Acute Peritonitis: Physiopathology, Etiology, Diagnosis, Development, Treatment. *Revue du Praticien*, **43**, 259-262.

[18] Froment, P.A. (2005) Proposition thérapeutique dans les traumatismes fermés isolés de la rate chez l'adulte. Archive ouverte UNIGE, p. 52. https://doi.org/10.13097/ARCHIVE-OUVERTE/UNIGE:347

[19] Abu-Zidan, F.M., Zayat, I., Sheikh, M., Mousa, I. and Behbehani, A. (1996) Role of Ultrasound in Blunt Abdominal Trauma: A Prospective Study. *The European Journal of Surgery*, **162**, 361-365.

[20] Wade, T.M.M., Konaté, I., Diao, M.L., Tendeng, J.N., Cissé, M., Seck, M., Dieng, M., Dia, A. and Touré, C.T. (2014) Perforations Digestives Traumatiques: Aspects Anatomo-Cliniques. *Journal Africain d'Hépato-Gastroentérologie*, **8**, 139-142. https://doi.org/10.1007/s12157-014-0535-y

[21] Raherinantenaina, F., Rakotomena, S.D., Tianarivelo, R., *et al.* (2015) Blunt and Penetrating Trauma the Abdomen: Retrospective Analysis of 175 Cases and Review of Literature. *Pan African Medical Journal*, **20**, Article 129.

[22] Choua, O., Rimtebaye, K., Adami, A., Bekoutou, G. and Anour, M.A. (2016) Penetrating Wounds by Stabbing and Firearms in N'Djamena. *European Scientific Journal*, **9**, 180-191.