

## Post-Traumatic Peritonitis in the General Surgery Departement of the Fousseyni Daou Hospital in Kayes, Mali

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### Abstract

### Original Research Article

**Introduction:** Acute generalized peritonitis is an acute inflammation and / or infection of the peritoneum. It is most often secondary to perforation of an intraperitoneal organ and/ or the spread of an intra-abdominal septic focus. Post-traumatic peritonitis is due to the pathological opening of the wall of a hollow organ of the digestive tract following trauma. **Objective:** To study post-traumatic peritonitis in the general surgery department of the Fousseyni Daou Hospital in Kayes. **Patients and Method:** This was a retrospective and descriptive study. The retrospective period extended from March 2019 to February 2022 and the prospective period from March 2022 to February 2023 inclusive. We included in this study all patients who consulted the emergency reception services and who were operated and the hospitalized in the general surgery department of the Fousseyni Daou Hospital in Kayes for post-traumatic peritonitis. **Results:** The frequency of post-traumatic peritonitis was 10%. The 11-20 year old age group was the most represented with 34.40%. In our series, 90.60% of patients Cameroun urgently. Abdominal contusions were the most frequent reason for admission with 46.90%. Public road accidents were the most common etiology with 34.40%. The most common preoperative diagnosis was peritonitis by perforation of a hollow organ with 62.50%. Therapeutically, 50% of patients benefited from excision, suture, washing and drainage. Surgical site infection was the main complication with 28.60%, and the death rate was 57.10% among complications. **Conclusion:** Post-traumatic peritonitis is nowadays a concern in emergency surgery because it represents a significant cause of death in the surgical environment.

**Keywords:** Peritonitis, Post-traumatic, Department, Surgery, General, Hospital, Kayes.

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## INTRODUCTION

Acute generalized peritonitis is a sudden inflammation and/or acute infection of the peritoneum [1]. It is most often secondary to perforation of an intraperitoneal organ or to the spread of an intra-abdominal septic focus [1]. Post-traumatic peritonitis is due to pathological opening of the wall of a hollow organ of the digestive tract (oesophagus, stomach, small intestine, large intestine, rectum and extra-hepatic bile ducts) following trauma [2]. Several mechanisms may be due to a penetrating wound (knives, firearms), contusion of the abdomen (work and sports accidents) or, exceptionally, as a complication of laparoscopy. [3]. It is an emergency requiring hospitalization and early treatment [4]. Road traffic accidents (RTAs) are one of

the main causes of abdominal trauma, in both Western and developing countries. [5]. In the USA, Kevin's 2008 study [6] of a series of 516 cases of abdominal trauma found an 11% incidence of post-traumatic peritonitis. In France, Vivien B [7], in a study of closed abdominal trauma, found an 8% incidence of post-traumatic peritonitis due to perforation of the small intestine. In Turkey, Mehmet [8] in a 2009 study of 38 abdominal trauma patients found 44.7% post-traumatic peritonitis. The latter study found a mortality rate of 2.63%. In Morocco, Mlle. Khaoula IKEMAKHEN [9] in 2019 on a series of 50 cases of post-traumatic peritonitis found a morbidity rate of 15%. In Mali M. D Sylla [10] in 2021 in a study carried out at Sikasso hospital on a series of 42 cases of post-traumatic peritonitis found a mortality rate of 9.5%. Koné N S [11] in 2015 in his study carried out

at CHU Gabriel Touré on 128 cases of post-traumatic peritonitis found that AVP was the main etiological mechanism in 36.8% of cases. A study carried out by Traoré OT [12] in 2013 at CHU Gabriel Touré on a series of 72 cases found a predominance of stabbing as the etiological mechanism of post-traumatic peritonitis in 55.6% of cases. In our country in general, and in Kayes in particular, few studies have focused specifically on post-traumatic peritonitis, hence the choice of this retrospective prospective study, the aim of which was to investigate post-traumatic peritonitis in the general surgery department of the Fousseyni Daou Hospital in Kayes.

## PATIENTS AND METHOD

Our study took place in the general surgery department of Hôpital Fousseyni Daou in Kayes. It was a retrospective descriptive study that took place from March 2019 to February 2022 (3y) and prospective descriptive from March 2022 to February 2023 (1y) inclusive. The study population consisted of male and female patients of all ages admitted to the general surgery department of Hôpital Fousseyni DAOU de Kayes during the period March 2019 to February 2023. We included in this study all patients who consulted the emergency department, underwent surgery and then were hospitalized in the general surgery department for post-traumatic peritonitis. We excluded from this study

all patients operated on for non-traumatic peritonitis, and all patients operated on for abdominal trauma who had not presented with any perforated hollow organs. We performed an exhaustive sampling of all patients meeting the inclusion criteria in the general surgery department. Data were collected from operative reports, medical records, consultation and hospitalization registers. Ethical confidentiality and anonymity were respected for each patient.

## RESULTS

During our study period, we recorded 32 cases of post-traumatic peritonitis out of 320 patients admitted for abdominal trauma, i.e. a frequency of 10%.

The 11-20 age group was the most represented, with a frequency of 34.40%. The average age of patients was 25.50 years, with extremes ranging from 5 to 62 years. Males were the most represented, with a frequency of 87.50% (28/31) and a sex ratio of 7 men to 1 woman. The majority of our patients came from the town of Kayes, with a frequency of 31.30% (10/32). Farmers were the most represented with 37.50% (12/32). In our series, 90.60% (29/32) of our patients came as emergencies. The majority of our patients (40.6%, 13/32) were treated within the first 6 hours. The average waiting time was 12.62 hours, with extremes ranging from 1 to 48 hours.

**Table I: Distribution of patients by mode of admission**

Reason for admission	Workforce	Percentage
Penetrating abdominal wound	8	25
Evisceration	6	18,7
Abdominal contusion	15	46,9
Hemorrhage (Hematemesis)	2	6,3
Discharge of intestinal fluid	1	3,1
Total	32	100

Nature of fluid (stool)

Abdominal contusions were the most common reason for admission (46.9%).

**Table II: Distribution of patients by etiology of trauma**

Etiology	Workforce	Percentage
Stab wound	10	31,3
Firearm	2	6,2
Road accident	13	40,6
Work accident	5	15,6
Sports accident	2	6,2
Total	32	100

MVA was the most frequent etiology at 34.4%.

**Table III: Distribution of patients according to functional signs**

Functional signs	Workforce	Percentage
Abdominal pain	27/32	84,3
Vomiting	11/32	34,8
Material and gas shut-off	2/32	6,2
Hematemesis	2/32	6,2
Discharge of intestinal fluid	1/32	3,1

Abdominal pain was present in 84.3% of patients.

In our series, 37.50% (12/32) of patients had a disturbance of consciousness, 43.80% (14/32) had

arterial hypotension and 31.20% (10/32) had conjunctival pallor.

**Table IV: Distribution of patients according to physical signs**

Physical signs	Workforce	Percentage
Abdominal contracture	23/32	71,9
Cry of the umbilicus	19/32	59,4
Pre-hepatic matter abolished	20/32	62,5
Painful, bulging Douglas	17/32	53,1
Sloping dullness in the flanks	22/32	68,7
Abdominal tympany	10/32	31,2
Reduced hydro-airborne noise	17/32	53,1
Evisceration	2/32	6,2
Abdominal wound	6/32	18,7
Flow through the wound	1/32	3,1
Bruise	15/32	46,9

Abdominal contracture, the pathognomonic sign, was found in 71.9% of our patients.

**Table V: Distribution of patients according to signs observed on unprepared abdominal radiography**

Unprepared Abdomen	Workforce	Percentage
Not done	14	43,7
Pneumoperitoneum	16	50
Hydro-aeric levels	2	6,3
Total	32	100

Pneumoperitoneum was present in 50% of patients.

In our series, 69% of patients had a hemoglobin level greater than or equal to 11g/dl.

**Table VI: Distribution of patients according to intraoperative diagnosis**

Preoperative diagnosis	Workforce	Percentage
Organ perforation peritonitis	20	62,5
Unstable hemoperitoneum	2	6,3
Penetrating wound	4	12,5
Traumatic evisceration	6	18,7
Total	32	100

The most common preoperative diagnosis was peritonitis due to perforation of a traumatic hollow organ (62.5%).

Preoperatively:

- 71.90% (23/32) of patients had received analgesics, antibiotics, rehydration and anti-tetanus serum,
- 28.10% (8/32) of patients had received analgesics, antibiotics, rehydration, anti-tetanus serum and transfusion.

**Table VII: Distribution of patients according to intraoperative diagnosis**

Intraoperative diagnosis	Workforce	Percentage
Jejunal perforation	10	31,2
Ileal perforation	9	28,1
Gastric perforation	4	12,5
Multiple bowel perforations	6	18,8
Colonic perforation	3	9,4
Total	32	100

Intraoperatively, the jejunum was the segment most affected (31.2%).

**Table VIII: Distribution of patients according to associated trauma**

Associated trauma	Workforce	Percentage
Liver fracture	3	9,4
Diaphragmatic perforation	1	3,1
Spleen fracture	2	6,3
Pancreatic	1	3,1
Costal fractures	1	3,1
Bladder perforation	1	3,1
Polytrauma	1	3,1

Polytrauma: (head injury + rib fracture + liver fracture).

The liver was the organ most affected by associated trauma (9.4%).

In our series, in the majority of cases, the injury occurred in the jejunum in 31.20% of cases (10/32), and in the ileum in 28.10% of cases (9/32). In 81.00% of cases, the perforation was located in a single segment,

was unique in 68.80% of cases, had a diameter greater than 1cm in 50% of cases, and was linear in 50% of cases.

**Table IX: Distribution of patients according to surgical technique**

Technical	Workforce	Percentage
Excision - suture + washing + drainage	16	50
End-to-end anastomosis resection	14	43,8
Colostomy	2	6,2
Total	32	100

Excision-suture+wash+drainage was the technique most frequently used in our study.

The Mannheim score was below 26 in 96.9% of our patients. Follow-up was straightforward in 78.1% (25/32) of our patients, and complicated in 21.9% (7/32).

**Table X: Distribution of patients by type of complication**

Types of complication	Workforce	Percentage
Digestive fistula	1	14,3
Surgical site infection	2	28,6
Deceased	4	57,1
Total	7	100

Surgical site infection was the main complication, with a frequency of 28.60%, and we observed 57.10% of deaths (4/7). Death was due to hypovolemic shock in 75% of cases, and visceral failure in 25%.

In the majority of cases, 50% (16/32) of patients were hospitalized for days, with extremes ranging from 5 to 32 days.

## DISCUSSION

During our study period, the frequency of post-traumatic peritonitis was 10% in the general surgery department of Hôpital Fousseyni Daou, Kayes. This frequency is lower than that reported by DEMBELE B.T. *et al.*, in Bamako (23% [14]), RAHERINANTENAINA in Madagascar (12.6% [16]) and KEVIN in the USA (11% [27]). Traffic accidents are one of the main causes of abdominal trauma in both Western and developing countries [5]. Large cities are the scene of major crime and banditry, including armed assaults. The 10% frequency of abdominal trauma observed in our study is no different from that reported in the literature, which ranges from 10 to 23% [16, 17, 6]. The mean age in our

series was 25.50 years. SADULLAH in Turkey reported an average age of 29 years [18], YAGINI in Morocco found 27 years [15], CARLOS also reported 29 years [17] and TAN K.K. in Singapore found 21 years. In our series, the sex ratio was 7 men to one woman. In Senegal, PA.BA reported a sex ratio of 8 in favor of men [20], and in Bamako, TRAORE O.T. reported 5 in favor of men [12]. However, the high proportion of men in African series can be explained by the fact that men are more involved in high-risk situations because of their behavior and habits. In our series, public road accidents were the most common etiology, with a frequency of 40.6%. The other etiologies were edged weapons, work accidents, sports accidents, intentional injuries and sports accidents. The high frequency of public road accidents can be explained by the rarity of assaults in Kayes. Several authors [11, 19, 21, 9] have found public road accidents to be more frequent, ranging from 34.4% to 66.7%. In our study, the average response time was 12 hours 62 minutes. This is a very important factor, which can greatly influence therapeutic management and prognosis [22]. The longer the delay on admission, the lower the chances of survival [23]. A significant increase in mortality has been reported for delays in intervention

beyond the eighth hour [24]. It ranged from 12.62 hours in our study, and from 13 hours to 73.2 hours in other African studies [20, 16, 11]. This delay in treatment in Africa may be linked to the absence of pre-hospital medicine, the absence of SAMU teams and the under-equipment of civil protection services in our country [12]. In our study, 84.37% of the functional signs were abdominal pain, 34.75% vomiting and 6.25% cessation of blood and gas. The functional signs of post-traumatic peritonitis are those of acute generalized peritonitis. Pain is a constant major functional sign in post-traumatic peritonitis. In both our study and those from Mali [12, 10] and Madagascar [25], pain was the most frequent functional sign, ranging from 84.37% to 92.5%. Arterial hypotension, altered consciousness and conjunctival pallor are related to the severity of visceral lesions responsible for hemoperitoneum and peritoneal infection [26]. Conjunctival pallor was present in 31.20% of our patients. This rate differs from those found by some authors [27, 12]. This difference could be explained by the severity of the trauma and the delay in consultation in our patients. Arterial hypotension was found in 43.80% of our patients, which is no different from the proportion found in the Swiss series [27, 12]. The physical examination is the key element in therapeutic decision-making. When carried out correctly and attentively, it enables the surgeon to establish the indication for surgery, even in the absence of complementary examinations [28]. Abdominal contracture was found in 71.88% of our patients. TRAORE O.T. in Bamako reported a rate of 62.50% [12] and ROKOTOARIVONY in Madagascar reported 57% [26]. Pain in the cul de sac of Douglas was present in 53.12% of our patients, whereas TRAORE O.T. in Bamako reported a rate of 54.2% [12] and ROKOTOARIVONY in Madagascar found a rate of 54.20% [26]. The abolition of pre-hepatic dullness was observed in 53.12% of our patients, and this, together with abdominal contracture and Douglas pain, enables the preoperative clinical diagnosis to be made. The unprepared abdominal X-ray consists of three views: two from the front (standing and supine), and one centered on the diaphragmatic cupolas. The main advantage of these views is their ability to reveal pneumoperitoneum or retroperitoneum, indicating perforation of a hollow organ requiring surgery [30]. Other signs that are less obvious and difficult to observe are hemoperitoneum and retroperitoneal hematoma [19]. The sensitivity of this examination is low, allowing the diagnosis of hollow organ rupture in less than 50% of cases [29]. Thus, the absence of a gas effusion does not guarantee the absence of perforation of a hollow organ. The presence of such an effusion may also indicate the existence of a pneumothorax or bladder rupture after catheterization [29]. In our study, we found 50% cases of pneumoperitoneum, a rate which differs from that of TRAORE O.T. in Bamako, who reported 12.5% [12]. In Senegal and India, PA.BA [20] and MAGU [31] reported 44.44% and 62.5% pneumoperitoneum respectively. In our series, we found 6.3% hydroaerosal levels, the same

as that reported by TRAORE O.T. [12] in Bamako. These hydro-aeric levels are the expression of a paralytic ileus or a functional occlusion complicating any progressive peritonitis [31]. CT scans not only enable the diagnosis to be made, but also specify the location and type of lesion, and determine the prognosis. During our study, none of our patients underwent a CT scan, due to its inaccessibility. The high cost of CT can be a problem for patients with limited financial resources. Treatment depends on the surgeon's intraoperative findings [5]. Suture excision was the most common surgical procedure in our series, with a rate of 50%. This rate is identical to those of other authors [19, 20, 9]. This differs from that of TRAORE O.T. in Bamako [12], who reported a rate of 76.4%. This difference may be due to the surgeon's intraoperative decision and the degree of severity of the lesions. Single-stage resection-anastomosis was performed in 43.7% of our patients. This rate is not identical to those of other authors [19, 20]. Ostomy was performed in 2 patients in our study, i.e. a rate of 6.3% of cases; this same rate was found in authors [12, 19]. Jejunum perforation was found in 31.25% of cases. This finding has been reported by several authors [22, 12]. This could be explained not only by the importance of the length of the small intestine and its mobility, but also by the fact that the small intestine is the most exposed of all the segments of the digestive tract. Morbidity in our series was 12.5%, with this high frequency linked to the highly septic nature of the lesions and the delay in appropriate management. In contrast, YAGINI in Morocco reported a morbidity of 25.40% [15] and RAHERINANTENAINA in Madagascar found a morbidity of 19.50% [16]. The postoperative course of traumatic digestive perforations can be fraught with complications:

- Parietal suppuration was the most frequent postoperative complication in our study, with a rate of 28.57%;
- Digestive fistula was the 2nd most frequent complication, with a rate of 14.29%. This is a frequently encountered complication, favored by the extent of intraperitoneal sepsis [32]. Morbidity influences hospital stay, which averaged 10 days in our study. This is no different from the 10.57 days reported by SYLLA M. D [10] in Mali, and 8.9 days by CHOUA O *et al.*, [33] in Chad. The prognosis of abdominal trauma, whatever the circumstances of occurrence, is conditioned by the rapidity and accuracy of the diagnosis of injury, and also by the therapeutic option [13]; it also depends on associated injuries. Our mortality rate was 12.5%, while KONE NS in Bamako reported a mortality rate of 17.18% [11] and RAHERINANTENAINA in Madagascar reported a rate of 34.30% [16]. This high mortality rate is thought to be due to the penetration index of the trauma, the severity score of the injury, the presence of associated vascular lesions and the delay in treatment.

## CONCLUSION

Post-traumatic peritonitis is now a major concern in emergency surgery, as it is a major cause of death. Any trauma to the abdomen must be monitored, as even the slightest injury can result in visceral damage that can be fatal for the patient. Prevention requires safer road traffic and energetic repression of all acts of violence and banditry.

**Conflict of Interest:** None

## BIBLIOGRAPHY

- Proske, J. M., & Franco, D. (2005). Péritonite aigue. *Rev Prat*, 55, 2167-2172.
- Suter, M., & Kayoumi, A. (1992). Les lésions de l'intestin grêle et du côlon dans les traumatismes fermés de l'abdomen. *Médecine et hygiène*, 50(1945), 2169-2174.
- Jean, Y. M., & Jean, L. C. (2001). Péritonite aiguë. *Rév Prat (Paris)*, (51), 2141-2145.
- Gore, R. M., & Meyers, M. M. (1994). Text book of gastrointestinal radiology. WB Saunders Company, Philadelphia, (2), 13-529.
- Rakoto-Ratsimba, H. N., Rakotoarivony, S. T., Rakotomena, S. D., & Randriamiarana, J. M. (2008). Aspects épidémiologiques des traumatismes abdominaux par accident de circulation au Centre Hospitalier Universitaire d'Antananarivo. *Revue tropicale de chirurgie*, 8, 18-21.
- Gorchynski, J., Dean, K., & Anderson, C. L. (2009). Analysis of urobilinogen and urine bilirubin for intra-abdominal injury in Blunt trauma patients. *Western Journal of Emergency Medicine*, 10(2), 85, 85-88.
- Vivien, B., Langeron, O., & Riou, B. (2007). Traumatisme abdominal fermé dans le service d'accueil des urgences congrès national d'anesthésie et de réanimation. *Elsevier Masson SAS*. (Paris), P433-443.
- Uludağ, M., Yetkin, G., Çitgez, B., Yener, F., Akgün, İ., & Çoban, A. (2009). Effects of additional intra-abdominal organ injuries in patients with penetrating small bowel trauma on morbidity and mortality, (15), 45-51.
- Khaoula, I. (2019). Perforation traumatique du grêle traumatisme de l'abdomen au service de Chirurgie Viscérale CHU Mohamed VI de Marrakech Thèse Med. Marrakech, 7p.
- Doh Sylla, M. (2021). Perforation digestives traumatiques dans le service de chirurgie générale de l'hôpital de Ségou thèse med. USTTB. Bamako (Mali), N°21M228.
- Keita, M. M., & Koné, N. S. (2015). Perforation traumatiques du grêle au CHU Gabriel Touré thèse med. USTTB; Bamako (MALI), N°5M34, 54P.
- Traoré, O. T. (2013). Perforation digestives traumatiques dans le service de chirurgie générale du CHU Gabriel Touré. Thèse méd. USTTB de Bamako (Mali), N°13M888; 103p
- Chevalier, J. M., & Vitte, E. T. (2011). Anatomie tome 1. Médecine-Sciences Flammarion 2<sup>e</sup> édition, Paris, (1), 492p.
- Dembélé, B. T., Togo, A., Diakité, I., Kanté, L., Traoré, A., Cissé, F., ... & Diallo, G. (2011). Perforations traumatiques d'organes creux intra-abdominaux au CHU Gabriel-Touré. *Journal Africain d'Hépatogastroentérologie*, 4(5), 290-292.
- Yaqini, K., Mouhaoui, M., Lemrini, M., Khaleq, K., & Louardi, H. (2010). Prise En Charge Des Plaies Abdominales Par Arme Blanche Au Service D'accueil Des Urgences De Casablanca. *Journal maghrébin d'anesthésie-réanimation et de médecine d'urgence*, 17(74), 209-212.
- Fanomezantsoa, R., Davidà, R. S., Tianarivelo, R., Fabienne, R. L., Aina, R. T. M., Auberlin, R. F., ... & Nirina, R. R. H. (2015). Traumatismes fermés et pénétrants de l'abdomen: analyse rétrospective sur 175 cas et revue de la littérature. *Pan African Medical Journal*, 20(1), 129.
- Morales, C. H., Villegas, M. I., Villavicencio, R., González, G., Pérez, L. F., Peña, A. M., & Vanegas, L. E. (2004). Intra-abdominal infection in patients with abdominal trauma. *Archives of surgery*, 139(12), 1278-1285.
- Girgin, S., Gedik, E., Uysal, E., & Taçyıldız, İ. H. (2009). Independent risk factors of morbidity in penetrating colon injuries. *Turkish journal of trauma & emergency surgery*, 15(2), 154-158.
- Muller, L., Prudhomme, M., Lefrant, J. Y., & De la Coussaye, J. E. Traumatismes pénétrants de l'abdomen. Reconnaître la gravité. Prescrire le bilan en urgence. Anticiper et traiter les détresses vitales. 01-c0nf Med SFMU04 LC 15/03/04 11:49 p(317).
- Bâ, P. A., Diop, B., Soumah, S. A., Aidara, C. M., Mbaye, E. M., & Fall, B. (2013). Les lésions intestinales au cours des traumatismes fermés de l'abdomen: diagnostic et prise en charge en milieu défavorisé. *Journal Africain d'Hépatogastroentérologie*, 1-4.
- Gad, M. A., Saber, A., Farrag, S., Shams, M. E., & Ellabban, G. M. (2012). Incidence, patterns, and factors predicting mortality of abdominal injuries in trauma patients. *North American journal of medical sciences*, 4(3), 129. [Downloaded free from <http://WWW.najms.org> on Friday, July 10, 2015, IP: 41.203.199.30].
- Hoffmann, C., Goudard, Y., Falzone, E., Pons, F., & Debien, B. (2011). Spécificités de prise en charge des traumatismes abdominaux pénétrants 53 congrès nationaux d'anesthésie et de réanimation. *Medecins Urgence vitales 2011 Sfar*. Tous droits réservés.
- Reche, F., Brunot, A., & Badic, B. (2010). Outcome of emergency embolization in the non-operative treatment of blunt trauma of the spleen: multicenter retrospective study of 52 cases, *Eur J Trauma Emerg Surg*, 10, 63.
- Allen, G. S., Moore, F. A., Cox, C. S., Wilson, J. T., Cohn, J. M., & Duke, J. H. (1998). Hollow visceral

- injury and blunt trauma. *Journal of Trauma and Acute Care Surgery*, 45(1), 69-77.
25. Yaya, K. (2019). Plaies pénétrantes par arme à feu de l'abdomen en chirurgie générale de l'hôpital Gabriel Touré. Thèse de med. USTTB Bamako (Mali), 144p.
  26. Rakoto-Ratsimba, H. N., Rakotoarivony, S. T., Rakotomena, S. D., & Randriamiarana, J. M. (2008). Aspects épidémiologiques des traumatismes abdominaux par accident de circulation au Centre Hospitalier Universitaire d'Antananarivo. *Revue tropicale de chirurgie*, 2(1), 18-21.
  27. Froment, P. (2005). *Proposition thérapeutique dans les traumatismes fermés isolés de la rate chez l'adulte* (Doctoral dissertation, Verlag nicht ermittelbar). *Th. Méd. Genève, Thèse N°10430*, 52p.
  28. Le Treut, Y. P. (1993). Péritonites aiguës: physiopathologie, étiologie, diagnostic, évolution, traitement. *La Revue du praticien (Paris)*, 43(2), 259-262.
  29. Mutter, D., Schmidt-Mutter, C., & Marescaux, J. (2005). Contusions et plaies de l'abdomen. *EMC-Médecine*, 2(4), 424-447.
  30. Douws, C., Grenier, N., Trillaud, H., & Palussière, J. (1995). Stratégie actuelle d'exploration des traumatismes de l'abdomen. *Feuillets de radiologie*, 35(3), 165-173.
  31. Magu, S., Agarwal, S., & Gill, R. S. (2012). Multi detector computed tomography in the diagnosis of bowel injury. *Indian Journal of Surgery*, 74, 445-450.
  32. Wade, T. M. M., Konaté, I., Diao, M. L., Tendeng, J. N., Cissé, M., Seck, M., ... & Touré, C. T. (2014). Perforations digestives traumatiques: aspects anatomocliniques. *J. Afr. Hépatol. Gastroentérol*, 8, 139-142.
  33. Choua, O., Rimtebaye, K., Adami, A., Bekoutou, G., & Anour, M. A. (2016). Les Plaies Penetrantes Par Armes Blanches Et A Feu A N'djamena, Tchad: Une Epidemie Silencieuse?. *European Scientific Journal*, 12(9), 180-191.
  34. Bore, D. (2006). *Etude des péritonites aiguës à l'hôpital Sominé Dolo de Mopti* (Doctoral dissertation, Université de Bamako), (82), 366.