

X-Ray-Ultrasound and Epidemiological Profile of the Victims of the Attacks in Mopti (Mali, West Africa)

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Abstract

Original Research Article

Objective: To determine the X-ray, ultrasound, and epidemiological profile of the victims of the attacks of March and April 2019 received at the Mopti hospital. **Materials and Methods:** This was a cross-sectional study of the victims of the armed attacks of March and April 2019 received at Mopti hospital. The study included all stroke victims who had an x-ray or ultrasound during this time. The variables were the socio-demographic profile, the etiological mechanism, the imaging means and their results. Data analysis was done with SPSS version 25 and Excel 2016 software. **Results:** The most common age group was 15-29 years old at 35.4%. Men predominated with 66.7%. Civilians were more affected, 83.3%. Firearms accounted for 93.8% of the etiologies. The x-ray was no longer performed, ie 66.7%. The lower limbs were more affected with 31.8%. Fractures of the limbs and the presence of bullets were anomalies most frequent with 25% each one. **Conclusion:** The majority of the injured were predominantly young and male civilians. Firearms were the most common etiology with predominant involvement in the lower extremities. Radiography was the most used imaging method, and the most common abnormalities were fractures and the presence of ballistic fragments. Gastrointestinal perforation was the most suspected lesion on ultrasound.

Keywords: Victims, Attacks, radiography, ultrasound.

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INTRODUCTION

In recent times there has been a change in the characteristics of warfare with the proliferation of unconventional so-called "asymmetrical" conflicts, waged by a weak against a strong, with the help of terrorist actions and at the cost of significant civilian collateral losses [1].

Current wars see one or more clearly identified regular armies opposing armed groups hidden in the population [2].

Firearm trauma is a real public health problem in many countries, especially developing ones [3]. They have experienced a resurgence in recent years, linked to the increase in crime; illegal and uncontrolled

possession of firearms; armed and inter-community conflicts and the war against terrorists [3, 4]. Projectile injuries nowadays increasingly affect civilian populations [4].

Our country Mali is facing a multidimensional crisis with an upsurge in armed conflicts in recent years, linked to the illegal and uncontrolled possession of weapons and the increase in crime [1]. The Mopti region is a crossroads between the north and the south of the country. It has been at the heart of these armed conflicts since 2012.

The end of March and the beginning of April 2019 were characterized by an upsurge in terrorist attacks against certain positions of our armed forces and

against certain villages in the Mopti region. Mopti hospital played a key role in caring for these victims.

The objective of this work was to determine the x-ray, ultrasound, and epidemiological profile of the victims of the March-April 2019 attacks received at the radiology department of Mopti hospital.

MATERIALS AND METHOD

Materials: Lung bone x-ray machine and Mindray brand ultrasound machine with 3 probes.

Study framework: Medical Imaging Department of Mopti hospital in Mali.

Type and period of study: A cross-sectional descriptive study from March to April 2019.

Study population: All victims of the armed attacks who had undergone an X-ray, an ultrasound, or both during the study period.

Inclusion criteria

- The study involved all victims of armed attacks who had undergone an X-ray, an ultrasound, or both during the study period.

Non-inclusion criteria:

- Patients without the notion of weapon injury were not included.
- Victims who did not undergo imaging examinations

Variables of study

- Socio-demographic profile: patient's age, patient's sex, and the type of citizen
- Etiological mechanism
- The means of imaging: x-ray, ultrasound, or both.
- Results of imaging

Procedure and data collection

Sociodemographic characteristics data were collected through A data collection sheet pre-established forms for this purpose. This data collection was made from the request form for the medical imaging examination or by direct questioning of the patient or his parents in search of additional information. The radiological results were entered directly on the forms.

Data processing and analysis

Data recording and analysis were done with computer-based SPSS version 25 and Microsoft Excel 2016 software.

Statistical Analysis

Data were analyzed using computer-based SPSS program version 25. Data were described in frequencies, percentages, and mean.

Ethical Conditions

We took ethical aspects into account during our study. The anonymity of the injured during data collection was an obligation. The confidentiality of the results of each injured person was respected.

RESULTS

Of a total of 48 victims, the most frequent age group was 15 to 29 years old with 35.4%. The average age was 28.63 years with extremes ranging from 8 to 67 years. Men predominated our series with 66.7% against 33.3% of women with a sex ratio of 2. Civilians were more affected with 83.3% against 16.7% of soldiers (Table 1).

Table 1: Distribution of patients according to socio-demographic profile

Sociodemographic data	n	%
Age groups		
≤ 14 years	10	20.8
15-29 years	17	35.4
30-44 years	13	27.1
45-59 years	5	10.4
≥ 60 years	3	6.3
Sex		
Male	32	66.7
Female	16	33.3
Citizen Type		
Civilian	40	83.3
Military	8	16.7

According to Table 2, the use of firearms was the most frequent etiologic mechanism with 93.8% (45 cases). Edged weapons took second place with 4.2% (2 cases).

Table 2: Distribution of patients according to etiologic mechanism

Etiology	n	%
Fire arms	45	93.8
Bladed weapon	2	4.2
Mine explosion	1	2.1
Total	48	100

In accordance with Table 3, the greatest number of patients had carried out x-ray exploration, ie 66.7% (32 cases). X-ray and ultrasound were performed in 25% of patients (12 cases). Only 8.3% (4 cases) of the patients had done only an ultrasound.

Table 3: Breakdown of patients by means of medical imaging

Imaging means	n	%
X-ray	32	66.7
Ultrasound	4	8.3
X-ray and ultrasound	12	25.0
Total	48	100

Table 4 illustrates that the most affected anatomical region was the lower limbs with 31.8% (14 cases) followed by the thorax with 18.2% (8 cases).

Table 4: Distribution of patients according to the anatomical region explored by x-ray

X-ray	n	%
Lower limb	14	31.8
Chest	8	18.2
Pool	7	15.9
Upper limb	5	11.4
Spine	3	6.8
Other	3	6.8
Severel anatomical regions	3	6.8
Shoulder girdle	1	2.3
Total	44	100

The result of x-ray exploration was without abnormality in the majority of our patients, i.e. 31.8% (14 cases). Limb fractures and the presence of bullet fragments ranked second, i.e. 25% (11 cases) for each (Table 5 and Iconographies 1 to 4).

Table 5: Distribution of patients according to x-ray results

X-ray results	n	%
Normal	14	31.8
Fractures	11	25.0
Ballistic fragments	11	25.0
Mutiple impairment	1	2.3
Chest lesions	4	9.1
Other	3	6.8
Total	44	100

Of a total of 16 ultrasounds performed, 50% were without abnormality (8 cases). Suspicion of digestive perforation ranked second with 19% (3 cases) versus 12.5% (2 cases) of liver damage (Table 6).

Table 6: Distribution of patients according to ultrasound result

Ultrasound results	n	%
Normal	8	50.0
Suspicion of digestive perforation	3	19.0
Liver injury	2	12.5
Isolated peritoneal effusion	1	6.2
Multi-organ lesions	1	6.2
Other	1	6.2
Total	16	100



Iconography 1: Right tibiofibular complex fracture following a ballistic trauma



Iconography 2: Bullet at the level of the soft parts of the popliteal fossa of the left knee



Iconography 3: Comminuted fracture of the right femoral diaphysis associating a left patellar fracture and ballistic fragments



Iconography 4: Complex fracture of the left elbow with ballistic fragments

DISCUSSION

Injuries by firearms have experienced an upsurge in recent years linked to the increase in crime; illegal and uncontrolled possession of firearms; armed and inter-community conflicts and the war against terrorists [3, 4].

In our series, the most frequent age group was from 15 to 29 years old with 35.4% out of a total of 48 victims. The average age was 28.63 years with a male predominance of 66.7%; sex ratio at 2. According to Chaibou *et al.*, the age group between 26 and 35 years old was the most affected with 47%, followed by the 15-25 year old group, i.e. 33.40% with an average age of 29.50 years [5]. Kéita *et al.*, had found an age group of 21 to 40 years with 55.8% of cases [3]. The male sex was the most represented with 66.7% in our study. In their study, Daghfouss *et al.*, found 81 men against two women [6].

Civilians were more affected with 83.3% against 16.7% of soldiers. According to Sagara *et al*, injuries by projectiles nowadays increasingly concern civilian populations [4]. According to Kéita *et al.*, civilians represented 79.1% [3]. Daghfouss *et al.*, had also observed a predominance of civilians, i.e. 96% [6]. Most authors agree on the predominance of civilians. This could be explained by the resurgence of terrorist attacks against villages, particularly in our context.

The use of firearms was the most frequent etiology with 93.8% (45 cases) in our series. Edged weapons took second place with 4.2% (2 cases). Tambasi *et al.*, stated in their study that the bullet was the most common etiology with 61% of cases [1]. The illegal and uncontrolled possession of firearms could explain its predominance in our context.

The greatest number of patients had performed a radiographic exploration, ie 66.7%. Radiography and ultrasound were performed in 25% of patients. Only 8.3% of patients had an ultrasound only. The most affected anatomical region was the lower limbs with 31.8%. Limb fractures and the presence of bullet fragments were the most observed anomalies, ie 25% for each. Suspicion of digestive perforation was the predominant lesion on ultrasound. According to Tambasi *et al.*, standard radiography without association with other complementary examinations was the most requested with 82.7% [1]. The fracture was the most frequent lesion with 82.6% [1]. According to Ehlioussou Kolima *et al.*, 85.8% of the lesions were on the limbs [7] with a predominance of the lower limbs, i.e. 51.9% of the cases [7]. In the cases reported by Adam *et al.*, the lesions predominated on the lower limbs [2].

CONCLUSION

The majority of victims were predominantly young and male civilians. Firearms were the most common etiology with predominant involvement of the lower limbs. Radiographic exploration was the most requested means of imaging and the most found abnormalities were fractures and the presence of ballistic fragments. The ultrasound performed was without abnormality in the majority of patients despite the digestive perforation being the most suspected lesion.

Conflict of Interest: The authors declare that they have no conflict of interest.

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