

Contribution of FAST Echo in the Management of Traumatic Abdominal Emergencies in the Surgical Emergency Department of the National Hospital of Niamey

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ABSTRACT

Objective: Review the FAST echo in the management of traumatic abdominal emergencies in the emergency department of the National Hospital of Niamey (HNN).

Patients and Method: This was a prospective study that took place over a period of 6 months, from February 2 to August 2, 2024. The following variables were studied: age, gender, circumstances of the trauma, results of the Fast echo, intraoperative diagnosis, treatment and evolution.

Results: During the period of our study, 59 patients with abdominal trauma or multiple trauma were collected out of a total of 2,189 admissions, i.e. a frequency of 2.70%. Male sex predominated in 88.14% (n=52); The mean age was 24.8 ± 15.5 years with extremes ranging from 20 months to 70 years. The age group between 15 and 30 years was the most represented with 52.54% (n = 31). Schoolchildren were the most affected in 35.57% (n = 21); road accidents (RAA) represented the main circumstance of occurrence of trauma in 79.66% (n = 47). The FAST echo was positive in 52.54% (n = 31). The lesions found on the FAST echo were mainly interhepatorenal effusion and intersplenorenal effusion in 38.98% (n = 21) and 32.20% (n = 19) respectively. Surgical treatment was indicated in 49.15% (n = 29); Splenic rupture was the most common lesion observed per-op in 36.36%. The surgical procedures frequently performed were splenectomy in 36.36% (n=4) and wound washing and suturing in 36.36% (n=4). The evolution was favorable in 59.32 % (n=43). The mortality rate was 32.40%.

Conclusion: Abdominal trauma is common in NNH. FAST echo is a rapid diagnostic tool in the initial assessment chain of trauma patients, especially with suspected intra-abdominal or thoracic injury.

Keywords

Abdominal trauma, Emergency, Fast echo, HNN.

Introduction

The management of abdominal trauma patients has evolved in recent years, particularly in relation to the development of the accessibility of complementary examinations and new therapies.

One of the major changes is the increasingly widespread use of ultrasound in emergency situations and in particular of FAST ultrasound for focused assessment with sonography for trauma (FAST) [1].

The HNN has a FAST echo device available in the surgical resuscitation room. In this study, we evaluated the contribution of

FAST echo in the initial management of abdominal and polytrauma patients in the surgical emergency department of the National Hospital of Niamey.

Materials and Methods

This was a prospective study that took place over a period of 6 months, from February 2 to August 2, 2024. All patients admitted for isolated abdominal trauma or multiple trauma and who underwent FAST echo were included. FAST echo results, intraoperative diagnosis, treatment and outcome. Word processing was done using Microsoft Word 2016 software and figures using Excel 2016. Data were analyzed with Epi-Info software version 7.2.4.0. The chi2 test (χ^2) was used to compare qualitative variables. All tests were interpreted with a significance threshold of 5% and confidence intervals were calculated at 95%.

Results

The total number of patients admitted during our study period was 2189. In this population, 59 were admitted for abdominal emergencies of traumatic origin; a frequency of 2.70%. The mean age of the patients was 24.8 ± 15.5 years with extremes ranging from 20 months to 70 years. The age group of 15 to 30 years was the most affected with 31 patients or 52.54% (Figure 1).

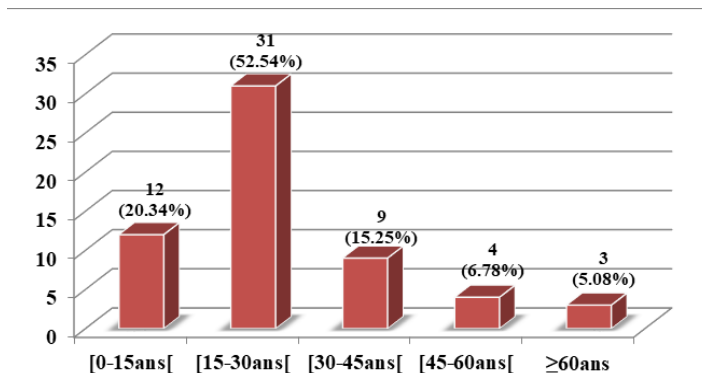


Figure 1: Distribution of patients by age group.

The male gender was predominant with 52 patients (88.14%) or a sex ratio M/F = 1.93.

Road accidents represented the main circumstance of occurrence of trauma with 47 cases or 79.66% (Figure 2).

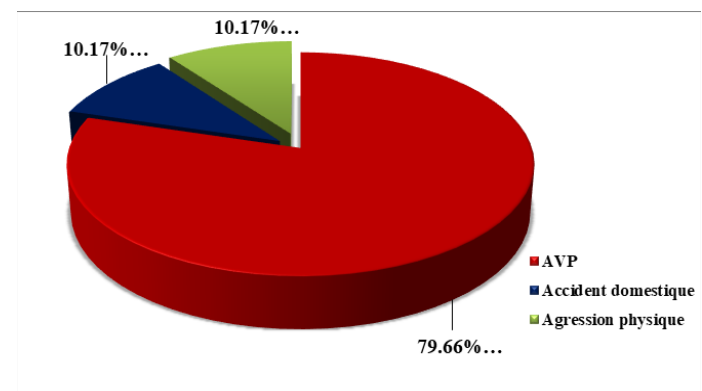


Figure 2: Distribution of patients according to the circumstances of

occurrence.

The reason for admission was isolated abdominal contusion in 24 patients or 40.68%, it was associated in 35 patients or 59.32%. Thoracic trauma followed by craniofacial trauma represented the injuries most frequently associated with abdominal trauma with respectively 21 patients (35.59%) and 17 patients (28.81%) (Table 1).

Table 1: Distribution of patients according to associated lesions.

Associated lesions	Number of cases	Percentage (%)
Thoracic trauma	21	35.59
Pelvic limb trauma	8	20.34
Craniofacial trauma	17	28.81
Thoracic limb trauma	6	3.39
Spinal trauma	1	1.69

At admission, the majority of our patients had respiratory distress: 34 patients (57.62%) had tachypnea; 6 patients (10.16%) bradypnea and 20 patients (33.89%) hypoxia. The majority of our patients had cardiovascular distress, with 34 patients (57.62%) having tachycardia; 6 patients (10.16%) bradycardia; 15 patients (25.42%) hypotension and 5 patients (8.47%) hypertension. Neurologically, 18 patients or 30.51% were in severe coma with a Glasgow score less than 8. FAST echo was performed in all patients. It was positive in 28 patients or 47.46%. The most common lesions found on FAST echo were interhepatorenal effusion in 30.50% (n=18) (Table 2).

Table 2: Distribution of patients according to lesions found on FAST ultrasound.

Lesions	Number of cases	Percentage (%)
Interhepatorenal effusion	18	30.50
Left renal intersplenic effusion	4	6.77
Retrovesical effusion	2	3.38
Fluid pleural effusion	3	5.08
Gaseous pleural effusion	1	1.69
None	31	52.54
Total	59	100.00

Surgical treatment was indicated in 29 patients, or 49.15% of cases; including 12 patients for laparotomy, or 20.23%. However, it should be noted that 3 patients refused surgery and left against medical advice, reducing the number of patients operated on to 26 (Table 3).

Table 3: Distribution of patients according to surgical indication.

Surgical treatment	Number of cases	Percentages (%)
Laparotomy	12	20.33
Osteosynthesis	4	6.77
External ventricle bypass	6	10.16
Chest drainage	4	6.77
Refusal	3	5.08
None	30	50.84
Total	59	100

The ASA II U score was the majority with 34.61% (n=9) followed by ASA III U score 30.76% (n=8) of cases. General anesthesia concerned 23 patients (88.36%) and locoregional anesthesia 3 patients (11.54%).

Splenic rupture was the most common lesion observed per-op with 4 cases or 36.36% (Table 4).

Table 4: Distribution of patients according to per-op laparotomy diagnosis.

Per-op laparotomy diagnosis	Number of cases	Percentage (%)
Ruptured spleen	4	36.36
Mesenteric and tail contusion of the pancreas	2	18.18
Liver contusion	2	18.18
Peritonitis/ileal perforation	1	9.09
Gastric perforation	2	18.18
Bladder rupture	1	9.09
Total	12	100

The surgical procedures frequently performed were peritoneal lavage + wound suture in 45.45% of cases (n = 5); followed by splenectomy in 4 patients or 36.36% and abdominal packing in 18.18% of cases (n = 2). The majority of patients were admitted to intensive care after the procedure with 16 cases or 61.53%. The clinical outcome was favorable in 35 patients (59.32%). However, the mortality rate was 32.2% (n = 19) (Table 5).

Table 5: Distribution of patients according to evolution.

Become	Number of cases	Percentage (%)
Exeat	35	59.32
Deceased	19	32.20
Exit against medical advice	3	5.08
Escape	2	3.39
Total	59	100

The average length of hospitalization was 4 days with extremes ranging from 12 hours to 24 days. A length of stay between 0 and 7 days was mostly found, i.e. 41 patients representing 69.49%.

FAST echo was positive in 12 patients (42.86%) operated for laparotomy and positive in 16 (57.14%) patients not operated for laparotomy with a statistically significant correlation (P < 0.0001) (Table 6).

Table 6: Association between FAST echo results and surgical indication.

Surgical indication	Echo FAST		
	Negative	Positive	Total
Operated for laparotomy	0 (0.00%)	12 (42.86%)	12
Not operated for laparotomy	31 (100.00%)	16 (57.14%)	47
Total	31 (100%)	28 (100%)	59
P< 0.0001			

The outcome was more unfavorable in subjects with abdominal contusion associated with other injuries with a statistically significant correlation (p=0.01) (Table 7).

Table 7: Association between type of abdominal trauma and outcome.

Type of abdominal trauma	Evolution		
	Death	Favorable	Total
Associated contusion	19 (32.20%)	28 (47.45%)	47
Isolated Contusion	0 (0%)	12 (20.33%)	12
Total	19 (32.20%)	40 (67.79%)	59

Discussion

During the period of our study 59 patients had been collected out of a total number of admissions of 2,189, i.e. a frequency of 2.70%. This result is similar to that of Choua O [2] in Chad in 2015 who reported a frequency of 2.13%. Certainly underestimated in our study which took place over a period of 6 months and therefore did not cover the whole year. On the other hand our result is higher than that of Fanomezantsoa R [3] in Madagascar in 2015 which found 0.24% of cases.

The male sex predominated with a rate of 88.14% (n=52) and a sex ratio of 1.93. Our result is similar to that of Choua O [2] in Chad in 2015, and Udobi KF [4] in 2001 in the USA and Fanomezantsoa R [3] has Madagascar in 2015 which reported a predominance of the male sex in 85.7%, 88% and 82.3% of cases respectively. This predominance could be explained by the fact that it is men who are more victims of accidents due to their risky behavior. The mean age was 24.88 ± 15.50 years with extremes ranging from 20 months to 70 years. The age group of 15 and 30 years was the most represented in 52.54% (n = 31) of cases. Our result is similar to that of Choua O [2] which reported an age range of 20 to 29 in 34.7% and an average age of 21.3 years. Indeed, this peak in frequency corresponds to the stage of life where forensic acts due to delinquency or violence are frequent in our countries.

AVPs represented the main circumstance of occurrence of trauma in 79.66% (n=47) of cases. This result is similar to that of Choua O [2] in Chad in 2015 which reported a predominance of road accidents in 61% of cases. On the other hand, our result is different from that of Fanomezantsoa R [3] in Madagascar in 2015 who reported a frequency of Third-party liability accidents (CLA) in 51.4% and those on public roads came second with 42.3% of cases. In a report, the WHO describes road injuries as a very serious epidemic, because they are responsible for 1.2 million deaths per year worldwide: in fact, while mortality from road accidents tends to decrease in Europe and the United States, it is only increasing in less wealthy countries due to the anarchic development of road traffic (90% of deaths from road accidents worldwide occur among injured people living in low- or middle-income countries) [5]. The hemodynamic, circulatory and ventilatory status of our patients was unstable on admission. This observation was made in the series of Choua O [2] in Chad in 2015. On the other hand, Fanomezantsoa R [3] has Madagascar in 2015 reported in their series that patients were hemodynamically stable. According to Hoffmann C [6] in France in expert centers, more than 90% of abdominal trauma patients are hemodynamically stable on admission thanks to advances in pre-hospital resuscitation.

The FAST echo was positive in 28 patients, i.e. a frequency of 47.45%. This result is higher than that of Brenchley J [7] in 2005 in the United Kingdom who reported a positivity of the FAST echo in 7 patients or 4.66% of cases. However, our result is lower than that of Udobi KF [4] in 2001 in the USA and Ma OJ [8] in 1995 who reported a positive FAST echo in 90 % and 67% respectively.

The lesions found on FAST echo were mainly: interhepatorrenal effusion and left intersplenorenal effusion in 38.98% (n=21) and 32.20% (n=19) respectively. Choua O [2] reported that intra-abdominal lesions were hemorrhagic in 93.7%, including splenic ruptures in 28.1% and hepatic ruptures in 25% of cases. Fast echo has the advantage of being non-invasive, being performed at the patient's bedside and being easily reproducible. Surgical treatment was indicated in 29 patients or 49.15%; including 12 (20.34%) patients for laparotomy and 17 (28.81%) for other surgery. Touré A [9] in Mali in 2023 found that laparotomy was the most commonly performed surgical procedure, i.e. 37.71%.

Splenic rupture was the most common lesion observed per-op in 36.36% (n=4) of cases. This result is different from those of Choua O [2] in Chad in 2015 who reported small bowel injuries in 16.32% of cases. The surgical procedures frequently performed are splenectomy with a frequency of 36.36% (n=4) and washing + wound suturing in 36.36% (n=4) of cases. This observation was also made in the work of Choua O and Fanomezantsoa R [2,3].

The evolution was favorable in 59.32% (n=43) of cases. This result is lower than that of Fanomezantsoa R [3] has Madagascar in 2015 which reported a favorable evolution in 94.3% of cases. The mortality rate was 32.40%. This result is higher than that of Choua O in Chad in 2015 and Fanomezantsoa R in Madagascar in 2015 who reported a respective frequency of 6.1 % and 5.7 % [2,3]. This difference could be explained by the severity of the associated lesions in our study. In our study we demonstrated a statistically significant correlation between the positivity of the Fast echo and the surgical indication ($P < 0.0001$); between death and abdominal contusion associated with other lesions thus falling within the framework of polytrauma ($p = 0.01$).

Conclusion

At the end of this study, it appears that abdominal emergencies are frequent in the emergency department of the HNN. Young

male subjects are mainly concerned. AVPs constituted the main etiological circumstance. Serious abdominal trauma requires multidisciplinary care between emergency physicians, anesthesiologists and resuscitators, radiologists and surgeons. The FAST echo is a rapid diagnostic tool in the initial assessment chain of trauma patients, especially those with suspected intra-abdominal or thoracic involvement. It allows rapid therapeutic decision-making. It is within the reach of any doctor who knows how to handle it, particularly emergency physicians and anesthesiologists and resuscitators.

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