

# Severity, Challenges, and Outcome of Retroperitoneal Hematoma in a Nigeria Tertiary Hospital

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## ABSTRACT

**Background:** Retroperitoneal hematoma (RH) can present as an acute life-threatening condition, report on RH in low-income countries are lacking. **Objective:** We present the severity, pattern, challenges, and outcome of RH in a low-resource country such as Nigeria. **Methods:** This was a retrospective observational study of all patients with blunt or penetrating abdominal injury needing surgery, patients with RH among them were analyzed. **Results:** In the last one decade spanning 2005–2015, our operation database record showed that 247 patients had exploratory laparotomy for blunt and penetrating abdominal trauma. Out of the 115 patients with complete record available, only 43 had RH. The median age of the patients was 30 years, and the most affected age group was 20–29 years. Female to male ratio was 1:13. Only eight patients (18.6%) reached the hospital from the accident site within the first “Golden Hour” of accident, which is the first 1 h posttrauma during which treatment intervention believed to have the best outcome. Only two patients (4.7%) got to operating theater within 1 h of reaching hospital. None of our patients had preoperative diagnosis of RH; overall, mortality was two patients (4.7%). **Conclusion:** Logistical infrastructural inadequacies such as lack of sterile theater bundle and drapes/nonavailability or busy theater space caused delay for patients between presentation in the Accident and Emergency Center and operating theater. None of our patients had a preoperative diagnosis of RH because of lack of access to computerized tomography scan dedicated to trauma in Accident and Emergency Center. The overall mortality of 4.7% in this study, which is on the low side, tends to suggest that mostly mild and stable cases which can make it to the operating table were eventually operated upon.

**KEYWORDS:** Nigeria, outcome, prehospital care, retroperitoneal hematoma, tertiary institution, trauma

## INTRODUCTION

Retroperitoneal hemorrhage or retroperitoneal hematoma (RH) refers to an accumulation of blood found in the retroperitoneal.<sup>[1]</sup> The retroperitoneum is a large space bounded anteriorly by the posterior parietal peritoneum, posteriorly by the transversalis fascia,

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and superiorly by the diaphragm. Inferiorly, it extends to the level of the pelvic brim.<sup>[1,2]</sup> Traumatic RH is the common complication of abdominal or pelvic injuries. Retroperitoneum contains some vascular structures in the gastrointestinal, genitourinary, vascular, and musculoskeletal system.<sup>[1,3]</sup> A mortality rate of traumatic RH is reported as high as 18–60% in English literature.<sup>[3,4]</sup> It is actually possible that RH mortality from resource-poor countries such as Nigeria is actually higher because death from trauma ranked high as a cause of mortality in such setting, previous work showed that death from trauma ranked second over a three decade period in a tertiary hospital setting in Nigeria.<sup>[5]</sup> Other authors have also shown that trauma from road traffic accidents from Nigeria is often very fatal with poor outcome.<sup>[6,7]</sup> However, there is a virtual paucity of literature to appraise this.

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Despite all advances in the field of technology and surgical techniques, RH resulting from blunt injuries remains a challenge for the surgeon.<sup>[8]</sup> More than 90% of patient with RH present as a result vascular injury.<sup>[9,10]</sup> Because of low pressure of bleeding due to venous injuries, hemostasis may be achieved spontaneously. Thus, RH caused by venous bleeding are usually restricted and located at the right side of the linea Alba, i.e., midline. On the other hand, RH originating from arterial bleedings appear as a bright red mass, expand rapidly, and often locate on the left side of the midline.<sup>[9,11]</sup> RH may occur after blunt and penetrating traumas.

Several classifications of RH have been made based on the localization of hematomas. In this study, we used Kudsk and Sheldon's classification described in 1982. In this classification, centromedial localization was described as Zone 1, flank localization as Zone 2, and pelvic localization as Zone 3 RH.<sup>[12]</sup>

Accurate characterization of RH and associated injury is best done with computerized axial tomography scan (CT-scan) can affect clinical management and can help minimize unnecessary laparotomies.<sup>[13,14]</sup> Equivocal findings at initial abdominal CT should prompt close clinical follow-up with possible imaging follow-up, particularly for suspected occult duodenal and pancreatic injuries.<sup>[15]</sup> Many at times, diagnosis is often delayed most especially in a poor resource country such as Nigeria where full armamentaria of radiological diagnostic tools such as CT-scan are not readily available at the Accident and Emergency department, the usual first point of call for the patient with traumatic condition like RH.

Despite all these challenges, we present the pattern and outcome of patients with RH in resource-poor setting such as the tertiary hospital in Nigeria. We highlight the severity and various challenges faced while managing patients with this condition in our peculiar setting.

## METHODS

This was a retrospective study of all patients with blunt or penetrating abdominal trauma needing emergency surgical exploration. Since it was almost impossible to make diagnosis of RH preoperatively because of the limited diagnostic armamentaria available in our center, all cases of abdominal trauma who had surgical exploration were sieved to find out the cases of RH. The study was carried out at a tertiary Hospital Southwest, Nigeria, after strict compliance with the ethical standard. Standard hospital ethical guideline was duly followed while retrieving the case record.

The medical record of all 247 patients who had exploratory laparotomy on account of blunt or penetrating abdominal injury in the last decade between 2005 and 2015 were called for but only 161 complete medical records were found. Out of this, 43 patients had an operative diagnosis of RH. Usually, indication for surgery would be ultrasound findings suggestive

of hemoperitoneum, positive abdominal paracentesis, or positive diagnostic peritoneal lavage. Data such as mechanism of injury, clinical features at presentation, time interval between trauma and arrival in emergency room, time interval between arrival and surgery, intraoperative classification of the zone of RH, operative procedure done, postoperative hospital stay, mortality, and morbidity were extracted from the patient record. The data were analyzed using the Statistical Program for Social Sciences (SPSS 12.0.1 for Windows; SPSS Inc. Chicago, IL, USA) software.

## RESULTS

In the last one decade spanning 2005–2015, our operation database record showed that 247 patients had exploratory laparotomy for blunt and penetrating abdominal trauma, out of this, only 115 complete records were found, 15 patient had wrongly quoted case note record number and 71 case record were missing. Out of the 115 complete record, 43 patients had RH. The rest of the analysis is based on 43 patients with traumatic RH. Table 1 showed patient characteristics with a median age of 30 years and the most common age group for RH occurrence to be 20–29 years,

**Table 1: Patient characteristics**

Variables	Value/frequency	Percentage
Age		
Mean	31.7 years	
Median	30 years	
Age group		
<20 years	1	2.3
20-29	19	44.2
30-39	15	34.9
40-49	3	7.0
50-59	5	11.6
Sex		
Male	40	93
Female	3	7
Occupation		
Students	9	20.9
Trader	8	18.6
Farmer	7	16.3
Driver	6	14
Civil servant	5	11.6
Others/unknown	8	18.6
Presenting symptoms		
Abdominal pain	13	30.2
Feature of hypovolemic shock	9	20.9
Abdominal gunshot injury	4	9.3
Thoraco - abdominal pain	2	4.7
Extremities injury and paraparesis	2	4.7
Others	7	16.3%
Information not available	6	14%
Types of injury		
Blunt abdominal injury	26	60.5%
Penetrating abdominal injury	17	39.5%

**Table 2: Etiology/mechanism of injury/clinical features**

Mechanism of injury	n (%)
Blunt abdominal injury	26 (60.5)
Penetrating abdominal injury	17 (39.5)
Cause of injury	
Attack by buffalo	1 (2.3)
Stab wound to abdomen	1 (2.3)
Fall	2 (4.7)
Motorcycle road traffic accident	10 (23.3)
Pedestrian road traffic accident	3 (7.0)
Gunshot injury	15 (34.9)
Vehicular road traffic accident	11 (25.6)
Clinical features	
Pulse rate (min)	
<60	0 (0)
61-80	6 (14.0)
81-100	15 (34.0)
101-120	20 (46.5)
121-140	1 (2.3)
>140	1 (2.3)
Blood pressure	
Hypotensive	17 (39.5)
Normotensive	23 (53.5)
Hypertensive	3 (7.0)
Hypovolemic shock stage	
Not in shock	20 (46.5)
Class I Shock	5 (11.6)
Class II Shock	14 (32.6)
Class III Shock	4 (9.3)
Class IV Shock	0 (0)

**Table 3: Intervention challenges**

Characteristics	Value	Percentage
Interval between injury and presentation in hospital (h)		
0-1	8	18.6
1.1-6	3	30.2
12.1-24	4	9.3
>24	4	9.3
Information not available	24	55.8
Interval between presentation in hospital and operation in theater (h)		
0-1	2	4.7
1.1-6	12	27.9
6.1-12	14	32.6
12.1-24	11	25.6
>24	4	9.3
Reason for delay intervention in operating theater		
No delay	21	48.8
Lack of blood for transfusion	8	18.6
Lack of sterile bundle and drapes for surgery	1	2.3
Nonavailable/busy theater space	1	2.3
Delay in making diagnosis of intra-abdominal injury	2	4.7
Financial constraints	1	2.3
Delayed laboratory result from chemical pathology (E and U)	1	2.3
Delay due to ongoing resuscitation (patient not stable)	2	4.7
Other logistic delay (no electricity)	1	2.3
Information not available	5	11.6

**Table 4: Intervention findings and associated abdominal injury**

	Number of patients	Percentage (%)
Ultrasound findings in the patients operated upon		
Hemoperitoneum	14	32.6
Hemoperitoneum and splenic injury	11	25.6
Hemoperitoneum and hemothorax	1	2.3
Ultrasound probe tenderness (otherwise normal findings)	1	2.3
Bladder injury	2	4.7
Ultrasound not done	14	32.6
Intraoperative findings and zone of hematoma		
Expanding hematoma	23	53.6
Nonexpanding hematoma	20	46.5
Zones involved		
Zone 2 hematoma	18	41.9
Zone 3 hematoma	12	27.9
Zone 1a hematoma	4	9.3
Zone 1b hematoma	2	4.7
Zone 2 and Zone 3 hematoma	2	4.7
Zone 1 and Zone 3 hematoma	2	4.7
Zone 1, Zone 2, and Zone 3 hematoma	1	2.3
Overall outcome		
Alive	41	95.3
Dead	2	4.7
Postoperative morbidity		
Surgical site infection,	3	7.0
Postoperative pyrexia	1	2.3
Lobar pneumonia	1	2.3
Intestinal obstruction	1	2.3
Pancreatic fistula	1	2.3
Psychological depression after colostomy	1	2.3
Multiple organ dysfunction syndrome, acute renal failure	1	2.3
Nil Postoperative complication	34	79.0

female: male ratio occurrence of 1:13, and student being the most susceptible group. RH is far more common in blunt abdominal trauma 26 (60.5%) compared to penetrating injury 17 (39.5%). Mechanism of injury showed that motor vehicular accident is the most common cause of injury 10 (23.3%). Other features such as etiology, mechanism of injury, and clinical features at presentation in hospital are shown in Table 2.

Challenges encounter during treatment of patients with RH in our setting are well illustrated in Table 3. Only eight patient (18.6%) reached the hospital from the site of accident within the first "Golden hour (GH)" of accident, and only two patients (4.7%) got into the operating theater within 1 h of reaching the hospital. Different causes of delay are highlighted in Table 3. Preoperative ultrasound findings, intraoperative findings, zones of hematoma, overall outcome, and postoperative morbidity were outlined in Table 4. The overall mortality in this

**Table 5: Associated intra-abdominal organ injury**

Associated intra-abdominal injury	Number of patients	Percentage (%)
Splenic rupture injury	8	18.5
Jejunal and ileal perforation injury	4	9.3
Ileal and colon perforation injury	5	11.6
Rectal wall laceration injury	2	4.7
Bladder contusion and posterior urethral disruption	2	4.7
Mesenteric tear and contusion	3	7.0
Bladder rupture	2	4.7
Splenic laceration, hepatic laceration, transverse colon perforation	3	4.7
Transverse colon and descending colon contusion	2	7.0
Sigmoid mesocolon tear and sigmoid colon injury	1	2.3
Duodenal contusion injury	1	2.3
Splenic laceration and diaphragmatic laceration	1	2.3%
Splenic rupture and right kidney injury	1	2.3
Hepatic laceration and duodenal contusion	2	4.7
Duodenum and stomach perforation pancreatic contusion	1	2.3
Stomach perforation and splenic rupture	1	2.3

study group is two patients (4.7%). Details of intra-abdominal organ injury associated with RH are shown in Table 5.

Two mortality were recorded during the study period. The first case was a 32-year-old man who presented with close range gunshot injury to the abdomen. Intraoperative findings included nonexpanding Zone I and II RH, multiple Jejunal perforation, pancreatic avulsion, left renal contusion, and 2.5 L hemoperitoneum. He had repair of bowel injury, packing of retroperitoneal hemorrhage, and peritoneal lavage. However, the patient developed pancreatic fistula and roaring peritonitis and died 48 h postsurgery. The second patient was a 35-year-old driver involved in a vehicular road traffic accident. He sustained blunt abdominal injury, findings at surgery were 3.0 L hemoperitoneum, Zone 2 RH, avulsion of splenic pedicle, hepatic laceration, and rupture transverse colon. He had splenectomy, peritoneal lavage, and colostomy, there was difficulty securing hemostasis of retroperitoneal bleeding. The patient eventually died of hypovolemic shock and multiple organ failure.

## DISCUSSION

Traumatic RH is a life-threatening complication of abdominal and pelvic injuries, early diagnosis and urgent surgical intervention are of utmost importance to give any surviving chance to the patient involved in this type of accident.<sup>[16]</sup> In this series, only eight

patient (18.6%) of the total number of 43 patients were brought to the hospital within the first GH of accident. The importance of trauma patient accessing definitive surgical intervention in the early hour of trauma after which morbidity and mortality increases significantly has been emphasized by many workers in the past.<sup>[17-20]</sup> There is the possibility that the poor and inefficient prehospital transport and lack of adequate emergency medical service that is often prevalent in many low-income and resource-poor countries such as Nigeria,<sup>[21,22]</sup> is responsible for the delay transport of trauma patients to the hospital. This probably suggests that the 43 cases (17.4%) of posttraumatic RH, who had exploratory laparotomy for blunt and penetrating abdominal injury is a tip of the iceberg. Quite a proportionate of patients with severe injury including more extensive RH would have died at the site of the accident and are not able to make it to the hospital. This is even more so considering the fact that trauma from road traffic accident is one of the leading cause of death in Nigeria, this has been established by the previous work.<sup>[5,6,21]</sup> In this study, RH arising from blunt or penetrating abdominal injury sustained in road traffic accident accounted for 24 cases (55%) of all the cases. This is quite sizable and is similar to findings in other studies of RH.<sup>[8,16]</sup> Also found to be more challenging and troubling in this cohort of the patient is the delay in getting to the operating theater room even after reaching the hospital. In this study, only eight patients (18.6%) of the total number of patient with RH were operated on within 1 h of presentation in the hospital [Table 4]. The reason for delayed surgery in this study include lack of sterile operation bundles, gown and outfit as at when need, limited and busy operating theater space, delay in getting blood for transfusion, and also delay in processing laboratory result. These causes of delay has been documented in other studies to be prevalent in low-resources country such as Nigeria.<sup>[7,23,24]</sup>

All the patients in this study had intraoperative diagnosis of RH. Patients were operated on based on main clinical findings of intra-abdominal organ injury as manifested by sign of peritonitis/peritonism, progressive abdominal distension, abdominal paracentesis, or positive diagnostic peritoneal lavage that suggest hemoperitoneum. The majority of the patient also had abdominopelvic ultrasound. In 32 patients (74.4%) who had abdominal ultrasound none of them had a preoperative diagnosis of RH, in fact, the most common diagnosis on ultrasound was hemoperitoneum and splenic injury 25 cases (58.1%). This is not surprising because ultrasound of the abdomen is known to be poor in making diagnosis of blood collection in a deeply situated space such as retroperitoneum with multilayers of overlying gas bearing bowel, instead CT scan has been found to be more accurate in detecting retroperitoneal injuries and collection.<sup>[13,14,25]</sup> Limitation of resources in developing countries means that high-end radiological investigation gadget like CT scan are not readily available in most hospitals. In situation where there is only one CT scan machine like in this center, such machine is deployed in central radiology suite to serve general diagnostic purpose rather than deploying it in Accident and Emergency Centre for trauma patient. The implication for this

is that many patients with an occult retroperitoneal injury can remain undiagnosed and may not be surgically explored thus dying from their injury.

Zone 2 RH is the most common type encountered in this study group, 18 patients (41.9%) present with Zone 2 RH alone and Zone 2 plus hematoma in other zones is seen in 21 patients (48.8%). Meanwhile, Zone 3 RH alone is seen in 12 patients (27.9%) while Zone 3 RH in combination with RH in other zones is seen in 17 patients (39.5%). The Zone 1 RH involvement is the least common in this series, 6 patients (13.9%). Only one patient had extensive RH in three Zones 1, 2, and 3. Other pattern of zone involved in RH is as shown in Table 4. This pattern is in contrast with what is reported in other parts of the world. In a study of extensive RH by Abdullah and Al-salamah, Zone 3 RH with extension to the lateral or central zone was the most common type of RH accounting for 65.2% of the patients.<sup>[8]</sup> Ishikawa *et al.*<sup>[26]</sup> found that RH extended out of the pelvis involving Zone 3 and 2 in 66 of his studied patients (39.1%), extension through the three zones in 41 of his patient (24.3%) and these have the worst prognosis. The reason for the low incidence of Zone 1 RH and also low occurrence of extensive RH involving Zone 1, 2, and 3 in our study patient can be due to the fact that these extensive RH which usually has poor prognosis probably never made it to the hospital, in view of the poor state of prehospital care and poor patient evacuation from the site of accident that is commonly seen in resource-poor countries like Nigeria.<sup>[21,22,27]</sup> It is most likely that some of the patients even died while in the hospital due to delay in having surgery done.

As previously stated above, the classification of traumatic RH into three zones proposed by Kudsk and Sheldon<sup>[12]</sup> was used in this study. Other workers like Feliciano<sup>[28]</sup> has proposed sub-classification and location-based treatment protocol. Zone 1 RH includes the midline area between the aortic hiatus and sacral promontory major vessels of the abdomen lies in this zone and most of the time it is recommended that hematoma in this zone be surgically explored to repair bleeding major vessels.<sup>[28]</sup> Zone 2 encompasses the lateral retroperitoneum, including the right and left perirenal spaces, management depends on severity many perirenal, and peri colonic hematomas are self-limiting, and patients can be treated with observation alone if they remain hemodynamically stable, even in these group of patient it is imperative to establish accurate diagnosis with CT scan of the abdomen.<sup>[14,29]</sup> Follow-up imaging can be used to assess the stability of retroperitoneal hemorrhage when observation is chosen.<sup>[14]</sup> Zone 3 encompasses the pelvic retroperitoneum, surgical intervention is avoided in most cases of blunt pelvic trauma with external fixation and angiographic embolization being the preferred for large bleeding.<sup>[30]</sup> In our study, none of the patients with Zone 1 hematoma who had surgical intervention had surgical repair of an injured major vessels in Zone1. In fact, the common surgical procedure carried out in most of the patients are those targeted toward repairing associated injury. Thus, in the whole cohort of patients, the most common surgical

procedure is splenectomy and peritoneal lavage carried out in 9 patients (20.9%). Followed by repair of bowel injury and peritoneal drainage in 8 patients (18.6%). Lavage and drainage alone were done in 6 patients (14.0%).

The overall mortality in this study group is two patients (4.7%). This is a very low figure compared to overall mortality recorded in other studies. Muhammad and Al-salamah<sup>[8]</sup> reported a mortality of 32.6%. Many other researchers have also reported a wide-ranging mortality rate of between 12.9% and 26% in their studies.<sup>[10,12,30,31]</sup> The reason for the deceptively low mortality rate in our series can be deductively inferred from the fact that most of our patients had stopped bleeding actively by the time they had surgical intervention. This became clear because most of them had non expanding hematoma and the majority surgical procedure carried out was lavage and drainage in most instances. The probability is that those patient with active massive ongoing bleeding did not make it to the operating table due delay from various reasons already alluded to above.

## CONCLUSION

Logistical infrastructural inadequacies such as lack of sterile theater bundle and drapes/nonavailability or busy theater space caused delay for patients between presentation in Accident and Emergency Center and operating theater. None of our patients had a preoperative diagnosis of RH because of lack of access to CT scan dedicated to trauma in Accident and Emergency Center. The overall mortality of 4.7% in this study, which is on the low side, tends to suggest that mostly mild and stable cases which can make it to the operating table despite all the delay were eventually operated on.

Allocation and distribution of resources in tertiary hospitals in low-income countries should be in such a way as to equip the Accident and Emergency Centre with modern diagnostic tools such as CT scan dedicated to trauma patients.

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## Conflicts of interest

There are no conflicts of interest.

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