British Journal of Healthcare and Medical Research - Vol. 12, No. 01
Publication Date: February 25, 2025
DOI:10.14738/bjhr.1201.18292.
Barrón, G. M., Sánchez, M. A. G., Cabello, J. de J. U., Valiente, M. G., Salvador, J. R. H., Acosta, E. G., Marcial, A. H., González, E. R., Daniel, M. Y. P., Rojas, O. C. R., Peña, F. M. R., & Castillo, L. F. F. (2025). Retroperitoneal Hematoma: What is the Procedure? British Journal of Healthcare and Medical Research, Vol - 12(01). 263-278.

Retroperitoneal Hematoma: What is the Procedure?

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ABSTRACT

Introduction: the causes of retroperitoneal hematomas are multiple, acute and/or chronic; it is common for underreporting to be underreported, overtreatment or, worst of all, misdiagnosis. Objective: to present the surgical experience of the Surgery Service of the "Rubén Leñero" General Hospital of patients with retroperitoneal hematomas in Trauma Surgery in 5 years, in Mexico City. Method: retrospective, longitudinal, observational and descriptive study, in a period from 2020 to 2024, with a confirmed diagnosis of retroperitoneal hematoma. Results: 106 patients of which 94 (89 %) men, 12 women (11 %), mean of 27 years, 31 of them present with retroperitoneal hematoma. In this group of patients, 30 men (96.77%) and one woman (3.22%), with a mean age of 24 years, range from 18 to 33 years. The first cause of retroperitoneal hematoma is a blunt trauma of the abdomen due to a motorcycle accident, reaching 32.25%. Morbidity of 41.93% and zero mortality. Discussion: computed tomography is the gold standard for the diagnosis of retroperitoneal hematoma, with a sensitivity and specificity of 100%. The first organ affected retroperitoneally is the colon, in the second pancreas, and in the third place the kidney. Conclusion: the incidence of retroperitoneal hematoma is low when compared to anterior abdominal lesions with hemoperitoneum. Conservative management is the most appropriate approach, reducing morbidity and bleeding and avoiding overtreatment, with beneficial and correct results for patients.

Keywords: Retroperitoneal hematoma, Retroperitoneal, Hemoperitoneum, Trauma, Massive Bleeding, Abdominal injurie.

INTRODUCTION

There is an impression of a sudden increase in violence or aggression today. This is exposed in the most recent statistics in Mexico, where death from this cause has been reported in sixth

place in mortality rates and consequently is much higher in the male sex around 90% at the young age groups of 16 to 36 years. [1] The causes of retroperitoneal hematomas (RHs) can be multiple, acute and/or chronic; in addition, it is very common for there to be underreporting, underestimation or overtreatment, or worse, a misdiagnosis. [2] The retroperitoneum is an anatomical space of the human body bounded anteriorly by the posterior parietal peritoneum of the abdomen and subsequently by the abdominal wall. It can be divided into three spaces: the anterior pararenal space, the perirenal space, and the posterior pararenal space. The hematoma or retroperitoneal (RH) hemorrhage, which is from significant but clinically occult bleeding. Hemorrhagic trauma and blood dyscrasias are the most frequent causes of this condition, although ruptured abdominal aortic aneurysms or kidney injury are other possible etiologies. [3] The retroperitoneum, a complex anatomical space within the abdominopelvic region, encompasses several vital abdominal organs. It is compartmentalized by fascial planes and contains critical potential spaces in multiple pathological processes, including inflammatory effusions, hematomas, and neoplastic conditions [4] Another etiology of RHs is to perform ultrasound-guided core needle biopsies, a biopsy was performed on 245 patients in the non-renal group and 281 patients in the renal group. Only 0.8% of patients in the non-renal group and 0.7% in the renal group had a complication with retroperitoneal hemorrhage that only warranted management with blood transfusion. [5] Median arcuate ligament syndrome describes a clinical presentation associated with direct compression of the celiac artery by the medial arcuate ligament, increased blood flow in the pancreatic arch, and aneurysms may form, resulting in arterial disruption and hemorrhage; being an etiology of RH [6] Rupture of an ovarian artery aneurysm is rare and leads to rapid retroperitoneal hemorrhage, theoretically with hemodynamic and hormonal alterations during pregnancy, with increased cardiac output and total blood volume due to the demand for uterine blood during pregnancy. [7] Wünderlich syndrome should be mentioned as an etiology of RH which was described in 1856. [8] And consequently the Lenk triad that is determined by the signs and symptoms of hypovolemic shock, severe pain in the flank of sudden onset and palpable tumor. [9] Statistically, this Wünderlich syndrome has an incidence of 63% due to a tumor cause (30% of malignant tumors and 33% of benign tumors), 25% are associated with vascular disease, the most frequent being periarteritis nodosa and finally 12% with an infectious pathology. [10, 11, 12]

OBJECTIVE

To present the surgical experience of the General Surgery service of the "Rubén Leñero" General Hospital of the Ministry of Health of Mexico City, second level of health care of patients suffering RHs in Trauma Surgery in 5 years.

METHOD

It is a study with a retrospective, longitudinal, observational and descriptive design, from the Surgery Service General, of the "Rubén Leñero" General Hospital of the Ministry of Health of Mexico City, second level of health care, in a study period ranging from November 2020 to November 2024, with the confirmed diagnosis of RH in the same surgical event by finding or preoperatively by simple computed tomography. Age, sex, etiology of abdominal trauma with RH, pathological history and associated factors and/or comorbidities were expressed. Surgical risk according to the American Society of Anesthesiologisth (ASA classification), [13] surgical time, techniques used in the surgical intervention, quantification of previous bleeding in the abdomen (hemoperitoneum), retroperitoneum and by the surgical event itself, days of hospital stay, complications and sequelae, reoperations, morbidity and mortality. With a follow-up of

URL: http://dx.doi.org/10.14738/bjhr.1201.18292.

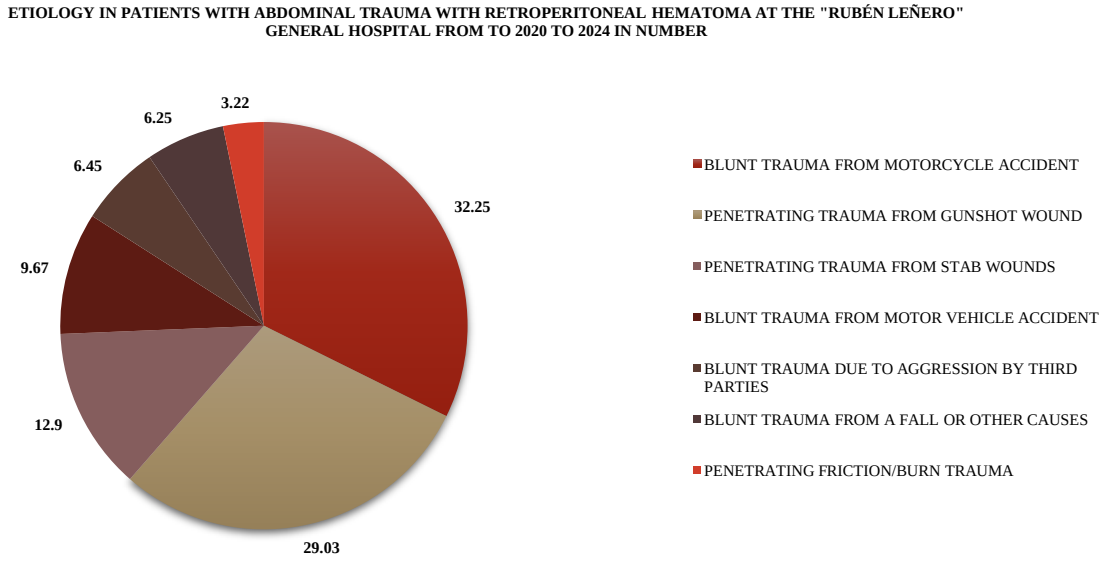
each patient upon discharge from the hospital at one week, one month, after two months, until their definitive discharge with the pathology report. The study and presentation of the results is carried out using descriptive biostatistics procedures.

RESULTS

A total of 106 patients were reviewed, of which 94 patients (89%) were men and 12 women (11%), with an average age of 27 years and a bimodal value of 22 and 48 years, as an etiology secondary to open and/or closed abdominal trauma, by accident/aggression by third parties, of which 31 of these have RH. In this group of patients, 30 were men (96.77%) and one woman (3.22%), with a mean age of 24 years and a range of 18 to 33 years. The etiology of the trauma is determined in table 1.

Table 1: Etiology in Patients with Abdominal Trauma with Retroperitoneal Hematoma at the "Rubén Leñero" General Hospital From 2020 To 2024 In Number/Percentage.

Etiology of abdominal trauma	Number/%
Blunt Trauma from Motorcycle Accident	10/32.25
Blunt trauma from motor vehicle accident	3 / 09.67
Blunt trauma due to aggression by third parties	2 / 06.45
Blunt trauma from falling or other causes	2 / 06.25
Penetrating trauma from gunshot wound	9 / 29.03
Penetrating trauma from a stab wound	4 / 12.90
Penetrating friction/burn trauma	1 / 03.22
Total	31 / 100



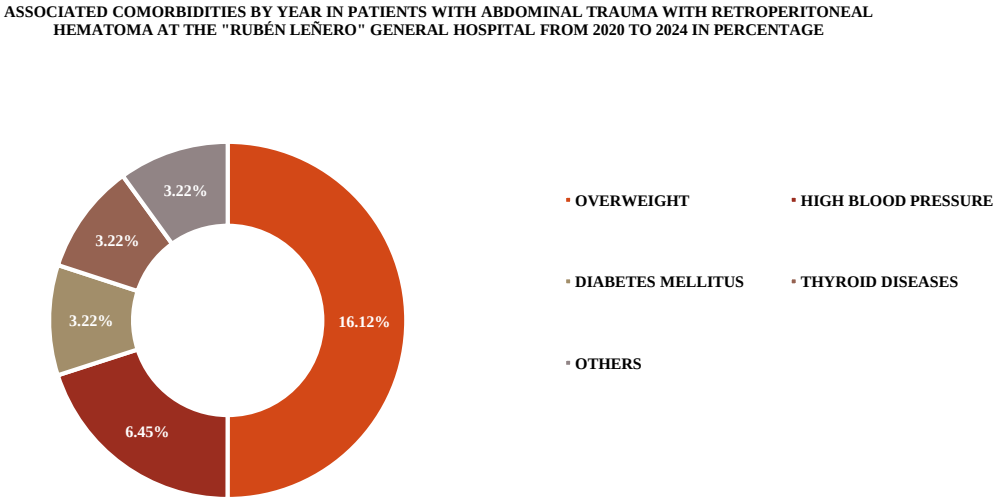
Not all patients who suffer abdominal trauma have an RH, but those who do have it are diagnosed by simple computed tomography (there is no contrast medium) or in the operating room itself, as they do not have the tomographic resource and/or have hemodynamic uncontrol. As shown in table 1, the first cause of RH is the result of blunt trauma to the abdomen due to a motorcycle accident, reaching 32.25%, the second cause is due to penetrating trauma of the abdomen due to a gunshot wound and in third place is due to trauma of the abdomen

caused by a stab wound. That if analyzed, the incidence is 15 cases that represent 48.38%, almost half of the group is due to aggression by third parties, and all of them are male.

In this study, the following comorbidities were detected, see table 2: firstly, overweight in 5 patients representing 16.12%, secondly, arterial hypertension in 2 cases and 6.45% and thirdly, type 2 diabetes mellitus, thyroid disease and Down syndrome, in the same incidence which were 3.22%.

Table 2: Associated Comorbidities by Year in Patients with Abdominal Trauma with Retroperitoneal Hematoma at the "Rubén Leñero" General Hospital from 2020 to 2024 in Number/Percentage

Comorbidities Año	Overweight	Hypertension arterial	Diabetes Mellitus	Diseases Thyroid	Other
2020	3	0	1	0	1
2021	1	0	-	0	0
2022	0	1	-	0	0
2023	0	0	0	0	0
2024	1	1	0	1	0
TOTAL	5 (16.12%)	2 (6.45%)	1 (3.22%)	1 (3.22%)	1 (3.22%)



Regarding the diagnosis of RH in patients suffering abdominal trauma, it should be noted that the few patients who had the option of previously having a CT scan (it is only done in the simple phase, there is no contrast medium), and without interpretation by a radiology specialist, which is sometimes frankly inoperative. However, hemodynamic instability and/or combined lesions in the anterior abdomen leads to the diagnosis of RH being found in the operating room, see table 3, where the diagnosis of the combined anterior (abdominal cavity) and retroperitoneal organic lesions or the type of hematoma, the size, evolutionary or not, the type of area involved in the retroperitoneum or the exclusive involvement of the organs.

URL: http://dx.doi.org/10.14738/bjhr.1201.18292.

Table 3: Diagnosis of Abdominal Trauma with Retroperitoneal Hematoma, Size, Organic Involvement of The Anterior and Retroperitoneal Abdominal Cavity, At The "Rubén Leñero" General Hospital From 2020 To 2024

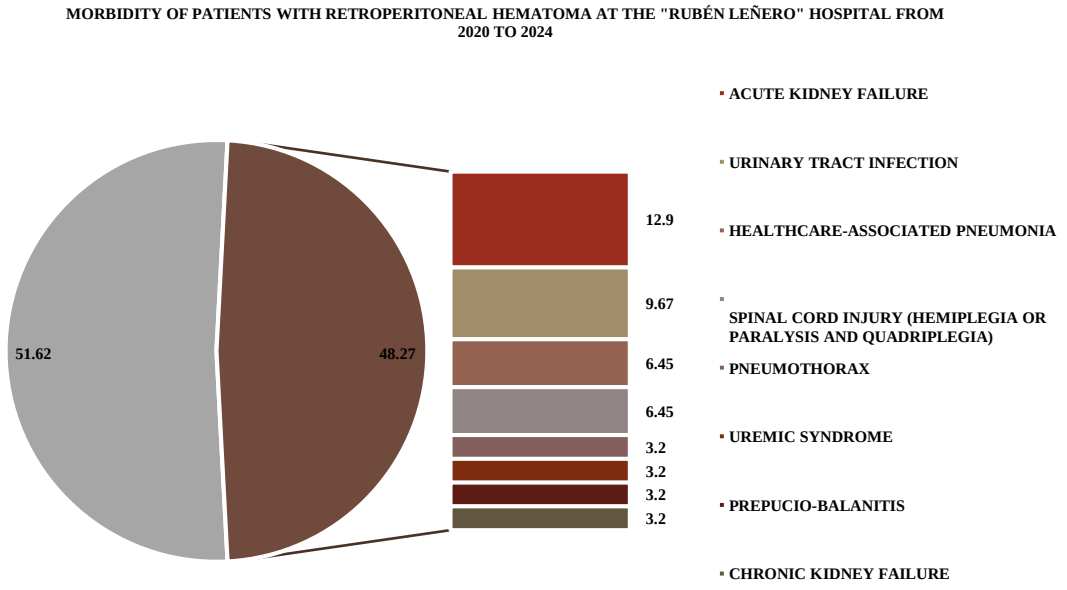
Type of abdominal trauma	Diagnosed by CT/QX	Organic affection anterior abdomen	Organic affection in retroperitoneum	Size of the hematoma/ Evolutionary Yes/No	Affected area in retroperitoneum
Motorcycle contusion	4/6	colon/small intestine, spleen bladder	mesenterio colon pancreas	4 cm/ 5 cm/no	I/II/III
Vehicle accident Contusion	1/2	liver, spleen	pancreas	6 cm/no	I/II
Contuso due to aggression by third parties	1/1	liver	kidney	7 cm/yes	II
Penetrating by firearm	1/9	small intestine/colon/liver	colon mesentery /kidney	5 cm/no	II/III
Penetrating by knife	1/3	-o-	lower vena cava/kidney	15 cm/yes 5 cm/no	I/II
Friction/Burn penetrant	1/0	small intestine/spleen	left colon	6 cm/no	II
TOTAL	9/22				

Of this series of cases, they only occurred in three patients, 9.67% of whom were exclusively RH due to penetrating stab wound. The most frequent and most affected target organ in the abdominal cavity was the small intestine, in second place the liver, in third place the spleen, fourth place the colon and finally bladder, in most of them together and are not isolated lesions, but multiple. Unlike the retroperitoneum, the first place the organ affected is the colon, secondly the pancreas, the thirdly the kidney, and fortunately the inferior vena cava. On the other hand, hip fractures in patients have a high incidence of RH. It is determined that of the 31 cases, the average size of the bruises was 5 cm, on average with ranges from 15 cm to 4 cm; of the progressive hematomas in this series, only two patients underwent surgical exploration of the retroperitoneum due to progressive or enlarged RHs. One of them underwent nephrectomy and the other patient had an adrenal inferior vena cava lesion, where vascular repair was performed. Both cases successfully. Conservative management was carried out in 93.54% with hemodynamic control, close surveillance and postoperative surgical drainage, with results that were assertive and conclusive. Of this series, 74.19% are classified as ASA IV and the rest of the study group, which is 25.80%, are classified as ASA V. The average surgical time for each surgery was 156 minutes, with ranges from 120 to 290 minutes. The quantified hemorrhage was very variable in the different compartments of the abdomen, hemoperitoneum reported an average of 650 ml., with ranges from 250 to 1, 200 ml., unlike in the retroperitoneum the mean was 350 ml with ranges from 50 to 750 ml., during the procedure it varied from 50 ml to 1, 800 ml., with an average of 400 ml. The complications and sequelae documented (morbidity) in table 4, which is described below:

Table 4

Morbidity of Patients with Retroperitoneal Hematoma at the "Ruben Leñero" Hospital from 2020 to 2024	Number/%
Healthcare-associated pneumonia	2 /06.45
Urinary tract infection	3 /09.67
Pneumothorax	1 / 03.22
Uremic syndrome	1 / 03.22

Acute renal failure	4 / 12.90
Prepucio-balanitis	1 / 03.22
Chronic kidney failure	1 / 03.22
Spinal cord injury (hemiplegia or paralysis and quadriplegia)	2 /06.45
Total	15/48.38



The morbidity of patients suffering from an RH detected in this study was 48.38%; firstly, acute renal failure occurred in 4 patients, with 12.90%, and one of them culminated in renal replacement therapy, leading to chronicity of the same renal failure, by nephrectomy for grade V lesion and having a hypoplastic contralateral kidney. This high incidence is due to the degree of hypovolemic shock with which patients arrive at the hospital, most of whom are III-IV, either by their own means or by being transported by ambulance; however, it begins with an aggressive therapy of fluids, not by the emergency department, but by the surgical service that assesses and captures them abruptly under intensive, effective and/or resolute management, which also determines and activates an immediate surgical conduct there in the emergency room, a priority in the operating room as a surgical emergency, or only with priority of urgency. All this determines the best prognosis and patient survival, where the 1st essential factor is the response time of surgical care. Thirdly, urinary tract infection (urosepsis), perhaps because in the asepsis of urinary catheter placement, the gel is not sterile, being a specific fomite that has weight in the incidence of urinary tract infection in these patients. No reoperations were documented, and the average days of in-hospital stay were tabulated by about 9 days, with a range of 5 to 47 days. Morbidity was previously reported in 15 pathologies and that combined or adjusted, there were 13 cases in a total of 41.93% and the reported mortality was zero.

DISCUSSION

In elective surgical resection, patients suffering from a retroperitoneal tumor (neurofibromatosis) may present with a RH, as it remains the only curative treatment option; complete removal of the tumor with a minimum of negative margins of 2 cm is essential for

URL: http://dx.doi.org/10.14738/bjhr.1201.18292.

surgical success, with the risk of local or distant recurrence. That is why it is at such a high risk of post-surgical bleeding. [14] Another cause of rare retroperitoneal hemorrhage is adenosine deaminase 2 deficiency, an autosomal recessive disorder caused by loss-of-function mutations in the ADA2 gene on chromosome 22q1. An abdominal and pelvic computed tomography scan with contrast revealed retroperitoneal hemorrhage and was identified as compressing the left kidney. [15]

Primary percutaneous coronary intervention, for the treatment of acute myocardial infarction, with the femoral artery approach is associated with greater hemorrhagic complications, with very rare, but potentially fatal incidence of RH. [16] Among the complications of this disease, spontaneous RH is rare, but it may be associated with congenital coagulopathies such as von Willebrand disease or hemophilia type A. [17] On the other hand, pelvic fractures suffered by patients also result in dramatic RHs related to lesions in these veins, as well as the risk of dangerous bleeding in pelvic lymph node resection procedures, hernia surgeries, gynecologic and orthopedic procedures of this anatomical region. [18]

The clinical picture is non-specific, and the diagnostic suspicion of RH is in fact remotely unexpected to anecdotal, with very non-specific signs and symptoms such as dull, continuous or intermittent abdominal pain, systemic arterial hypertension, hemiparesis, transient ischemic attacks, anemia, skin lesions, fever, local edema or even erythema, but it can be caused by the underlying disease, in short, nothing conclusive. [15, 19] Symptoms such as bloating, urinary system symptoms, weight loss, and pelvic pain are also present. [20] The diagnosis of RH may be delayed because the retroperitoneum serves as a non-compressible area where a large amount of blood can accumulate rapidly without causing obvious stigmata of an underlying expanding hematoma, it is particularly complicated after blunt abdominal trauma, requiring suspicion in patients who show signs of hypovolemic shock. See figure 1.

Figure 1: Bilateral Ecchymosis of The Flanks of The Abdomen, Resulting in A Retroperitoneal Hematoma. Image taken from the reference: Masha, Luke et al. Grey Turner's sign suggesting retroperitoneal hemorrhage. The Lancet. 2014; 383, (9932): 1920 [21]

Abdominal ultrasound is a routine bedside tool to quickly diagnose and control the bleeding, however, it has significant limitation in detecting retroperitoneal bleeding. [22] CT scan revealed signs of bleeding in the larger tumor as well as in the retroperitoneum, imaging plays a crucial role in the diagnosis of RH. [15, 19, 20] Computed tomography is considered the gold

standard for detecting spontaneous bleeding in stable patients, with sensitivity and specificity reaching 100%. The tomographic scans were obtained in the basal, arterial (bolus tracking technique was used with a delay of 50-60 seconds) and venous (180 seconds) with exploration parameters of 120 kVp, 200 mA and cut-off thickness of 3 mm to 5 mm. The volume of the hematoma was calculated by taking 2 diameters. [23] See figure 2.

Figure 2: Uncontrasted Computed Tomography of The Abdomen and Pelvis. Axial Section Shows Extensive Left Retroperitoneal Hematoma Located Preferably in The Anterior Pararenal Space. Image taken from the reference: Álvarez G. D., Schiappacasse F. G., Castro S. M., y cols. Hematoma retroperitoneal de causa infrecuente: A propósito de un caso. Rev. Chile. Radiología. 2012; 18(3): 107-110. [24]

The use of radiologic software in the computed tomography study in Japan can automatically calculate internal or external diameters and areas at each point of the iliofemoral artery, while also helping to avoid operator bias in the measurement of iliofemoral parameters, and the workstation has already been used in clinical studies associated with the quantitative assessment of atheromatous changes of the aorta in referring to RH secondary to aortic aneurysms for repair. [25] On the other hand, magnetic resonance imaging is the most accurate imaging study for adrenal hemorrhage, as the mass lesion in relation to the kidney was initially thought to be an abscess, however, this cabinet study helps to better characterize the tumor as a hematoma. [26] In addition, magnetic resonance imaging (MRI) allows the characterization of massive hemorrhage following lumbar vertebral body infarction and treatment and/or follow-up at the same time. [27] See figure 3.

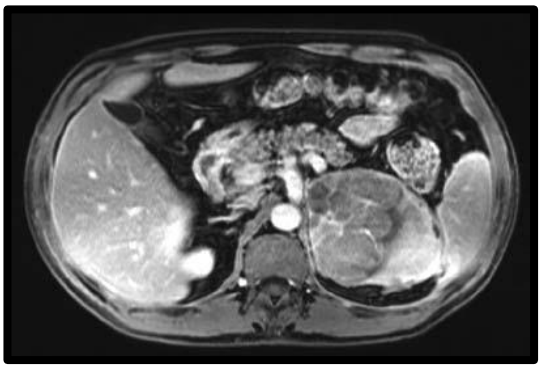


Figure 3: Nuichlear Magnetic Resonance Imaging to Control The "Conservative" Management of The Abdomen at One Week, Where It Is Evidenced in The Axial Cut in T1, Fat Suppression and

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Use of Gadolinium. A Slight Increase in Signal Corresponding to The Solid Component of The Tumor Is Observed. Image taken from the reference: Álvarez G. D., Schiappacasse F. G., Castro S. M., y cols. Hematoma retroperitoneal de causa infrecuente: A propósito de un caso. Rev. Chile. Radiología. 2012; 18(3): 107-110. [24]

Diagnostic imaging of RH is complex, as there are cases such as a contrast-enhanced CT scan revealing a lobed retroperitoneal mass around the abdominal aorta, initially misdiagnosed as a possible hemorrhagic retroperitoneal tumor. Despite multiple diagnostic studies such as an MRI and even positron emission tomography with 18F-fluorodeoxyglucose (FDG-PET)/CT, the diagnosis was not confirmed, however, it was not until surgery that was discovered in the operating room where it revealed an organized hematoma with a defect in the right wall of an abdominal aortic aneurysm. [28] Lesions of the inferior vena cava are reported to only become evident during surgery, absent on computed tomography, on the other hand, they occur in unusual wounds that do not fit any of these scenarios such as RH, massive bleeding in the retroperitoneum, RHs; but patients with hypovolemic shock do arrive and require massive blood transfusions. [29] This condition is often hidden and not sufficiently recognized by clinicians, making it a cause of significant morbidity and mortality.

The overall incidence of RH is difficult to determine since the label includes a very heterogeneous group of injuries, those of traumatic origin occur in 67 to 80% of blunt injuries, compared to 20 to 33% of penetrating injuries, unlike spontaneous injuries, which is rare, with an incidence of approximately 0.6%. The treatment of RH, regardless of its etiology, is multifaceted and requires an interprofessional approach. Specific therapeutic interventions should be individualized according to the etiology and general clinical status of each patient. Treatment modalities include palliative care with close observation for stable patients, angioembolization or surgical exploration for unstable patients, where persistent hemodynamic instability is defined, and an expanding or pulsatile hematoma are indications of progressing to aggressive management of surgical treatment. [30] Figure 4.

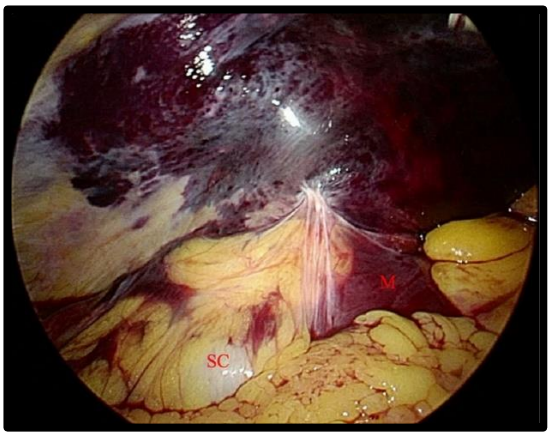

Figure 4: Laparoscopic Image of Retroperitoneal Hematoma. SC: Sigmoid Colon. M: Mesentery. Image taken from the reference: Fuchs A., Parthasarathy K., Coots A., et al. Large Retroperitoneal Hematoma: A Rare Intraoperative Complication of Total Vaginal Hysterectomy. Cureus. 2021; 13(7): e16760. doi:10.7759/cureus.16760. [31]

To examine the perioperative clinical features and prognosis of patients with ruptured abdominal aortic aneurysms with retroperitoneal hemorrhage who received surgical repair,

with complications including acute gastrointestinal dysfunction, hypovolemic shock, acute respiratory distress syndrome, pancreatic injury, coagulation dysfunction, disseminated intravascular coagulation, acute kidney injury, infection/sepsis, gastrointestinal bleeding, and abdominal compartment syndrome. [32]

Medial central RH are commonly explored as the underlying etiology can often be attributed to injury to the great vessels or one of their branches. Lateral lesions mainly comprise renal lesions that are amenable to conservative treatment. Pelvic RHs are primarily the result of pelvic fractures and venous bleeding. These lesions are less amenable to surgical treatment. The initial approach to the patient with suspected blood loss due to pelvic injury is an external pelvic fixation or bandage to stop or block bleeding. Definitive treatment is by angiographic embolization of the bleeding vessels. [16, 30]

Endovascular therapy of RH has been widely accepted during the last two decades in adult patients, since the endovascular management of abdominal aortic trauma presents satisfactory results, increasing the knowledge of this technique and offering a probable new, feasible and safe therapeutic approach; percutaneous transarterial embolization being a watershed in the treatment of RH to evaluate treatment outcomes in patients undergoing targeted or empirical embolization. [27, 33, 34, 35] In the event that right renal artery angiography reveals massive extravasation of contrast medium from the microaneurysm. The ruptured micro aneurysm and proximal arterial branch were successfully embolized, and the patient was discharged without surgery. [36] When the RH did not progress in size and the patient was hemodynamically stable, conservative management was planned, with observation, tomographic follow-up, transfusion, and strict fluid control for replacement, with surgical management pending or under close surveillance if warranted. [16, 30, 37, 38]

Penetrating and traumatic injuries are classified into the following zones or areas:

- **Zone I: Midline RH** from the diaphragmatic hiatus to the aortic bifurcation and inferior vena cava. Concern for significant vascular injury of the great vessels.
- **Zone II: Lateral RH**: Concern about injury to the hilum and renal vessels or renal pelvis. Most are very small, non-pulsatile, and do not expand.
- **Zone III: Pelvic RH**: In penetrating lesions, they should be surgically explored to rule out injury to the major pelvic vessels. **[39]**

Previously, more than 40 years ago, the RHs had an unceremoniously aggressive surgical approach, where the condition in zone I was equal to surgical exploration, the same in zone III, without considering any factor or condition; [40] but must have the criteria or surgical expertise to perform it or not, in the same surgical act according to the case of each patient. Most studies suggest that, although surgical treatment of hematoma is possible, it is associated with considerable morbidity and mortality, where surgical overtreatment plays a morbid role; and a "damage control surgery" is a surgical strategy, applicable to traumatic and non-traumatic patients, in which, in a context of severe physiological instability, a complex surgical situation is addressed in stages, aiming in the first intervention to save the patient's life even without solving all the injuries. [41, 42]

URL: http://dx.doi.org/10.14738/bjhr.1201.18292.

Percutaneous drainage may be attempted in case of worsening symptoms and progressive neurological deficits, the natural history of RH results in spontaneous resolution. Most hemodynamically stable patients can be treated by fluid resuscitation, blood transfusions, and coagulopathy correction. [43]

On the other hand, other therapeutic alternatives have been carried out of the RH where transcatheter sclerotherapy and placement of coils in a right mesenteric varice, which was the source of bleeding, have been successful. [44] Another successful option documented in the international medical literature is the use of the aortic balloon and aorta-femoral-femoral bypass of femoral injuries due to trauma, aneurysm, among others, with surgical management taking a back seat. [45, 46] However, patients with polytrauma have other conditions, as high-energy traumatic injuries have a poor prognosis, and these types of polytrauma are likely to cause serious and sometimes fatal injuries, including fractures, brain injuries, internal organ damage, spinal cord injuries, major bleeding, and organ rupture. Treatment includes emergency surgery, blood transfusions, emergency first aid and rehabilitation, and a multidisciplinary team approach and having an infrastructure in place is essential. [47]

It has been anticipated that the patient would require management with an open abdomen for several weeks if we expected the hematoma to be spontaneously reabsorbed; this is not necessary since it is considered by the authors of this manuscript that this behavior is not a strategy, but an armagedón to leave the abdomen open, since it does not offer any advantage and does increase morbidity in infection. perforation of hollow viscera or intestinal perforations (so-called "enteroatmospheric fistulas") [48] or in planned ventral hernia, when only drains can be placed with close monitoring by the surgeon. [47, 49] Bleeding complications following thrombolytic therapy have been documented in patients with acute myocardial infarction with an RH of 1,500 cc., and autopsy revealed that despite emergency surgical treatment, there was no way to delimit bleeding. [50] Mortality in patients with pelvic fracture presenting with hemorrhagic shock ranges from 21% to 57%. And where ResQFoam is a self-expanding foam that has been previously described to significantly reduce mortality in large animal models of abdominal exsanguination; that is why foam treatment facilitated hemodynamic stabilization and resulted in significantly less bleeding. [51] In cases that are without active bleeding and with stable life parameters, conservative treatment measures may be sufficient. Surgical treatment is often reserved for treatment-refractory bleeding with abdominal compartment symptoms. [52]

REMARKS

- In the diagnosis, the symptoms and signs of **RH** are very non-specific and only the diagnostic suspicion of the surgeon, which is made thanks to direct stab or firearm injuries or by computed tomography with contrast medium.
- **RH** can only be diagnosed preoperatively correctly by contrasted CT or magnetic resonance imaging; so only the second option remains, which is the surgical procedure itself as a "finding" of surgery.
- The authors of this manuscript conclude that the conduct in the face of an **RH** is an aggressive resuscitation, with the decision of a specific surgical exploration of the retroperitoneum, which will depend on the characteristics of the hematoma itself,

(whether it is evolutionary, pulsatile, size greater than 5 cm in diameter, accelerated growth, active bleeding, etc.,) not from the physical area where it manifests.

- **RH** should be critically evaluated, analytically and with the expertise of the surgeon according to the clinical conditions, the involvement of other abdominal structures, the mechanism of trauma, the degree of shock, the active infectious process/degree of contamination, risk/benefit, survival and installed infrastructure. In four treatment scenarios:
    1. Conservative
    2. Non-surgical interventional alternative.
    3. Surgical exploration of the retroperitoneum, according to findings.
    4. Damage control surgery
- Conservative management of **RH** is the safest, most effective and successful therapeutic alternative, since it avoids overtreatment, since if it does, it evokes a disproportionate increase in the trans operative hemorrhage of a patient who is already in a state of shock, with an uncontrolled metabolic response to trauma, as well as the risk of accidental injury to labile and/or healthy anatomical structures. Exponentially increasing morbidity and the risk of death.
- In Mexico, the installed hospital infrastructure is scarce or stunted for the effective and efficient management of **RHs** and where trauma surgeons come to make a difference, since these specialists can adapt from the existing supplies, which allows, despite the adversities, to save the lives of patients with this pathology.

CONCLUSIONS

RH is a multifactorial manifestation that in this series is a common etiology, but extremely frequent due to aggression to third parties, trauma or laceration. The incidence of RH is low when compared to anterior abdominal lesions with hemoperitoneum for the same etiology. Conservative management of RH is the most appropriate approach, as it reduces morbidity, reduces bleeding and overtreatment, with beneficial and adequate results for patients. RH with an accelerated, pulsatile, expansive or evolutionary growth, which is mostly greater than 5 cm, therefore the conduct is a surgical exploration of the retroperitoneum, depending on the affected area in the suspicion of the injured organ for hemostasis, resection or even surgical packing in a damage control surgery, as the case warrants. Conservative treatment in patients with RH has allowed for a mortality absent in this series of cases, the result of experience, pragmatism of an effective and efficient surgical criterion applied by the surgeon, with the opportunity to offer the survival that patients need.

Conflict of Interest

The authors stated that they had no potential conflicts of interest regarding the research, authorship, and/or publication of this article.

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