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ISSN (Print):1992-92 18, ISSN (Online):1992-92 18
DOI: https://doi.org/10.32792/utq/utjmed/16/2/6

Incidence and Management Modalities of Splenic Injury in Blunt Abdominal Trauma in Al-Hussein Teaching Hospital at 2017

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Abstract :

Study was done Over the past one year, starting from January 2016 to the end of October 2017, an observational, analytical –cross-sectional study had been conducted in Al-Hussein Teaching Hospital in Al-Nasiriya city to study the estimate the incidence, severity, and mode of splenic injuries in blunt abdominal trauma, other objectives were to detect sensitivity investigations, and modalities of management in this injuries.

A representative sample of 67 individual aged (6-77) years through multistage sampling had been included in the study . The diagnosis of the cases was clearly depending on the history, physical examination and investigations (ultra-sonography and CT scanning)

The overall 67 patients with blunt splenic injury were identified (47 males, 20 females). The mean age of patients with splenic injury was 24.7 years .The most common cause of injury was RTA (88.2%). The most common grades of splenic injury were grade I, II. Majority of patients arrived to emergency unit after 2 hours .The most patients with RTA were managed as splenectomy (60.0%). The abdominal pain and abdominal tenderness were the most common clinical finding in splenic injury patients arrived to emergency unit. More than half of patients were stable at time of arrival to emergency unit (62.6% s) .Splenectomy was the most common type of management (50.7%), while the conservative management was 19 patients (28.3%) most of them at age under 20 years.

The study will help in establishing the priorities to act on according to the problems and their impact. Also to design the strategies for control and treatment of patients with blunt splenic injury in emergency unit.

Introduction

The splenic trauma is the physical injury to the spleen (the lymphatic organ located in the upper left side of the abdomen under the rib cage). [1]

The spleen remains the most commonly affected organ in blunt trauma injury to the abdomen in all age groups,

although protected under bony ribcage. [2] Blunt injuries to the spleen are documented

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more frequently as the primary solid organ injury in the abdomen, while some references occasionally document liver injuries as being more common [3]. These injuries are result from motor vehicle crashes, sporting events, domestic violence and accidents involving bicycle handlebars. [2]

The traumatic and non-traumatic are splenic injury causes.

Traumatic causes such as blunt trauma which is the most common cause (traffic collisions or falling from height) and penetrating injuries, such as (gunshot wounds and stab) are less common. [4]

Non-traumatic causes which are less common than traumatic, those include infectious diseases, medical procedures such as colonoscopy, hematological diseases, medications and pregnancy. [4]

Trauma is the major cause of mortality and morbidity, road traffic accidents (RTA)are one of the leading causes, in the developed world .With blunt abdominal trauma up to 45% will have splenic injury ,which require urgent surgical management ,angio-embolisation or non-operative management under active observation .[5]

The primary goal for a splenic injury management is the diagnosis and prompt management of potentially life-threatening hemorrhage [6]. The preservation of splenic tissue function is secondary, and in selected patients, it may be accomplished by using non-operative management and operative salvage techniques. [6]

The patient with signs of ongoing bleeding or hemodynamically unstable is reserved for surgical therapy. [2] The surgical management divided to splenoectomy or splenorrhaphy. [2]

Non-operative management (NOM) is preferred treatment for hemodynamically stable, and it can be divided in either observation or artery embolization [7]. The blunt splenic injury is fatal injury and its complication is frequent, so it's mandatory to early recognition and treatment of these injuries, not all splenic injured patients come with clear criteria indicating injury, so they need for special diagnostic aids to be done like U/S or CT scan in order to support clinical finding elicited from patient examination. [8] The patients with splenic injury may be present with either left hypochondrium pain associated with left shoulder tip pain or diffuse abdominal pain. It has be show that left lower chest injury presents in 43% of patients with splenic injury. [9] The mortality resulting from splenic injury increases if there are associated injuries of other organs, increased injury severity score and increased age. According to trauma centers in North America, the mortality rate

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after splenic injury is 6%-10%. [10] The spleen is encapsulated by the outer layer (elastic, tough) that contains some muscle fibers .Splenic blunt injury can cause the capsule to split open and hence splenic rupture .[١١] The splenic injury can classified according to severity, vascular injury, including laceration and hematoma. The American Association for the Surgery of Trauma (AAST) grading system for spleen injury as following; [12]

0- Grade 1: the tear (laceration) in the capsule less than 1 cm deep to spleen; or hematoma (accumulation or of clotted blood) less than 10%of the splenic surface area under the capsule.

0 – Grade 2: a tear 1-2 cm that dose not involve the trabecular vessels (splenic arterial branches); or the hematoma over 10-50% of surface area under the capsule (sub-capsular) ; intra-parenchymal hematoma less than 5cm diameter (inside the organ` s tissue).

0 – Grade 3 : the tear greater than 3cm with depth (or involve splenic artery) ; or over 50% sub-capsular hematoma ; or greater than 5cm intra-capsular hematoma

0 –Grade 4; the tear that laceration hilar blood vessels or segmental and cause loss of more than 25% of the organ`s blood supply.

0- Grade 5 ; tear that laceration certain blood vessels causes total blood supply of the organ (hilar vascular injury with devascularized spleen) ;or hematoma that completely shatters the spleen .

According to grading of splenic rupture determine whether surgical or non-operative management is indicated for treatment.

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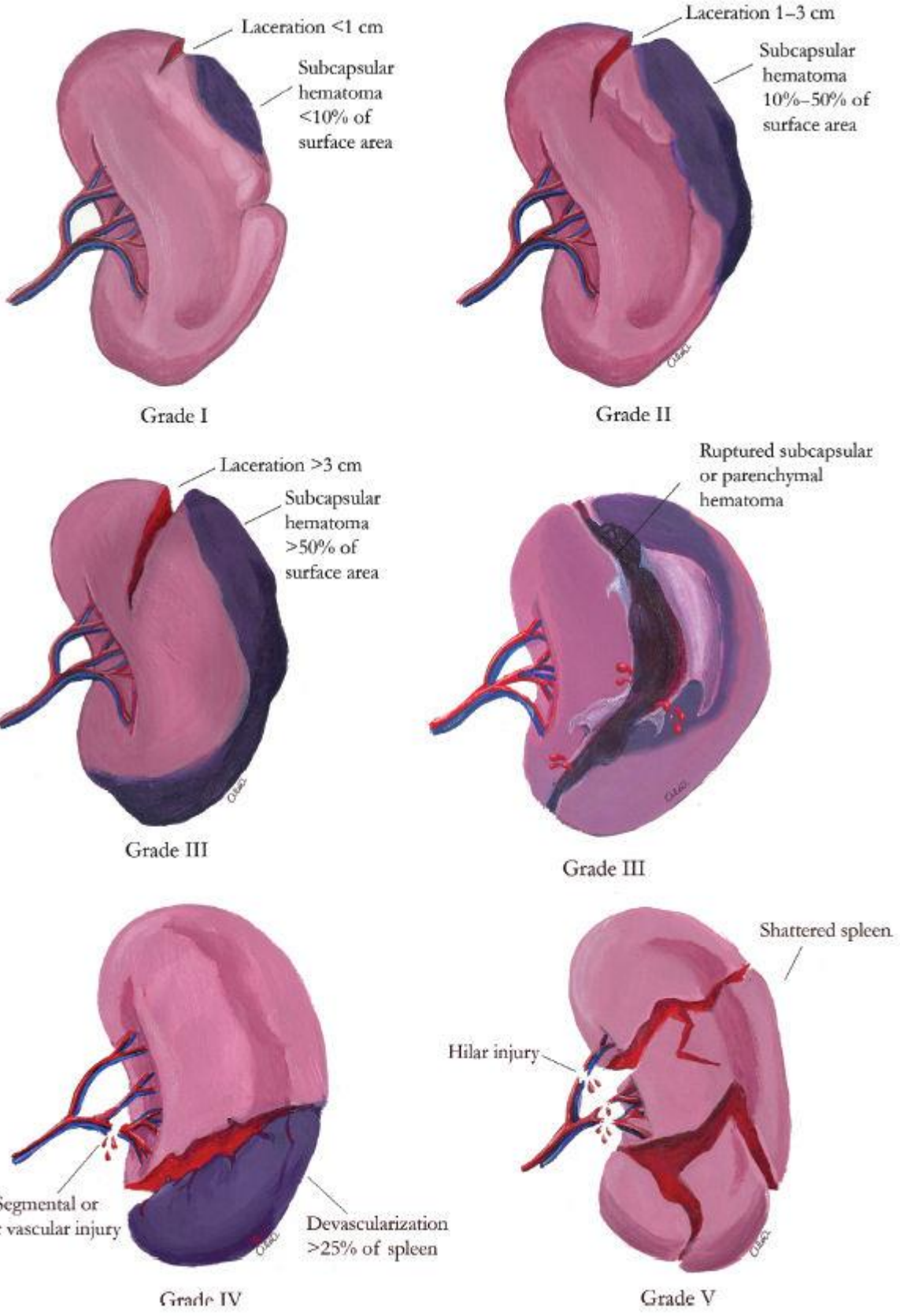

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Figure 1.2 AAST Splenic injury Grading

Source: AAST Splenic injury Grading Radiology Reference-WordPress.com

Patients and Methods

The study is observational, analytical, cross sectional done in emergency unit of Al-Hussein Teaching Hospital .The duration of the study was more than one year started from Jun. 2016 to the end of October 2017. The benefits of this type of study done in unit emergency to directly interview with the respondent can be seen from following:

1- The respondent can be seen directly by researcher with all available reports, investigation and treatment.

2- Questions can be delivered and translated to the respondents in simple and easy way to be well understood.

3- All cases can be seen in medical institutes.

4- The main advantage of these cross sectional study with the direct observation from the researcher (face –to–face interview), was to minimizing the information bias during the stage of data collection in contrast to self –reporting studies.

The study population include all individuals (male and female) who have splenic injury due to blunt abdominal trauma (aged 6 years and 77 years in these study). The patients who present in the emergency unit of Al-Hussein Teaching hospital .Diagnosis of cases depend on the history, physical examination, and investigations (U/S and CT scan).[13]

The sampling of the patients include, detecting all the patients with splenic injuries due to blunt abdominal trauma present in emergency unit of Al-Hussein Teaching Hospital from Jan. 2016 to end of October 2017.

The golden standard for measurement of blood pressure was used the mercury sphygmomanometer. [14]

The patient was resting at least (5 minutes), appropriate and validated instrument with appropriate cuff bladder (12.5cm) encircling 80% of the arm was applied. Two measures were taken. [15] Ultra-sonographic technique (U/S), CT scanning.

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RESULTS

Sixty-seven participants in this study, with the mean age of (24.7), that ranging from (6 to 77) years old, the male to female ratio was (2.01:1).

Table 3.1 Show the demographic characters of studied population. The majority of the splenic injuries patients (70.14%) were male, while female (29.85%). Those injuries were mostly seen in the age group 20-39 years (55.2%).

Road traffic accidents (RTA) were most common cause in splenic injuries (88%) predominantly male.

Regarding occupation with significant difference, more than 2/3 (83.5%) was non-employed and predominantly male. The majority of female were housewives.

In education status shows (40.2%) were primary education and predominant male.

With no significant difference in marital status (single or married). In residence there was no significant difference.

Figure 3.1 Shows distribution of patients with traumatic splenic injury according to the type of trauma. Road traffic accident (RTA) is major cause of splenic injury (88%) while the fall from height (7.4%) is the second cause of splenic injury.

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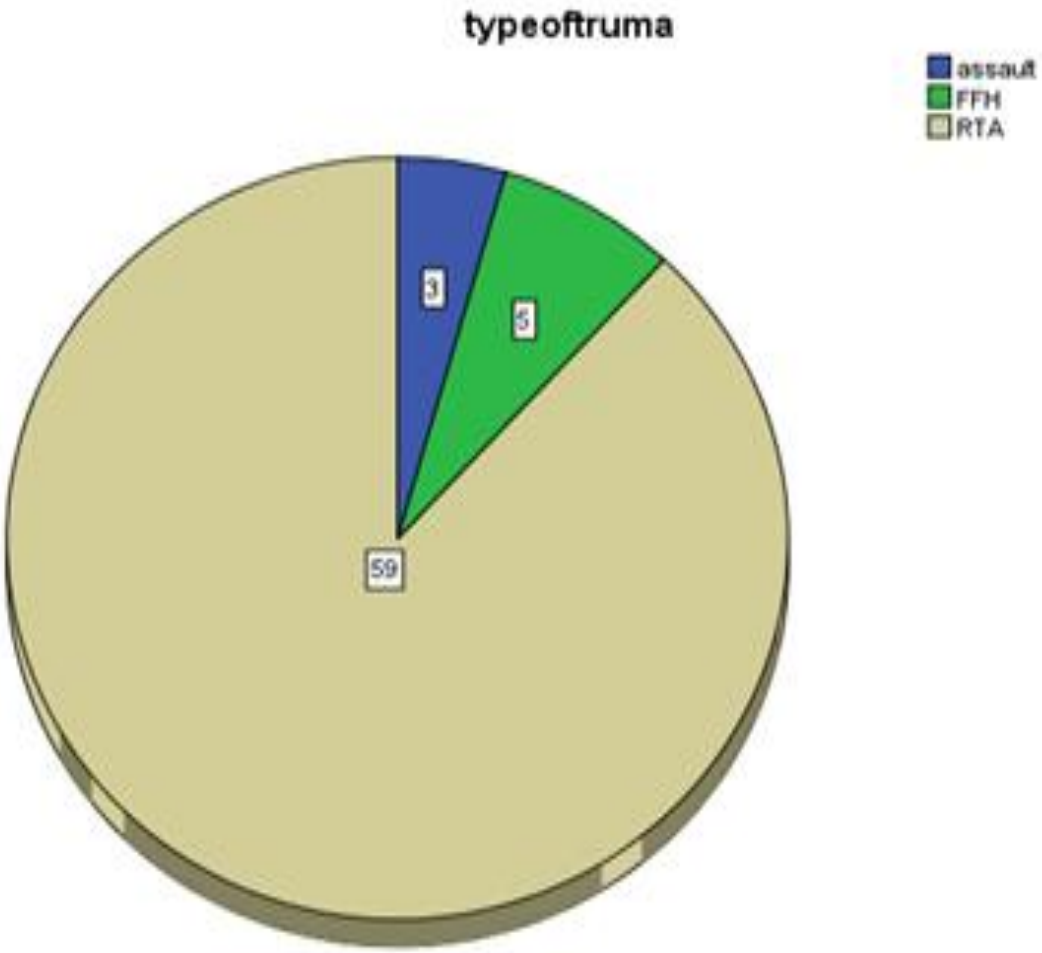

Figure 3.1 distribution of injured population according to their type of trauma

Figure 3.2- Shows the time by hours of arrival the patient with traumatic splenic injury to the hospital after trauma. Most of patients arrival after two hours (31.34%) to the emergency unit of the hospital after trauma.

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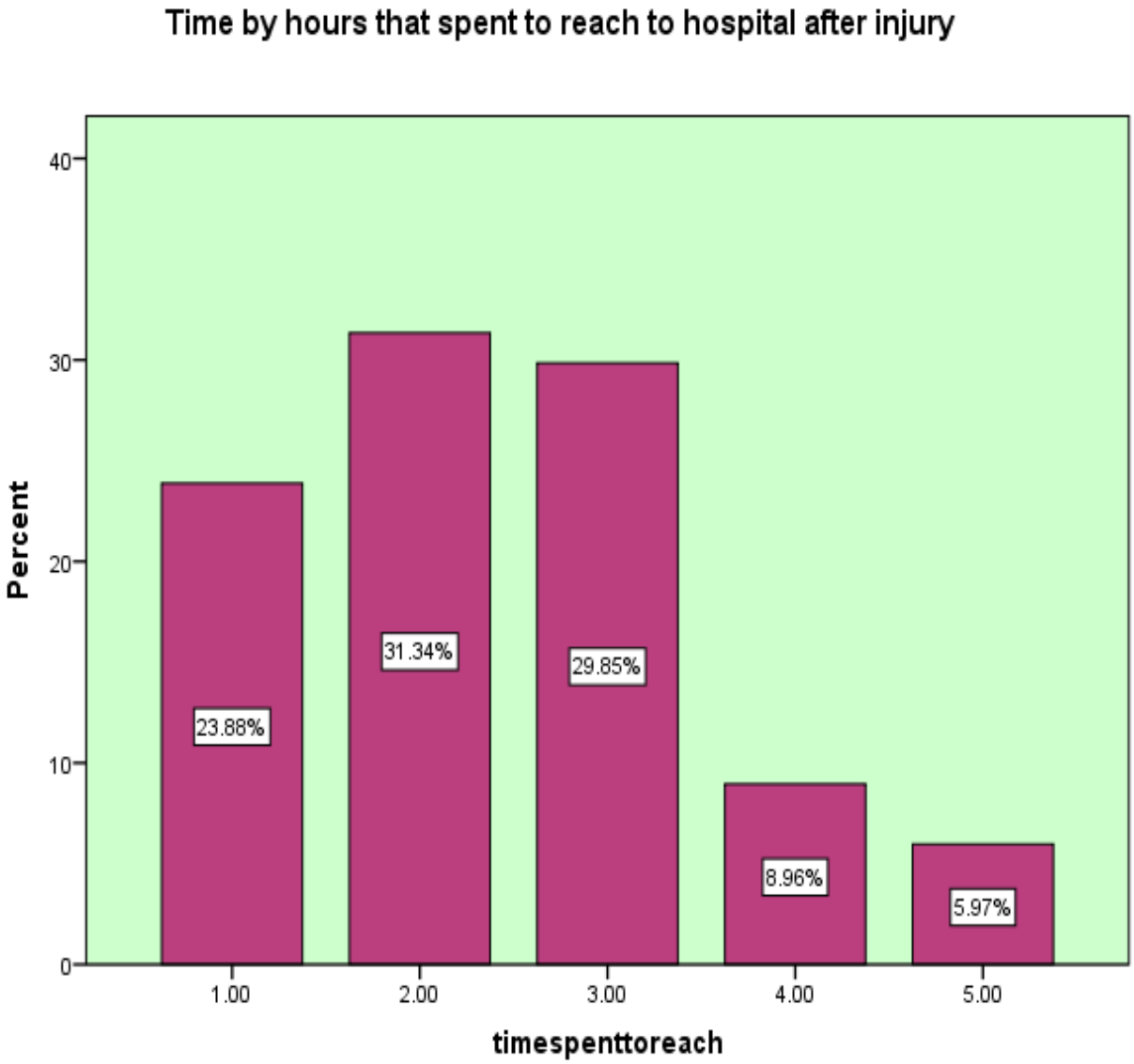

Figure 3.2 Time by hours that spent to reach hospital after injury

Figure 3.3- shows the mode of transport of splenic traumatic patient to the hospital. The majority of the patients with splenic injury were transported to hospital (56.7%) by ambulance, while the minority of them by other (4.4%).

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Figure 3.3 Mode of transport to the hospital

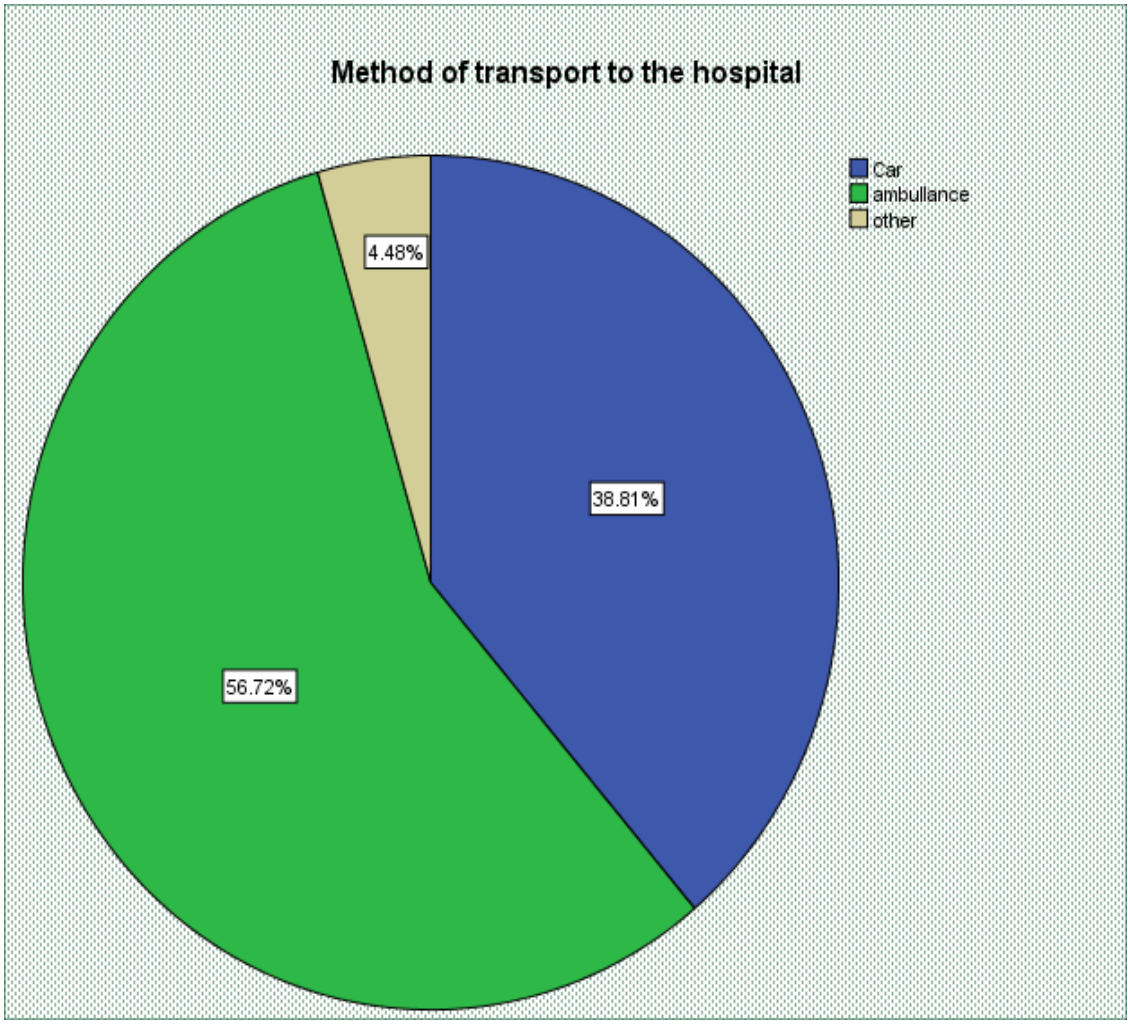

Table 3.2 Show relationship between transport ways after injury, time of arrival to hospital and stability of the patients with splenic injury. Regarding the method of arrival the majority (38 patients) was arrived to hospital by ambulance: 23 patients was stable (60.5%) while 15 patients was unstable (39.5%) .While the minority arrival by others.

Most patients were arrival to the hospital after two were stable (71.4%), while most who arrival after one hour were unstable(56.3%)

With no significant difference in method of arrival of injured population to hospital with stability of injured patients.

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Table 3.2 Relationship between transport ways after injury, time of arrival to the hospital and stability of the patient

Variables	Stability		Total	X^2
	Stable	Unstable		P value
Method of arrival				
Car	18	8	26	1.657
	69.2%	30.8%	100.0%	0.191
Ambulance	23	15	38	
	60.5%	39.5%	100.0%	
Other	1	2	3	
	33.3%	66.7%	100.0%	
Time of arrival to hospital				
1.00 hour	7	9	16	5.628+
	43.8%	56.3%	100.0%	0.52
2.00	15	6	21	
	71.4%	28.6%	100.0%	
3.00	12	8	20	
	60.0%	40.0%	100.0%	
4.00	4	2	6	
5.00	66.7%	33.3%	100.0%	
	4	0	4	
	100.0%	0.0%	100.0%	
Total	42	25	67	
	62.7%	37.3%	100.0%	

Figure 3.4 shows the relationship between type of trauma and its` management among the studied population. Regarding RTA with the significant difference, one ½ of the patients (50.8%) were splenectomy.

FFH show significant difference with nearly 2/3 of them (60%) were splenectomy, while majority of assault were conservative (66.7%).

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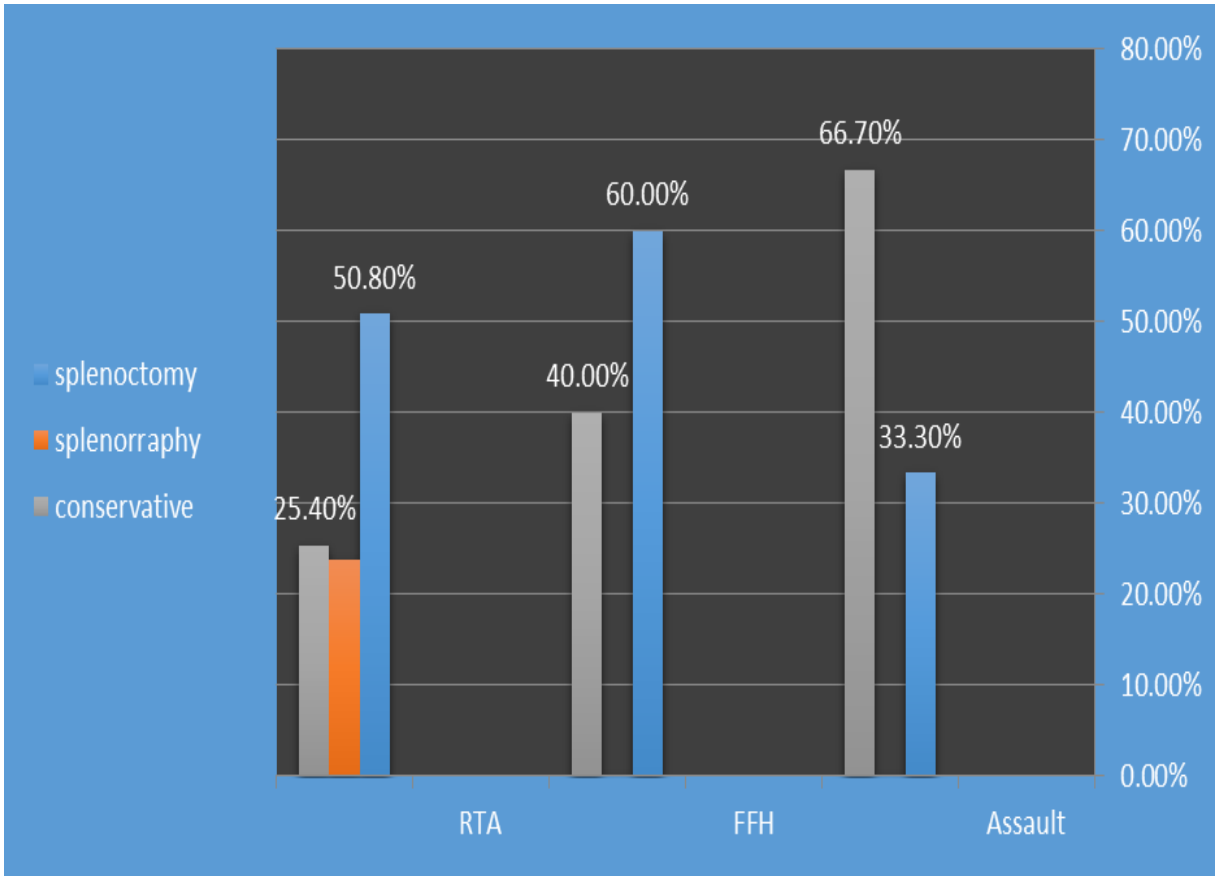

Figure 3.4.Relationship between type of trauma and its` management

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Table 3.4 show Validity of ultrasound examine against grading of CT examination

Validity of ultrasound exam against grading of C-T examination, most patients with grade II had positive U/S examine 28 patients (59.6%).

Table 3.5 Show relationship between time and method of arrival, general condition, associated injuries and types of management of the splenic injured population.
Most patients arrival to the hospital in first hour have splenectomy (62.5%).
Most patients arrival by ambulance have splenectomy (60.5%). Majority of unstable patients had splenectomy (92.0%), Most patient with positive U/S have splenectomy (63.8%). All patients with grade III,IV have splenectomy. Half of patients with grade I have conservative management. Most patients with grade II have splenectomy (65.5%). Patients with two associated injuries have splenectomy (85.7%).

US	C-T scan grade				Total
	I	II	III	IV	
Positive	12	28	6	1	47
	25.5%	59.6%	12.8%	2.1%	100.0%
Negative	18	1	1	0	20
	90.0%	5.0%	5.0%	0.0%	100.0%
Sensitivity	40%	96.5%	85.7%	100%	70.1%
Total	30	29	7	1	67
	44.8%	43.3%	10.4%	1.5%	100.0%

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Figure 3.5 Show CT scan grading of splenic injured patient population. The majority was grade I (30%) then grade II (29%), while the minority was grade IV.

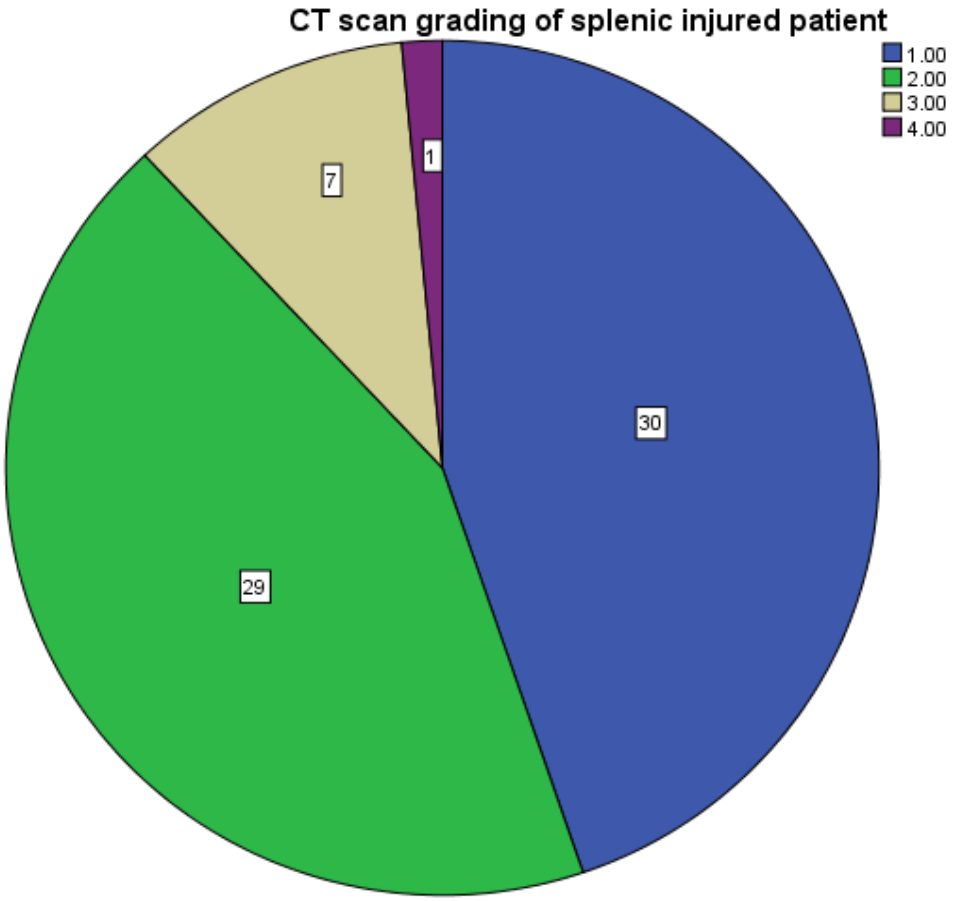

Figure 3.5 CT scan grading of splenic injured patient

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Figure 3.6 show the distribution of splenic injured population according to the general condition of patient at presentation to the emergency unite of hospital. The most of them were stable (62.6%).

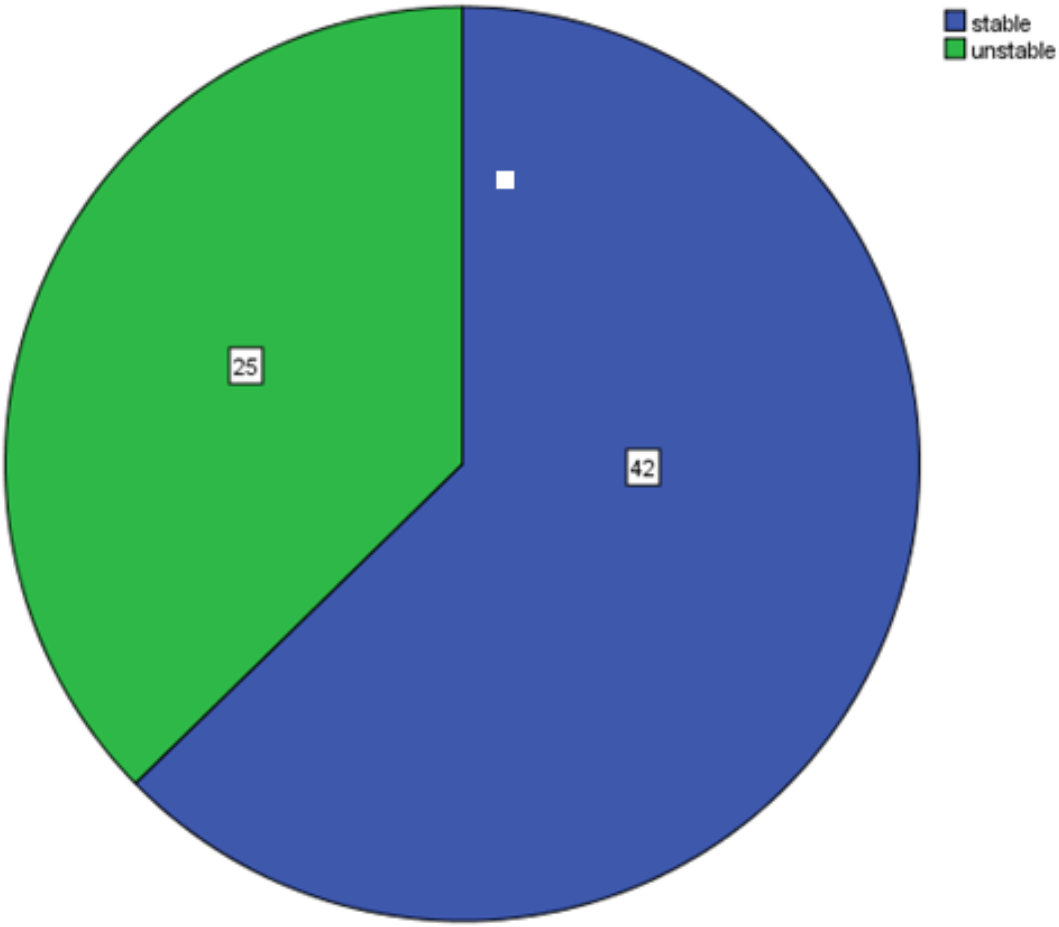

Figure 3.6 distribution according to the general health at time of presentation to emergency unite.

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Figure 3.7 Show type of the management of splenic injured population. The majority was splenectomy.

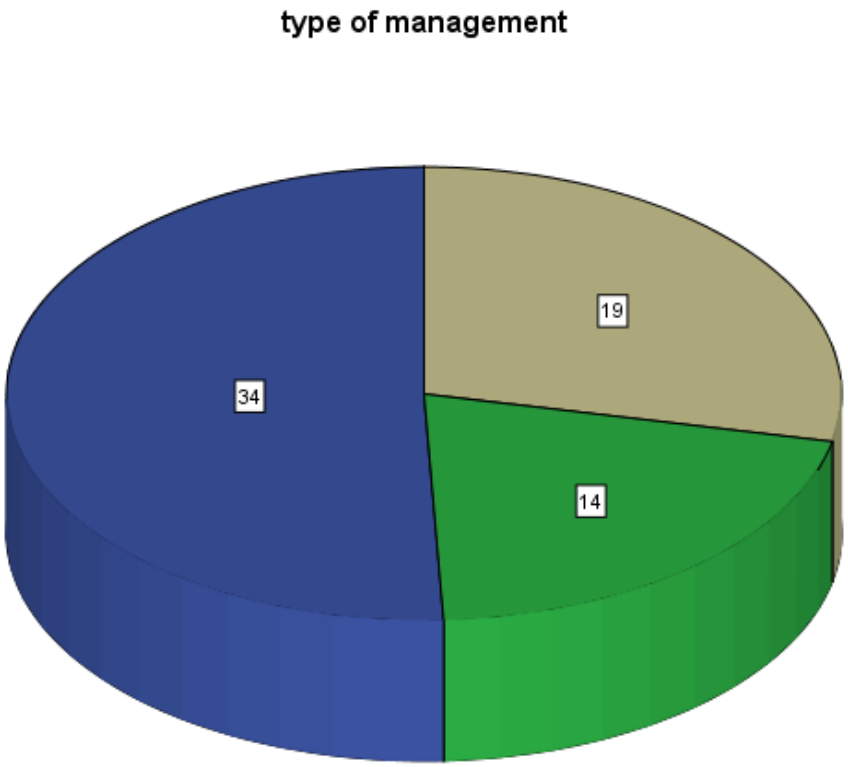

Figure 3.7 type of management

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Discussion

A cross sectional study extended over one year to include 67 patients in Al-Hussein Teaching Hospital in Al-Nasiriya city to estimate the incidence and type of management modalities of splenic injuries in blunt abdominal trauma. The study shows that most blunt splenic injuries occurred in the male gender 47 patients(70.1%), more of half of them (55.2%) at age 20-39 years old ,while female 20 patients (39.9%) with mean age of splenic injury patients was 24.7years .This can be attributed to the Al-Nasiriya population being considered as a young population and the males more common working outside and the males are more sustainable to traumatic injury .Comparable to other studies ,a lower results reported from a study done in Sultan Qaboos University Hospital 2014, males (79.0%) and female(21.0%), with high mean age(36.0 years), [88] and in India 2015 maximum (75%) incidence of splenic injury is observed in males.[89] The most common mechanism of splenic injury was found to be motor vehicle collision (88%), most of those injured occurred at age (20-39) years. This can be due to nature of our road traffic accidents, modes of transport, poor condition of urban and rural road networks, education of traffic rules, and lack of the awareness of safety measures (seal belts, helmets, air bags and other). The study result was lower than Oman study 2014 which was 90.7% reported in the Sultan Qaboos university Hospital.[88]Comparable to other study that done in India 2013 higher of these 75% . [89] Those who had splenic injury due to fall or assaults nearly equal proportion .This can be explained by the small size where only 5 patients had falls, and only 3 patients had assaults. The occupation of the traumatic injury patients, majority of them were non-employed 56 patients (88.01%).This can be attributed to the number of the patients were under20 years age and females patients in sample not working. In this study 34 patients (50.7%) with blunt splenic trauma had splenectomy. The majority of them was in RTA patients (60.0%), while minority with in assaults (33.5%) This reflect the patients with RTA had major trauma and large number than other. The conservative management 19 patients (28.3%) most of them under 20 years because majority of the patients were children and had small splenic injury and not associated with other intra-abdominal injuries .With majority in assaults (66.7%), while minority (25.4%) in RTA due to massive trauma in RTA. This study shows 14 patients (2o.8%) with minor capsular and sub-capsular affection of spleen underwent successful splenic repair (splenorraphy). The most of them 10 patients (14.9%) were at age group (20-39) years. The most of them was in RTA. The primary survey of the abdomen usually to detect signs of major intra-abdominal bleeding ,but the secondary survey is essential to pick up continuing severe bleeding or further hemorrhage following the restoration of the normal blood pressure .[90] Regarding time by hours of arrival of patient with blunt splenic injury to the hospital, majority of them (31.34%) arrived after 2 hours after time of trauma, while minority (5.9%) of them arrived after 6 hours .This can be due to location of hospital away from the trauma please and the method of arrival to hospital ,most of patients refereed from anther hospital. Method of transport of splenic injured patients to the hospital, about ½ of them (56.7%) by ambulance and rest by car and others method because limited number of ambulance and poor medical education of population. There is no significant difference between method of arrival and stability of the patient, due to poor pre-hospital care. Regarding CT scan grading of the patients with blunt splenic injury .Most

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of them with grade I, 30 patients (44.7%) and grade II 29 patients (43.2%), while 7 patients with grade III and one patient with grade IV. Patients with grade I half of them have conservative management 50%, while 23.3% of them have splenectomy due to small splenic injury and not associated with other intra-abdominal injuries.

In grade II injury majority of cases have splenectomy (65.5%) due to more splenic injury and associated with other injuries. Most patients have 2 other associated injuries had splenectomy 85.7% because have major trauma. The distribution according to the general condition of the splenic injured patients at the time of arrival to the emergency unit of hospital .More of half of them were stable 42 patients (62.6%) at time of arrival to the emergency unit.

Conclusion and recommendation

Conclusion

1. This study reveals that young age group and male patients are commonly involved in traumatic splenic injury.
2. The most common cause of splenic injury was RTA.
3. The abdominal pain and abdominal tenderness were most common clinical finding in splenic injured patients.
4. In initial clinical examination if patient have hypotension, tachycardia, rigidity, guarding and respiratory distress that it indicates severe splenic injury and high probability for surgical intervention.
5. Splenectomy was most common type of management special in RTA patients.
6. The majority of non-operative management was in patients under age 20 years.
7. The most patients were arrival to the hospital after 2 hours.

Recommendation

1. Patients who hemodynamically unstable after blunt abdominal trauma should be taken urgently for laparotomy.
2. A routine laparotomy is not indicated in the hemodynamically stable patients without peritonitis presenting with an isolated splenic injury.
3. The severity of splenic injury (as suggested by CT scan grade or degree of hemoperitoneum), neurological status, age >55 years and/ or the presence of associated injuries are not contraindications to a trial of nonoperative management in a hemodynamically stable patients.
4. In the hemodynamically stable blunt abdominal trauma patient without peritonitis, an abdominal CT scan with intravenous contrast should be performed to identify and assess the severity of injury to the spleen.
5. Nonoperatve management of splenic injuries should only be considered in an environment that provides capabilities for monitoring, serial clinical evaluations, and an operating room available for urgent laparotomy.
6. After blunt splenic injury, clinical factors such as a persistent systemic inflammatory response, increasing /persistent abdominal pain, or an otherwise unexplained drop in hemoglobin should dictate the frequency of and need for follow-up imaging for a patient with blunt splenic injury.
7. Pharmacological prophylaxis to prevent venous thromboembolism can be used for patients with isolated blunt splenic injuries without increasing the failure rate of nonoperative management, although the optimal timing of safe initiation has not been determined.

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مدى شيوع وطرائق علاج اصابات الطحال في جروح البطن الحاده في مستشفى الحسين التعليمي في مدينه الناصرية ٢٠١٧

الدكتور صادق جعفر سائل البعاج
الاستاذ الدكتور علاء جميل
الدكتور صلاح مهدي صالح

ملخص البحث

دراسة مدى شيوع وتقدير حدة والتحليلات اللازمة للتشخيص وطرائق علاج اصابات الطحال في جروح البطن الحاده في مدينه الناصرية وتقييم الوضع الصحي العام .

المواد والاساليب : دراسة مقطعيه وصفيه وتحليليه من خلال اجراء مسح للمرضى في وحدة الطوارئ وردهات مستشفى الحسين التعليمي في مدينه الناصرية حيث اجريت هذه الدراسة التي تبعد عن العاصمة بغداد ٣٦٠ كم جنوبا. تمت الدراسة خلال فتره امتدت لأكثر من سنه، (٤ كانون الثاني ٢٠١٦ الى نهاية ايلول ٢٠١٧) تم جمع البيانات من عينه٦٧ شخص الذين تتراوح اعمارهم٦-٧٧ .

النتائج: كان عدد الذكور٤٧ وعدد الاناث٢٠ ومعدل عمر المصابين٢٤,٧. معظم اسباب الاصابات كانت حوادث السير٨٨,٢% معظم درجات الإصابة كانت الاولى والثانية معظم الحالات وصلت الى وحدة الطوارئ بعد ساعتين من حدوث الإصابة معظم حالات حوادث السير تم علاجها جراحيا معظم الحالات كانت مستقرة عنده وصولها وحدة الطوارئ العلاج غير الجراحي كان في معظم المصابين الذين تقل اعمارهم عن ٢٠ سنه ونسبتهم ٢٨.٣% .

اثبتت هذه الدراسة (الخلاصة) ان معدل انتشار اصابات الطحال في مدينه الناصرية كانت مرتفعة والتي تحتاج الى جهود فعاله في الحد من حوادث الطرق والالتزام بقواعد المرور العامة .