

A Successful Management of Juxta-Renal Inferior Vena Cava Injury After Penetrating Trauma: A Case Report

Mohammad Reza Hashempour^{1,2*}, Motalebi R¹, Mosallami SM¹ and Mortazavi N¹

¹Golestan University of Medical Sciences, Trauma Centre, 5 Azar Hospitals, Gorgan, Iran

²Army University of Medical Sciences, Tehran, Iran

*Corresponding author: Mohammad Reza Hashempour, Golestan University of Medical Sciences, Trauma Centre, 5 Azar Hospitals, Gorgan, Iran, Tel: +981732430310; E-mail: Hahempourm@yahoo.com

Rec date: Jul 04, 2016; Acc date: Oct 04, 2016; Pub date: Oct 06, 2016

Copyright: © 2016 Hashempour MR, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Abstract

Here, in the present case the authors report a patient with IVC injury repaired by venorrhaphy and it can be performed by a team led by general surgeon. Inferior vena cava injuries remain a challenge for the skill, experience and diligence of a surgeon. Not only vascular surgeons, but all surgeons should be familiar with the principles of their treatment. A case of the inferior vena cava injury encountered after penetrating abdominal trauma in old age man with hemorrhagic shock with about 4 cm vertical tear of juxta-renal vena cava, survived due to immediate transportation, appropriate and successful perioperative fluid and blood resuscitation, prompt surgical management with team approach and critical postoperative surgical management without any residual complication. IVC injuries are associated with high mortality. Patients presenting with clinical and physiological evidence of shock and who require "damage control" surgery are more likely to suffer a worse outcome, particularly when multiple physiological derangements are present.

Keywords: The inferior vena cava; Penetrating trauma; Venorrhaphy; Damage control surgery

Introduction

Injuries to the inferior vena cava (IVC) are rare, and occur more commonly following penetrating (0.5% to 5.0%) than blunt (0.6% to 1.0%) trauma. They are associated with a high mortality. The best reported survival rate in modern trauma centers is approximately 33%. Some centers have reported that it constitutes up to 40% of all abdominal vascular injuries [1]. The management of these injuries is usually challenging since they are rarely isolated, and are often associated with serious adjacent solid and/or hollow visceral injuries. Patients are frequently hemodynamically unstable, and require the utilization of multiple resources, including blood products, anesthetic care, theatre time and often prolonged intensive care unit stay [2]. The concept of "damage control" surgery has become the guiding principle. Complex time-consuming anatomical repairs of major vascular injuries are foregone and temporary measures such as shunting, or non-corrective measures, such as ligation, are instead utilized. The majority of patients with IVC injuries meet the criteria for damage control surgery, and ligation of the IVC is a frequent strategy. Although there is little doubt that this is a lifesaving measure, the associated morbidity after cava ligation has not been clearly elucidated [3].

Case Presentation

A 60 years old male patient was brought with alleged history of penetrating abdominal injury with about 4 cm × 1.5 cm sized wound in right upper midline just 3 cm above umbilicus with protruding bowel and active bleeding from the wound. Patient was confused with and cold clammy extremities with marked pallor. His vital signs included a pulse of 130 beats/min and blood pressure of 70/50 mmHg and respiratory rate >25/min. At casualty after rapid evaluation and

immediate resuscitation patient was brought to operation room. On exploration there was gross haemoperitoneum. On draining 2 liter haemoperitoneum there was expanding retroperitoneal hematoma in zone I of retroperitoneum and right lobe of the liver perforation with oozing and leak of the bile from gallbladder was seen. On exploration of retroperitoneal hematoma, after partial control with packing with multiple pads, distal and proximal control was achieved on applying Sattinsky's vascular clamps. About 4 cm vertical tear over anterior and posterior wall (through and through) of juxta-renal portion of the inferior vena cava were found. Primary repair of tear with polypropylene no. 4-0 done (venorrhaphy). Cholecystectomy and horizontal mattress suture for liver tearing was done. Patient was in hypovolaemic shock in operation and received 11 packed cell volumes, 4 units of FFP and 4 platelet concentrate with inotropic support with CVP pressure measuring. Then Perihepatic packing for second lock because of the damage control surgery was done, and he send to SICU for better resuscitation. After 36 hours later with stable vital sign depacking of the long gauzes was done. The site of IVC repair has no active bleeding, only has minimal narrowing of circumferential with good renal vein function. Post operatively the patient developed bilateral pleural effusion and bilateral tube thoracostomy has inserted. He was given low molecular weight heparin for 07 postoperative days with oral anticoagulant tablet warfarin 10 mg once a day started on 5 postoperative day and. Patient was discharged on 15th post-operative day with normal biochemical parameters and advises to wear abdominal binder and oral tablet warfarin 10 mg daily for about 3 months. Patient was followed up twice in 20 days after discharge and thereafter once a month for 6 months, Patient is well after 1 years of injury to IVC.

Discussion

Injuries to the IVC are one of the most challenging injuries encountered by trauma surgeons and are mostly caused by penetrating

trauma. Fortunately, it is rare because of its protection by several intra-abdominal organs and musculoskeletal structures, and is found in less than 4% of all trauma laparotomies [4-6]. The incidence of injuries to major abdominal vessels in a patient sustaining penetrating abdominal trauma is 10%. The majority of injuries to the inferior vena cava are due to penetrating trauma; only 10% of these injuries will be caused by blunt trauma and are associated with other abdominal injuries. In about 18% of patients with penetrating abdominal injuries with the inferior vena cava injuries, there is an associated aortic injury [5]. Uncontrollable hemorrhage and/or associated abdominal injuries are considered responsible for mortality and rates of mortality have been described as high as 59% [4].

Damage control principles should be readily utilized in patients with injuries to the IVC owing to the high likelihood of associated major injuries. Early recognition of these patients in the emergency department is possible with the use of simple measurements, i.e. the patient's vital signs, haemoglobin and serum lactate concentration. An abbreviated laparotomy in an unstable, bleeding patient is the optimal management, and rapid and definitive control of the major haemorrhage is required. It was found in this series that the majority of injuries (approximately 80%) involved the infrarenal and juxta-renal cava. Although a statistically significant association between the likelihood of survival and the level of injury was not found, of the patients who survived, a high percentage (67%) of them had infrarenal injuries. There were slightly fewer infrarenal injuries in this series than those found in the original series by Navsaria et al. where more than 85% of the injuries were infrarenal or juxta-renal, although this change is unlikely to represent true statistical difference [1]. The first goal of damage control surgery, which is to stop major bleeding, is rapidly achieved with ligation of the IVC. Ligation and primary suture are the most common surgical therapies applied. Grafts are rarely used in selective patients. Cavoplasty can be the procedure of choice in case of infrarenal IVC injury in stable patients especially in young age group when attempt at simple repair produces significant narrowing. The optimal treatment is primary suture repair, but this is not always possible due to the patient's critical condition or complex injuries [4].

Patients treated by ligation may experience lower-limb swelling, which is usually self-limited and responds well to the use of elastic stockings and leg elevation [1]. Fasciotomies should be considered after ligation of the IVC when high compartment pressures are obtained or clinically incompressible compartments are identified [7]. Primary suture in injuries to the suprarenal IVC is preferred, although ligation is a life-saving and acceptable modality [1,7].

Retrohepatic IVC injuries are the most challenging to treat because of their anatomical position. This also explains the greater rates of mortality associated with it (compared with the other sections of the IVC), because exposure is difficult. Primary repair should be attempted. In cases in which this is not amenable, an atriocaval shunt can be used [1,5]. Several factors have been related to deaths in IVC injuries. Mortality is greater in patients admitted with shock, initial base deficit, and coagulopathy [1,6]. The association of shock and base deficit can lead to a mortality rate of more than 80% [6].

The crucial factor in the management of inferior vena caval injuries is rapid and effective control of bleeding, whether from the caval or associated injuries. Improving the survival of patients with blunt retrohepatic cava and hepatic vein trauma remains a dilemma due to associated problems. Management should include appropriate resuscitation and ultimately may require novel operative techniques [8].

We present a case of successful repair of IVC injury by venorrhaphy. We believe that this technique can be performed by general surgeons and eliminates the risks of subsequent venous occlusion and lower limb edema resulting from ligation of vein.

References

1. Navsaria PH, De Bruyn P, Nicol AJ (2005) Penetrating abdominal vena cava injuries. *Eur J Vasc Endovasc Surg* 30: 499-503.
2. Asensio JA, Chahwan S, Hanpeter D, Demetriades D, Forno W, et al. (2000) Operative management and outcome of 302 abdominal vascular injuries. *Am J Surg* 180: 528-533.
3. Hampton M, Bew D, Edu S, Nicol A, Naidoo N, et al. (2016) An urban trauma center experience with abdominal vena cava injuries. *SAJS* 54.
4. Huerta S, Bui TD, Nguyen TH, Banimahd FN, Porral D, et al. (2006) Predictors of mortality and management of patients with traumatic inferior vena cava injuries. *Am Surg* 72: 290-296.
5. Shah P, Shah N (2008) Penetrating abdominal trauma - A case of isolated inferior vena cava Injury. *Bombay Hosp J* 50: 286-287.
6. Paul JS, Webb TP, Aprahamian C, Weigelt JA (2010) Intraabdominal vascular injury: are we getting any better? *J Trauma* 69: 1393-1397.
7. Sullivan PS, Dente CJ, Patel S, Carmichael M, Srinivasan JK, et al. (2010) Outcome of ligation of the inferior vena cava in the modern era. *Am J Surg* 199: 500-506.
8. Hansen CJ, Bernadas C, West MA, Ney AL, Muehlstedt S, et al. (2000) Abdominal vena caval injuries: Outcomes remain dismal. *Surgery* 128: 572-578.