Retrohepatic inferior vena cava caval injury: Difficult but manageable situation

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ABSTRACT

Inferior vena caval 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. We are reporting a patient of retrohepatic inferior vena caval injury due to blunt trauma. Initial packing and later planned re-exploration saved the life of the patient. After taking proximal and distal control and proper mobilization, direct repair of rent was done and patient recovered well without any residual complication.

Key words: Inferior vena cava, retrohepatic, venous injury

INTRODUCTION

Inferior vena cava (IVC) injuries are potentially devastating insults that continue to be associated with high mortality despite advances in prehospital and in-hospital critical care due to delayed or inadequate volume resuscitation, difficulty of diagnosis and technical problems with repair. Abdominal vena caval injuries are mostly found in young male patients by penetrating trauma. The overall mortality rate is 60-70%.[1] Retrohepatic inferior vena caval injuries when associated with multiple organ injuries are almost always fatal. Death in such circumstances is caused by intraoperative exsanguination. Knowledge of the anatomy and exposure techniques for the different segments of the intraabdominal vena cava are very important to surgeons.

CASE REPORT

A 22-year-old male sustained blunt injury in the epigastric region of the abdomen by handle of the motorcycle, when his motorcycle banged into a truck. Provisional diagnosis of visceral organ damage with hemoperitoneum was made. In a peripheral surgical center, due to hemodynamic instability, immediate midline exploratory laparotomy was done. During surgical exploration, torrential venous bleed from inferior vena cava was noticed. So, tight packing by sponge and compression of liver was done and procedure abandoned with sponge packing behind liver. After 24h of injury, in another specialty surgical center, the wound was re-explored. Surgeons were unable to control bleed from the retrohepatic inferior vena caval region so, again tight packing by gauze sponge was done. Patient reached our centre after 48 h of injury in hemodynamic stable condition. Inferior venacavography by femoral venous route was done. It was nonconclusive. The wound was re-explored by same midline abdominal incision. Immediate uncontrollable venous bleed started. After tight packing, kocherisation of the duodenum was done. Caudally, suprarenal IVC control and vascular clamping was done. After removal of packing, foley's catheter was inserted in rent and balloon inflated by 30ml normal saline. Despite these maneuvers, adequate hemostasis and exposure for repair were not achieved. Because of rapidity and ease, incision extended for right anterior thoracotomy. Pericardium was opened and clamping of supadiaphragmatic IVC just below the junction to right atrium was done. Diaphragmatic incision up to vena caval hiatus and complete division of triangular, round and falciform
ligaments of liver was done. Pringle’s maneuver was also applied. After these, an oval clean rent of 2 x 3 cm in the anterior wall of the retrohepatic inferior vena cava was repaired by direct continuous suturing by 3-0 nonabsorbable monofilament. Total occlusion time was 10 min. Adequate hemostasis was achieved. Slight oozing was controlled by hot sponge compression. All three hepatic veins and portal vein were normal. Patient did not have any other organ injury except liver lacerations with contusion. During this procedure seven units of whole blood was transfused. Recovery from general anesthesia was smooth. Postoperatively he had biliary leakage from lacerated liver bed, which healed spontaneously within two weeks.

The patient survived despite three major surgical explorations under general anesthesia and 15 units of whole blood transfusion because of appropriate and successful perioperative blood and fluid resuscitation and adequate repair.

**DISCUSSION**

The primary purposes of all operative procedures in venous injuries are hemostasis and secondarily the reconstruction. The most reliable instrument for the immediate control of venous bleeding is a compressing finger or sponge. In desperate cases the patient can be saved from exsanguination only by tamponade which can be readily achieved by tight sponge packing, as in this case. If the rent is large, a foley’s catheter can be inserted into the defect and inflated. When tamponade is unsatisfactory, ligature is the second safe method for hemostasis. However, ligature of retrohepatic vena cava is not compatible with life. If for technical reasons, surgical reconstruction in this difficult-to-expose area is not possible, extensive tamponade by packing and later planned reconstruction is preferable to ligature. For reconstruction, three methods are possible: simple suture or lateral venorrhaphy, patch graft and graft reconstruction. Absence of tension and free inflow and outflow are essential for successful reconstruction. A narrowing of the lumen up to 50% can be tolerated in simple lateral suturing. If more than 50% narrowing with tissue loss is present than a saphenous vein graft is the material of choice for patch graft repair. If ligature seems life-threatening as in this region and other methods are not possible due to entire segmental loss, then only reconstruction by autogenous vein or allograft material is justified. This is the least favorable method of reconstruction.\[1-4\]

Isolated injuries of the inferior vena cava are rare because of their protected position deep within the abdominal cavity. An injury of the inferior vena cava occurs in two regions: infrarenal and suprarenal or retrohepatic vena cava. It is most difficult to expose the retrohepatic vena cava. This segment receives the hepatic veins, which are short and fragile. Exposure can be achieved initially by Kocherisation of the duodenum, and ascending colon mobilization medially. Packing and downward pressure on the liver can cause immediate hemostasis. Injured area can be exposed by dividing hepatic ligaments.\[1-9\]

Abdominal transdiaphragmatic intrapericardial approach (Heaney’s approach), involves ‘L’ shaped incision in diaphragm which is angled posterolaterally toward the vena cava and the pericardium is opened on the left side of the vena cava. Extension of the laparotomy to median sternotomy or towards right thoracoabdominal incision with radial incision of diaphragm up to venacaval hiatus is sometimes required for control, as in our case.\[4-7\] In our opinion, extension towards right thoracotomy is easier and gives adequate control and exposure for the RA-IVC junction, which is adequate for control and via this approach liver mobilization and exposure is also achieved. Median sternotomy needs electrical saw, time for arrangements and doesn’t add to exposure for control. Complete isolation of liver from circulation for hepatic venous bleed prevention is achieved by occluding hepaticoduodenal ligament with a clamp or fingers (Pringle’s maneuver). For vascular isolation of the liver various techniques and modifications have been described, but none seems to be satisfactory. One should not hesitate to cross clamp the vein proximally and distally since a reversal of flow has occurred as a result of the massive venous injury distally.\[7\]

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.\[6,7\]

**REFERENCES**