

Case Report

Management of Inferior Vena Cava Injury in a Non Specialized Tertiary Hospital-a Case Report

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Abstract :

Abdominal vascular injury are among the most challenging and lethal injuries in the traumatized patients. Inferior vena cava (IVC) is the most frequently injured vein during the blunt or penetrating trauma. Ligation of IVC, venorrhaphy, venoplasty, end to end anastomosis, endovascular stenting or graft interposition should be considered in selected cases. However most of the procedures require special setting and surgical team. Relatively simple procedure e.g. venorrhaphy produces narrowing of lumen in many cases. Ligation of IVC may result in thrombosis and embolism thus increases morbidity of patients. Here, in the present case the authors report a patient with IVC injury repaired by venoplasty (cavaplasty) with great saphenous vein patch in a non specialized tertiary hospital and it can be performed by a team led by general surgeon.

Key words : IVC injury, venorrhaphy, cavaplasty, great saphenous vein patch.

Introduction :

There has been enormous increase in civilian violence as we see in our country during the last few years. In the face of escalation in violence the general surgeons often encounter either isolated major vascular injuries or along with injuries to other organs. IVC although deeply protected against accidents of nature, it is the most frequently injured vein in penetrating or blunt

abdominal trauma¹. Whether caused by blunt or penetrating mechanisms caval wounds are highly lethal.

As many as 50% of the patients with such injuries die before reaching the hospital and mortality rate among patients who arrive at hospital with signs of life ranges between 20% and 57%². The key to successful management of IVC injuries lies in immediate control of haemorrhage and repairing the vein in accessible cases¹. Making the diagnosis of IVC injury preoperatively is extremely difficult if possible at all, nearly all patients are operated on the basis of findings suggesting haemorrhagic shock or peritonitis³. There are several methods to deal with the injured IVC. Caval ligation, venorrhaphy, venoplasty, end to end anastomosis, endovascular stenting or graft interposition with autogenous or synthetic materials should be considered in selected cases¹. Most of the techniques demand specialized units and specialist vascular surgeons. In the present case we report a patient with IVC injury managed in non specialized tertiary hospital by general surgeons.

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Case Report:

A 15 years old boy admitted to our hospital with a history of stab injury to his left central abdomen. Four hours had been elapsed before admission. On admission patient was found in profound hemodynamic instability with pulse 120 beats per minute and blood pressure was 60/40 mm Hg. There was escaping of blood through the wound. The patient was managed according to the

ATLS protocol. Controlled attempt at resuscitation failed to improve his hemodynamic status. Finally he was submitted for urgent laparotomy under endotracheal general anaesthesia. Abdomen was quickly opened by long midline incision. Extensive retroperitoneal haematoma in the infracolic compartment with active bleeding through a point, diffuse oozing from everywhere and clotted blood was seen at laparotomy. Bleeding was controlled by pressure and packing. Right colon and duodenum were mobilized up to vena cava. Injuries were noted in second part of duodenum, body of the stomach close to greater curvature and infrarenal vena cava. Vena cava was partially clamped initially with rubbershot haemostat then by satinsky clamp. IVC was mobilized to achieve proximal and distal control keeping lumbar veins intact. The large defect about 5 cm was repaired by continuous suture using fine 5/0 polypropylene. Injuries to duodenum and stomach were repaired in two layers. By this time patient became stable haemodynamically and rewarmed but venorrhaphy resulted significant narrowing about > 70% of luminal diameter. We decided for revision of narrowed segment considering the age of the patient and possible complications of narrowed vena cava. A segment of great saphenous vein twice the length of IVC injury was taken above the ankle (fig. 1) and divided into two equal halves. Both the segments were then split longitudinally. Two parts were joined together side by side with 5/0 polypropylene to create a patch of vein and tailored to a size of original defect of IVC. Occluding the IVC partially by satinsky clamp previous venorrhaphy was taken down and the patch was fixed to the defect by continuous suture using the same suture material (fig. 2). The clamp was released. It was noted that IVC regained almost its original diameter (Fig-3). The patient received seven units of blood transfusion perioperatively. Post operative period was uneventful. He received subcutaneous enoxaparin 60 IU daily for seven days. Diet was allowed from fifth Post Operative Day (POD) and he was discharged on fifteenth POD. After a month the patient came back to us without any complication and with a very good quality of life.

Figure-1: Great saphenous vein taken for cavaplasty just above the ankle.

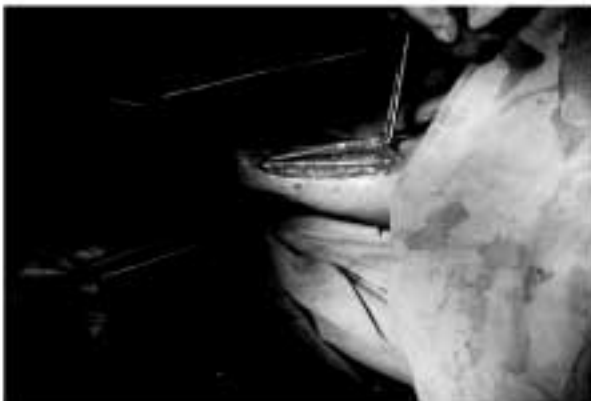


Figure-2: Defect in IVC clearly seen held by tip of forceps below, patch is being placed on it. Note the suture material and blade of satinsky clamp also.



Figure-3: IVC near to its original caliber after grafting



Discussion :

Penetrating injury of the abdominal IVC continues to pose a taxing problem for trauma surgeons². Mortality remains high despite advances in rapid pre-hospital transit, development of trauma centers and practice of damage control laparotomy⁴.

Several clinical factors have been shown to be predictive of survival namely presence of shock on arrival, site of IVC injury and associated visceral and vascular injuries³. Mortality is four times higher in those hypotensive patients who are admitted with unrecordable than those admitted with recordable blood pressure. The mortality is six times higher in those patients who did not respond to preoperative fluid resuscitation than in those who responded³. Our patient arrived at hospital almost within four hours of incident

with profound haemodynamic instability but laparotomy was arranged as a part of definitive care within first hour of hospital admission with an intention to arrest haemorrhage irrespective of source.

Site of IVC injury has major impact on survival. Our patient sustained an injury to infrarenal vena cava mortality rate of which shown in a large series is 33% whereas mortality rate is 100% in supradiaphragmatic injuries, 71.4% in retrohepatic, 68.8% in suprarenal injuries⁶.

Penetrating IVC injuries are almost always associated with other visceral and/or other major vascular injuries⁴. Our patient sustained concomitant stomach and duodenal injuries. An increase in the mortality is directly related to presence and number of additional vascular injury³ but evidence is lacking to find any relation with associated intraabdominal organ injuries. However one retrospective study⁴ done on 48 IVC injured patients showed that associated intraabdominal organ injuries have no influence on outcome.

Minimization of shock period and rapid control of active caval haemorrhage are the principal goals to be pursued in the definite surgical management of intraabdominal IVC injury⁷. The injury should be repaired as soon as the diagnosis is made and the patient is stabilized haemodynamically¹. In the most cases caval wounds can be rapidly repaired using lateral suture technique⁸. Exactly we did lateral venorrhaphy to achieve immediate control of bleeding. Primary venorrhaphy has been criticized because of the potential for stenosis, thrombosis and embolism⁹. In a large series Degiannis E et al³ showed 15% incidence of thromboembolic complication after lateral venorrhaphy. Moreover if after lateral repair, the narrowing of the vena cava is deemed unacceptable and the patient is stable revision by patch angioplasty or graft replacement to restore luminal diameter can be considered⁷. Our patient was very young boy of 15 years old. Venorrhaphy produced significant narrowing of IVC about more than 70% of luminal diameter. It is not very clear that how much narrowing is termed as significant. In suprarenal IVC more than 75% reduction of luminal diameter may be considered significant⁸. As our patient became stable haemodynamically after primary repair, considering the age of the patient, possible complication of venorrhaphy and luminal narrowing decision was made for revision of narrowed repair in the same setting.

There are several techniques of repair for IVC injuries. Patch cavaplasty with autogenous i.e. saphenous vein, APF (autogenous peritoneo-fascial) graft¹, reconstruction using panel grafts⁷, end to end anastomosis, graft interposition are the available options. However every case should be evaluated in its own condition¹. Most of the methods require a team including general, trauma and vascular surgeons. But we are far away from arranging such type of team in our tertiary hospital setting especially in districts.

First two techniques (venorrhaphy and cavaplasty using saphenous vein patch) are relatively simple and can be done by the general surgeons. There are distinct advantages of simple vein reconstruction over venous ligation or venorrhaphy. Cavaplasty by saphenous vein patch in a stable patient relieves the patients from the risks of developing stenosis, thrombosis, life threatening embolism and even lower limb odema^{1,4}. Thereby reduces the hospital stay, postoperative morbidity, use of elastic stockings or avoids fasciotomy in many patients and improves quality of life⁴.

Conclusion :

We present a case of successful repair of IVC injury by cavaplasty using great saphenous vein patch taken from just above the ankle. We believe that this technique can be performed by general surgeons and eliminates the risks of subsequent venous occlusion, thrombosis, lower limb odema resulting from narrowing after venorrhaphy and improves quality of life. However other options like venorrhaphy and ligation of infrarenal IVC are being supported by many authors cavaplasty 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.

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