Vascular Reconstruction Technique Using a Tubular Graft for Leiomyosarcoma of the Inferior Vena Cava: A Case Report

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Objective/background: This study is a case report that addresses the key aspects of vascular reconstruction, as well as the intraoperative complications, postoperative morbidity, and possibility of adjunctive therapy.

Methods: This article reports the case of a 46 year old female patient with a leiomyosarcoma located in the middle segment of the inferior vena cava (between the renal and hepatic veins) who underwent surgical resection with vena cava reconstruction and insertion of a tubular graft made of a synthetic material.

Results: This case report reveals that surgical resection of the tumor with the insertion of a smaller-caliber tubular graft provide better patency of the vena cava reconstruction, which was maintained for a year after surgery. In addition, the patient was asymptomatic for lower limb edema, despite having a local recurrence after one year. Surgical resection is the treatment of choice for leiomyosarcoma of the inferior vena cava (LIVC) and is the only therapy that offers a chance of cure. Several surgical techniques are used for this condition, especially, reconstruction with a vascular graft using natural or synthetic materials.

Conclusion: Due to the aggressiveness of the disease, this study suggests that surgical intervention used may have no influence on a patient’s survival outcome. However, vascular reconstruction with a smaller-caliber tubular graft may yield a better prognosis for patients in terms of postoperative symptoms, such as edema and thrombosis.

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Keywords: Inferior vena cava, Leiomyosarcoma, Synthetic vascular grafting

BACKGROUND

Leiomyosarcoma of the inferior vena cava (LIVC) is a rare malignant tumour of the venous system originating from the smooth muscle cells of the middle layer of the inferior vena cava.1–3 LIVC usually remains asymptomatic for a long time and is diagnosed at an advanced stage, which worsens the prognosis. This tumour accounts for 7% of soft tissue sarcomas,1 and it is estimated that 2% of tumours of this type are of vascular origin. The venous system is most affected. Furthermore, the inferior vena cava is affected in more than 50% of cases.1

Because of its rarity, only approximately 300 cases are reported in the literature; these cases were treated using different surgical approaches, which makes it difficult to reach a consensus about the best treatment option. Among the vascular reconstruction techniques already mentioned, it is worth highlighting the use of vascular grafts—both grafts made of synthetic materials (bifurcated polytetrafluoroethylene [PTFE] and tubular Dacron grafts) and natural grafts such as the great saphenous vein, bovine pericardium, and cadaveric aorta.4

Given the importance of understanding the different surgical techniques and various approaches to this type of cancer, this case aims to report an LIVC resection with vena cava reconstruction using a tubular graft, as well as the postoperative 1 year follow-up.

CASE REPORT

A 46 year old female sought urgent care for abdominal colic in the mesogastrium region with radiation to the back. The abdominal physical examination revealed pain on mesogastric palpation with no signs of peritoneal irritation and no palpable masses.

A computed tomography scan of the abdomen was performed and revealed a retroperitoneal mass on the right
side in contact with the vena cava, displacing the pancreas and the duodenum by approximately 6 cm (Fig. 1). The tumour was located in the middle segment (between the hepatic vein and renal veins).

The patient underwent surgery to resect the tumour; a full length midline laparotomy was performed initially, requiring right subcostal extension. A solid and prominent tumour was located in the middle segment, including the right anterolateral wall of the vena cava, as well as the right renal vein. Right nephrectomy and ligature of the left renal vein were performed during the tumour resection. The reconstruction of the vena cava was performed by the interposition of a 16 mm Dacron graft (Fig. 2). There were no intraoperative complications.

Histology suggested sarcoma. Immunohistochemistry confirmed the diagnosis of leiomyosarcoma. After surgery, the patient remained haemodynamically stable without alterations in urea and creatinine levels, despite right nephrectomy and ligature of the left renal vein. There was no lower limb edema, however, owing to postoperative complicated pneumonia, she was discharged after 30 days.

The patient underwent a colour Doppler study at 4 and 7 months postoperatively. Both studies showed a patent Dacron graft without signs of stenosis (Fig. 3).

It was decided not to perform chemotherapy, and the patient was followed as an outpatient. Abdominal computed tomography, after 1 year, showed local recurrence of the tumour and patency of the Dacron graft. The patient was referred for adjuvant chemotherapy.

DISCUSSION

This case report shows that surgical resection of a tumour with the insertion of a smaller-caliber Dacron tubular graft provided better patency of the vena cava reconstruction, which was maintained for one year after surgery, and in addition, there was no lower limb edema.

For LIVC, complete surgical resection with free margins may increase the long-term survival and offers the only chance of cure.5 However, tumour recurrence occurs in more than half of these patients.5 Although usually bulky, the tumour may remain asymptomatic for long periods, which may delay the diagnosis.5

Several forms of surgical approach to the inferior vena cava are found in the literature, such as ligature, primary repair, repair with an autologous patch, and PTFE or Dacron graft interposition,2,7 the latter being used in this case. In cases of resection of the inferior vena cava below the confluence of the renal veins, in addition to ligature of the right renal vein with right nephrectomy,7 the left renal vein can also be ligated, and venous drainage of the left kidney is maintained by collaterals (gonadal, lumbar, and adrenal veins).2
Several types of prosthetic material, such as Dacron and bovine pericardium, are recommended for grafting. However, because of the small number of cases reported, there is no consensus on the ideal material to be used. Regarding the prosthesis diameter, studies show that the smallest caliber can increase the blood flow velocity, whereas a larger caliber (20 mm diameter) may improve the adaptation to the native vessel. Some authors recommend a caliber \( >16 \) mm because of the tendency of the PTFE to form a pseudointima. Some authors recommend a caliber \( >16 \) mm because of the tendency of the PTFE to form a pseudointima.

The need to perform an arteriovenous fistula (AVF) between the aorta and IVC or common iliac vein to maintain graft patency and eliminate the need for long-term anticoagulation is still being evaluated. However, this study supports the satisfactory efficacy of the graft without an AVF and attributes the persistence of lower limb edema to its presence. In the present case, it is possible to evaluate the non-performance of the AVF and the non-development of lower limb edema during follow-up. In one study, four of six (67%) patients treated with an inferior vena cava ligature and one of three (33%) patients treated with synthetic grafts developed lower limb edema.

The combination of radiotherapy with surgical resection also offers a greater potential for survival; however, there are no data supporting the effectiveness of these treatment combinations. Radiotherapy and/or chemotherapy is performed in cases of local or distant recurrence.

Although there were no complications in the present case, the most common intraoperative surgical complication is haemorrhage. Embolism during the surgical manipulation of intraluminal tumours has also been described. Postoperative morbidity is reported to involve renal failure with temporary haemodialysis, atrial fibrillation, retroperitoneal haematoma, transient hepatic encephalopathy, deep venous thrombosis, lower limb edema, bleeding, chronic renal failure, and respiratory distress syndrome. None of these was observed in the present case.

Among the postoperative morbidities, phlebitis is the most common. The causes of death during the postoperative period include Budd–Chiari syndrome, multiple organ failure, liver failure, and duodenal fistulae. However, none of these morbidities were observed in the patient. In a longer follow-up, local tumour recurrence and/or metastases and chemotherapy complications were identified as causes of death; this was observed in the present case.

CONCLUSION

This study suggests that vascular reconstruction with a smaller-caliber tubular graft may yield a better prognosis for patients in terms of postoperative symptoms such as edema and thrombosis. However, owing to the aggressiveness of the disease and the lack of solid studies to prove its efficacy, these factors most likely have no influence on patient survival. Therefore, given the difficulty of performing larger trials due to the rarity of the tumour, the present report contributes to the literature by presenting a discussion on the technique performed.

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CONFLICTS OF INTEREST

None.

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