LEIOMYOSARCOMA OF INFERIOR VENA CAVA

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ABSTRACT

Sarcomas are very rare tumors and in 10-30% of the cases are located in the retroperitoneum. Leiomyosarcomas of inferior vena cava account for less than 1% of all sarcomas. Despite the poor prognosis as a whole, some cases with R0 resection might have an excellent outcome. So, all attempts for R0 resection should be undertaken. Herein we present a case with tumor located at the border of lower and middle third of the IVC managed by excision, primary suture and preservation of both renal veins. A short review of the basic surgical options and risk factors is given.

KEYWORDS leiomyosarcoma, inferior vena cava

Introduction

Sarcomas are very rare tumors and with incidence 4-5/100 000 per year [1]. In 10-30% of the cases, they are located in the retroperitoneum. Leiomyosarcomas (LMSs) of inferior vena cava (IVC) account for less than 1% of all sarcomas [2]. Most of the information comes from case reports or small case series and due to their rarity most of the surgeons do not have enough experience. The treatment of LMSs may be challenging, especially of the tumors arising from the middle and upper part of IVC or when concomitant organ resection is required. Herein we present a case with tumor located at the border of lower and middle third of the IVC managed by excision, primary suture and preservation of both renal veins.

Case Report

A 70-years old female admitted due to discomfort and pain in the right subcostal area with irradiation to the spine, fatigue and loss of 5 kilos for two months. The contrast abdominal CT showed a well-defined mass carefully adhering to the IVC (figs. 1, 2). During the laparotomy, the IVC was approached through a right rotation maneuver. An extraluminal tumor located between lower and middle part of IVC found (Figs. 3, 4). It was well-demarcated with size 7x5x4 cm. There was the engagement of the anterior wall of IVC with length about 5 cm and width 1.5 cm. No other intraabdominal pathology found. After applying for total vascular control (proximally, distally and of both renal veins) the tumor was removed with 5 mm free margin and subsequent primary suture of the vein with Prolen® 4/0 performed. No fresh frozen section examination performed.

The histopathological examination with hematoxylin–eosin, desmin and actin staining revealed well-differentiated (G1) leiomyosarcoma of IVC without necrosis (fig. 5). The fraction of Ki-67-positive tumor cells was 15% (fig. 6). Resection lines were examined separately and were free of tumor infiltration. Postoperative antithrombotic prophylaxis with low-molecular heparin 2 x 0.6 was used. The patient had an uneventful recovery and discharged on 6th postoperative day. Six months after the operation she is well and free of disease which was confirmed by PET scan. The tumor staged as T2NxM0 (stage II) according to American Joint Committee on Cancer/International Union against Cancer (AJCC/UIIC). No chemo- or radiotherapy performed.

Discussion

Pearl is thought to report the first case of LMS of IVC found in autopsy in 1871 [3]. A Recent analysis of the English literature based on Pubmed search 2013 reported 377 cases during the period 1951-2013 [4]. The International Register of Mingoli et al. which did not include in this analysis, reported 281 cases till 1996, whereas others reported additional 94 cases during 1998-2016 [5-11].

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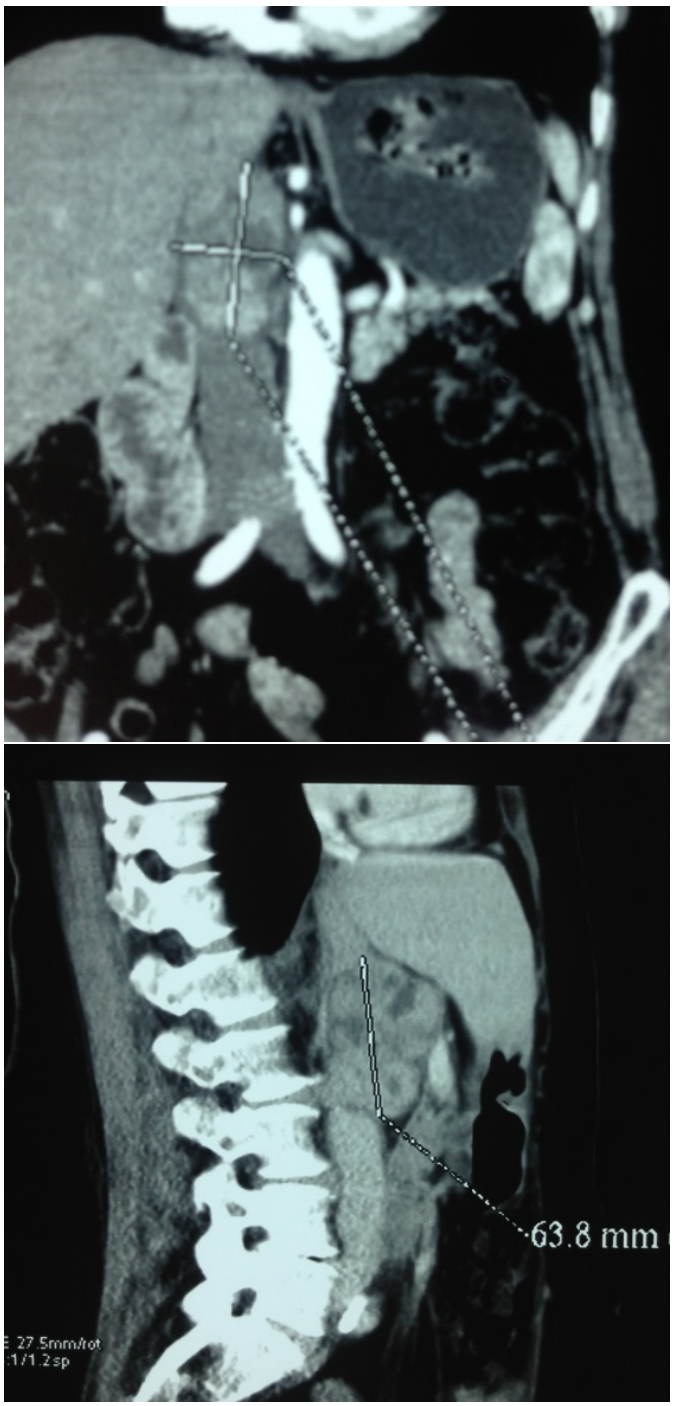

Fig. 1,2. Contrast CT showing a mass originating from IVC.

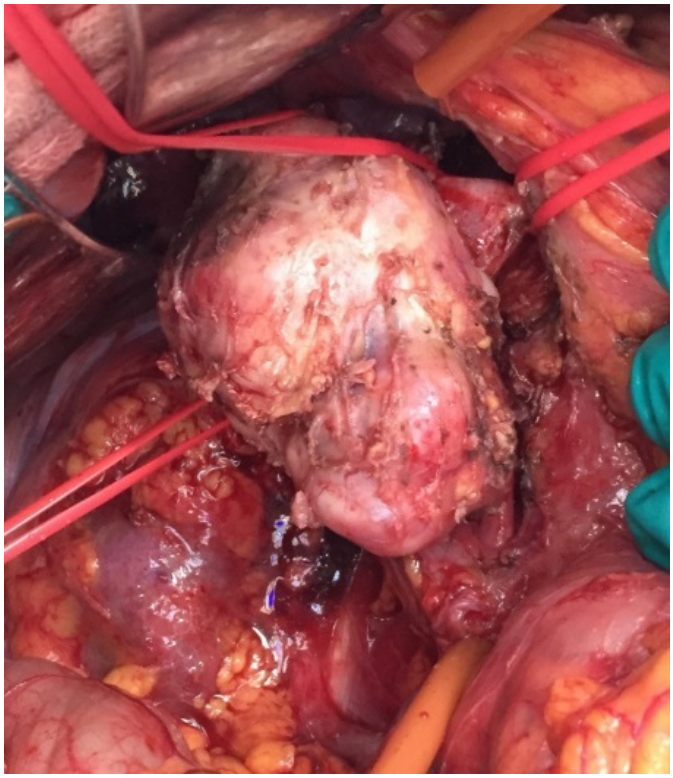

Fig. 3. Tumor located between I and II part of IVC. Total vascular control is applied.

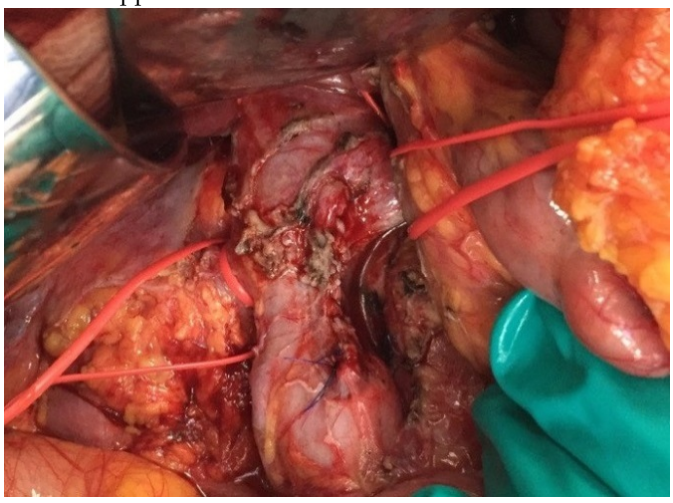

Fig. 4. Primary closure of IVC with preservation of the both renal veins.

LMS of IVC affect predominantly females in the 6th decade and diagnosis is often delayed due to the particular location. Usually, it manifests with abdominal or back pain (70%), abdominal distension (9%), swelling of the lower extremities (15%), weight loss (11%) or on rare occasions with complications such as thrombosis of IVC or pulmonary embolism [4]. LMS may have extra- (59-73%) or intraluminal (25%) growth and spread locally involving adjacent tissues and organs. The right atrium is affected in about 6% of the cases. The distant spreading occurs through the blood in lung and bones and by lymphatics in adjacent lymph nodes. Due to lack of effective adjuvant treatment, the complete excision remains the only curative option. IVC can be divided into three segments as follows – I (below the renal veins), II (between renal veins and hepatic veins) and III (from hepatic veins to the right atrium). A particular characteristic of these tumors is the need for IVC resection sometimes with organ resection. The latter depends on the location and the spread of the tumor. The first resections of LMS of IVC performed in 1928 in Germany and 1951 in Chicago [4, 10]. Partial resection of IVC with primary suture indicated when the length of the defect is less than 2 cm or less than 30% of the circumference as it was in our case [12]. The other options include the closure of the defect with a patch or complete resection of IVC with graft reconstruction. Recent series reported excellent results after reconstruction with polytetrafluoroethylene (PTFE) graft with mortality 0%, postoperative morbidity 28%. The cumulative graft patency was 67% at five years [10]. Graft occlusion noted in 39% of the cases in the more recent series of the same authors [11], whereas in similar series Kieffer et al. reported rate of 10% due to local recurrence 38 month after the operation [8].

The excision of the tumors located in the segment I can be relatively straightforward in experienced hands whereas for those located in segments II and III may require more complex procedures such as the total vascular exclusion of the liver (up to 36%) [8,9] or cardiopulmonary bypass. Fortunately, the latter is required in only 4% of the cases [4], but other authors reported its use in 30% of the cases with 17% mortality [8]. Some of the tumors may require liver resection or nephrectomy (right kidney in 60-65%) [8]. When the tumor involves only the ostium of the renal vein, the kidney might be spared with re-implantation of the vein. The ligation of IVC is a feasible option and used in 20% of the cases in the review of Wachtel et al. [4].

However, in some of the cases, the resection of the IVC may involve a significant amount of the collaterals which results in a disabling lower limb edema. Therefore, given the excellent results after reconstruction with PTFE the ligation nowadays should be considered a palliative operation. Nevertheless, it may be a valuable option in the cases with iatrogenic lesion of the gastrointestinal tract which increases the risk of graft infection [8]. Keeping a low central venous pressure and the use of pneumatic compression of the lower limbs are useful to diminish the blood loss. To maintain the graft patency Kieffer et al. strongly recommend the creation of an arteriovenous fistula. They use a graft from great saphenous vein reinforced with PTFE prosthesis which anastomosed between aorta and IVC or common iliac vein [8].

Since 2000 at our institution only three other cases was reported by Vladov et al., which were managed by primary suture, patch and graft replacement, respectively. In one of them, it was combined with the right liver resection, whereas the other underwent resection of Sg. VIII [9].

According to the recent guideline of the European Society for Medical Oncology (ESMO), radiotherapy is indicated in selected cases with low-/high grade superficial tumors > 5 cm and in low-grade deep tumors < 5 cm [1]. The low-grade deep tumors > 5 cm should be discussed individually considering the anatomical site and seeking the balance between expected benefits and risks (evidence level IIB). As of today, there is a lack of evidence that chemotherapy improves the survival. It based on anthracyclines as a first-line treatment, and multidrug regimens are not superior [1]. Nevertheless, the combinations gemcitabine-docetaxel and doxorubicin-dacarbazine are options in angiosarcoma and leiomyosarcoma respectively. Gemcitabine might be active as a single agent in leiomyosarcoma and angiosarcoma. As a second line, several agents might be used such as high-dose ifosfamide, trabectedin or gemcitabine-docetaxel.

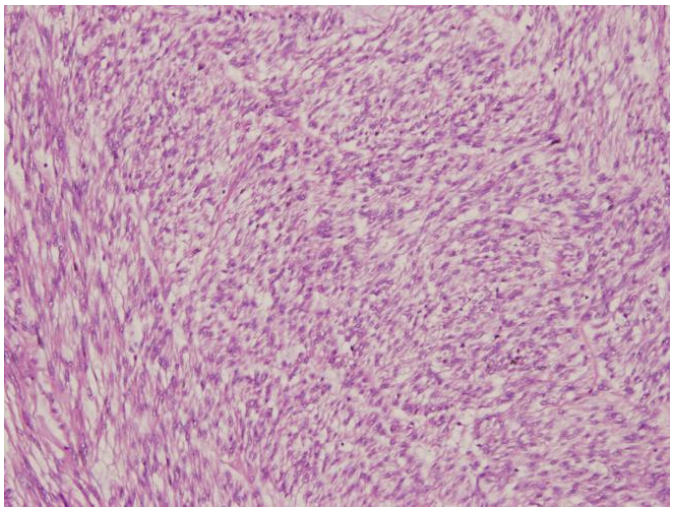

Fig. 5. Microscopic view of the tumor (HE, x 10).

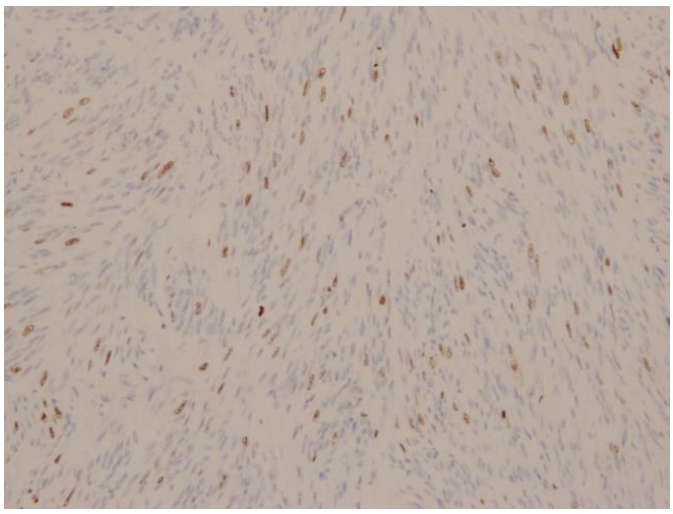

Fig. 6 Ki 67 – 15% (x 10).

Sarcomas have a notoriously poor prognosis, most of them recur and require multiple re-operations when possible. Nevertheless, a good prognosis could be achieved in selected cases which warrant the efforts. According to the recent work of Wachtel et al., the median disease-free survival (DFS) and overall survival (OS) were 12 and 23 months. The 1- and 5-year DFS was 57% and 6%, whereas the overall 1- and 5-year OS rates were 92% and 55%, respectively.

Predictive factors for worse overall survival were advanced

age, larger tumor size, en bloc resections, adjuvant chemotherapy and incomplete resection. Surprisingly, the histological grade was not a significant predictor, which was interpreted by the aggressiveness of the sarcoma and probably the incomplete pathological reports in some of the included series. According to the model proposed by the authors the patients with 0-1 risk factors had longer OS than those with 4-5 risk factors (20 vs. six months) significantly. The studies not included in this analysis reported 5-year OS rates between 33% and 53% [5-8]. More recently, Illuminati et al. reported 60% and 54% 3- and 5-year disease specific survival in series with 18 cases [11]. Isolated involvement of the middle IVC and reconstruction procedures associated with longer survival [4].

Conclusion

Despite the recent advance in chemo- and radiotherapy the surgery remains the best treatment of the LMSs of IVC. According to the literature middle IVC involvement, resection with reconstruction of IVC and the complete excision with microscopically negative margins seems to be associated with better survival. The technological advance changed the resection of IVC into a feasible and safe procedure, so all attempts for R0 resection are justified. However, the lack of experience determined by their rarity and the need for advanced technical skills in vascular and hepatobiliary surgery demands referral of such cases to specialized and high-volume centers.

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Competing Interests

There were no financial support or relationships between the authors and any organization or professional bodies that could pose any conflict of interests.

References

1. The ESMO/European Sarcoma Network Working Group. Soft tissue and visceral sarcomas: ESMO Clinical Practice Guidelines for diagnosis, treatment, and follow-up. Ann Oncol 2014; 25 (Suppl. 3):102-12.
2. Tilkorn D, Hauser J, Ring A, et al. Leiomyosarcoma of intravascular origin - a rare tumor entity: a clinical pathological study of twelve cases. World J Surg Oncol 2010; 8:103.
3. Dzsinich C, Gloviczki P, van Heerden J, et al. Primary venous leiomyosarcoma: a rare but lethal disease. J Vasc Surg 1992; 15:595-603.
4. Wachtel H, Gupta M, Barlett E, et al. Outcomes after resection of leiomyosarcomas of the inferior vena cava: a pooled analysis of 377 cases. Surg Oncol 2015; 24(1):21-7.
5. Mingoli A, Cavallaro A, Sapienza P, et al. International registry of inferior vena cava leiomyosarcoma: analysis of a world series on 218 patients. Anticancer Res 1996; 16:3201-5.
6. Hines O, Nelson S, Quinones-Baldrich W, et al. Leiomyosarcoma of the inferior vena cava: prognosis and comparison with leiomyosarcoma of other anatomic sites. Cancer 1999; 85:1077-83.
7. Hollenbeck S, Grobmyer S, Kent K, et al. Surgical treatment and outcomes of patients with primary inferior vena cava leiomyosarcoma. J Am Coll Surg 2003; 197:575-9.
8. Kieffer E, Alaoui M, Piette J, et al. Leiomyosarcoma of the inferior vena cava: experience in 22 cases. Ann Surg 2006; 244:289-95.
9. Vladov N, Mihaylov V, Belev N, et al. Resection and reconstruction of the inferior vena cava for neoplasms. World J Gastrointest Surg 2012; 4(4):96-101.
10. Illuminati G, Calio F, D'Urso A, et al. Prosthetic replacement of the infrahepatic inferior vena cava for leiomyosarcoma. Arch Surg 2006; 141(9):919-24.
11. Illuminati G, Pizzardi G, Calio F, et al. Outcome of inferior vena cava and noncaval venous leiomyosarcomas. Surgery 2016; 159(2):613-20.
12. Liao G, Hsieh H, Hsieh C, et al. Vessel reconstruction for great vessel invasion by hepatobiliary malignancy. J Med Sci 2005; 25:309-12.