CASE REPORT

Role of imaging in successful management of malignant ovarian vein thrombosis in RCC

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SUMMARY

Renal cell carcinoma (RCC) is the most common renal malignancy in adults. Since complete surgical resection is the treatment of choice, accurate staging and extent delineation are imperative for optimal management. Owing to venous tropism, the tumour has a propensity to extend into renal vein and/or inferior vena cava. However, contiguous gonadal vein extension has rarely been reported. Here we present an unusual case of a 65-year-old woman who demonstrated a large left renal mass with extension of tumour thrombus into the left renal and ovarian veins with multiple retroperitoneal venous collaterals detected on multiphasic CT examination. This preoperative imaging information facilitated en bloc resection of the tumour and thrombosed vessels. To the best of our knowledge, this is the first case where comprehensive imaging evaluation enabled successful surgical management of RCC with malignant ovarian vein thrombosis and limited preoperative complications.

BACKGROUND

Owing to the recent imaging advances, renal cell carcinomas (RCCs) are now detected at an early stage, and accurate delineation of the tumour extent and staging are possible preoperatively. We report an unusual case of an RCC extending retrogradely into the left ovarian vein from left renal vein along with multiple engorged surrounding venous collaterals. The uniqueness of this case report lies in the first-time description of successful surgical management of ovarian vein invasion by RCC, based on comprehensive imaging information provided by multiphasic multidetector CT (MDCT) examination.

CASE PRESENTATION

A 65-year-old woman presented to the emergency department with a single episode of painless gross haematuria. No known bleeding diathesis or comorbidities requiring anticoagulant medication were found. She was a non-smoker and had no family history of cancer. Physical examination was normal except for mild tachycardia of 100 bpm. Abdominal examination revealed a vague ill-defined lump in the left lumbar region.

INVESTIGATIONS

Laboratory parameters including haemogram and renal function tests were within normal limits.

Sonography revealed a large heteroechoic mass in the left kidney, extending contiguously into the left renal vein. A multiphase MDCT was performed for

Figure 1 Contrast-enhanced CT venous phase axial section of a heterogeneously enhancing mass in the left kidney, showing hypodense areas of necrosis (asterisk) and punctate foci of calcification (arrows) within.

characterisation and extent delineation of the mass lesion. CT showed a mass measuring 9.9×6.8×6.3 cm in the upper and interpolar regions of the left kidney with heterogeneous attenuation and contrast enhancement with internal areas of calcification and necrosis (figure 1). The mass contiguously extended into the left renal vein and retrogradely into the left ovarian vein (figures 2A,B). The tumour thrombus expanded the involved veins, showed arterial neovascularity and heterogeneous contrast enhancement on the venous phase, similar to the primary mass (figures 2A,B). No extension of the tumour thrombus into inferior vena cava (IVC) was seen. Numerous dilated tortuous collateral channels were seen in the retroperitoneum, particularly posterior to the left renal artery and around the renal mass (figure 3). Workup for distant metastases, including a whole-body 18F-fluorodeoxyglucose positron emission tomography scan, was negative.

TREATMENT

Since total surgical excision offers the best hope of disease-free survival, the patient was taken up for left open radical nephrectomy. Owing to the precarious location of the left renal artery between the thrombosed left renal vein anteriorly and retroperitoneal collaterals posteriorly, consent for high risk was taken from the patient and intraoperative blood loss was contemplated. An anterior approach was adopted via bilateral subcostal (chevron) incision and the left kidney was exposed. The left renal and ovarian veins were dilated with thrombus, and numerous collaterals were noted over the kidney surface. Despite all precautions, retroperitoneal collaterals were injured while mobilising and ligating

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Figure 2 (A) Arterial phase coronal contrast-enhanced CT (CECT) image showing the contiguous extension of the left renal mass (M) into left renal (long arrow) and gonadal veins (small arrowhead). The mass and the tumour thrombus are showing arterial neovascularity. (B) Venous phase coronal CECT image depicting the malignant thrombus as filling defect, expanding the left renal (long arrow) and gonadal veins (small arrowhead). The malignant thrombus is showing heterogeneous enhancement, similar to the primary mass. Inferior vena cava is normal.

the left renal artery, and had to be repaired. The left renal vein was ligated close to the ostium and the left gonadal vein was ligated distally. En bloc resection of the left kidney along with thrombosed left renal and gonadal veins was carried out.

OUTCOME AND FOLLOW-UP

The postoperative course was uneventful and the patient made a successful recovery. Histopathology revealed clear-cell RCC Fuhrman's nuclear grade 3 and confirmed the venous thrombus to be malignant. Resected regional lymph nodes were found to be reactive. At 6 months follow-up, the patient had no fresh symptoms and abdominal sonography was normal. Surveillance with abdominal CT examination is planned at 1 year follow-up.

Figure 3 Contrast-enhanced CT venous phase axial section showing numerous dilated tortuous retroperitoneal collateral channels (long arrows) particularly posterior to the left renal artery (small arrowhead) and around the renal mass (M). Asterisk represents malignant thrombus in the expanded left renal vein, while inferior vena cava (I) is free of thrombus. a, aorta.

DISCUSSION

RCC accounts for about 2% of all adult malignancies and 85% of all renal malignancies.¹ Accurate preoperative tumour staging is mandatory to determine resectability, as well as for optimal surgical planning.

RCC is known to have a particular tropism for the venous system, propagates into the renal vein and IVC in 10% and 4–23% of cases, respectively,¹ and can reach into right heart chambers.² Retrograde extension into the gonadal vein is rare, and to the best of our knowledge, only three such cases have been reported in the past.^{3–5} Despite its rarity, it is important to look for this finding since failure to recognise it can lead to perioperative thromboembolism and/or residual disease after surgery, implying poor patient survival.

The left gonadal vein drains into the left renal vein, making it more vulnerable to tumour infiltration than the right gonadal vein, which drains directly into IVC. It has also been postulated that spread of malignant cells down the ovarian vein may be responsible for vaginal metastasis which is occasionally seen in patients with RCC and more common with left-sided tumours.⁶ In addition, ligation of all the involved veins prior to handling the tumour is believed to be important to prevent catastrophic consequences of thromboembolism.³

Wherever feasible, radical extirpative surgery is the treatment of choice in locally advanced renal malignancies and is curative in up to 70% of cases.^{7,8} However, these patients have a significant risk of disease recurrence and progression, despite complete surgical resection. Targeted agents including vascular endothelial growth factor, platelet-derived growth factor and mammalian target of rapamycin inhibitors have improved survival in metastatic RCC, and integrated regimens combining surgery and targeted therapy are under investigation for advanced RCC.⁷

We report a rare case of RCC with left ovarian vein extension and intend to emphasise the role of imaging in successful surgical management. In our case, the intraoperative course was complicated by collateral injury leading to excessive intraoperative bleeding. However, since intraoperative bleeding was already envisaged based on imaging findings, the outcome was favourable. Owing to advanced disease, such patients have high risk of recurrence postoperatively, and therefore active surveillance is necessary. To conclude, radiologists and urologists should be familiar with the possibility of gonadal vein invasion in RCC and, if suspected, should be taken care of during surgery.

Multiphasic MDCT examination provides comprehensive pre-operative staging information and associated collateral status, which can limit perioperative complications, guiding optimal surgical management.

Learning points

- ▶ Despite its venous tropism, extension of renal cell carcinoma contiguously into the gonadal vein is uncommon.
- ▶ Nevertheless, it is important to look for and recognise gonadal vein involvement because of its surgical implications.
- ▶ Exact description of tumour extent and associated collateral information with cross-sectional imaging is valuable in appropriate surgical planning and helps limit/control complications such as thromboembolism, excessive intraoperative blood loss and residual tumour burden.

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