

Flank Incision is A Safe and Effective Surgical Approach for Renal Carcinoma with Inferior Vena Cava Thrombus

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Citation

H Aw, D Spornat, S Farah, M Winter, S Appu. *Flank Incision is A Safe and Effective Surgical Approach for Renal Carcinoma with Inferior Vena Cava Thrombus*. The Internet Journal of Urology. 2012 Volume 9 Number 2.

Abstract

PURPOSE: We present an Australian perspective on the use of flank incision as a surgical strategy in the management of renal cell carcinoma (RCC) with vena cava thrombus. **METHOD:** A retrospective analysis of all patients who had a flank incision for RCC with caval thrombus performed at our tertiary centre, from June 1997 to June 2011 was performed. The following parameters were studied: demographics, thrombus extension, tumour size, operative time, estimated blood loss, need for cardio-pulmonary bypass, complications and length of hospital stay. We also evaluated the disease progression and patient status at follow-up. **RESULTS:** From June 1997 to June 2011, a total of 29 patients had radical nephrectomy and caval thrombectomy for RCC with caval thrombus at our institution. Of them, 12 patients who had a flank incision were selected reviewed. We had 8 male and 4 female patients, with a mean age of 59.6 years old and median age of 64 years old. We used the Neves-Zincke classification to assess extent of caval thrombus, with classifications I (n=9), II (n=2), III (n=0) and IV (n=1). Mean tumour size was 88.0mm. 1 patient required cardio-pulmonary bypass, and the average blood loss intra-operatively was 589.16mls. Of these patients, 9 had negative margins. **CONCLUSION:** RCC with vena cava thrombus is associated with a high mortality rate. A flank incision for radical nephrectomy provides adequate exposure to the renal hilum and infra-hepatic vena cava for Neves-Zincke I and II caval thrombi. Thus flank incision is a safe and effective option in selected cases.

INTRODUCTION

Renal cell carcinoma accounts for 2% of all cancers in adults¹. It was estimated that up to 20-35% of these are associated with renal vein thrombus, and inferior vena cava (IVC) extension in 4-10%². Radical nephrectomy and caval thrombectomy remains the only curative option for RCC with IVC thrombus. A subcostal or flank incision is among the various techniques described for this procedure. The aim of this study is to evaluate the efficacy and safety of radical nephrectomy and caval thrombectomy via a flank incision.

METHODOLOGY

We conducted a retrospective review of all patients who had a radical nephrectomy and caval thrombectomy from June 1997 to June 2011. Of these patients, we identified those who had a flank incision. Various parameters were analysed, including patient demographics, thrombus extension, tumour size, operative time, estimated blood loss, need for cardio-pulmonary bypass, complications and length of hospital stay. Outcomes of patients were evaluated based on evidence of disease progression and patient status on follow-up.

RESULTS

Of the 29 patients who had radical nephrectomy with caval thrombectomy, we identified 12 patients who had flank incisions, which consisted of 8 males and 4 females. The mean age of the patients was 59.6 years old, and median age was 64 (Range: 23- 72 years old). 7 patients had right-sided RCC, and 5 had left-sided RCC.

All the patients had pre-operative CT-IVP, and the Neves-Zincke classification was used to assess the extent of the caval thrombus (See Table 1).

Figure 1

Table 1: Neves-Zincke Classification

| Level | n (number of patients) |
|-------|------------------------|
| I | 9 |
| II | 2 |
| III | 0 |
| IV | 1 |

The average size of resected tumour was 88.0 mm (Range: 25- 170mm). The average operating time was 138 minutes (Range: 70- 180mins). Of the 12 patients who had the surgery via a flank incision, 1 patient with level 4 Neves-Zincke caval thrombus, and required cardiopulmonary bypass. The average blood loss during surgery for these patients was 589.16mls (Range: 90- 3000mls). The average hospital length of stay for these patients was 12 days (Range: 6- 42 days). Post-operatively, 1 patient developed subphrenic abscess that resolved with drainage and antibiotics, and 1 patient died from candidal sepsis of the peritoneal cavity. The grades of post-operative complications were assessed using the Clavien- Dindo classification (See Table 2).

Figure 2

Table 2: Post-operative complications grading with Clavien-Dindo classification

| Grades | Number of patients | Details |
|--------|--------------------|---|
| I | 2 | tachycardia post-operative fever |
| II | 1 | E. coli urinary tract infection |
| IIIa | 1 | subphrenic abscess requiring drainage and intravenous antibiotics |
| IIIb | 0 | |
| IVa | 0 | |
| IVb | 0 | |
| V | 1 | intra-abdominal sepsis with Candida krusei |

The patients were then followed-up post-operatively. The histological diagnoses and staging were as follow (See Appendix: Tables 3 & 4).

Figure 3

Table 3: Histological analysis of excised RCCs

| Cell Type | n |
|-------------------|---|
| Nephroblastoma | 1 |
| Papillary Type II | 1 |
| Clear cell | 9 |
| Chromophobe | 1 |

Figure 4

Table 4: Pathological staging of excised RCCs

| Stage | Frequency | Percentage |
|--------------|-----------|------------|
| pT3bN0M0 | 10 | 83.33 |
| pT3bN1M0 | 1 | 8.33 |
| pT3cN1M0 | 1 | 8.33 |
| Total | 12 | 100 |

Out of 12 patients, 3 patients had positive excision margins (2 positive peripheral margins and 1 positive renal vein margins). Of the 2 who had positive peripheral margins, 1 had pT3bN0M0 disease, and the other had pT3cN1M0. Both subsequently developed metastatic disease and were treated with localised radiotherapy. Both of these patients continued to have stable disease at 2 years. The patient with a pT3bN0M0 positive renal vein margin died post-operatively secondary to candidal septicaemia.

Patients were followed for a mean of 14 months. Of these patients 4 were found to have metastatic disease and were treated with salvage radiotherapy.

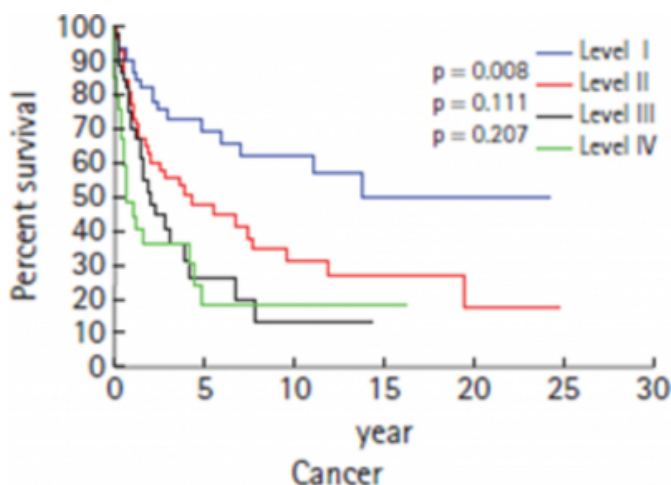
Figure 5

Table 5: Neves-Zincke Classification

| Level | Cranial extension of RCC Thrombus |
|-------|-----------------------------------|
| 1 | Renal |
| 2 | Infrahepatic |
| 3 | Retrohepatic |
| 4 | Atrial |

Figure 6

Figure 1: Cancer-specific survival in patients according to the Neves-Zincke classification (Image adapted from , by Wotkowicz and Libertino)



DISCUSSION

Radical nephrectomy with vena cava thrombectomy remains the only curative option for RCC with IVC thrombus³. This is a complex urological procedure, and there are various techniques described. A flank incision offers good access to renal hilum and infra-hepatic vena cava, and is appropriate for well-selected cases⁴.

Most of our patients who had RCC with IVC thrombus were asymptomatic on initial presentation (22 out of 29 patients). Most of these were detected incidentally on imaging studies. The triad of haematuria, flank pain and mass for detection of RCC is now outdated with the increased usage of various imaging modalities. This has led to down-staging of tumour and reduced the complexity of the caval thrombus that is presenting, making flank incisions an ideal surgical approach.

Establishing the extent of IVC thrombus pre-operatively in these cases is essential. CT is useful for initial diagnosis. However, more precise imaging such as Doppler ultrasound, trans-oesophageal echocardiogram or MRI with gadolinium is recommended. MRI is considered the gold standard as it more sensitive and specific to assess intravascular involvement of tumour⁵. IVC thrombus extension is classified according to the Neves-Zincke classification, which correlates with prognosis (See Appendix: Table 5 and Figure 1⁶).

For our patients, the surgical approach taken to expose the kidneys is through an eleventh-rib resection. If better

exposure is needed, the incision is extended into a Chevron's incision, or laterally into a thoraco-abdominal incision. This is then followed by complete mobilisation of the kidney within the Gerota's fascia, and careful dissection of the adrenal gland from the kidney. The main renal artery is isolated and, alongside the proximal ureter, is secured with vessel loops. This is followed by cross-clamping of the renal artery with a bulldog vascular clamp. The renal tumour is then resected.

Our average operating time was 138 minutes. The average blood loss was 589.16mls, and only 3 patients required transfusion post-operatively. Our average patient length of stay was 12 days. Analysis of our data and grading of complications with the Clavien-Dindo classification suggests that flank incision is a safe and effective option for RCC with IVC thrombus. Out of 12 patients who were operated, 1 had Grade IIIa complication requiring drainage of a subphrenic abscess, and 1 had Grade V complication (death) as a result of sepsis. 7 out of 11 patients remained disease-free after an average of 14 months follow-up.

CONCLUSION

Advanced RCC with IVC thrombus carries a high mortality

rate, and a radical nephrectomy and IVC thrombectomy remains the only curative option. A flank incision is a safe and effective option for this complex procedure in well-selected cases.

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