

# Bolster material granuloma masquerading as recurrent renal cell carcinoma following partial nephrectomy

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## Abstract

Nephron sparing surgery has seen a phenomenal rise in its application over the past few decades. The use of Surgicel and gel foam for closure of defect created after partial nephrectomy has become a routine practice at many centers. In this case report, we describe radiological artifact secondary to a surgical bolster mimicking a residual disease or an early recurrence in the kidney. This case highlights two facts; first, reapproximation of the renal tissue is best done without the use of Surgicel bolsters. Second, bolsteroma should always be kept in mind as a differential diagnosis in a case where computed tomography (CT) imaging is showing early recurrence. If the surgeon is sure about the surgical margins being negative and the CT image shows a bolsteroma, the patient should be observed and a repeat scan should be done at 3–6 months, which would show regression or disappearance of the lesion proving it to be an artifact rather than malignant lesion.

**Key words:** Bolsteroma; partial nephrectomy; Surgicel

## Introduction

Nephron sparing surgery has seen a phenomenal rise in its application over the past few decades. The concept of vascular control has also seen a paradigm shift. The initial years saw the emphasis on restricting the warm ischemia time to less than 30 min, later the concepts of early declamping and zero ischemia were popularized. Hemorrhage can be an extremely morbid complication in partial nephrectomies and a variety of hemostatic agents have used for controlling bleeding during this procedure. The use of Surgicel and Gel foam for closure of defect

created after partial nephrectomy has become a routine practice at many centers.<sup>[1]</sup>

In the follow-up of partial nephrectomy patients, NCCN guidelines suggest performing a computed tomography (CT) examination between 6 months to 12 months depending on the stage of the tumor. A few studies in the past have shown that hemostatic agent-induced foreign body granuloma, may mimic a tumor in the liver, ovaries, and CNS.<sup>[2-4]</sup> In this case report, we describe radiological artifact secondary to a surgical bolster

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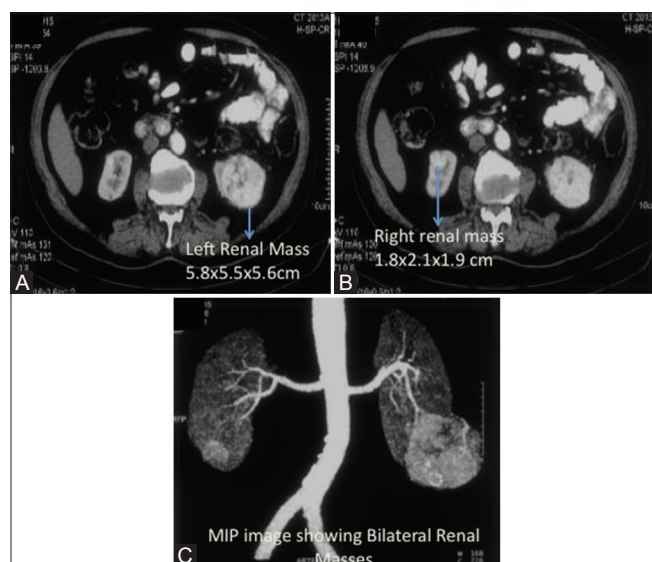
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mimicking residual disease or an early recurrence of renal tumor.

## Case History

A 71-year-old gentleman presented with a history of lower urinary tract symptoms and single episode of painless hematuria 2 years prior to presentation. An ultrasound examination revealed 5 cm, partially exophytic left lower polar mass with a normal right kidney. For characterization of the right renal mass, 5 mm thick, contiguous, multiphasic helical contrast enhanced CT was done using GE™ Bright Speed 16 Slice CT scanner (GE Health Care™, Chicago, USA). 100 ml of iopromide (Ultravist™ 370 mg l/ml) was used as intravenous contrast and images were acquired before (plain axial images), during (corticomedullary phase after a 25 s delay), and after (nephrographic phase after a 120 s delay) injection of contrast. CT revealed a well circumscribed, 5.8 × 5.5 × 5.6 cm size, exophytic, heterogeneously enhancing soft tissue mass arising from the lower pole cortex of the left kidney without any infiltration of pelvicalyceal system (PCS) and preserved perinephric fat planes [Figure 1A-C]. In addition, the right kidney showed two masses similar in characteristics to the left kidney mass; the first one was arising from lower pole cortex and measured 1.8 × 2.1 × 1.9 cm in size, and the second mass was arising from mid interpolar region at the corticomedullary junction without any significant invasion into the calyceal system and measured 1.0 × 0.9 cm in size [Figure 1A-C].

Patient was planned for a left-sided partial nephrectomy because the left-sided disease was larger in size and potentially more aggressive. The right-sided tumor was planned for management subsequently. Patient underwent



**Figure 1 (A-C):** Preoperative CT scan images: (A) An axial image with an enhancing left renal mass; (B) an axial image with an enhancing right renal mass; (C) an MIP image demonstrating bilateral renal mass

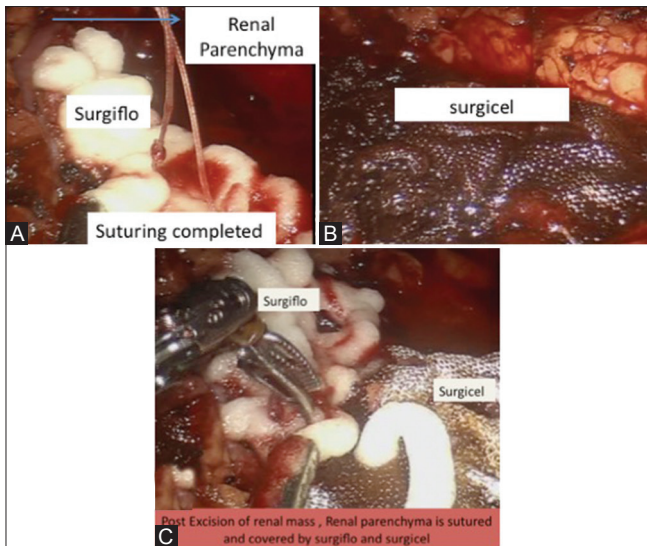
a left robotic partial nephrectomy using a Da Vinci Si™ (Intuitive surgical Sunnyvale, CA) platform. After port placement, robot was docked, colon was reflected, and the kidney was exposed. Renal artery and vein were dissected, and after doing an intraoperative ultrasound, tumor was marked with electrocautery. Renal artery was clamped using a bulldog clamp and tumor was excised with robotic scissors keeping a margin of healthy tissue. Intraoperative ultrasound and frozen section were used to ensure that the cut margins were free of tumor. Warm ischemia time was 21 min and defect in the renal parenchyma was sutured with Vicryl 1™ (Ethicon) on CT 1 needle over Surgicel bolsters using sliding renoraphy technique and synched with a Hem-o-lok™ (Teleflex) clip. After renoraphy, Surgiflo™ haemostatic matrix (Ethicon), which is absorbable porcine gelatin paste, was put over the sutured surface of kidney for hemostasis [Figure 2A-C]. Perurethral catheter, ureteric catheter, and drain were placed. Perurethral catheter and ureteric catheters were removed on postoperative day 3 and drain was removed on postoperative day 4. Postoperative recovery was uneventful. Histopathology of the mass came out to be clear cell carcinoma, clinical stage was T1b Nx, and it was a Furman grade 2 tumor. Tumor had no lymphovascular invasion and all margins were free of tumor [Figure 3A and B].

On 1 month follow-up, a CT angiography was done before proceeding for the management of the other side. On CT, a small homogeneously enhancing (53 to 120 HU) nodular lesion was noted close to the operative site. It measured 10 × 11 mm and there was associated small pocket of fluid collection with no air present within [Figure 4A and B]. No significant change was noted in the appearance of the right renal mass. There was a possibility of a recurrent or residual tumor on the left side, but since we were sure of the surgical margins being free of tumor on intraoperative ultrasound and histopathology, it was thought as an unlikely cause. We counseled the patient and planned close observation with monthly examination using ultrasound and a CT scan at 3 months. A repeat CT scan was done at 3 months and there was a well-defined loculated hypodense perinephric collection at left lower pole (average CT density 15 HU) with no evidence of enhancing soft-tissue density as seen in the earlier study. This excluded the possibility of residual or recurrent lesion [Figure 5]. Meanwhile, right-sided lesions remained static.

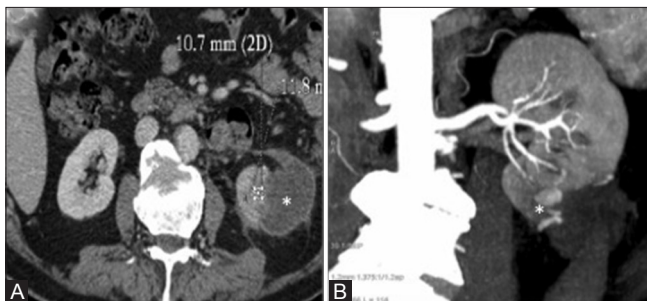
This evaluation confirmed the findings of bolsteroma that presented as a mass of 10 × 11 mm at 1-month CT scan and got absorbed by 3 months.

## Discussion

Use of oxidized cellulose (Surgicel™, Ethicon) as a hemostatic agent has been in surgical practice for some time. It has

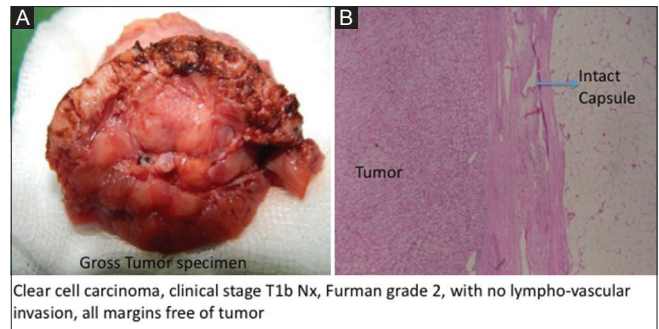


**Figure 2 (A-C):** Intraoperative pictures. (A) Sutured edges of renal parenchyma with Surgiflo™ instilled over it. (B) The suture line being covered by Surgicel™. (C) The completed suture line with Surgiflo™ being put over Surgicel™



**Figure 4 (A and B):** CT scan at 1-month post-operatively: (A) an axial image with a 10 × 11 mm mass, with a fluid collection at operative site (\*). (B) a 10 × 11 mm enhancing mass (\*)

been used in major ablative and reconstructive surgeries such as partial nephrectomies, partial hepatectomy, major oncological surgeries, neurosurgeries, and vascular surgeries.<sup>[2-5]</sup> Oxidized cellulose causes absorption of blood and its interaction with hemoglobin leads to the formation of gelatinous mass with thrombus. Platelet aggregation along with a foreign body reaction also contributes to hemostasis.<sup>[5,6]</sup> In partial nephrectomies, the defect created is closed using oxidized cellulose with gelatin matrix (Surgiflo™ Ethicon) and combination of both has been conventionally used in closing large defects. A review article has described use of bolsters as a gold standard for closing defects post partial nephrectomy, however, search of literature shows no study showing superiority of using bolsters over using no bolsters.<sup>[7,8]</sup> Contrary to this practice, there are a number of studies to suggest that defect in partial nephrectomies can be closed without use of bolsters.<sup>[8-10]</sup> Hemostatic agents have been shown to form a radiological artifact in many situations such as post liver, brain, ovarian, and kidney surgeries. The absorption of blood products on oxidized cellulose may be



**Figure 3 (A and B):** (A) Gross tumor with cuff of normal renal tissue and (B) microscopic tumor free margins



**Figure 5:** CT scan 3 months post-operatively showing absence of any mass

responsible for the enhancement that is seen on CT scan. The presence of air specks and focal collection may help to differentiate these artifacts from tumor recurrence.<sup>[1-3]</sup> Air specks were absent in our case and there was associated enhancement making the situation more challenging.

Presence of bolsteroma as an artifact has been reported up to 18 months and beyond.<sup>[11]</sup> The evolution of the shape of the artifact has also been described from oval to irregular to fibrotic scar.<sup>[11]</sup>

Because of the enhancement seen on the postoperative CT scan, the bolster granuloma may appear like a recurrent or residual tumor and potentially the patient may have to



undergo a repeat surgery for the same. These instances have been well documented in the literature,<sup>[12]</sup> and on surgical exploration of these cases, presence of bolster granuloma was revealed. These cases highlight the importance of awareness of the radiologist to the existence of this entity, which might prevent the unwarranted morbidity and anxiety to the patient burdened with a previous surgery.

If the surgeon is sure about his surgical margins, has done an intraoperative ultrasound, and frozen section examination was negative, such lesions are likely to regress and should be kept under observation.

## Conclusion

Bolsteroma post robotic partial nephrectomy can mimic residual or early recurrent disease. This case highlights two facts; first, reapproximation of the renal tissue is best done without use of Surgicel bolsters. Second, bolsteroma should always be kept in mind as a differential diagnosis in a CT imaging showing early recurrence. If the surgeon is sure about the surgical margins being negative, patient should be observed and a repeat scan should be done at 3–6 months, which would show regression or disappearance of the lesion proving it to be an artifact rather than malignant lesion.

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## Conflicts of interest

There are no conflicts of interest.

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