Renal artery pseudoaneurysm following robotic partial nephrectomy. A rare case report and review of the literature

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Abstract

A 50-year old woman with a 3 cm left lower pole renal tumor underwent Robot Assisted Laparoscopic Partial Nephrectomy (RALPN). On postoperative day 11, the patient presented with gross hematuria and left flank pain. Selective renal arteriogram revealed the presence of a renal artery pseudoaneurysm in the lower pole of the left kidney. Selective embolization of the artery feeding the pseudoaneurysm was performed with excellent results. In conclusion surgeons need to maintain a high level of suspicion for this rare complication in order to diagnose and manage patients that presents with hematuria or flank pain after RALPN.

Introduction

The innovations that the daVinci platform provides (3D view, 7 degrees of freedom, precise movements), drove many surgeons to prefer it over pure laparoscopy, in performing nephron sparing procedures. Renal artery pseudoaneurysm (RAP) is a rare cause of postoperative hemorrhage after partial nephrectomy, occurring in 0.43% after open and 1.7% after laparoscopic partial nephrectomies.[1,2] There are only sparse data in the literature, reporting RAP after Robot Assisted Laparoscopic Partial Nephrectomy. We report a rare case of RAP after RALPN and discuss the diagnosis and management difficulties of this entity.

Case Presentation

A 50-year old woman with asymptomatic, incidentally detected 3 cm left lower pole renal tumor underwent transperitoneal Robot Assisted Laparoscopic Partial Nephrectomy. During surgery, a small renal pseudoaneurysm was observed in the lower pole of the left kidney. Selective embolization of the artery feeding the pseudoaneurysm was performed with excellent results. In conclusion, surgeons need to maintain a high level of suspicion for this rare complication in order to diagnose and manage patients that present with hematuria or flank pain after RALPN.

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Nephrectomy (RALPN) after completing a full informed consent. The tumor was outlined by monopolar scissors and the renal artery was controlled with a laparoscopic bulldog clamp. The tumor was excised using cold scissors. The tumor bed was sutured with a 15 cm 3-0 polyglactin running suture. A Lapra-Ty (Ethicon, Cincinnati, OH, USA) clip was placed after two consecutive sutures. No argon beam coagulation was used. Parenchymal approximation was performed over surgical cell bolster with 15 cm No 1 polyglactin running suture. After proper tension has been applied, a 10-mm Weck (Teleflex, Research Triangle Park, NC) clip was placed perpendicular to the capsule and pushed towards the renal parenchyma. Once the bulldog clamp was released, bleeding was observed and two more renorrhaphy sutures were placed deeply for hemostasis. Operating time was 180 minutes and warm ischemia time 22 minutes. Estimated blood loss was 300 ml.

The final histopathological evaluation revealed clear cell renal cell carcinoma with negative surgical margins(T1aN0M0). Postoperative period was uneventful, and the patient was discharged home on postoperative day 4.

On postoperative day 11, the patient admitted to the emergency department with gross hematuria and left flank pain. A non-contrast tomography was subsequently performed, revealing a perirenal hematoma. Although the patient was hemodynamically stable, follow-up ultrasonography revealed minimal increase in the size of the hematoma.

Due to ongoing bleeding and persisting flank pain, a selective renal angiography was planned. Selective renal arteriogram revealed the presence of a saccular renal artery pseudoaneurysm with active extravasation in the lower pole of the left kidney (Figure 1). One 5x5 mm, one 4x4 mm and two 2x3 mm coils (TRUFILL; Cordis, Miami, FL) were used for selective embolization of the artery feeding the RAP. After insertion of endovascular coils, no further filling of the pseudoaneurysm was demonstrated (Figure 2). Gross hematuria and flank pain stopped immediately. The patient was discharged home on the next day without any procedure-related complications.

Discussion
Renal artery pseudoaneurysm (RAP) is a rare complication of partial nephrectomy. It is potentially life-threatening and requires high index of suspicion. The time between the surgery and its presentation is variable, but RAP generally occurs in a delayed fashion. The in-
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Cidence of this rare complication in laparoscopic partial nephrectomy varies between 1.7 - 2.3% in the literature [1-3], whereas the incidence of the same complication in robotic procedures is reported in only one recent retrospective analysis (1.7%) [4]. Renal artery pseudoaneurysm occurs because of renal arterial bleeding. High pressure arterial flow originating from a transected or punctured artery, leaks into a contained hematoma cavity in the renal parenchyma or hilar areolar tissue and results in a pseudoaneurysm.

Several factors have been identified as possible causes for this rare complication. An artery transected partially or end on during resection may be obscured by arterial spasm and complete hilar clamping and so may be nonrecognized throughout the surgery. During parenchymal reconstruction, parenchymal compression and approximation sutures may be insufficient to provide hemostasis. Combination of hypotension, coagulation and support of the surrounding tissue temporarily controls bleeding [5].

In the postoperative period, with mobilization and increasing activity of the patient, blood pressure returns to baseline and the occluding clot may become dislodged and degraded, resulting in bleeding into a contained space. Another possible cause may be the suturing technique during renal parenchymal reconstruction. Suboptimal insertion of needle into the renal parenchyma, removing and redirection of the needle, may puncture an intrarenal arterial branch. During the subsequent few weeks, leakage from the puncture hole can increase and result in a pulsatile pseudoaneurysm. These aneurysms are pulsatile hematomas and erosion of the pseudoaneurysm into the adjacent pelvicalyceal system results in macroscopic hematuria. Other less frequent causes include, partial arterial wall injury, late arterial wall breakdown, dislodgement of tissue sealants and suture breakdown and may account for delayed presentation. In our case the suturing technique, which we have abandoned several years ago, was held responsible for this complication. Some technical caveats are proposed to prevent RAP after partial nephrectomy (Table-1)

Late onset gross hematuria and/or flank pain are the most common symptoms of RAP, but the patient can also present with dizziness, syncope, fever, bloody drainage or can even be asymptomatic [3,5]. For the diagnosis of RAP, renal angiography has been proven to be the reference standard. Also, non-invasive tests such as contrast enhanced computed tomography, magnetic resonance angiography, color Doppler ultrasonography can be used if the patient is clinically stable. Computed tomography (CT) is the preferred technique for follow-up. The standard management of this rare complication (when bleeding persists) is percutaneous renal angiography with selective coil embolization, which is a minimal invasive technique with low morbidity. Nevertheless, spontaneous resolution of RAP has been reported making conservative treatment (bed rest, close monitoring of vital signs and hemoglobin, and blood transfusion when necessary) a reasonable option [1].

Conclusion
In conclusion, it is very important to delineate the factors that may predict RAP formation. It is also critical to emphasize that true incidence of RAP may be higher due to possible underreporting and asymptomatic course and for that reason a high level of suspicion is advised [7].

Conflicts of interest
The author declared no conflict of interest.

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<th>Proposed caveats to prevent RAP after partial nephrectomy</th>
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<td>- Suture transected blood vessels in the tumor bed meticulously and tightly [2]</td>
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<td>- Preplan angle and direction of needle passage carefully to minimize false punctures [2]</td>
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<tr>
<td>- Undclamp renal vein during inspection of the tumor bed if selectively controlled [6,7]</td>
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<tr>
<td>- Not rely only on renorrhaphy sutures for hemostasis, give more attention to close open-ended vessels [6]</td>
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<td>- Inspect the operative field after desufflating the abdomen for 5-10 minutes to reveal any bleeder [2]</td>
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Γυναίκα 50 ετών με 3 cm όγκο στον κάτω πόλο του αριστερού νεφρού υπεβλήθη σε ρομποτική μερική νεφρεκτομή. Την 11η μετεγχειρητική ημέρα, η ασθενής παρουσίασε μακροσκοπική αιματουρία και οσφυικό άλγος αριστερά. Η αρτηριογραφία αποκάλυψε την παρουσία ενός ψευδοανευρύσματος κλάδου της νεφρικής αρτηρίας στον κάτω πόλο του νεφρού. Εκλεκτικός εμβολισμός του κλάδου που προσέφερε αγγείωση στο ψευδοανεύρυσμα, πραγματοποιήθηκε με εξαιρετικά αποτελέσματα. Συμπερασματικά οι χειρουργοί πρέπει να διατηρούν υψηλό βαθμό υποψίας για αυτή τη σπάνια επιπλοκή έτσι ώστε να είναι ικανοί να την διαγνώσουν και να την αντιμετωπίσουν έγκαιρα και αποτελεσματικά.

Περίληψη

References