

Kidney Clamp by Using Intestinal Forceps during Nephron Sparing Surgery

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Abstract

We experienced a case of renal cell carcinoma in congenital solitary kidney of an 80-year old male with a status post bypass grafts of coronary arteries and advanced heart failure. Incidentally we identified a left renal cell carcinoma 60mm in diameter, and an aneurysm of left renal artery. According to the R.E.N.A.L. Nephrometry Score, the tumor had 2-2-3-2 and total 9 points. Preoperative e-GFR was 62.1 ml/min. He underwent open nephron sparing surgery by using intestinal forceps for kidney clamp instead of vascular clamp. Following an uneventful postoperative course, e-GFR became 45.6 ml/min. No recurrence was observed at 25 months after surgery. Even though laparoscopic partial nephrectomy is the gold standard for small renal mass, open procedure is still a mainstay for imperative cases.

Keywords: Kidney clamp; Renal cell carcinoma; Imperative nephronsparing surgery; Congenital solitary kidney; Open surgery; Aneurysma of renal artery

Introduction

In accordance with increase of incidental renal tumor, partial nephrectomy is currently recommended as the gold standard for small renal mass. Since the nephron sparing may prevent the sequelae of chronic kidney disease, elderly patients might be especially appropriate for laparoscopic partial nephrectomy. However, tissue ischemia may occur when the procedure accompany with a vascular clamp which induce transient tissue injury. To solve this problem, various techniques are addressed. We report a case with imperative nephron sparing surgery using a very simple method for T1b RCC in an elder patient with advanced heart failure.

Clinical Presentation

An 80 year-old male with systemic arterial sclerosis and heart failure admitted to our hospital for heart attack. Immediately he underwent three bypass grafts of coronary arteries. Incidentally, abdominal CT detected a left renal mass of 60mm in diameter within a congenital solitary kidney (Figure 1) and an aneurysm of left renal artery (Figure 2). According to the R.E.N.A.L. Nephrometry Score, the tumor had 2-2-3-2 with total 9 points [1]. At evaluation, e-GFR was 62.1 ml/min and ejection fraction was 28% in ultrasound cardiography. Metastatic work-up was negative. Significant problems were aged patient, solitary kidney, impaired cardiac function, systemic artery sclerosis and associated aneurysm. His preoperative ECOG [2] performance status was 1, and ASA-PS (ASA physical status) [3] was 3. He underwent open nephron sparing surgery under general anesthesia in a lateral position over the kidney rest. A left flank incision at eleventh rib was made. Incising Gerota's fascia, retroperitoneum was developed to expose the whole kidney. Removing the perirenal fat, vascular pedicle was sufficiently exposed to allow use of vascular clamp. Associated aneurysm of renal artery had been recognized at this field. Two clamps (intestinal forceps; 280 mm in length, curved line) instead of using vascular clamp are applied directly to the kidney in a head to head manner. We placed them 1cm below the resection line which we determined using intraoperative ultrasound (Figure 3). These forceps had an appropriate tension to clamp while protecting injury of the normal kidney tissue. The preserved part of the kidney

were perfused normally and we easily removed tumor by scalpel with a minimal bleeding. After the removal, we closed the opening of collecting system and exposed vessels with running sutures of 4-0 absorbable monofilament. We used retroperitoneal fatty tissue to fill the defect of parenchyma and closed renal capsule using horizontal mattress sutures of 2-0 absorbable monofilament. During the procedure above, we required no hemostatic energy for bleeding from remaining kidney. We observed no hemorrhage or urine leakage after releasing these two clamps. The whole procedure required 25 minutes of tissue clamping, 107 minutes of total surgical time and 70g of total blood loss. Following an uneventful postoperative course, e-GFR became 45.6 ml/min after surgery without significant change on laboratory data. Histopathological examination revealed a typical clear cell renal carcinoma, grade 1, INFa, v0, ly0 with negative surgical margin.

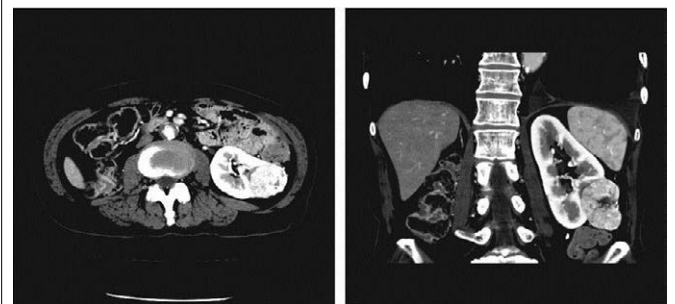


Figure 1: CT abdominal Showing left renal mass, consistent with renal cell carcinoma. Nephrometry R.E.N.A.L. score 2.2.3.2. total 9.

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Received December 07, 2015; Accepted December 18, 2015; Published December 26, 2015

Citation: Kawata N, Igarashi T, Yamaguchi K, Hirakata H, Takahashi S (2015) Kidney Clamp by Using Intestinal Forceps during Nephron Sparing Surgery. J Integr Oncol 4: 155. doi:10.4172/2329-6771.1000155

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Figure 2: 3-D CT(LAO 30.0) detecting aneurysm of the left renal artery.

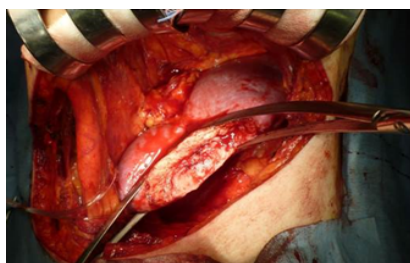


Figure 3: The clamps (intestinal forceps; length 280mm, curved line) instead of using vascular clamp are applied directly to the kidney towards each other.

We described a simple technique by using intestinal forceps at the time of nephron sparing procedure for an aged patient with systemic arterial sclerosis, severe heart failure and solitary kidney. No recurrence was observed at 25 months after surgery.

Discussion

According to the report of Statistics Bureau Affair and communications in 2012, population of elderly person at 65 years old or older occupy 24.1% of total population in Japan. Moreover, people at 75 years old or older was 11.9%, and these figures are annually increasing by 0.4% per year [4]. It is well known that elder person has been accompanied with hypertension, and cardiovascular disease. According to the data in 2006, with regard to the population of hypertension, 61% of people at 60-69 years old, 71.4% of male and 73.1% of female of 70 years old or older had hypertension. The association of hypertension with heart disease is similar to that of hypertension with stroke. The results are similar too when heart disease is specified as coronary heart disease. In men, morbidity and mortality rates due to coronary artery disease increase by 15% with a 10mmHg increase in systolic blood pressure [5].

With respect to making a strategy for removal of renal tumor with elderly patient who suffered from hypertension and cardiovascular disease, the main challenge include how to maintain renal function. For localized and locally advanced RCC, current guidelines recommend surgical resection via either partial or radical nephrectomy followed by observation. In addition, traditional partial nephrectomy has been performed in the setting of renal pedicle occlusion and some nephron may not recover from ischemia.

As it is well known that warm ischemic time has been strongly associated with acute renal damage, various techniques allowing the evasion of renal pedicle clamping have been described. Smith et al reported that safety of partial nephrectomy without vascular clamping in appropriate selected patients. And nephron sparing surgery without renal clamping can be associated with preservation of renal function without compromising oncological outcomes [6]. With respect to the other device, Sciarra et al. reported usefulness of thulium laser during the off clamp procedure for reducing hemorrhage or positive surgical margins [7]. Farber et al. presented a brief clamp method for tumor enucleation of renal cell carcinoma of renal hilum in solitary kidney [8]. At laparoscopic partial nephrectomy, clamping of renal pedicle is generally advocated as a necessary procedure for adequate vision at time of renal parenchymal dissecting. Techniques for tissue cooling at laparoscopic surgery have been advanced with ice slush or transarterial hypothermic perfusion. Of course these techniques have some advantage, each of them may have some disadvantage in technical difficulty, cost and effectiveness. We believe the present procedure is the simplest way and lowest in cost in a limited case.

Major complications of laparoscopic nephron sparing surgery include bowel injury. The majority of bowel injuries usually were recognized as abdominal pain after an uneventful course [9]. Tan et al. reported that laparoscopic procedure was accompanied by two fold greater probability of genitourinary complication and postoperative bleeding [10]. Lane et al. compared the result of open nephron sparing surgery in 169 solitary kidneys with laparoscopic procedure in 30 solitary kidneys. Only 24% complications were observed after open surgery as compared to 43% after laparoscopic surgery, with a ten fold lower postoperative need for dialysis [11]. They recommend to treat RCC in solitary kidney by open nephron sparing surgery and we agree with this opinion.

Conclusion

Even though laparoscopic partial nephrectomy is the gold standard procedure to treat localized and small renal mass, open procedure is still a mainstay for imperative cases.

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