Approach to Carcinoma Cervix with Pelvic Kidney

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Abstract To study the management of carcinoma cervix when the patient has an associated pelvic kidney. The simultaneous occurrence of carcinoma cervix and pelvic kidney is rare. It is an interesting scenario where surgery is technically challenging and radiation is difficult since the pelvic kidney lies within the field of radiation. In our department, we treated three cases of cervical carcinoma with pelvic kidney. First case was FIGO IIB treated with external beam radiotherapy followed by radical hysterectomy; second case stage IB1 treated with radical hysterectomy, third case was referred to us after panhysterectomy with carcinoma detected in postoperative histopathological report, and she was treated with external beam radiotherapy. We made an online database search and found few case reports of gynecological malignancies associated with pelvic kidney and reviewed their management. All the three patients are alive and disease free in the last follow up. None of the patients developed uremia. The pelvic kidney of the patients treated with radiotherapy has shrunk in size. Surgery is preferred over radiotherapy in early stages of carcinoma cervix with pelvic kidney to avoid radiation-induced damage to pelvic kidney.

Synopsis Surgery is recommended in early stages of carcinoma cervix with pelvic kidney to avoid radiation-induced damage to the pelvic kidney.

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Introduction

Carcinoma cervix is one of the most common cancers affecting women, with 493,000 estimated new cases a year worldwide [1]. Pelvic kidney has been estimated to occur in 1 of 2100 to 3000 autopsies [2]. There is no etiological association between carcinoma of the cervix and pelvic kidney, but gives rise to a therapeutic dilemma when they present together. Radical hysterectomy can be done up to FIGO stage IIA1 and for non-bulky disease. The only difficulty anticipated during surgery would be the identification of the vessels and pelvic node dissection. When the parametrium is involved, the reduced tolerance of the kidney to radiation limits the use of radiotherapy. Hence, the complete dose of conventional radiation in treating carcinoma cervix cannot be given in the presence of a pelvic kidney.

We report three cases of carcinoma cervix in patients with pelvic kidney treated in our department. We analyzed the problems associated with the treatment of cervical cancer when it is presents along with a pelvic kidney. We also reviewed the previously reported cases of carcinoma cervix with pelvic kidney.

Materials and Methods

Between January 2006 and December 2007, our records showed that there were 3 patients with carcinoma cervix associated with pelvic kidney treated with curative intent. The mean age group was 43.3 years (range 40–50) years. Biopsy and staging evaluation were carried out with examination under anesthesia, cystoscopy, ultrasound and CT of abdomen and pelvis. The third patient had come to us after a

panhysterectomy. She was evaluated again with the above investigations. Renal function tests were monitored before and after the completion of treatment. All the three patients were explained about the cancer in cervix and the problems with treatment when associated with a pelvic kidney.

Case Details

Case 1 Forty-year-old diabetic patient with history of abnormal bleeding per vaginum and leucorrhoea of 3 months duration was seen in our department in August 2006. Examination revealed growth in the cervix involving the anterior fornix of size 3×4cms. The left medial parametrium was found to be involved on examination under anesthesia. She was staged as FIGO IIB after investigations. On imaging she was found to have a right pelvic kidney (Fig. 1). Renal parameters and kidney excretion was normal. Biopsy revealed well differentiated squamous cell carcinoma. External beam radiotherapy of 50 Gy was given in 25 fractions of 200 cGy 5 days a week without any treatment breaks. Two weeks after radiotherapy, examination revealed residual disease of 1×1cms in the anterior lip of cervix and both the parametrium were fibrosed. Radical hysterectomy was done 4 weeks after completion of radiotherapy. Peroperatively, the right kidney was found in the pelvis (Fig. 2), with a short ureter and the renal artery was arising from the common iliac artery and the vein draining into common iliac vein. On both the sides pelvic lymphadenectomy was done carefully from the bifurcation of the common iliac vessels preserving the renal vessels on the right side. The right ureter had to be mobilized to the bladder with care preserving its blood

Fig. 1 C.T image of case 1 with right pelvic kidney

Fig. 2 Per operative picture of case one showing pelvic kidney on the right side

supply. The pelvic kidney was preserved. There were no perioperative or postoperative complications. Postoperative histopathological analysis revealed no residual tumor in the cervix, vagina, parametria and in the 10 pelvic nodes.

In the last follow up 3.5 years after surgery, the patient was disease free. Renal function tests were normal. Ultrasound imaging showed the pelvic kidney had reduced in size. Further contrast studies were not undertaken to avoid precipitating any borderline renal compromise, as the patient was a diabetic.

Case 2 A 40 year old female patient presented to our department with lower abdominal pain, leucorrhea and bleeding per vagina of 2 months duration in September 2007. Clinical examination revealed an ulceroproliferative growth of 3×2cms size confined to the cervix (FIGO stage IB1). Examination under anesthesia showed that both the parametrium were not involved. On evaluation, renal function tests were normal. Abdominal and pelvic CT scans showed right kidney in normal position and left kidney in the pelvis from L5-S1 to S3 level. The patient underwent radical hysterectomy. Peroperatively, the left kidney was found in the pelvis on the left side (Fig. 3), with short ureter (which was anterior to renal vessels), the renal hilum was anterior and the renal vessels were arising from the left common iliac vessels. Left ovarian vein was found draining into left common iliac vein. The pelvic kidney was preserved and radical hysterectomy was done. Bilateral pelvic lymphadenectomy was done from below the bifurcation of the common iliac vessels preserving the renal vessels and the ureter. There were no perioperative or postoperative complications.

Postoperative histopathological examination revealed infiltrating squamous cell carcinoma confined to the cervix.

Fig. 3 Per operative picture of case 2 showing pelvic kidney on the left side

The parametria, vagina, uterus, tubes, ovaries & the pelvic nodes were free. Patient was kept under follow up.

In the last follow up, the patient is disease free and both the kidneys are functioning normally and of normal size on imaging.

Case 3 A 50-year-old female patient presented to us after she underwent a pan hysterectomy in a private hospital for a moderate dysplasia of the ecto-cervix in June 2006. The postoperative HPE revealed invasive squamous cell carcinoma in the cervix with moderate dysplasia in the margins. As the patient was not seen before surgery and a radical procedure was not done, she was assumed to have residual disease and a tumor board policy obtained to give radiotherapy. The patient was evaluated and found to have left pelvic kidney (Fig. 4). Both clinical and radiological investigation did not reveal any residual disease. Fifty gray of External beam radiotherapy was

Fig. 4 Before RT C.T image case 3

given in 25 fractions of 200 cGy for 5 days a week without any treatment breaks, which was completed in September 2006. Four years in the follow up the patient is alive and disease free. The last C.T scan showed that the pelvic kidney had shrunk in size (Fig. 5). The renal parameters were normal.

After initial evaluation, an urologist advice was taken and the condition of the patient was discussed. Generally none of the patients planned for Wertheim's hysterectomy have a pre operative ureteric catheterization in our department. The patients with pelvic kidney were also operated without ureteric catheterization. Per operatively the ureter was traced with meticulous dissection and identified (Fig. 2).

With the help of imaging studies renal calculi, hydronephrosis were ruled out. Further, the imaging studies done before the start of treatment did not reveal any congenital anomalies other than the pelvic location of the kidney. As grossly, the kidney appeared normal and the urea/creatinine values were normal a DTPA scan was not done.

Results

Follow Up All the three patients are on regular follow up. In the last follow up, they are alive and disease free.

Investigations Yearly imaging of the pelvis with either an ultrasound or a CT revealed that the pelvic kidney of the patients (case 1 and 3) who received radiation had reduced in size. The renal function tests of all the patients were within the normal limits. The follow up imaging of the patient treated with radical hysterectomy alone (case 2) showed that both the kidneys are of normal size.

Fig. 5 Post RT C.T image of case 3

Discussion

Pelvic Kidney

The pelvic kidney is situated opposite the sacrum and below the aortic bifurcation overlapping the lymph nodes draining the cervix. The axis of the kidney is slightly medial or vertical, but it may be tilted as much as 90° laterally, so that it lies in a true horizontal plane. The renal pelvis is usually anterior (instead of medial) to the parenchyma because of incomplete rotation of the kidney. As a result, 56% of ectopic kidneys have a hydronephrotic collecting system.

The arterial and venous pattern depends on the ultimate resting place of the kidney. There may be one or two main renal arteries arising from the distal aorta or from the aortic bifurcation, with one or more aberrant arteries coming off the common or external iliac or even the inferior mesenteric artery. In no instance has the main renal artery arisen from that level of the aorta that would be its proper origin if the kidney were positioned normally. Understanding the anatomy of pelvic kidney will be helpful in avoiding injury during pelvic lymphadenectomy.

Radiotherapy in Pelvic Kidney

There are few data in the literature regarding optimal technique of radiotherapy in patients with pelvic kidney [3–11]. There is no definite data about the optimal dose and method of pelvic radiotherapy in patients with pelvic kidney. We found 9 case reports regarding this issue [3–11].

Technical Difficulties of Radiotherapy

Renal tolerance to radiation depends on the irradiated volume [12]. Tolerance dose for a 5% chance of late adverse effect at 5 years is estimated to be 50 Gy for one third of the kidney, 30 Gy for two thirds, and 23 Gy for the whole kidney. It increases to 50% late toxicity if two thirds are irradiated to a dose of 40 Gy or whole kidney to a dose of 28 Gy.

The tolerance dose to the whole kidney is 20 Gy. Radiation induced damage to pelvic kidney is reduced if the dose delivered to kidney is less than 20 Gy. Teletherapy planning should be done ideally with a 3D-conformation to calculate the dose delivered to the pelvic kidney. Ideally, to avoid RT to pelvic kidney, the pelvic kidney has to be autotransplanted at least 5 cm above the level of L4–L5.

The dose to the pelvic kidney can be reduced by either of the following modifications:

- instead of box field, the ipsilateral field on the side of pelvic kidney can be omitted
- the dose on that particular field can be reduced
- modifying the field by either shaping or rotating

But by the above mentioned modifications, the dose delivery to the target tissue will be compromised.

With the use of IMRT or IGRT, the dose delivered to the pelvic kidney can be significantly reduced. IMRT is a valid technique to keep the pelvic kidney dose under acceptable dose volume constraints without compromising the target volume [9]. Marcus castilho et al. have reported a case of carcinoma of endometrium treated with adjuvant IMRT and the follow up renal evaluation was shown to be normal [9]. Even with these newer modalities, whether the pelvic nodes will receive the calculated dose and whether the pelvic kidney will not receive any scatter radiation is not clear.

Patients with a pelvic kidney should not receive RT unless it is the mainstay in the treatment of that type of tumor. It is important to establish the need, and the benefits of RT to any patient with such a condition. In two patients described by us, we had to resort to external beam radiation therapy to treat the disease in the presence of the normal functioning and located kidney. The patient had to be treated of malignancy and she was fully explained about the associated after effects.

There are various radiation nephropathies described: acute radiation nephropathy, chronic radiation nephropathy, benign or malignant hypertension, hyperreninemic hypertension (Goldblatt's kidney). To avoid radiation nephropathy in pelvic kidney, proper treatment planning should be done before advocating radiation as the primary modality of treatment in carcinoma cervix with pelvic kidney.

RT After Auto Transplantation

Auto transplantation is an option in patients with pelvic kidney undergoing pelvic radiotherapy. Auto transplantation is a difficult procedure because of multiple vascular anomalies and short ureter available for anastomosis. The surgical complications are also high.

Radiotherapy has also been delivered after auto-transplantation of the pelvic kidney in patients with carcinoma of vulva [10], and stage III carcinoma of rectum (adjuvant radiation) [11]. An advanced case of carcinoma cervix, 9 years after renal transplantation has been reported to have undergone successful auto transplantation for delivering extended radical radiotherapy to include even the Para aortic nodes [3]. Transplanting the kidney out of the field of radiation is an attractive option and has been shown to have a good success rate. The difficulties encountered in auto transplantation are technical in relation to vascular and ureteric re-anastomoses [10].

The need for auto transplantation depends on the exact site of the ectopic kidney, status of opposite kidney, percentage of kidney that might receive radiation and dose delivered to kidney.

Surgical Management

Surgery is preferred over radiotherapy in early stages of cervical carcinoma with pelvic kidney to avoid radiation-induced damage to the pelvic kidney and better regional nodal management.

The difficulties in performing radical hysterectomy in case of associated pelvic kidney are:

- Dissection of pararectal fossa
- Dissection of ureter
- Parametrial dissection
- Pelvic lymphadenectomy
- Presence of multiple vascular anomalies
- Inadequate space in the pelvis
- Presence of genital anomalies

In our patients, we encountered difficulties during dissection of pararectal fossae, ureter, parametrial dissection and pelvic nodal dissection. However, we were able to preserve the kidney in both the cases. Thus, when radical hysterectomy is meticulously performed, the pelvic kidney can be preserved without any damage.

In our experience, we find surgical management of cervical carcinoma is superior to radiotherapy with respect to preservation of pelvic kidney and its function.

Revision of the Published Cases of Pelvic Kidney Associated with Carcinoma Cervix

Rosenheim et al. [4] have described a case of carcinoma cervix with pelvic kidney. They have recommended that the pelvic kidney to be moved out of the field of radiation or a nephrectomy to be done prior to radiation.

Lateifah et al. [5] have reported a case of carcinoma cervix IIB treated with concurrent chemo radiation. They have reported a disease free survival of 2 years with normal renal function. In a letter to the editor Bakri et al. [7] have discussed about a case of carcinoma cervix IIB and difficulties in the management.

Roth et al. [8] have reported a case of advanced cervical cancer with bilateral pelvic kidney. The patient underwent an anterior pelvic exenteration. The patient had to undergo a nephrectomy for hemorrhage and a urinary conduit leakage. They have reported a 14-month follow up of disease free survival with normal renal function.

Conclusion

Management of patients with pelvic kidney and carcinoma cervix is challenging situation since there are difficulties in radiotherapy and radical hysterectomy. Surgery is recommended in early stages of carcinoma cervix with pelvic

kidney to avoid radiation induced damage to the pelvic kidney. Advanced cases can be treated with pelvic radiotherapy with proper planning with 3D-CRT or with IMRT. It is important to identify that the normally positioned kidney is of normal function before embarking on any method of radiation delivery. We conclude that Wertheim's hysterectomy is superior to radiotherapy in treating patients with early stage carcinoma cervix with pelvic kidney and methods of radiation delivery have to be identified and studied before radiation can be safely given in these patients.

Conflict of interest All the authors declare that there is no potential conflict of interest in relation to the above work. The authors do not have any financial and personal relationships with other people or organizations that could inappropriately influence this work.

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References

1. Parkin DM, Bray F, Ferlay J et al (2005) Global cancer statistics, 2002. *CA Cancer J Clin* 55:74–108
2. Gray SE, Skandalakis JE (1972) Embryology for surgeons - The embryological basis for the treatment of congenital defects. W.B. Saunders Co, Philadelphia, pp 472–474
3. Abouna GM, Micaily B, Lee DJ, Kumar MS, Jahshan AE, Lyons P (1994) Salvage of a kidney graft in a patient with advanced carcinoma of the cervix by reimplantation of the graft from the pelvis to the upper abdomen in preparation for radiation therapy. *Transplantation* 58:520–522
4. Rosenshein NB, Lichter AS, Walsh PC (1980) Cervical cancer complicated by a pelvic kidney. *J Urol* 123:766–767
5. Lataifeh I, Amarin Z, Jaradat I (2007) Stage IIB carcinoma cervix that is associated with a pelvic kidney: a therapeutic dilemma. *Am J Obstet Gynecol* 197(6):e8–e10
6. Ripley D, Levenback C, Eifel P, Lewis RM (1995) Adenocarcinoma of the cervix in a renal transplant patient. *Gynecol Oncol* 59:151–155
7. Bakri YN, Mansi M, Sundin T (1993) Stage IIB carcinoma of the cervix complicated by an ectopic pelvic kidney. *Int J Gynaecol Obstet* 42:174–176. doi:10.1016/0020-7292(93)90634-9
8. Roth TM, Woodring CT, McGehee RP (2004) Stage II-B carcinoma of the cervix complicated by bilateral pelvic kidneys. *Gynecol Oncol* 92:376–379
9. Castilho MS et al (2006) Intensity Modulated Radiotherapy (IMRT) in the postoperative treatment of an adenocarcinoma of the endometrium complicated by a pelvic kidney. *Radiat Oncol* 1:44
10. DeRoover A, Verni MP, Taylor RJ (2000) Renal allograft autotransplantation before pelvic irradiation. *Transplantation* 70:844–846
11. Bokhari MB, Hostetter RB, Auber ML, Ulewicz DE (1996) Locally advanced rectal cancer with a pelvic kidney complicating adjuvant radiation therapy. *J Surg Oncol* 63:57–60
12. Emami B, Lyman J, Brown A, Coia L, Goitein M, Munzenrider JE et al (1991) Tolerance of normal tissue to therapeutic irradiation. *Int J Radiat Oncol Biol Phys* 21:109–122