

Clinical Research Paper

Clinical analysis of 14 cases of urachal carcinoma

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Background and Objective: Urachal carcinoma is a rare malignancy. This study was to summarize our clinical experience in the diagnosis and treatment of urachal carcinoma. **Methods:** Fourteen cases of urachal carcinoma treated from May 1994 to April 2007 at Cancer Center and The First Affiliated Hospital of Sun Yat-sen University were retrospectively reviewed and analyzed. **Results:** The most common complaints of the 14 patients were hematuria and irritative bladder symptoms. Cystoscopy mainly revealed broad-based tumors located at the dome of the bladder. Soft-tissue masses between the bladder dome and the abdominal wall were detected by imaging examinations; the wall of the bladder was often invaded. Thirteen patients were found adenocarcinoma, the other one was malignant stromal cell tumor. Seven patients underwent extensive partial excision of the bladder, among which one case developed local recurrence 24 months after operation, and the other six were followed up for 14–120 months, with a median follow-up of 42 months without recurrence. Three patients underwent radical bladder resection and urinary diversion, two of which were followed up for 16 months and 84 months respectively without recurrence, while the other one died from surgical complications three months after operation. One patient underwent partial cystectomy at another hospital developed recurrence 10 months after operation. Three advanced cancer patients received chemotherapy, two of which achieved progression free survival for seven and eight months respectively, while the other one died three months after chemotherapy. The one- and five-year survival rates were 85.0% and 56.0%, respectively. **Conclusions:** Extensive partial excision of the bladder is recommended for urachal carcinoma. Radical removal of the tumor during the first treatment, and comprehensive therapies for advanced cancer patients and patients

with recurrence or metastasis after operation are critical to improve the treatment efficacy of urachal carcinoma.

Urachal carcinoma is a rare type of bladder malignancy. Its special location results in its different clinical manifestations, diagnoses, treatment and prognosis from other bladder cancers, which often precludes a timely diagnosis. This study reviewed 14 patients with urachal carcinoma treated from May 1994 to April 2007 in Sun Yat-Sen University Cancer Center and The First Affiliated Hospital of Sun Yat-Sen University.

Data and Methods

General information. Nine male and five female patients, with a median age of 52 years (range, 24–75 years) and a median course of disease of 19 months (range, 1–10 years) were included in the study. The largest cross-sectional diameters of the tumors ranged from 1.5 to 9.5 cm with a median of 4.5 cm. The most frequent presentation was intermittent gross hematuria with irritative bladder symptoms. There were 13 cases of gross hematuria, six cases of irritative bladder symptoms, one case of terminal mucinuria and one case of a lower abdominal mass. None of the patients presented with abnormal umbilical discharge. One patient had received a partial cystectomy at another hospital and presented with post-operative recurrence.

All patients underwent cystoscopic examination prior to surgery. Broad-based masses arising at the bladder dome and the anterior wall were found invading the bladder wall in 12 cases. No obvious masses were observed in two cases, one of which showed compression at the anterior dome of the bladder. On pressing the suprapubic region, tumors were observed protruding towards the bladder cavity; tumors were covered with mucus in three cases. All patients had ultrasound examinations. Solid masses were detected starting from the umbilicus to the bladder dome or between the anterior wall of the bladder and the abdominal wall in 12 cases, with an uneven surface and inhomogeneous echogenicity; calcification was seen in five cases. Thirteen patients received CT scans. Solid masses were found at the anterior dome of the bladder in 12 cases; one case which had received a partial cystectomy in another hospital showed irregular thickening at the anterior dome of the bladder. Two patients had MRI scans and two had PET / CT scans (Fig 1). Three cases were detected to have diffused peritoneal metastases on presentation. They were examined using colonoscopy and endoscopy without finding gastrointestinal primaries.

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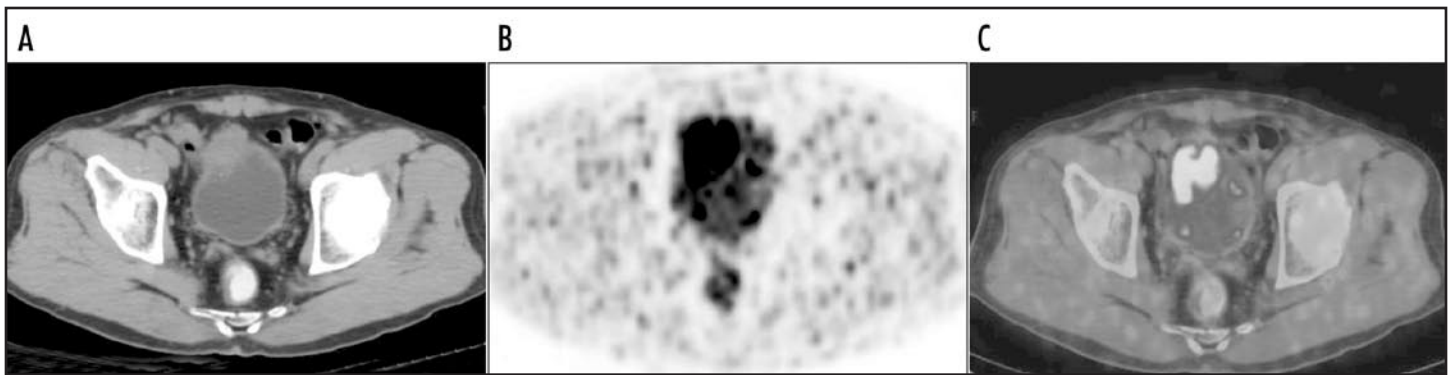


Figure 1. CT, PET and PET/CT images of a case of well-differentiated urachal adenocarcinoma at the same scan layer. (A) CT shows an irregular mass at the anterior wall of the bladder dome and the tumor infiltrates the inner and outer sides of the bladder; (B) PET image shows irregular radioactivity uptake at the anterior wall of the bladder dome; (C) Integrated PET and CT (PET/CT) image shows an irregular mass at the anterior wall of the bladder dome. A visible radioactivity uptake is observed.

Treatment methods. The extended partial cystectomy included resection of the tumor, the urachus along with adjacent 2 cm normal peritoneum, transversalis fascia, connective tissues in the space of Retzius, adjacent 2 cm normal bladder wall and bilateral pelvic lymph nodes. The total cystectomy and urinary diversion included total cystectomy of the above stated range and bilateral pelvic lymph node dissection. Patients who presented with recurrence received a local resection of the lesion followed by adjuvant chemotherapy, and those with diffuse peritoneal metastases were treated with systemic chemotherapy or bilateral internal iliac artery infusion chemotherapy. The regimen was a combination of 5-fluorouracil, mitomycin, cisplatin and doxorubicin-based chemotherapy (Table 1).

Follow-up and statistical analysis. All patients were followed up through tracking records, telephone and letters until 31 July 2007. The survival was analyzed using SPSS13.0 statistical software.

Results

Pathology and staging. Thirteen cases of adenocarcinoma and one case of malignant mesenchymal tumor were pathologically confirmed after operation. Patients were assessed based on the staging system proposed by Sheldon et al.¹ for the primary urachal carcinoma. Stage I: no invasion beyond the urachal mucosa; stage II: invasion confined to the urachus; stage III: local extension into the bladder (III a), abdominal wall (III b), peritoneum (III c), or viscera other than the bladder (III d); stage IV: metastases to the regional lymph nodes (IV a) or distant sites (IV b). Clinical staging was determined retrospectively, including one case of stage I, 10 cases of stage III and three cases of stage IV.

Follow-up results. Seven patients received extended partial cystectomy, among whom one developed local recurrence two years post-operatively, and died three months later without receiving further treatments. The remaining six patients were followed up for a median follow-up period of 42 months (range, 14 months to 10 years) without recurrence. Three patients underwent total cystectomy and urinary diversion; two were followed up for 16 months and seven years respectively with no recurrence; one died of surgical complications three months after operation. One patient had local recurrence 10 months after operation at another hospital and died 21 months after recurrence. Three patients with diffuse abdominal and pelvic metastases were treated with chemotherapy only. Two

were followed up for seven and eight months respectively with stable disease, while the other one died six months after chemotherapy. The one-year and five-year survival rates of the patients were 85.0 % and 56.0 %, respectively.

Discussion

Histopathological and biological characteristics of urachal carcinoma. Urachal carcinoma is a rare entity, accounting for 0.5% to 2.0 % of bladder tumors and 20.0 % to 39.0 % of bladder adenocarcinoma.^{1, 2} It mostly occurs in males of 40 to 70 years of age (75.0 % to 80.0 %). The histological classification of urachal carcinoma is mostly adenocarcinoma (94.0 %), but rarely squamous cell carcinoma, transitional cell carcinoma or undifferentiated carcinoma. This study consisted of 64.3 % of males (9/14) with 92.9 % (13/14) of adenocarcinoma, similar to results reported in literatures.

Typically, urachal carcinoma spreads locally, but also carries a high risk of distant metastases. In the early stages, it often forms a mass within the urachus, then spreads locally in the space of Retzius, or the space between the bladder dome and the umbilicus, or the space between the transversalis fascia and the peritoneum, or into the rectus abdominis muscle. Pelvic lymph nodes are often involved and distant metastases can occur to the lung, bone, liver, lymph nodes, skin, brain, and so on. Bone metastasis usually occurs as a part of widespread metastases; and isolated bone metastasis is rare.³ Thali-Schwab et al.⁴ reported that 28.0% of the urachal carcinoma patients had metastases at the time of presentation. Three (21.4%) out of 14 cases in this study had diffuse implantation metastases to abdominal and pelvic cavities on presentation.

Diagnosis of urachal carcinoma. The pathologic criteria for the diagnosis of urachal carcinoma are varied. Mostofi et al.⁵ have proposed a number of criteria. But some scholars think that those criteria are overly restrictive. Wheeler et al.⁶ suggest that for any adenocarcinoma located in the dome of bladder, a diagnosis of urachal adenocarcinoma can be made unless there is definite evidence of a transitional change between the tumor and normal epithelium. Henly et al.⁷ analyzed 38 cases of urachal adenocarcinoma and suggest that the diagnosis can be made if the tumor is located in the dome or at the anterior wall of bladder, without presence of cystitis glandularis or cystitis cystica, and with evidence of a tumor in the urachal remnant. We adopted Henly's criteria for the diagnosis in this study.

Table 1 Clinical data of 14 patients with urachal carcinoma

No	Sex	Age	Diameter of the tumor (cm)	Sheldon staging	Treatment	Follow-up (months)	Prognosis
1	Male	62	4.0	III	Extensive resection of bladder	14	Survival
2	Male	75	9.5	III	Extensive resection of bladder and part of the rectus abdominis	14	Survival
3	Female	44	5.5	III	Extensive resection of bladder	51	Survival
4	Female	40	5.0	III	Extensive resection of bladder	17	Survival
5	Male	67	3.2	III	Extensive resection of bladder	120	Survival
6	Male	44	3.5	III	Extensive resection of bladder	27	Died
7	Male	75	2.0	II	Extensive resection of bladder	36	Survival
8	Male	35	1.5	III	Radical cystectomy	84	Survival
9	Female	24	3.5	III	Radical cystectomy	16	Survival
10	Female	53	4.0	III	Radical cystectomy	3	Died
11	Male	35	3.5	III	Partial cystectomy	31	Died
12	Male	61	4.0	IV	Chemotherapy	8	Survival
13	Male	46	7.0	IV	Chemotherapy	7	Survival
14	Male	73	7.0	IV	Chemotherapy	6	Died

We summarized our experience in the diagnosis of urachal carcinoma as below: (1) Due to its obscure anatomic position, urachal carcinoma is often misdiagnosed at the early stage and many patients have progressed to advanced states upon presentation. Three patients presented with diffuse implantation metastases to abdominal and pelvic cavities in this study. (2) The most common clinical symptoms are hematuria, urinary frequency and mucinuria, similar to other bladder tumors. Patients may present with a mass in the lower abdomen. There was one such a case in this study. (3) Cystoscopic findings often reveal a broad-based ulcerative mass in the dome or at the anterior wall of bladder. The tumor may sometimes be covered by mucosa. On pressing the suprapubic area, mucus-like substance can be observed flowing out from the surface of the tumor. However, there may not be any obvious lesions in the bladder. There were two such cases in our study. (4) The presence of an inhomogeneous solid mass between the anterior wall or the dome of bladder and the abdominal wall in the image is highly suggestive of urachal carcinoma. In ultrasound, the tumor often manifests as a solid mass with an uneven surface and echogenicity, sometimes with calcification. CT or MRI often reveals a hypodense or low signal mass between the anterior dome of the bladder and rectus abdominis, located either mostly within or outside the bladder. CT and MRI scans are essential for pre-operative staging assessment of urachal carcinoma. (5) Two patients in this study underwent whole body PET / CT scans before operation. Irregular masses and concentrated radioactivity in the anterior dome of the bladder were detected, which spread both inwards and outwards. We believe PET scanning would provide more timely and accurate information for the preoperative staging and decision of treatment plans than traditional imaging studies. It also helps with early evaluation on the operative effect and determining the necessity of adjuvant treatment.

Treatments for urachal carcinoma. Urachal carcinoma is mostly managed with surgery. It remains debatable that which one is more efficacious: extended partial cystectomy or radical total cystectomy.

Radical total cystectomy has been regarded as the first choice for the treatment of urachal carcinoma. It is combined with urachectomy for a large tumor or squamous cell carcinoma.⁸ In recent years, extended partial cystectomy has been recognized as an important surgical treatment for urachal carcinoma. There is a report of successful laparoscopic resection of urachal carcinoma with good short-term follow-up results.⁹ The impact of radiotherapy and/or chemotherapy on prevention and treatments for post-operative recurrence remains controversial.

In summary, we believe that: (1) Surgery should be able to completely remove the tumor. Partial cystectomy, which may leave positive margins, increases the risk of short-term recurrence. In this study, one patient, who received a partial cystectomy in another hospital, developed local recurrence 10 months after operation. (2) Radical surgery yields a large wound, resulting in a variety of complications in the following urinary diversion.¹⁰ For cases with a small tumor or minimal involvement of the bladder wall, extended partial cystectomy can be considered in order to improve the patient's quality of life without affecting the survival rate. The most important thing is to excise sufficient areas, including not only the bladder dome, but also the covering peritoneum, the connective tissues in the space of Retzius and urachus, plus dissection of conventional bilateral pelvic lymph nodes for staging purposes. Seven patients in this study underwent extended partial cystectomy. Except that one case had local recurrence two years after operation, the other six cases were free of recurrence 54 months after operation. (3) For tumors spreading outwards into the peritoneal wall, the affected part of the peritoneal wall should also be excised. One patient in this study was found to have the involvement of rectus abdominis, so part of the rectus abdominis was also removed. (4) Radical cystectomy plus urachectomy is indicated for large tumors or tumors with positive margins found intraoperatively. (5) Three patients in this study at advanced stages were treated with chemotherapy alone. Two were followed up for seven and eight months respectively with stable disease; one died six months after chemotherapy. Two patients had post-operative

recurrence. One survived 21 months after combined therapy; while the other one who did not receive any chemoradiotherapy died three months after recurrence. This indicates that combined therapy has some impact on the survival of patients with advanced disease and post-operative recurrence.

Prognosis of urachal carcinoma. The prognosis of urachal carcinoma is very poor with a five-year survival of 5.6% to 29.0%. A recent study reported a five-year survival of 61.9%.¹¹ We achieved a one-year survival rate of 85.0% and a five-year survival rate of 56.0%, which appear to be relatively better than other reports. We believe that radical removal of the tumor during the first treatment, and comprehensive therapies for advanced cancer patients and patients with recurrence or metastasis after operation are critical to improve the treatment efficacy of urachal carcinoma.

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