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Rare presentations of Wilms tumor in children: A case report

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Abstract
Wilms tumor (WT) is the most common malignant tumor (neoplasm) of the urinary tract in early childhood. The median age at WT diagnosis is 3-4 years, and 90% of cases are diagnosed before the age of 7 years. In this report, three adolescent patients with WT, aged 12, 17 and 16, are investigated. Left kidney involvement was observed in these three cases. The clinical presentation in case one was the complaint of abdominal pain with a palpable abdominal mass. The second case was presented with hematuria and an abdominal mass. The clinical symptoms in case three included left flank pain and weight loss. Although WT is usually observed in children under 7 years of age, its diagnosis should also be expected in older children with abdominal pain, palpable mass and gross hematuria.
Keywords: Child, Neoplasm, Wilms tumor

Introduction

Wilms tumor (WT) is one of the most common renal tumors in childhood, and its incidence in children younger than 15 years is about 10 cases per million (1). The majority of the cases are diagnosed in children under 5 years of age (2). In most countries, the median age for unilateral WT at diagnosis is 32-44 months. Mitry et al. (3) reported that 90% of patients were diagnosed by the age of 7. Ninety percent of the total incidence of WTs occurs in children younger than 7 years and 98% in those younger than 15 years. In contrast, its prevalence is rather stable after 15 years of age (1). The clinical presentation of WT in young children is not different from that in adolescents (4). Although the presence of an abdominal mass detected by abdominal palpation can be considered as the typical clinical presentation in some children, renal tumors are associated with hypertension, hematuria. Also, in rare cases, they are a consequence of central nervous system metastasis with an obstructive hydrocephalus. As reported, WT has been diagnosed by the use of prenatal ultrasonography (5-7). Totally, 4-7% of all WTs are synchronous bilateral WTs (BWTs) presented at a younger age (mean age of 2.6 vs. ~3.3 years) compared to unilateral WTs. Prognosis is excellent after the treatment of unilateral WTs (8). It is now apparent that there are at least two WT-associated gene loci located on the short arm of chromosome 11. WT1 at 11pl3 is associated with the WAGR syndrome, congenital heart disease and ear anomaly. Another presentation of WT is Beckwith–Wiedemann (BWS) syndrome including rabdomyosarcoma, hypoglycemia, macroglossia, hepatoblastoma, omphalocele, macrosomia, distinct facies, hemihypertrophy, and embryonal tumours (9). Treatment of WT is currently based upon tumor staging, the presence of favorable or unfavorable histology, and age. The Children's Oncology Group

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(COG) developed a specific treatment protocol (10). The overall survival rate of WT has increased to more than 90% (11). A recent report indicates that a high weight at birth may be related to the subgroup of WTs, which is characterized by perilobar nephrogenic rests (12). Laparoscopic surgery has been greatly expanded in children (13), and preoperative chemotherapy generally precedes nephrectomy (14). Considering the high incidence of WTs in early childhood, this case report focuses on three patients with WT aged 12, 17, and 16.

Case Report

In this report, we have presented three adolescent girls (12, 17, and 16 years old) dignosed with WT and left kidney involvement but different clinical manifestations.

Case 1

A 12-year-old girl was admitted to Amirkola Children's Hospital due to abdominal pain and a palpable large abdominal mass noted five days before the hospital admission (weight: 52 kg and height: 159 cm, 10-25% percentile). The whole left abdomen was filled with a palpable mass. The result of the genitourinary examination was normal, and the laboratory evaluation was significant for lactate dehydrogenase (LDH). Its features were 1070 U/L (give normal range), Bun of 15.1 mg/dL, and Cr of 0.8 mg/dL. Her serum α- fetoprotein (FP), 24-hour urine vanile mandelic acid (VMA), urine analysis (U/A), blood pressure, and chest-X ray were normal. Abdominal ultrasound was performed, and a heterogeneous big mass in the lower pole of the left kidney with the size of 155×98 mm, internal vascularity and limited distorting renal capsule were confirmed. The spiral contrast computed tomography (CT) scan of the lungs, mediastinum, abdomen, and pelvis was performed revealing a hypodense left renal mass at the size of 100×104 mm which had extended into the right hemithorax with at least two pulmonary nodules (8×7.5 mm), segment V of the liver (a 12×16–mm mass), lymphadenopathy, a tumor expanded to the renal vein, and aortocaval lymph nodes (9×5 mm). Since the size and the extension of the tumor mass made its surgical removal very difficult, only biopsy was done and the existence of a wilms tumor was confirmed by a pathologist (stage IV). The patient underwent chemotherapy and irradiation. Her chemotherapy protocol included vincristine, actinomycine, adriamycine, and cyclophosphamide. There was no congenital anomaly or family history of a similar malignancy. Her initial response to treatment was well.

Case 2

A 17-year-old girl referred to our children's hospital with a history of gross hematuria that had lasted for two weeks. An abdominal mass was detected in her left lower quadrant by abdominal palpation. Her renal function revealed Bun of13 mg/dL and Cr of 0.7 mg/dL. Also, abdominal ultrasound indicated the existence of a big heterogeneous mass in her left kidney with the size of 160×155 mm, but the right kidney was normal in size. Moreover, an abdominal CT scan demonstrated a large abdominal mass with the size of 150×100 mm in the left kidney, distorting the whole structure of the kidney. The biopsy of the mass suggested a circumscribed WT of mixed tubule papillary and blastemal pattern. It was limited to the kidney with no vascular or lymphatic invasion and favorable histology (stage I). The patient underwent exploratory laparotomy with left radical nephrectomy and lymphadenectomy. Her blood pressure (BP) was normal, and the results of the laboratory tests including Bun, creatinine 24-hour VMA and U/A, and serum α-FP were normal too. The post-surgery patient was treated using a vincristine and actinomycine protocol. At

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the time of writing this report, the patient was in good general health.

Case 3

A 16-year-old girl with general weakness, left flank pain, and weight loss (13 Kg in 3 months) was studied through a number of experiments. The physical examination revealed a mass in the left lower quadrant of the abdomen. The laboratory test results included Bun of 12 mg/dL and Cr of 0.85 mg/dL. Also, U/A, 24-hour VMA, and serum α-FP were normal. An abdominal ultrasound displayed the existence of a heterogeneous mass in the left kidney with the size of 150×155 mm. Then, abdominal CT scan confirmed a mass in the left side of the kidney, distorting the whole structure of the left kidney. The tumor was not metastasized to other organs (lungs, bones and chest). She underwent exploratory laparotomy with left radical nephrectomy and lymphadenectomy.

The pathology of the tumor mass showed a circumscribed WT of mixed tubule papillary and blastemal pattern with lymphatic invasion (stage 3). Her BP was normal.

During the surgery, the tumor capsule was ruptured into the peritoneum and spread the tumor cells in the abdomen. This case was treated using a more intensified chemotherapy protocol and irradiation. The chemotherapy protocol consisted of vincristine, actinomycine, and adriamycin. Her response to the treatment was excellent.

Discussion

As the occurrence of WT is rare in children over 10 years of age, we reported three cases of WTs in adolescent girls who had an abdominal mass.

Some studies suggested that the preoperative diagnosis of WT was extremely difficult because there were no specific radiographic findings that could distinguish it from the more common renal neoplasms (15, 16), which was similar to our study.

Khanna et al. (11) showed the limited sensitivity of CT in the diagnosis of the peritoneal spread of malignancy. However, in one of our cases, the CT scan revealed a 100 × 104-mm hypodense left renal mass extended into the right hemithorax with at least two pulmonary nodules (8 × 7.5 mm), segment V of the liver (with a mass size of 12 × 16 mm), lymphadenopathy, and a tumor expanded to the renal vein and aortocaval lymph nodes (9 × 5 mm).

In one study, the alpha-fetoprotein level in the serum was elevated in an infant with a familial synchronous bilateral teratoid mass (17), while, in our cases, the level of this serum protein was not increased.

As another study suggested, the relative excess risk of death for males was twice as high as that for females. The one-year and five-year survivals were higher for those diagnosed in the 1990s than in the 1980s, whereas the trend in the relative excess risk of death within five years across four triennia of diagnosis (1983-1994) was not statistically significant after adjustment for age, gender, and geographic region. Regional differences in survival were not significant either (3). As for the present study, survival was good in case 2 with favorable history and WT (stage I, III).

Giannoulia et al. (18) reported that WT had a tendency to invade vascular structures. They found that intravascular extension into the renal vein had occurred in 10% of the patients, predominantly on the right side. In this regard, cases 1 and 2 in the present study had a heterogeneous big mass in the lower pole of their left kidneys with internal vascularity expanded into the renal vein, and case 3 had an abdominal mass on the left side of her kidney with metastasis to lymph nodes.

A study demonstrated that the interaction between age and respiratory infection did not follow this pattern as the relationship

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between infection and WT was stronger among older children (12), which was not the case in our patients.

In a large national cohort study by Crump et al. (19), it was demonstrated that higher fetal growth was related to the enhanced risk of WT with an onset before the age of 5 among females, but not to later-onset WT among males. In our study, however, all of the cases were females with normal birth weight.

Survival rates for children with WT, especially those in additional chemotherapeutic regimens and radiation therapy, have dramatically improved, approaching 90% for even the most advanced stages of the disease (14). Similarly, the survival in our cases was improved following chemotherapy and radiotherapy.

Rodrigues et al. (20) recommended adjuvant chemotherapy along with vincristine and dactinomycin for WT stages I and II as well as flank irradiation and doxorubicin for stages III and IV. In that study, the overall survival rate was 100%, 92%, 70%, and 73% for the patients with favorable histologic features in stage I, II, III, and IV, respectively. It was found that the stage-based treatment according to the established protocols would be essential for an improved prognosis. Similarly, in the present study, the first case was treated using vincristine and actinomycin, case 2 was treated with an intensified protocol and irradiation, and case 3 was treated with vincristine, actinomycine, adriamycin, cyclophosphamide, as well as irradiation.

In adults with WT, flank pain is the most common complaint, while it is presented as a palpable mass in children (21). In our study, case 3 was presented with flank pain and a palpable mass similar to adult cases.

Mitchell et al. (22) reported that a 6-week preoperative course of 2-drug chemotherapy led to improved stage distribution, indicating an enhancement of 10% in stage-I tumors but a decrease of 20% in stage-III ones.

Conclusion

Although WT is usually presented in children under 7 years of age, its diagnosis is also expectable in older children with abdominal pain, palpable mass, and gross hematuria.

Author Contribution

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Conflict of interests

The authors declare no conflict of interests regarding this manuscript.

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