The utility of prenatal ultrasonography for the detection of congenital masses

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Abstract
Objective: Congenital masses are associated with an increased risk for perinatal complications and death; therefore prenatal imagining studies are fundamental to determine the optimal postnatal interventions. Herein we evaluate the usefulness of the prenatal ultrasonography in determination of congenital masses.

Method: Nineteen newborns with mass were enrolled in this retrospective study. Data of the ultrasonographic diagnosis, gestational age at diagnosis, survival, and histological confirmation of the disease were reviewed.

Results: Of the 19 newborn babies (8 male and 11 female) with mass, 13 patients were diagnosed prenatally (68%).

The location of the masses were abdominal (n: 12), thoracic (n: 6) and cranial (n: 1). The ratio of prenatal diagnosis of abdominal, and thoracic mass was established as 10/12 (83%), 3/6 (50%), respectively. The intracranial mass could not be detected in the prenatal period. Definitive diagnosis of the prenatally detected masses were teratoma in 4 patients, ovary cystadenoma in 2 patients, Wilms tumor in 2 patients, neuroblastoma in 1 patient, and rhabdomyoma in 1 patient. The remaining 3 patients had variety of masses (mesenteric cyst, gastroenteric cyst, lymphangiomata).

Conclusion: Our data shows that abdominal and cystic masses are more easily detected during prenatal periods by ultrasonographic examination.

Keywords: Congenital mass, neonate, prenatal ultrasonography.

Introduction
Solid tumors are very rare in the neonatal period and only a few reports about these tumors were described. Malignant tumors such as teratoma, neuroblastoma, rhabdomyosarcoma, Wilms’ tumor, retinoblastoma, and the other soft tissue sarcomas; and also benign tumors such as rhabdomyoma, mesenteric cyst, gastroenteric cyst, and lymphangiomata had been reported in the perinatal period (1-15). Improvements of the sophistich techniques in radiological means represent a revolutionary advance in the diagnosis of the fetal masses in the prenatal period (4). Early diagnosis and determination of tumor may aware the clinicians to alter the mode of delivery and facilitate possible postnatal supportive care, and therefore affect the overall prognosis (4, 5). The aim of this study is to evaluate the usefulness of the prenatal ultrasonography in determination of neonatal masses.

Material and Methods
In this study, 19 newborns that had been referred to our center with tumor in neonatal period from January 2006 to June 2008 were
evaluated retrospectively. The charts of these patients were reviewed retrospectively, and the following data were evaluated: location of the tumors, sex distribution, associated anomalies, gestational age at diagnosis and delivery, mode of delivery, and histopathological type, and overall prognosis as well as obstetric records and stored fetal imaging modalities, obstetric and postnatal therapeutic management were described. This study was performed after approval from the institutional review board at our institution.

Results

During thirty months, 19 newborns diagnosed with mass were enrolled in this study (Table 1). There were 11 girls and 8 boys, and the median age at the first admission to our clinic was 8 days (range 1 day to 29 days). All patients were delivered by cesarean section and the median gestation age was 38 weeks (range, 34-39 weeks). The median birth weight was 3.1 kg (range, 1.8-4.1 kg).

Table 1: Clinical features of the patients

<table>
<thead>
<tr>
<th>No</th>
<th>Sex</th>
<th>Day at Radiological diagnosis</th>
<th>Prenatal diagnosis</th>
<th>Gestational age at prenatal diagnosis (wk)</th>
<th>Localization</th>
<th>The nature of the mass</th>
<th>Histological diagnosis</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>F</td>
<td>21</td>
<td>+</td>
<td>28</td>
<td>Abdomen</td>
<td>Cystic</td>
<td>Mesenteric cyst</td>
<td>Alive</td>
</tr>
<tr>
<td>2</td>
<td>M</td>
<td>28</td>
<td>ND</td>
<td></td>
<td>Cranial</td>
<td>Solid</td>
<td>Medulloblastoma</td>
<td>Exitus</td>
</tr>
<tr>
<td>3</td>
<td>F</td>
<td>16</td>
<td>ND</td>
<td></td>
<td>Thorax</td>
<td>Solid</td>
<td>Neuroblastoma</td>
<td>Exitus</td>
</tr>
<tr>
<td>4</td>
<td>M</td>
<td>28</td>
<td>+</td>
<td>34</td>
<td>Abdomen</td>
<td>Solid</td>
<td>Neuroblastoma</td>
<td>Exitus</td>
</tr>
<tr>
<td>5</td>
<td>M</td>
<td>1</td>
<td>+</td>
<td>34</td>
<td>Abdomen</td>
<td>Cystic-solid</td>
<td>Teratoma</td>
<td>Alive</td>
</tr>
<tr>
<td>6</td>
<td>F</td>
<td>1</td>
<td>+</td>
<td>22</td>
<td>Abdomen</td>
<td>Cystic-solid</td>
<td>Teratoma</td>
<td>Exitus</td>
</tr>
<tr>
<td>7</td>
<td>F</td>
<td>1</td>
<td>+</td>
<td>14</td>
<td>Abdomen</td>
<td>Cystic-solid</td>
<td>Teratoma</td>
<td>Alive</td>
</tr>
<tr>
<td>8</td>
<td>F</td>
<td>1</td>
<td>+</td>
<td>32</td>
<td>Thorax</td>
<td>Cystic</td>
<td>Gastroenteric cyst</td>
<td>Alive</td>
</tr>
<tr>
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<td>1</td>
<td>ND</td>
<td></td>
<td>Abdomen</td>
<td>Solid</td>
<td>Teratoma</td>
<td>Alive</td>
</tr>
<tr>
<td>10</td>
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<td>+</td>
<td>28</td>
<td>Abdomen</td>
<td>Cystic-solid</td>
<td>Teratoma</td>
<td>Alive</td>
</tr>
<tr>
<td>11</td>
<td>M</td>
<td>29</td>
<td>-</td>
<td></td>
<td>Abdomen</td>
<td>Cystic-solid</td>
<td>hemangioendothelioma</td>
<td>Alive</td>
</tr>
<tr>
<td>12</td>
<td>F</td>
<td>22</td>
<td>+</td>
<td>32</td>
<td>Abdomen</td>
<td>Cystic</td>
<td>Over cystadenoma</td>
<td>Alive</td>
</tr>
<tr>
<td>13</td>
<td>M</td>
<td>1</td>
<td>+</td>
<td>30</td>
<td>Thorax</td>
<td>Solid</td>
<td>Rhabdomyoma</td>
<td>Alive</td>
</tr>
<tr>
<td>14</td>
<td>F</td>
<td>1</td>
<td>+</td>
<td>28</td>
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<td>Cystic</td>
<td>Over cystadenoma</td>
<td>Alive</td>
</tr>
<tr>
<td>15</td>
<td>M</td>
<td>28</td>
<td>-</td>
<td></td>
<td>Thorax</td>
<td>Solid</td>
<td>Rhabdomyoma</td>
<td>Alive</td>
</tr>
<tr>
<td>16</td>
<td>M</td>
<td>1</td>
<td>+</td>
<td>28</td>
<td>Abdomen</td>
<td>Solid</td>
<td>Wilms’ tumor</td>
<td>Exitus</td>
</tr>
<tr>
<td>17</td>
<td>F</td>
<td>24</td>
<td>+</td>
<td>24</td>
<td>Thorax</td>
<td>Cystic</td>
<td>Lymphangioma</td>
<td>Alive</td>
</tr>
<tr>
<td>18</td>
<td>M</td>
<td>15</td>
<td>+</td>
<td>34</td>
<td>Abdomen</td>
<td>Cystic</td>
<td>Wilms’ tumor</td>
<td>Alive</td>
</tr>
<tr>
<td>19</td>
<td>F</td>
<td>15</td>
<td>-</td>
<td></td>
<td>Thorax</td>
<td>Solid</td>
<td>Teratoma of pericardi-um</td>
<td>Alive</td>
</tr>
</tbody>
</table>

F: female, M: male, ND: not diagnosed.
Abdominal tumors

The most frequent diagnosis in this study was abdominal tumor (n: 12). Ten newborns with the abdominal mass (83%) were detected prenatally. Five patients had teratoma and the others were Wilms’ tumor (n: 2), cystadenoma of the ovary (n: 2), neuroblastoma (n: 1), mesenteric cyst (n: 1), hepatic hemangioblastoma (n: 1). The masses were detected at 14th (n: 1), 22nd (n: 1), 28th (n: 4), 32nd (n: 1) and 34th (n: 3), weeks of gestation. Three patients with abdominal mass whose diagnosis were neuroblastoma, teratoma and Wilms’ tumor died from respiratory distress (Wilms’ tumor and teratoma), and treatment related complications (neuroblastoma).

Thoracic tumors

Of the distribution of the diagnosis of the six thoracic tumors, two had cardiac tumors and both of them were rhabdomyomas, the others were neuroblastoma (n: 1), gastroenteric cyst (n: 1) and lymphangioma (n: 1), and teratoma of the pericardium (n: 1). From the six newborns whom have thoracic mass lesions, three of them (50%) were detected prenatally. The masses were detected at 24th, 30th and 32nd weeks of gestation. One of the newborns with thoracic tumors diagnosed neuroblastoma with Pepper Syndrome died from respiratory distress in the neonatal period, whereas the rest of the subjects with thoracic tumor are at complete remission without any sequel or complication.

Cranial tumors

Medulloblastoma was diagnosed in one newborn. However, this patient was not detected during prenatal period. This patient died because of progressive disease.

Discussion

Neonatal tumors are extremely rare tumors in childhood, and comprise approximately 2% of childhood malignancies (1, 2). There are only a few reports including retrospective case series and reviews, whereas case reports concerning this topic can be encountered in medical literature.

The prenatal diagnosis of the neonatal masses was established in 13 patients (68%) of total 19 patients. Albert et al had reported that thirteen patients (48%) of total 27 patients were prenatally diagnosed (6). López Almaraz and colleagues had introduced that five neonates (31.2%) of 16 patients had a prenatal diagnosis, 60% of which were made in the last 7 years of the study period (3). We believe that the high percentage of prenatal diagnosis in our study is a result of the increased prenatal screening programs in obstetric follow.

The median age at diagnosis was 8 days in the current series. When compared to another study from our country (1), the delay in some of the reported cases in the previously mentioned study had been diminished in our study and; we speculate that the timing of the diagnosis of the neonatal tumor can be closely connected with prenatal screening studies such as ultrasonographic and obstetric examination. At the distribution of the prenatal detected masses; the majority of them were germ cell tumors such as teratoma (n: 6/19, 31%), which originates from all three germinal layers, and may occur in a variety of locations. In the current study, all of the diagnosed teratomas were located in the abdomen, especially in the sacrococcygeal region; expect one which originated from pericardium. Neuroblastoma, rhabdomyoma, Wilms’ tumor and ovary cystadenoma are following teratoma by 2 patients for each of the diseases. The distributions of neonatal tumors in other studies were similar to the current study (1). Perek and co-workers (7) reported that the most common diagnosis in neonatal tumors were germ cell tumours such as teratoma (n: 6/19, 31%), which originated from all three germinal layers, and may occur in a variety of locations. In some case series, the neuroblastoma had gone in front of teratoma (3).

We did not find any associated syndromes or congenital anomalies in our patients but two of our patients were twin sisters.
Gray scale ultrasonography, an operator-dependent examination is a feasible and cheap imaging modality that does not have any contradictions or side effect make for pregnant and children. On the other hand recent advance in the imaging area had also affect the sonography, and high resolution machines with the features of color Doppler has been widely used. Color Doppler twinkling artifact may allow functional evaluation (16). Magnetic resonance imaging has an excellent value on determinate the prenatal pathologies including benign and malignant masses. But magnetic resonance studies require much time, equipment’s and educated technician and naturally an expert radiologist. The comparison of different radiological modalities is out of the current study. The usefulness of ultrasonography was determined with comparison to the histological diagnosis as a gold standard.

As a limitation of the current study it must be emphasized that ultrasonography is an operator depended study. The experience of the ultrasound performer can affect the radiological diagnosis. The six patients who don’t have prenatal diagnosis may have been examined by un-experienced ultrasound performers.

In conclusion, we would like to vigorously emphasize that the knowledge of the presence of a neoplasm in the fetus may alter the prenatal management of a pregnancy and the mode of delivery, and facilitates immediate postnatal supportive treatment. The early detection of a fetal neoplasm is therefore very important. Obstetric ultrasonography has a significant importance in this area. Our current study underlines that the predictive value of fetal neoplasm by ultrasonographic examination is higher when the tumor is cystic and located in the abdomen.

References

Köse et al.

