Coexistence of Pregnancy and Malignancy

NICHOLAS A. PAVLIDIS

Department of Medical Oncology, Medical School, University of Ioannina, Ioannina, Greece

Key Words. Pregnancy · Cancer · Diagnosis · Staging · Treatment

ABSTRACT

Cancer complicating pregnancy is a rare coexistence. The incidence is approximately 1 in 1,000 pregnancies. The most common cancers are those more frequently seen during the reproductive age of a woman. Breast cancer, cervical cancer, Hodgkin’s disease, malignant melanoma, and leukemias are the most frequently diagnosed malignancies during gestation.

The diagnostic and therapeutic management of the pregnant patient with cancer is especially difficult because it involves two persons, the mother and the fetus.

In this paper we review: A) the therapeutic and diagnostic management of these patients; B) the safety of diagnostic and therapeutic procedures; C) the metastatic pattern of the maternal tumors to the placenta and fetus, and D) the potential recommendations for therapeutic abortion.

INTRODUCTION

The occurrence of cancer in pregnant women is not a common phenomenon. The incidence ranges from 0.07% to 0.1% of all malignant tumors, although a variety of other benign neoplasms (i.e., desmoid tumors, pheochromocytoma) are also seen. The most common malignancies associated with pregnancy include cervical cancer, breast cancer, melanoma, lymphomas, and leukemias (Tables 1 and 2) [1-4].

It is estimated that about 3,500 new cases of cancer are diagnosed annually in pregnant women in the U.S., which is equivalent to one case every 1,000 gestations [5]. As the trend for delaying pregnancy into the later reproductive years continues, physicians can probably expect to see more cases of cancer complicating pregnancy.

Clear guidelines for the management of these women are very important. Despite the absence of strict guidelines,

<table>
<thead>
<tr>
<th>Tumor type</th>
<th>Incidence*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breast cancer</td>
<td>1:3,000-10,000</td>
</tr>
<tr>
<td>Cervical cancer</td>
<td>1:2-10,000</td>
</tr>
<tr>
<td>Hodgkin’s disease</td>
<td>1:1,000-6,000</td>
</tr>
<tr>
<td>Malignant melanoma</td>
<td>2.6:1,000</td>
</tr>
<tr>
<td>Leukemias</td>
<td>1:75,000-100,000</td>
</tr>
<tr>
<td>Ovarian cancer</td>
<td>1:10,000-100,000</td>
</tr>
<tr>
<td>Colorectal cancer</td>
<td>1:13,000</td>
</tr>
</tbody>
</table>

* Malignant tumors per pregnancies or deliveries

<table>
<thead>
<tr>
<th>Site</th>
<th>n of cases</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breast</td>
<td>298</td>
<td>26</td>
</tr>
<tr>
<td>Cervix</td>
<td>294</td>
<td>26</td>
</tr>
<tr>
<td>Leukemia</td>
<td>174</td>
<td>15</td>
</tr>
<tr>
<td>Lymphoma</td>
<td>119</td>
<td>10</td>
</tr>
<tr>
<td>Melanoma</td>
<td>93</td>
<td>8</td>
</tr>
<tr>
<td>Thyroid</td>
<td>45</td>
<td>4</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>111</td>
<td>11</td>
</tr>
<tr>
<td>Total</td>
<td>1,134</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 1. Incidence of malignant tumors during gestation [1-4]

Table 2. Distribution of cancer in pregnant women

Correspondence: Nicholas A. Pavlidis, M.D., Department of Medical Oncology, Medical School, University of Ioannina, 45110 Greece. Telephone and Fax: 30-651-99394 and 30-651-97505; e-mail: npavlid@cc.uoi.gr Received December 5, 2001; accepted for publication March 21, 2002. ©AlphaMed Press 1083-7159/2002/$5.00/0

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the following optimal gold standards should always be followed: A) try to benefit the mother’s life; B) try to treat curable malignant disease of pregnant women; C) try to protect the fetus and newborn from harmful effects of cancer treatment, and D) try to retain the mother’s reproductive system intact for future gestations.

SAFETY OF DIAGNOSTIC WORK-UP

Staging Radiodiagnostic Procedures

Ionizing radiation includes gamma rays, x-rays, and particulate radiation. Epidemiological studies have established the potential of ionizing radiation to induce leukemia and solid tumors in children and adults [6, 7]. The radiation effect on fetal life seems to be dose dependent (Table 3). In addition, the adverse effects of radiation are directly related to the stage of gestation—the earlier the stage, the more detrimental the expected effects (Table 4).

It has been suggested that in utero exposure to radiodiagnostic procedures may cause leukemia or solid tumors. This comes from the results of a number of studies mainly based on the Oxford Survey of Childhood Cancer, which showed a greater risk (1.3-3.0) of leukemia after exposure, especially when exposure was during the first trimester [8].

In a large study on 32,000 twins, the relative risk for leukemia and solid tumors was 1.6 and 3.2, respectively [9]. Despite numerous studies that correlate childhood leukemia with prenatal radiation, there is still uncertainty whether it plays a causative or an associative role.

In pregnant women with cancer, staging imaging tests should be limited to those associated with the lowest exposure to ionizing radiation. Abdominal plain films, isotope scans, and computerized tomography should be avoided. In contrast, chest x-ray and abdominal ultrasound are indicated as staging procedures.

In certain cases, i.e., brain tumors or pheochromocytomas, magnetic resonance imaging is recommended since it has the benefit of avoiding ionizing radiation to the fetus.

SOLID TUMORS ARISING DURING GESTATION

Breast Cancer

Epidemiology

The incidence of breast cancer during pregnancy is approximately 1 in 3,000 pregnancies [10]. It has been estimated that 0.2%-3.8% of all breast tumors are coincident with pregnancy. Pregnancy-associated breast cancer is defined as carcinoma that is diagnosed during pregnancy or within 1 year postpartum. The median age of these women is 33 years, ranging from 23 to 47 [11].

It is estimated that for an obstetrician managing approximately 250 deliveries annually, he/she would require at least 40 years of clinical practice to see two to three cases of pregnancy-associated breast cancer.

Diagnosis

Pregnant women are at a higher risk of presenting with more advanced disease than nonpregnant women since small lumps cannot be easily detected due to the natural tenderness and engorgement of the breasts during pregnancy and lactation. Average delays of 5 to 7 months are reported.

Most patients present with painless masses, 90% of which are detected by self-examination. Diagnosis of breast cancer should be made as early as possible. Breast examination must be a regular clinical practice to detect persisting and enlarging masses, nipple or skin retraction, other skin changes, or axillary lymphadenopathy.

Due to a difference in radiographic density, the sensitivity of mammography in detecting cancerous changes in breasts of pregnant women is about 68%, while that of ultrasonography is around 93% [12]. Diagnosis may be safely made with a fine-needle aspiration or excisional biopsy under local anesthesia. Zemlickis et al. showed that

| Table 3. Radiation dose effect on fetal life |
| Dose | Effect on fetus |
| <0.1 Gy (<10 rad) | No major effect |
| 0.1-0.15 Gy (10-15 rad) | Increased risk |
| 2.5 Gy (250 rad) | Malformations in most |
| >30 Gy (300 rad) | Abortion |

| Table 4. Adverse effects of radiation in relation to gestation stage |
| Stage | Period | Adverse effect |
| Preimplantation/immediate postimplantation | From conception to day 9-10 | Lethal |
| Early organogenesis | Weeks 2-6 | Teratogenesis, growth retardation |
| Late organogenesis/early fetal period | Weeks 12-16 | Mental and growth retardation, microcephaly |
| Late fetal stage | From weeks 20-25 to birth | Sterility, malignancies, genetic defects |
a pregnant woman has a 2.5-fold higher risk of presenting with disseminated breast cancer than a nonpregnant woman, and a lower chance of being diagnosed in stage I [13].

There are no differences in various histologic types of breast cancer between pregnant and nonpregnant women with cancer. Most of the benign tumors diagnosed during pregnancy are similar to those seen in nonpregnant women, e.g., fibroadenoma, lipomas, and papillomas. However, almost 30% of benign breast lesions, such as lactating adenosmas, galactoceles, mastitis, and infarcts, are unique to pregnant or lactating women [14].

**Treatment**

The strategies for therapeutic management of pregnancy-associated breast cancer are mainly dependent on the disease stage.

**Early Breast Cancer (Stages I and II)**

Modified radical mastectomy is the treatment of choice for stage I and stage II breast cancer. Radiotherapy should be delayed until after delivery in order to avoid harmful effects on the fetus. Adjuvant chemotherapy—if indicated—should not be administered during the first trimester of gestation. In the studies of Zemlickis et al., and Berry et al., 75% and 91% of pregnant women underwent modified radical or segmental mastectomy, respectively [13, 15].

In the study of Petrek et al., the 5-year survival of patients with negative axillary nodes was 82% in both pregnant and nonpregnant women, while the 10-year survival was 77% for pregnant and 75% for nonpregnant women. No statistically significant treatment effect was noted [16].

**Advanced Breast Cancer (Stages III and IV)**

Radiation therapy should be completely avoided for the benefit of the fetus. Chemotherapy is still indicated after the first trimester of pregnancy. Berry et al. treated 24 pregnant patients suffering from primary or recurrent breast cancer with CMF combination chemotherapy. Chemotherapy was safely administered to all patients after the first trimester [15].

Again, in the Petrek et al. study, the 5-year survival of patients with positive axillary nodes was 47% for pregnant and 59% for nonpregnant women, whereas 10-year survival rates were 28% and 41%, respectively. Statistical analysis showed no difference between pregnant and nonpregnant women [16].

**Fetal Outcome**

Zemlickis et al. reported that radiation alone or in combination with systemic therapies was given to 73 of the 118 pregnant women, while 26 patients were treated with chemotherapy alone. Concerning fetal outcome, 22 pregnancies were terminated by therapeutic abortion, 12 by miscarriage, and there were 85 deliveries, 21 of which were by cesarean section. Of the 85 deliveries, there were 83 live births and two stillbirths [13] (Table 5).

**Therapeutic Abortion**

In the 1950s and 1960s, therapeutic abortion was advocated due to concerns for hormonal stimulation of tumor growth or to lack of effective systemic therapy. In the 1980s and 1990s, therapeutic abortion failed to improve survival, and it was found that pregnancy had no effect on the course of the disease. In addition, it was observed that 80% of pregnancy-associated breast cancers were estrogen and progesterone receptor negative. Nowadays, oncologists should consider therapeutic abortion during the first and second trimesters only in aggressive primary breast cancer or in patients with advanced disease, in which prompt treatment is strongly recommended.

| Reference | n | Stage (%) | S | RT | CX | Gestational age at delivery | Delivery method | Median survival | Malformations | Birth weight | Stillbirth | Follow-up |
|-----------|---|-----------|---|----|----|-----------------------------|----------------|----------------|---------------|--------------|------------|-----------|-----------|
| [13]      | 118| I-II = 85.5; III-IV = 14.5 | 75 | 62 | 22 | 38.3 weeks | 65% vaginal | At 7 years, Overall: 50% | 0% | Low | 2% | NM |
| [14]      | 24 | I-II = 41.5; III-IV = 58.5 | 83 | 8  | 100| 38.0 weeks | NM | At 3 years, Overall: 75%* DFS: 70% | 0% | Normal | 0% | 4.5 years |
| [15]      | 20 | I-II = 50; III-IV = 50 | 55 | 0  | 100| 34.7 weeks | 75% cesarean | NM | 0% | Normal | 15% | 3.5 years |

**Table 5. Therapeutic management of pregnant women with breast cancer: literature review**

Abbreviations: S = surgery; RT = radiation; CX = chemotherapy; NM = not mentioned; DFS = disease-free survival

*for stages II + III
**Pregnancy After Breast Carcinoma**

The effect of pregnancy on survival after successful treatment of breast carcinoma is predominantly related to the stage of the disease. Patients with early stages (stage I and II) show no difference in overall and 5-year survival rates. Patients with stage III disease should consider deferring pregnancy for at least 5 years after treatment, whereas women with stage IV disease should not consider conception at all [17, 18] (Table 6).

**Carcinoma of the Cervix**

**Epidemiology**

Carcinoma of the cervix, being a tumor of the reproductive years, is one of the most common cancers diagnosed during gestation. Reports of the incidence vary between 0.02% and 0.9%. The real incidence during the decade 1980-1990 was 1.2 in 10,000 pregnancies [19-21]. Recently, the incidence has seemed to decline due to better public awareness for early detection.

**Diagnosis**

Although the diagnosis of cervical cancer in pregnancy can sometimes be delayed, there is adequate evidence that pregnant women have a 3.1-fold higher chance of being diagnosed with stage I disease because of frequent pelvic examinations. [22]. The diagnosis can be safely performed by colposcopy and colposcopy-directed biopsy.

**Treatment and Outcome**

Since most cases are diagnosed in an early stage, a delay in treatment should be recommended in order to reach fetal maturity and viability. With modern neonatal care, newborn mortality has been dramatically decreased.

In order to avoid perinatal complications, it is preferable to manage abnormal cytologic smears in a conservative way. During the first trimester of pregnancy, it is generally safe to delay cone biopsy since it can increase the overall abortion rate by up to 17%. Conization should be left for the second trimester and for cases where the diagnosis of invasive cancer cannot be made otherwise. Conization in the first trimester is associated with an abortion rate of 33%. Following delivery, conization or hysterectomy should be decided by the obstetrician [4, 23].

The overall therapeutic management of pregnancy-associated carcinoma of the cervix, according to the disease stage, is as follows:

1. **Stage I or carcinoma in situ.** Treatment should be delayed until the fetus has matured. If invasion is less than 3 mm without lymph-vascular space involvement, the pregnant woman should be followed to term and delivered vaginally. If invasion is 3-5 mm and lymph-vascular space is involved, these women may also be followed to term. Afterward, a cesarean section should be performed followed by radical hysterectomy and pelvic lymphadenectomy. If invasion is more than 5 mm, the tumor should be treated as invasive cervical carcinoma while taking into consideration the stage of gestation and the preference of the parents.

2. **Stage IB (bulky), II, III, and IV.** For all these stages, radiotherapy is the treatment of choice. In the case of a viable fetus, cesarean section is preoperatively recommended.

In general, cervical cancer does not adversely affect pregnancy. Several retrospective studies have demonstrated no difference in tumor grade or in 5-year survival between pregnant and nonpregnant women with cervical cancer. Also, some reports found no difference in maternal survival between women who delivered vaginally and women who underwent cesarean deliveries [19, 22].

**Malignant Melanoma**

**Epidemiology**

The real incidence of malignant melanoma during pregnancy is unknown. Smith and Randall, in 1969, reported an incidence of 2.8 per 1,000 deliveries [24]. Generally, it is postulated that melanoma accounts for about 8% of all malignant tumors arising during gestation. However, 30%-35% of women with melanoma are of child-bearing age. From the registry of the German Dermatological Society, it was found that 1% of female melanoma patients were pregnant and 40% were diagnosed during the premenopausal stage [25].

**Diagnosis**

The diagnosis of melanoma is always made by tumor excision and pathological examination. Tumor thickness, primarily, as well as tumor site remain important prognostic factors for pregnant women with melanoma. The effect of pregnancy on tumor location and thickness is still unclear [4].

**Treatment and Outcome**

Despite a long-term controversy on the prognosis of pregnancy-associated malignant melanoma, there is now strong evidence.
evidence that the clinical course of pregnant women with melanoma is similar to that of nonpregnant women. Pregnant patients with early primary lesions and adequate surgical excision have a very good prognosis. In these cases, there is no need for therapeutic abortion, whereas in advanced disease, termination of the pregnancy may be useful [4].

Slingluff and Seigler published a series of 100 cases of pregnancy-associated malignant melanoma. Although they found a higher incidence of nodal involvement compared with matched controls, overall mortality was not statistically different [26].

**HEMATOPOIETIC TUMORS ARISING DURING GESTATION**

**Lymphomas**

**Epidemiology**

The incidence of Hodgkin’s disease ranges from 1 in 1,000 to 1 in 6,000 pregnancies [27, 28]. Among 775 women with stage IA-IIA Hodgkin’s disease treated with radiotherapy, 3.2% were pregnant [29]. Non-Hodgkin’s lymphoma (NHL) occurring in pregnancy is more rare. Up to 1985, 75 cases of pregnancy-associated NHL were reported in the literature [30].

**Diagnosis and Staging**

To avoid teratogenicity, a limited staging work-up for Hodgkin’s disease and NHL is mandatory during pregnancy. Staging should always include physical examination, blood tests, chest x-ray, bone marrow biopsy, and abdominal ultrasound. Tomographic and isotope scans are contraindicated.

It seems that pregnant women are not likely to be at a higher stage of their disease when diagnosed than their matched controls. From the 48 women with Hodgkin’s disease and pregnancy managed at the Princess Margaret Hospital between 1958 and 1984, 34 (70.8%) had early-stage disease (stage I and II) and the rest (29.2%) had advanced disease, stages III and IV [31].

**Treatment and Outcome**

Pregnancy in itself does not affect the course of the lymphoma and survival, while therapeutic abortion does not improve the course of the disease. From the Princess Margaret Hospital experience, no significant difference in the 20-year survival rate between 48 women with pregnancy-associated Hodgkin’s disease and 67 matched controls was found. Of the 50 pregnancies studied, there were 38 live births. No statistically significant differences in gestational age, birth weight, delivery method, malformations, or stillbirth rate were observed [31].

There is also enough evidence from the literature to show that no differences in maternal, pregnancy, or fetal outcomes exist between pregnant women with Hodgkin’s disease or NHL and matched controls [4].

There seems to be no evidence for teratogenic effect of local treatment with supradiaphragmatic radiotherapy, especially in early trimesters, or chemotherapy, mainly given during the second or third trimester of pregnancy [29].

**Leukemias**

**Epidemiology**

The real incidence of leukemia during gestation is not well known. It is estimated to range from 1 in 75,000 to 100,000 pregnancies [32-34]. Acute leukemias are more frequent. Among them, acute myeloid leukemia is diagnosed twice as often as lymphatic leukemia. Concerning chronic leukemias, chronic myeloid leukemia (CML) accounts for less than 10% of all cases. Chronic lymphocytic leukemia is very rare since it is a malignancy most commonly detected in the elderly.

**Treatment and Outcome**

From the existing data in the literature, it seems that leukemia can affect both the pregnancy and the fetus. The treatment of acute leukemia should be started immediately after diagnosis. The therapeutic management of pregnant women with acute leukemia is very difficult, and the final decisions should be made by the hematologist/oncologist, the patient, and the family. Abortion should be recommended during the first trimester of pregnancy, however, if the patient expresses the desire to keep the baby, then nonteratogenic cytostatics should be used. Systemic chemotherapy during later trimesters is not associated with teratogenic risk [35-37].

CML is usually treated conservatively. The successful administration of hydroxyurea and interferon or even of leukapheresis has been reported in single cases. If the option for aggressive treatment (i.e., bone marrow transplantation) has been taken, then this should be delayed until after delivery [38, 39].

**OTHER MALIGNANT TUMORS ARISING DURING GESTATION**

**Ovarian Cancer**

The incidence of ovarian malignancies during pregnancy is estimated to be between 1 in 10,000 and 1 in 100,000 deliveries [40, 41]. Around 40% of these tumors are germ-cell tumors. Epithelial ovarian tumors are usually of low stage and low grade. The optimal management of pregnant women with ovarian cancer is not well established,
but several reports found good fetal outcomes with a conservative surgical approach [4].

**Endometrial Cancer**

Endometrial cancer occurs very rarely during pregnancy. Only 16 cases were reported up to 1996 [4].

**Colorectal Cancer**

Up to 1985, almost 200 pregnant women with colorectal cancer were reported in the literature [42, 43]. Woods et al. report an incidence of 1 in 13,000 deliveries [44]. More than 60% of cases were rectal tumors. There is probably a delay in diagnosis, resulting in the presentation of more advanced stages and poorer prognoses than in nonpregnant patients. This delay could be explained by attributing the symptoms of colorectal cancer to the normal changes of pregnancy [4].

**Thyroid Cancer**

Thyroid cancer seems to be rare during pregnancy. No endocrine association between maternal hormonal changes and thyroid cancer has been found. Therapeutically, lobectomy with cervical node dissection can be performed. Radioactive iodine should be avoided, and chemotherapy is not effective [45, 46].

**Central Nervous System Tumors**

Intracranial and spinal tumors are extremely rare in pregnancy. Thirty percent of tumors are gliomas, and another 30% are meningiomas. The most common spinal tumor is vertebral hemangioma [47].

**SAFETY OF CHEMOTHERAPY**

The administration of chemotherapy during gestation can induce harmful effects to the fetus, the newborn, and the mother. For the fetus and the newborn, these detrimental effects include malformations, teratogenesis, mutations, carcinogenesis, organ toxicity, and retarded development; for the mother, they include spontaneous abortion and sterility.

Despite the fact that all chemotherapy drugs are capable of crossing the placenta, fetal toxicity is clearly dependent on the time of treatment. In most cases, toxic effects were reported when treatment was given during embryogenesis in the first trimester and less often when administered during later trimesters. The rate of chemotherapy-associated fetal malformation is 12.7%-17%, and that of low birth weight is 40%. In contrast, the usual rate of malformations in the general population is around 1%-3% [48-50].

Among the therapeutic drugs, antimetabolites (aminopterin, methotrexate, 5-fluorouracil, arabinosyl cytosine) and alkylating agents (busulfan, cyclophosphamide, chlorambucil) are the most common drugs reported to induce malformation or to exert teratogenic effects (Table 7). Vinca alkaloids and antibiotics seem to have no effect on the fetus; however, cisplatin is implicated in growth restriction and hearing loss, whereas etoposide is implicated in pancytopenia. No data are available on the effect of taxanes or of other drugs on the fetus. The Toronto Leukemia Study Group data demonstrated that about one-third of all infants exposed in utero to chemotherapy experienced pancytopenia at birth [51-52].

In addition, Doll et al. studied the effect of combination chemotherapy on the rate of fetal malformation in 139 cases treated in the first trimester of pregnancy. They found that the rate was only slightly higher (25%) than that observed with single agents (17%) [48].

It should be pointed out that most of the available data on the teratogenic risks of chemotherapy are based on case reports and small series. Long-term studies are needed to evaluate the effects of chemotherapy on the mother, the fetus, and the neonate.

In 1986, The Registry of Pregnancies Exposed to Cancer Chemotherapy was established at the National Cancer Institute by J.J. Mulvihill. The purpose of this computerized registry is to clarify the effects of cancer chemotherapy on the developing fetus. It is a collection of published and unpublished outcomes of pregnancies exposed to drugs and radiation. To date, the registry includes 277 pregnancies, 234 abstracted from the medical literature, 40 personally reported cases, and three from other sources. The 277 registered cases include 247 with cancer (52% leukemia, 27% lymphoma, and 18% other cancers) and 30 transplants, autoimmune disorders, or attempted abortions. At present, the registry can provide rapid access, via a Microsoft® Access database, to specifically relevant cases from the literature as an aid to counseling. The Registry is now located at the University of Oklahoma Medical Center Section of Genetics (940 NE

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**Table 7. Treatment given during first trimester and estimated risk of malformation**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorambucil</td>
<td>1:2</td>
</tr>
<tr>
<td>Nitrogen mustard</td>
<td>1:3</td>
</tr>
<tr>
<td>Aminopterin</td>
<td>1:3</td>
</tr>
<tr>
<td>5-fluorouracil</td>
<td>1:3</td>
</tr>
<tr>
<td>Methotrexate</td>
<td>1:4</td>
</tr>
<tr>
<td>Cyclophosphamide</td>
<td>1:6</td>
</tr>
<tr>
<td>Cytosine arabinoside</td>
<td>1:8</td>
</tr>
<tr>
<td>Busulfan</td>
<td>1:9</td>
</tr>
</tbody>
</table>
METASTASES OF MATERNAL TUMORS TO THE PLACENTA AND FETUS

Vertical transmission of cancer is exceptionally rare, although maternal cells do reach the fetus. From 1866 to 1999, 58 cases of documented maternal malignancy metastatic to the placenta and fetus were reported in the western literature [4, 55-58]. The tumors most commonly seen coexisting with pregnancy are not those most commonly found involving the products of conception (placenta and fetus). The most likely way for dissemination is through the hematogenous route. The rarity of this dissemination is probably due to the placental barrier and the fetal immune system.

The most common tumor metastasizing to the placenta or fetus is malignant melanoma, accounting for 30% of all pregnancy-associated tumors. The second most frequent malignancies are leukemia and lymphoma followed by carcinoma of the breast and lung [56]. For more details see Table 8.

Table 8. Maternal cancer metastatic to the products of conception (1866-1999) [4, 55-58]

<table>
<thead>
<tr>
<th>Tumor type</th>
<th>n of cases to POC*</th>
<th>n of cases to placenta</th>
<th>n of cases to fetus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malignant melanoma</td>
<td>17</td>
<td>13</td>
<td>7</td>
</tr>
<tr>
<td>Leukemia and lymphoma</td>
<td>11</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>Carcinoma of the breast</td>
<td>7</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Lung carcinoma</td>
<td>6</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Sarcoma</td>
<td>6</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Gastric carcinoma</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Hepatic carcinoma</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Ethmoid carcinoma</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Cervical carcinoma</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Adrenal carcinoma</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Ovarian carcinoma</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Adenocarcinoma of rectum</td>
<td>1</td>
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<td>0</td>
</tr>
<tr>
<td>Undifferentiated carcinoma</td>
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<td>1</td>
<td>0</td>
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<tr>
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<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Squamous carcinoma</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>58</td>
<td>50</td>
<td>15</td>
</tr>
</tbody>
</table>

*POC: products of conception

RECOMMENDED THERAPEUTIC ABORTION IN PREGNANT WOMEN WITH CANCER

Although a final decision for therapeutic abortion is not always easy, it becomes more important when the diagnosis of cancer is made during the first trimester of pregnancy. Most of the time, the patient, her partner, and her physician are required to make a difficult decision without a clear answer. For the first trimester, the most important parameters for consideration are: A) the stage of the disease; B) the need to provide chemotherapy, and C) the potential curability of this disease.

Despite the absence of guidelines, therapeutic abortion during the first trimester of pregnancy could be recommended primarily for locally advanced-stage cervical carcinoma, advanced breast cancer or breast cancer necessitating adjuvant systemic treatment, stage III-IV aggressive NHL or Hodgkin’s disease, and acute leukemia. In addition, any other chemo-sensitive or nonchemosensitive solid tumor could be included under the same recommendations, provided that the decision follows a thorough discussion among the pregnant patient, the doctor, and the family.

REFERENCES


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Erratum

COEXISTENCE OF PREGNANCY AND MALIGNANCY
Nicholas A. Pavlidis

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On page 281, in the first paragraph under Advanced Breast Cancer (Stages III and IV) the protocol used by Berry et al. was identified as CMF combination chemotherapy, however, the correct protocol was cyclophosphamide, doxorubicin, and fluorouracil (FAC).