Why cancer patients request disposal of cryopreserved semen specimens posttherapy: a retrospective study

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Objective: To determine why patients with cancer stop storing semen in a sperm bank program.

Design: Retrospective study.

Setting: Hospital andrology laboratory.

Patient(s): Cancer patients (n = 56) who discontinued sperm storage.

Intervention(s): A database of 342 patients with cryopreserved sperm was searched for disease diagnosis, marital status before and after diagnosis, type of therapy, number of specimens banked, interval between diagnosis and sperm banking, and postthaw semen characteristics. Patients discontinuing storage were surveyed.

Main Outcome Measurement(s): Reasons for discontinuing storage and clinical correlation of the decision.

Result(s): Reasons included patient death (n = 21); fertility but no plans for more children (n = 23); good sperm quality (n = 8); and no plans to have children (n = 4). Patients were similar in age, number of specimens, and interval between diagnosis and treatment, but they showed significant differences in type of treatment and time in the program. Cost of cryopreservation and specimen storage was not cited.

Conclusion(s): Most patients decided to discontinue sperm banking because either they regained fertility or had improved semen quality. Sperm banking should be strongly recommended for all patients with malignant diseases who may wish to have children, even if they eventually decide that the specimens are not needed. (Fertil Steril 1998;69:889–93. ©1998 by American Society for Reproductive Medicine.)

Key Words: Spermatozoa, cryopreservation, cancer, infertility, sperm bank, posttreatment fertility

Testicular cancer, Hodgkin’s disease, and leukemia are among the most prevalent malignancies in young men of reproductive age. Testicular cancer represents 1%–2% of all neoplasms in the male (1). Hodgkin’s disease is the second most common malignancy affecting young men between the ages of 20 and 40 (2). Receiving a diagnosis of cancer is both emotionally and physically stressful.

Infertility is often the price for the curative, aggressive treatment of the cancer. Although improved treatment regimens have resulted in a high degree of recovery of fertility (1, 2), the incidence of azoospermia in patients after treatment for malignant diseases is still high. It is not possible to predict which patients, after cancer treatment, will become sterile and which will recover adequate spermatogenic function (3–5).

Cryopreservation decreases sperm quality and the numbers of motile sperm in both normal healthy men and cancer patients (6, 7). Sperm cryopreservation for cancer patients who will be treated by surgery, radiation, or chemotherapy is available in many institutions to safeguard the patient’s chances of later procreation (8, 9). Initially, only a high-quality sperm sample could be used because simple IUI was the only method available. However, advances in assisted reproductive technology have improved the chances of pregnancy with few sperm of lesser quality (10–12).

Some patients (or surviving family members) decide to dispose of the cryopreserved samples for a variety of reasons, such as having enough children or regaining good sperm quality after the cancer treatment. Our study examines the reasons for the disposal of sperm spec-
imens at our sperm-banking facility and whether it was associated with a specific type of cancer, treatment, or posttreatment fertility.

**MATERIALS AND METHODS**

**Patients**

This study was approved by our institutional review board. We reviewed records of all cancer patients (n = 342) referred to our andrology laboratory from 1984 to 1996 for cryobanking. Patients who had their sperm specimens banked before initiating cancer treatment were included. Among them, 56 patients had their specimens disposed and were placed in three groups according to the type of cancer: testicular (n = 23), Hodgkin’s disease (n = 19), and other cancers (n = 14). Included in this latter group were those with leukemia (n = 8), colon cancer (n = 2), sarcoma (n = 2), and lung cancer (n = 2).

Review of medical records revealed that all 21 families of patients who died requested disposal of their semen specimens. All living patients (n = 35) were interviewed by phone regarding the type of treatment (chemotherapy, radiation, or surgery), the time between the diagnosis and banking of first sperm specimen, impact of treatment on fertility status, posttreatment fertility status, and finally, reasons for disposal of their banked specimens. The cost of cryopreserving three semen specimens at our center averages about $800. A long-term storage fee of $70 is assessed annually for each frozen ejaculate.

**Statistical Analysis**

The categorical factors were analyzed by Fisher’s exact tests and the continuous factors by the Kruskal-Wallis test. A P value of <0.05 was considered statistically significant. Pairwise comparisons were performed for any significant overall results, and Bonferroni corrections were used to control for the type I error rate. All statistical analyses were performed with the SAS statistical package (SAS Institute, Inc., Cary, NC).

**RESULTS**

Patients who discontinued their sperm banking were subdivided into four major groups based on their reasons of disposal. The categorical factors were analyzed by Fisher’s exact tests and the continuous factors by the Kruskal-Wallis test. A P value of <0.05 was considered statistically significant. Pairwise comparisons were performed for any significant overall results, and Bonferroni corrections were used to control for the type I error rate. All statistical analyses were performed with the SAS statistical package (SAS Institute, Inc., Cary, NC).
because the patients were no longer alive. Twenty-three patients (41.1%) had regained their fertility and had fathered all the children they had planned. Eight patients (14.3%) had good-quality sperm but as yet had no children, and four patients (7.1%) had no children and did not want to have children in the future.

No patient cited cost as a reason for opting out of the sperm-banking program. Most patients with a history of testicular cancer were alive after treatment (21 of 23 [91.3%]) and 14 of these 21 (67%) had regained their fertility but already had the desired number of children after treatment. Of the patients with Hodgkin’s disease, 11 of 19 (57.9%) were alive after treatment. Of these, 7 of 19 (36.8%) had caused a pregnancy after treatment. In patients with other types of cancer, 11 of 14 (78.6%) died. Of the survivors, 2 of 3 (66.7%) fathered children after treatment (Table 2). All of these patients’ spouses achieved natural pregnancy, except for one, who had a successful third-cycle IUI.

Two thirds of the patients with testicular cancer (14 of 21) discontinued participation in the program because they had the desired number of offspring. Patients in the three cancer groups did not differ in age, number of cryopreserved specimens, or interval between diagnosis and treatment (Table 3).

**DISCUSSION**

Our study shows that most requests for disposal of specimens were made because the patients had regained fertility or died. Cost was not a factor. Information on the outcome of pregnancies achieved with cryopreserved sperm from cancer patients is limited. However, existing data suggest no apparent increase in birth defects after inseminations using sperm from men with Hodgkin’s disease, testicular cancer, and other malignancies (13, 14).

Evidence of the recovery of spermatogenic function after chemotherapy in patients with testicular cancer is convincing (15). Posttreatment fertility was seen in approximately 50%–64% of the patients with testicular cancer after 1–3 years (16). A fertility rate of 67% (14 of 21) also was seen in our study in patients with testicular cancer. The probability of return of spermatogenic function after treatment was 48% after 2 years and 80% after 5 years (17). Results of fertility in patients with Hodgkin’s disease after treatment are scarce. Persistent azoospermia 17 years after chemotherapy or radiation therapy has been reported in 85% of children (18) and in 69% of children 7 years after chemotherapy (19). These results indicate a high degree of damage to the germinal epithelium even when the treatment is given during the prepubertal age.

Spontaneous pregnancies can occur with sperm counts of \(<5 \times 10^6/mL\) (20). Most patients in our study did not undergo a semen analysis before requesting disposal of their semen specimens. In all but one instance they impregnated their wives by natural intercourse, the exception being one couple who used IUI. Data on posttreatment fertility are meager and differ for each patient.

In conclusion, we found that most patients discontinued...
TABLE 3

Characteristics associated with different kinds of cancer.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Testicular cancer</th>
<th>Hodgkin’s disease</th>
<th>Other cancers</th>
<th>P value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before treatment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>13 (56.5)</td>
<td>11 (57.9)</td>
<td>6 (42.9)</td>
<td>0.74</td>
</tr>
<tr>
<td>Married</td>
<td>10 (43.5)</td>
<td>8 (42.1)</td>
<td>8 (57.1)</td>
<td></td>
</tr>
<tr>
<td>After treatment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>7 (33.3)</td>
<td>4 (36.4)</td>
<td>1 (33.3)</td>
<td>0.99</td>
</tr>
<tr>
<td>Married</td>
<td>14 (66.7)</td>
<td>7 (63.6)</td>
<td>2 (66.7)</td>
<td></td>
</tr>
<tr>
<td>Treatment</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Chemotherapy</td>
<td>6 (26.1)†</td>
<td>15 (79.0)†</td>
<td>13 (92.9)†</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Radiation</td>
<td>9 (39.1)</td>
<td>10 (52.6)§</td>
<td>1 (7.7)§</td>
<td>0.03</td>
</tr>
<tr>
<td>Surgery</td>
<td>23 (100)§</td>
<td>10 (52.6)§</td>
<td>4 (28.6)§</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Mean age (y)</td>
<td>28 (25, 34)</td>
<td>25 (21, 29)</td>
<td>30 (25, 32)</td>
<td>0.25</td>
</tr>
<tr>
<td>No. of specimens banked</td>
<td>3.0 (3, 4)</td>
<td>3.0 (2, 4)</td>
<td>2.5 (2, 4)</td>
<td>0.36</td>
</tr>
<tr>
<td>Length of storage (mo)</td>
<td>52.0 (38, 72)¶</td>
<td>62.0 (35, 82)¶</td>
<td>16.5 (10, 42)¶</td>
<td>0.02</td>
</tr>
<tr>
<td>Diagnosis and treatment interval (d)</td>
<td>14 (5, 27)</td>
<td>14 (9, 26)</td>
<td>27 (5, 32)</td>
<td>0.64</td>
</tr>
<tr>
<td>Post thaw characteristics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total sperm count (× 10⁶/mL)</td>
<td>13.0 (4.9, 50.0)</td>
<td>62.0 (6.4, 85.0)</td>
<td>16.1 (5.5, 29)</td>
<td>0.28</td>
</tr>
<tr>
<td>Motile sperm count (× 10⁶/mL)</td>
<td>3.6 (1.9, 13)</td>
<td>11 (9.0, 24)</td>
<td>3.75 (0.7, 9.0)</td>
<td>0.62</td>
</tr>
<tr>
<td>Percent motility</td>
<td>20.0 (15, 33)</td>
<td>30.0 (3, 38)</td>
<td>15.5 (12, 18)</td>
<td>0.29</td>
</tr>
</tbody>
</table>

Note: Numbers in parentheses represent the median and interquartile values (25%, 75%) or the percentage.

* P value for the overall group comparison. If the P value was statistically significant, then the pairwise comparisons with Bonferroni corrections were used.
† Patients with testicular cancer were significantly different from both Hodgkin’s disease (P = 0.0016) and other cancer group (P = 0.0001).
‡ Patients with Hodgkin’s disease were significantly different from the other cancer group (P = 0.011).
§ Patients with testicular cancer were significantly different from both Hodgkin’s disease (P = 0.0002) and the other cancer group (P < 0.001).
¶ Patients with other cancers were significantly different from both testicular cancer (P = 0.017) and Hodgkin’s disease (P = 0.013).

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References