Twin pregnancy using cryopreserved sperm from a man with chondrosarcoma[1]

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This case report illustrates the usefulness of sperm banking before radical tumor removal. Sperm was collected from a 25-year-old man with chondrosarcoma and frozen in liquid nitrogen before the patient underwent hemipelvectomy to remove the tumor. The surgery resulted in complete removal of the sarcoma and subsequent impotence and failure of emission. After 10 months of sperm storage, the patient's wife received the first of three artificial inseminations. On the third attempt, the wife conceived and carried the pregnancy to term, when normal twin infants were delivered.

Index terms: Fertility • Tissue bank • Chondrosarcoma

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Survival rates for men with testicular cancer, leukemia, sarcoma, and Hodgkin's disease have improved dramatically in the past ten years, but the cost of this success has often been impaired fertility or permanent sterility. Cryopreservation of spermatozoa, or "sperm banking," allows the possibility of subsequent pregnancy in these men's wives. We describe a case of successful twin pregnancy using cryopreserved sperm obtained before treatment for chondrosarcoma.

Case report

A 25-year-old man was referred to the Department of Orthopedic Surgery in September 1983 for evaluation of a mass in the left hemipelvis, which had been present since an automobile accident in 1980. After noticing progressive enlargement of this mass, a physician at another institution performed a biopsy and diagnosed osteochondroma. The patient was referred to the Cleveland Clinic, where x-ray studies showed in the soft tissue a flocculent calcification extending into the pelvis that appeared to be four times the size observed in 1980. A CT scan revealed the mass extending through the obturator foramen and growing up the wall of the pelvis to involve the hip. Pathologic review of the biopsy specimen showed chondrosarcoma. The patient was advised that the planned resection of the mass would probably result in sterility and/or impotence, and he was referred to the Cleveland Clinic Sperm Bank for semen cryopreservation.

The sperm banking technique used was based on Sherman's method[1,2]: the patient's semen was collected by masturbation into a sterile, nonsperimicidal plastic container and was delivered to the laboratory within 30 minutes. After analysis, the semen was mixed with glycerol, added at a rate of 2 to 3 drops every 5 minutes until a concentration of 7% was reached. One- to 1.5-ml aliquots of the glycerolized semen were placed in plastic screw-cap freezing vials (Nunc, Denmark), cooled to 0° C at 2.5° C/min, then to −100° C at 4.3° C/min, and stored in liquid nitrogen at −196° C.[3] This patient's initial semen analysis showed 28.4 × 10^6 sperm per ml, 3+ motility with 90% motile sperm, and a volume of 5.7 ml. This specimen and four subsequent ejaculates were analyzed and frozen during the next 10 days (*Table*).

The patient underwent left hemipelvectomy, which revealed chondrosarcoma grade II of the left pelvis; the tumor involved the ischium and pubis and extended widely into surrounding tissue with minimal involvement of the acetabulum. Three weeks later the patient was discharged for

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Table. Pretreatment semen analyses in a patient with chondrosarcoma*

Date	Volume (ml)	CT†/ ml ($\times 10^6$)	CT† Total ($\times 10^6$)	% Motile	Motility grade‡	Thaw motility ($\times 10^6$)	Total motile ($\times 10^6$)
9/16/83	5.7	28.4	161.9	90	3.5	30	48.6
9/19/83	5.0	45.1	225.5	80	3.0	45	101.5
9/21/83	4.8	48.3	231.8	80	3.0	40	92.7
9/23/83	3.5	49.4	172.9	75	3.0	50	86.5
9/26/83	3.8	45.2	171.8	90	3.0	40	68.7

* All specimens collected after 48-hour continence period and analyzed within 30 minutes of collection.
† CT = Sperm count.
‡ Motility was graded on a scale from 0 to 4.0 where 0 is no movement and 4.0 is movement too fast to distinguish the tail distinctly.

subsequent follow-up. During the next year, his disease did not recur, but he was severely depressed and unwilling to undergo prosthesis training. The patient came to the Department of Urology five months after surgery seeking evaluation for impotence and failure of emission, which were considered to be secondary to the previous surgery.

Four months later, the patient and his wife elected to begin artificial insemination using the husband's frozen semen. All inseminations were performed using 28×10^6 motile sperm obtained from the husband's second specimen. The wife (gravida 1, para 1) was inseminated during two consecutive ovulatory cycles but did not conceive. Because she ovulated irregularly during these cycles, she was treated with clomiphene citrate (Clomid, Merrill Dow, Cincinnati; 50 mg/day × 5 days) during the next cycle. She was artificially inseminated on day 12 and tested positive for pregnancy one month later. An ultrasound examination at 12 weeks of gestation revealed two normal fetuses with separate placentas and amniotic sacs. The pregnancy proceeded normally to term, when a 3.2-kg male and a 2.6-kg female infant were delivered by cesarean section. Both infants were normal and were discharged from the hospital with the mother six days after delivery.

Discussion

A major problem in therapeutic sperm banking is an educational one: many patients are not told that reproductive options are available and that fertility may be salvaged. Some physicians are reluctant to recommend sperm banking because they assume that sperm counts will be inadequate; however, many of the patients who have the best chance for survival have good pretreatment sperm quality, as this patient did. Twenty-five to 50% of the motile sperm are lost initially during the freezing process; however, once submerged in liquid nitrogen, sperm viability and remaining motility appear to be stable for extended periods. Although we do not know precisely how long sperm function can be preserved, we do know that properly stored sperm remain functional for at least three years[4] and probably for 10 to 20 years, as shown by Sherman's studies.[1] The use of frozen sperm from normal men has not been associated with any increase in pregnancy complications or birth defects in the offspring[1,2,5]; however, the use of ovulation-induction agents like clomiphene citrate has resulted in a higher incidence of twin births.

The conception rates possible using frozen sperm from men with various cancers are unknown. In the past, cervical insemination was the sole method used for achieving pregnancies with cryopreserved sperm; thus, several authors have attempted to set sperm-quality criteria for cryopreservation.[6] However, in vitro fertilization (IVF) techniques have permitted conception with small numbers of poor-quality sperm. Frozen sperm, including that obtained from cancer patients, has been used successfully for IVF,[7–9] and the increasing availability of this technology further augments the value of banked sperm to patients with no other alternative.

The recommendation to bank sperm reinforces the notion that the patient has a treatable disease and that his chance for survival is excellent. Another benefit of sperm banking, observed in this patient, is the improvement of the patient's self-image after the wife achieves a successful pregnancy. Our patient experienced severe depression after surgery and refused to undergo rehabilitation and use a leg prosthesis. After learning that his wife was pregnant, he enrolled in an artificial limb training program so he could help care for the expected twins, which would be difficult if he continued using crutches. Since the birth of his children, the patient has been psycho-

logically normal and has expressed great satisfaction with the quality of his life.

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