Fertility and testicular cancer: histological type and seminogram relation


ABSTRACT

Mobile sperm count has been observed to have a tendency to diminish to the degree that cancer stage increases in patients depositing their semen in a sperm bank. In one study mean spermatozoid concentration in patients presenting with seminomas was 50 million/mL, while in patients presenting with non-seminomatous germ cell tumors (NSGCT) the mean decreased to 17 million/mL.

Objective: To evaluate the relation between histopathological presentation and seminogram results in patients having undergone radical orchiectomy in the Urology Service of the Hospital Juárez de México.

Materials and Methods: From March 2006 to May 2007 a cross-sectional study was carried out in testicular tumor patients from the Urology Service of the Hospital Juárez de México, who underwent radical orchiectomy. Direct preoperative spermatobioscopy was carried out on all patients and the results were statistically analyzed in relation to tumor type, stage and progression.

Results: A total of 22 radical orchiectomies were performed. Eighteen patients presented with spermatobioscopy alterations. Six of those patients presented with 1 alteration and 12 patients presented with 2 or more alterations, predominating necrospermia, hypospermia and astenospermia.

Conclusion: There is a relationship between testicular cancer and alterations in the seminogram; the histological type, time of evolution and stage of the tumor are directly related to specific alterations in the results.
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with 2 or more. Necrospermia, hypospermia and asthenospermia were the predominating alterations.

**Conclusions:** There is a relation between testicular cancer and seminogram alterations. Histological type, progression and tumor stage are directly related to specific alterations in the seminogram results.

**Key words:** Testicular cancer, testicular tumors, Seminoma, Infertility, Spermatobioscopy.

**INTRODUCTION**

It has been demonstrated in studies of cancer patients who deposited their semen in a sperm bank that mobile sperm count tends to diminish to the degree that cancer stage increases (1). In one study, mean spermatozoid concentration of patients presenting with seminomas was 50 million/mL, while in patients presenting with nonseminomatous germ cell tumors (NSGCT) the mean was 17 million/mL.

Testicular cancer is the most common neoplasia in 15- to 35-year-old men and the second most common in 35- to 40-year-old men. There are approximately 6900 new cases per year in the United States (3-6). Incidence has increased over the last 25 years, with a reported 3.7 cases per 100,000 individuals. Incidence peaks occur in young adults (20 to 40 years of age), mature adults (60 years and older) and in children under 10 years of age. These neoplasms are the most frequent solid tumors in men from 20 to 34 years of age and the second most frequent in those from 35 to 40 years of age (7,8).

Ninety percent of testicular tumors are germ cell tumors. Of these, 85% are classic seminoma which are rare before 10 years of age and after 60 years of age. Five to ten percent of all seminomas are anaplastic seminomas. Two to twelve percent of seminomas are spermatocytic tumors which are more common after 50 years of age (6).

Even though semen quality is considered to be poor after orchiectomy performed to treat testicular tumor, little is known of the semen quality before surgery. Azoospermia rates from 10 to 56% have been observed after radical orchiectomy (9,10). The absence of seminal production in the contralateral testicle has been reported in 8% of cases. Different studies have suggested that there is a direct relation between sterility and testicular cancer. In theory this can be due to precocious premalignant alterations of the tubular germinal epithelium or the alterations can occur at the same time that malignant disease is manifested. Normal spermatogenesis depends on normal hormone balance. A significant fraction of testicular tumors are hormonally active and therefore endocrine-related testicular dysfunction is one of the mechanisms that explains sterility associated with these neoplasms (11,12). Chorionic gonadotropin hormone elevation alters follicle-stimulating hormone secretion which then causes spermatogenesis alterations. Alpha-fetoprotein (AFP) and estrogen elevation have also been implicated in spermatogenesis alterations (13).

It has not yet been determined if there is a clearly defined relation between cancer stage or histology and semen quality alteration. Argawal and cols. showed that mobile sperm count tends to diminish to the degree that cancer stage increases in a study of patients who deposited their semen in a sperm bank (1). In a study comparing semen quality in patients with NSGCT and those with seminomas, Botchan observed that mean spermatozoid concentration in seminoma patients was 50 million/mL, while it decreased to 17 million/mL in NSGCT patients (2).

In a study of quality of semen that was conserved in banks and that came from seminoma and NSGCT patients, Padron observed that mean mobile spermatozoid count before cryopreservation in seminoma patients was 17 million/mL, while it decreased to 5.7 million/mL in NSGCT patients. Another study described a decrease in mobile spermatozoid count in seminoma patients (14 million/mL), embryonal carcinoma (8.9 million/mL) and mixed germ cell tumor (4 million/mL).

Noting the variability in the results of these retrospective studies we decided to carry out a prospective study on the relation between testicular tumors and spermatobioscopy results, emphasizing the fact that there is not enough data to determine whether...
or not the significant infertility presenting in patients in the late postoperative period is a result of the tumor, the surgery or an adjuvant therapy.

**MATERIALS AND METHODS**

From March 2006 to May 2007 a cross-sectional study was carried out in patients presenting with testicular cancer in the Urology Service of the Hospital Juárez de México who had undergone radical orchietomy. All patients presenting with testicular tumor that were attended to in the above-mentioned service were included in the study. Patients were excluded if they presented with varicocele or previous varicocelectomy, vasectomy and/or previous vasovasostomy or sterility secondary to another cause.

All patients were physically examined and a complete medical history was obtained from them. Preoperative tests and studies included complete blood count, full blood chemistry, coagulation time, tumoral markers (HGC beta fraction, AFP, lactic dehydrogenase), testicular ultrasound, thorax teleradiograph, contrasted abdominopelvic tomography and spermatobioscopy. The study objective was explained to all patients and they signed a letter of informed consent. Conventional inguinal radical orchietomy was carried out and the surgical specimens were analyzed by the hospital pathology service. Staging was determined according to current TNM standards.

**RESULTS**

From March 1, 2006 to May 31, 2007 twenty-two radical orchietomies for testicular cancer were carried out in the Hospital Juárez de México. Two patients were excluded from the study – one because of varicocele and the other because of previous vasectomy. Patient age range was from 20 to 45 years and the most affected age group was that of the third decade of life. Twelve cases were in that category. Mean age of the patients was 29.3 years.

No alterations were found in the blood count, blood chemistry or coagulation time tests. There was an elevation of stage S2 tumoral markers in 7 cases and stage S1 in 12 cases. Abdominopelvic tomography showed no lymphatic activity in 14 patients and retroperitoneal lymph nodes (N2) were shown in 4 cases.

Tumor types were the following: 11 pure seminomas and 9 non-seminomatous (2 pure and 7 mixed). Embryonal carcinoma and teratoma predominated.

Alteration in 18 cases were observed. Six cases had one alteration and 12 cases had two or more. Necrosermia and asthenospermia predominated in the pure seminomas (45% of cases) and hypospermia and necrosermia were dominant in the non-seminomatous tumors.

Anatomopathological stage T1 was determined in 8 cases. One of them had stage S1 markers and 3 cases had S2 markers with a progression of more than 6 months. Seven cases presented with striking alterations in the seminogram, two of which had only one alteration and 5 that had more than one altered line. Necrosermia predominated in 3 cases and asthenospermia in another 3 cases.

Stage T2 was determined in 11 cases. Of those 6 had S1 markers and 5 had S2 markers. Four of the cases had one altered line in the seminogram and 7 had more than one alteration. Hypospermia (4 cases), necrosermia (4 cases) and asthenospermia (4 cases) predominated.

Seven patients had a 2-month disease progression. Of those 4 were seminomas and 3 were mixed germ cell tumors. Two of the cases had one altered line in the seminogram and 5 had more than one alteration as a consequence of asthenospermia (5 cases) and necrosermia (4 cases). Eight cases had a progression of 3 to 4 months. Five of them were seminomas and 3 were mixed germ cell tumors. The predominant seminogram alterations were asthenospermia (4 cases), necrosermia (4 cases) and hypospermia (3 cases). Three cases had a 5-month progression with patterns of greater severity. One of them presented with azoospermia and the other 2 with necrosermia greater than 90%.

**DISCUSSION**

In the present study age group distribution was similar to that reported in the literature and the third decade of life was predominant (4,6,8). Tumor distribution differed in relation to seminoma prevalence. It was only 60% in the present series compared to the 90% reported in the literature. We found a greater number of mixed germ cell testicular tumors in relation to teratoma and embryonal carcinoma (8).

Seminoma only elevated the beta HGC fraction in 25% of cases and was not greater than 500 ng in any of them. This concurs with studies reported in the literature where the margin is 10 to 25% of cases (6). All non-seminomatous tumors elevated HGC to the same degree as reported in different series in which teratoma and choriocarcinoma had elevation rates from 80 to 100% (4). AFP was not elevated in seminomas but was elevated in 60% of the non-seminomatous tumors, this latter finding being similar to that reported by Campbell (8).

The tumors in our study were in the initial stages of T1 and T2 with a 3-month progression in approximately 60% of cases, similar to recent reports in the literature (5,9).

Mean spermatozoid concentration was 40 million. Distribution was similar in seminomas and
non-seminomatous tumors. Bothchan reported a concentration of 50 million for seminomas and 17 million for non-seminomatous tumors (3).

There was a relation between tumor type and semenogram alteration. The principal alteration in seminomas was asthenospermia and in mixed germ cell tumors it was hypospermia. Necrospermia was equally predominant in both. These three alterations were the most frequent in this series of cases. The degree of affection in the altered lines of the semenogram was greater in teratocarcinoma and embryonal carcinoma. There is no information in the literature supporting these findings except the comments of Argawal and Padron in relation to the decrease in spermatic motility being directly related to tumor stage (1,10).

Progression analysis showed distribution of seminomas and mixed germ cell tumors to be similar in the first 4 months. There was greater severity of results in mixed germ cell tumors with a progression greater than 4 months that included necrospermia rates above 90% and one case of azoospermia. There is no information on these findings in the literature.

CONCLUSIONS
The cause of alterations in spermatobioscopy in patients presenting with testicular tumors is unknown. Perhaps they are caused by tumor molecules that are toxic for germ cells that have not yet been identified. There is a relation between testicular cancer and semenogram alterations with an affection rate of 90%. In more than half the cases there was more than one alteration in the spermatobioscopy. There is a relation between anatomopathological tumor type and semenogram alteration type. Asthenospermia was more frequent in seminomas and hypospermia was more frequent in non-seminomatous tumors. There was also a relation between progression and stage and spermatobioscopy alterations. There were higher necro spermia rates in those cases having a progression of more than 5 months. Sixty percent of stage T2 patients presented with spermatobioscopy alterations compared with 40% in stage T1.

In conclusion, sterility in these patients is largely due to the tumor itself and it increases after adjuvant therapy in the late postoperative period.

BIBLIOGRAPHY