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ROLE OF CIRCUMCISION IN CANCER PREVENTION*

ABRAHAM RAVICH, M. D., F. A. C. S.

That human cancer, like certain animal cancers, might be an infectious disease caused by transmissible viruses has not yet been proven. The evidence to be presented in this paper, however, suggests a possible etiological role of a transmissible factor in the preputial smegma of uncircumcised males to cancer of those genito-urinary organs that are usually involved in venereal diseases. For this reason, circumcision is recommended as a preventive.

Sexual promiscuity, poor sex hygiene and venereal diseases are by now fairly well recognized as playing important roles in the incidence of cancer of the penis (1) and cervix (2, 3). Pereyra (4) in a study of the inmates of a female prison in California, most of whom were prostitutes, reported that cancer of the cervix was 6 times more common among these prisoners than among the general population of that area.

Conversely, and of comparable significance, Gagnon (5) was unable to find a single case of cancer of the cervix in the 13,000 Canadian Catholic celibate nuns he had under observation for 20 years. These nuns came from various Canadian-American family backgrounds where the incidence of cervical cancer is about the same as that of white females in the United States, viz. around 35%. This finding seems to indicate that endogenous factor do not play a significant role in the etiology of cervical cancer.

Dunn et al (6) and many others are convinced that some carcinogen in the preputial smegma from uncircumcised or incompletely circumcised males may be an important etiological factor in cancer of male and female genito-urinary organs. Francis (7) and Palmer et al (8) and others have reported that Jewish women are apparently immune to cancer of the vulva. Corscaden (9) found that cancer of the vagina is relatively as rare in these women as that of the cervix.

For many years it has been an accepted fact, particularly in areas like New York City where there is a large concentration of Jews, that cancer of the cervix is about 10 times more common in Non-Jews than in Jews (2, 3).

The following observations are drawn from the author's urologic experience during 35 years with many thousands of ward and private patients. The statistics to be presented here, however, are based upon 15,790 available records of the all white private urological patients whom he had had under treatment.

Accepted for publication October 2, 1964.

*Based in part on a paper presented at the annual meeting of the American Medical Association, Section on Preventive Medicine held June 24, 1964 in San Francisco.
Having been actively involved in the establishment of urologic departments in 6 Jewish hospitals and a Home and Hospital for Aged Jews in Brooklyn, N. Y. soon after my urological military service in World War I, I developed a private practice of which 90% of the patients were Jewish. Of these about 2/3 were males and 1/3 females (TABLE 1). All Jewish males are completely circumcised by the 8th. day after birth according to ancient custom or ritual. Only about 5% of the Non-Jews in this series were circumcised, more or less completely, at various ages from infancy to adulthood.

Not a single case of cancer of the penis, vulva or vagina was ever found by me among Jews.

**PROSTATE:** In a study of the prostatectomies performed by me on private patients, I was impressed by the difference in the incidence of prostatic cancer between the Jews and Non-Jews as shown in TABLE 2.** In the paper based on a survey of 843 prostate cases published in 1942 (10) and another of 564 cases operated on the 6 year period ending July 1948, the date of my retirement from practice and presented before the 5th. International Congress on Cancer in Paris in 1950 (11), among the 1,275 Jews operated for prostatic obstruction, there were only 23 with cancer, or an incidence of 1.8%. This compared with 25 cancers or 19% in the 132 Non-Jews. This 19% incidence corresponding closely to that reported from other sections of the country where Jews constituted a small minority of the population, thus served as a control.

The average age of the patients in this series was 63.9 years for benign hypertrophy and 63.8 years for cancer among the Jews, and 65.2 years and 66.2 years respectively among the Non-Jews.

Wilhelm (12), Singer (13) and Cambel (14) dealing with predominantly circumcised groups subsequently issued corroborative reports. Neuswanger (15) also reported that prostatic cancer was rare in his Jewish patients.

**BLADDER:** Among the 15,790 patients, there were 330 cases of cancer of the bladder. TABLE 3 shows an incidence in my practice of 1.8% for the 14,034 Jews and 4.7% for the 1756 Non-Jews. There were 248 Jewish cases, of which 206 were males or an incidence of 2.0%, and 42 females with an incidence of 1.1%. Of

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**Table 1.** Ethnic Sex Distribution of 15,790 Private Urological Patients.

<table>
<thead>
<tr>
<th></th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of patients</td>
<td>11,496</td>
<td>4,294</td>
</tr>
<tr>
<td>Jewish</td>
<td>10,213</td>
<td>3,821</td>
</tr>
<tr>
<td>Non-Jewish</td>
<td>1,283</td>
<td>473</td>
</tr>
</tbody>
</table>

**Table 2.** Incidence of Cancer in 1,407 Prostatectomies.

<table>
<thead>
<tr>
<th>Period</th>
<th>Total No.</th>
<th>Cancer</th>
<th>% Cancer</th>
<th>Total No.</th>
<th>Cancer</th>
<th>% Cancer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1930—1941</td>
<td>768</td>
<td>13</td>
<td>1.7</td>
<td>75</td>
<td>15</td>
<td>20.0</td>
</tr>
<tr>
<td>1942—1948</td>
<td>507</td>
<td>10</td>
<td>2.0</td>
<td>57</td>
<td>10</td>
<td>18.0</td>
</tr>
</tbody>
</table>

**Method of calculation shown below in the Discussion.**
A. RAVICH—ROLE OF CIRCUMCISION IN CANCER PREVENTION

Table 3. Ethnic and Sex Distribution and Incidences of 330 Cases of Cancer of the Bladder as Related to the Numbers of Urological Patients Treated.

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>Incidence</td>
<td>No.</td>
</tr>
<tr>
<td>Jewish</td>
<td>248</td>
<td>1.8%</td>
<td>206</td>
</tr>
<tr>
<td>Non-Jewish</td>
<td>82</td>
<td>4.7%</td>
<td>59</td>
</tr>
</tbody>
</table>

The 82 Non-Jewish cases, the 59 males constituted an incidence of 4.6% and the 23 females, an incidence of 4.9%.

The average age of the Jewish males in this bladder series was 57.8 years and females 53.8 years; of the Non-Jewish males 56.4 years and 58.4 years for the females.

Colby (16) and others have reported incidences of about 5% for the bladder cancers under their care.

Table 4. Male Patients Questioned About Gonorrhoeal History.

<table>
<thead>
<tr>
<th></th>
<th>Total No.</th>
<th>Positive History</th>
<th>% Of No. Questioned</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All Cases</td>
<td>Prostates</td>
<td></td>
</tr>
<tr>
<td>Benign Cancer</td>
<td>535</td>
<td>151</td>
<td>28</td>
</tr>
<tr>
<td>Cancer</td>
<td>36</td>
<td>24</td>
<td>67</td>
</tr>
<tr>
<td>Jewish</td>
<td>486</td>
<td>132</td>
<td>27</td>
</tr>
<tr>
<td>Benign Cancer</td>
<td>22</td>
<td>16</td>
<td>73</td>
</tr>
<tr>
<td>Cancer</td>
<td>49</td>
<td>19</td>
<td>39</td>
</tr>
<tr>
<td>Non-Jewish</td>
<td>14</td>
<td>8</td>
<td>57</td>
</tr>
<tr>
<td>Benign Cancer</td>
<td>96</td>
<td>33</td>
<td>34</td>
</tr>
<tr>
<td>Cancer</td>
<td>29</td>
<td>18</td>
<td>62</td>
</tr>
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ROLE OF VENERAL INFECTIONS:

TABLE 4 shows a rather high incidence of prior venereal infections reported by those patients questioned who had cancer of the prostate (67%) and of the bladder in males (41%) as compared with 28% in the benign prostatic cases. These findings may be compared with a reported average of 16~18% in the U.S. Armed Forces from 1900~1910, before prophylactic measure were introduced. This period corresponds to the youthful years of the patients in my series.

During the period of this study, venereal disease had not been suspected as having any relationship to neoplasms, so that no such information was available in the records of the female patients. Only about 1/3 of the prostatic cases and 1/2 of the male bladder cases were interrogated about their gonorrhoeal history. How many more of these patients, both male and female, were infected with Trichomonas vaginalis or other organisms, and how many deliberately falsified their venereal histories is unknown. How many females had become possible carriers of an oncogenic smegma factor through vulvo-vaginitis innocently acquired during their early childhood, or through some venereal infection later in life, which may have become dormant, was also not determined. Careful history taking by others, made aware of this possibility, could be illuminating.

In support of the idea that cancer of the prostate and bladder might be due to an exogenous smegma factor or virus which could be an infectious agent transmitted through sexual intercourse, much like a venereal disease, recent research has established the fact that viruses may invade
or infest bacteria or other organisms. This being so, the Gonococcus, Trichomonas vaginalis and other venereal infectious agents may thus be contaminated or the smegma virus or factor may act independently in producing cancer.

DISCUSSION

Poor sex hygiene, chronic inflammation, trauma from early and frequent coitus and cervical lacerations from multiple child-births have been and still is widely considered as important potential etiological factors in cancer of the cervix. Thus the cervix can be considered an external organ which is subject to those factors in Jews and Non-Jews alike. Yet the incidence of this disease in white Non-Jews in America is around 10 times that in Jews.

The prostate and bladder, however, are definitely internal organs, not subject to the external influences just mentioned. These two organs, however, are very frequently involved in venereal infections by the Gonococcus, Trichomonas vaginalis, etc. What part these organisms play in the cancer process is a moot question. Whether a transmissible smegma virus acting independently or in association with common venereal infections produces cancer of the genito-urinary organs through sexual intercourse, is a distinct possibility and worthy of serious study.

Cancer of the bladder also occurs quite frequently in dye and chemical workers and following Bilharziasis. The latter is endemic and common in Egypt and the surrounding countries. The etiology of these two types of cancer are distinct and need not conflict with the type under discussion.

Since there is no apparent anatomical difference except the presence or absence of the foreskin in Jews and Non-Jews, apparently the only carcinogenic factor that might be suspected is a propagating organism which can invade the prostate or bladder alone or in combination with the Gonococcus or Trichomonas. This organism is probably a virus. Viruses may remain dormant for long periods, and may at some point disappear from the lesions they have produced. These characteristics may account for the fact that a viral agent has not been suspected or detected up to the present time.

Although poor sex hygiene, inadequate hygienic facilities and venereal diseases tend to increase the incidence of genito-urinary cancers in ethnic groups or populations that do not practice circumcision, these factors are not as influential among circumcised groups or populations. This is true for circumcised Moslems in Hindu India and in the Moslem countries where the hygienic facilities are equally poor.

Practically all Jews are fully circumcised soon after birth before the pain sensation develops and the smegma becomes troublesome. At that early age, because the lesion generally heal promptly without complications the glans can be completely exposed without danger of denudation from erections. According to Reiser (17) this is not so when done at a later age. At that time complications such as denudation and infection may occur from painful erections. Ordinarily Moslems are ritually circumcised from the age of 4 to 14—16. In the older Moslem children when the pain sensation is fully developed, only a token part of the prepuce is sometimes ritually removed. Dunn et al (6) found that only 1/2 of circumcised Non-Jews can
be considered completely circumcised. Under such conditions smegma can still persist and develop its carcinogenic capacity.

The findings regarding the low incidence of cancer of the prostate and of the bladder among the Jewish patients in this series may be related to particular social and environmental factors.

During the period studied, about one million Jews lived in Brooklyn, constituting about 40% of the population, and forming the largest single urban Jewish community in the world. Manhattan had 18.5% and the rest of the United States 2.2%. The great majority of the Jewish prostatic and bladder patients in this study were immigrants who came to this country from Eastern Europe between 1890 and 1930, when immigration from these countries were stopped by legislation. In their countries of origin, they had been more or less confined to segregated districts called "Pales" or Ghettos. On arriving in New York and Brooklyn, as brought out by Handlin (18), the Jewish immigrants at first retained their cohesiveness as a group, as did most other large immigrant populations that have passed through this great metropolitan melting pot. However, with the passing of time, social communication with the Non-Jewish population increased steadily. It can be presumed that sexual relations between the two groups also increased, and as a result, this more or less inbred and isolated immigrant Jewish group was increasingly exposed to venereal infections which could be mixed more or less with oncogenic factors from preputial smegma.

By and large the all white patients of the two ethnic groups in this study came from approximately the same economic strata with similar sexual habits and hygienic facilities. The presence or absence of the foreskin seemed the only important difference.

Under the present immigration laws of the United States, such a unique situation and opportunity for comparative study may never again be repeated in this country. Nor would such a study ever be possible in countries with homogeneous populations that either do or do not practice early circumcision. It is also not possible to evaluate date from area where a small minority group practicing circumcision, had over many years become fairly well assimilated socially and sexually.

During a recent visit to Israel by the author, two of its leading urologists, Prof. M. Caine and Dr. J. Singer stated that they failed to find a single case of cancer of the prostate, bladder or cervix in Yemenite Jews who had migrated to Israel en masse in 1950. For centuries in Yemen, capital punishment was meted out to any Jew discovered having sexual relations with a Non-Jew there. Thus the Yemenite Jews constitute another isolated group and the absence of these genito-urinary cancers among them appears to support the findings in may patients.

In view of the high incidence of penile, up to 33%, of all male cancers, and cervical up to 60% of all female cancers in Japan and other Asiatic countries where circumcision is done only for the relief of phimosis, Muir (19) and others beside the author had been unable to explain the very low incidence of cancer of the prostate reported from these countries and particularly from Japan which professed the lowest incidence of this disease of any country in the world. Such reports with
their implication of an inherent ethnic immunity had cast doubt upon the possibility of an exogenous carcinogenic factor responsible for cancer of the prostate as first postulated by the author in 1942.

In the Far East, cancer of the prostate seemed to pose a special statistical problem. While on a recent trip to Japan and Eastern Asia, the author had the pleasure of meeting the distinguished Prof. T. Inada, Head of the Dept. of Urology in the Faculty of Medicine of Kyoto University and Editor of Acta Urologica Japonica with his staff. Since relatively few operations for prostatic cancer were being done by them and others in Japan, they presumed that this disease was rarer there than in the West.

Further inquiry revealed that there had been 14,000 admissions to Dr. Inada’s busy urological clinic in the previous 10 years and that there were only 530 operations for benign hypertrophy and 180 for cancer of the prostate during this period. Thus instead of the 2% cancer incidence widely reported from Japan, the figure according to the American standard of computation, should be 25.4%. According to this standard which was popularized many years ago by Prof. Hugh H. Young, widely recognized as the father of modern urology in America, the incidence was figured as the ratio of the number of cancer cases to the total number of patients with prostatic obstruction, whether benign or malignant, thus:

\[
\text{Incidence} = \frac{\text{No. of prostatic cancer cases}}{\text{Total no. with prostatic obstruction}} \times 100.
\]

For many years this incidence in the United States has been rated at about 20%. Since about 25% of all men over 55 had prostatic disease, around 20% of this number or 5% of all men above this age supposedly developed and were treated for cancer of the prostate.

Prostatic operations in the Orient are far less common than in the United States and some of the other western countries for several reasons. First, the life span is generally shorter, so that most men die before they reach the age of the peak incidence of prostatic cancer which according to Muir is 65—74 years. Secondly, a large majority of even those who reach the prostatic age, various psychological reasons, fear, shame, ignorance or superstitions, do not seek or obtain competent urological examinations or care for their prostatic ailments, but go to witch doctors, quacks, etc. Because of this, many die of prostatic disease without a proper diagnosis being made or registered. Only until very recently in Japan, has there been a gradual increase in the number of prostates who submit to operation, but in the less developed countries of the Far East, the number still remains very low. This leads to a false impression of the real situation in this part of the world.

Within recent years, as a result of the many medical contributions appearing in the literature which emphasized the hygienic value of early circumcision and its role as a cancer preventive, particularly of the penis and cervix, it is commonly held that about 80% of all male infants, white and colored, born in the metropolitan areas of the United States and about 95% in Australia (20) are now being circumcised soon after birth.

The world might with benefit follow the example of the New York City Dept. of
Health which was recently stated to the author as follows: “Everyone agrees that circumcision is an ideal preventive procedure... This practice is a routine one in most institutions and few babies born in hospitals to-day escape this procedure”

SUMMARY AND CONCLUSION

In the 1407 prostatectomies studied, the cancer incidence relative to the total number performed was 1.8% for the Jewish patients, against 19% for the Non-Jews. In the 330 cases of cancer of the bladder in both males and females encountered in a series of 15,790 private, white urological patients of which 90% were Jews, there was an incidence of approximately 1.8% for the Jewish group and 4.7% for the Non-Jewish.

The most important difference between the Jews and Non-Jews was the presence or absence of the foreskin with its smegma, which seems to play a vital role in the occurrence of cancer of these organs. A virus or other carcinogenic factor, presumably present in the preputial smegma is apparently transmissible through sexual intercourse. Theoretically the greater the frequency of such contact with individuals who might harbor a sufficient amount of this factor, the greater the likelihood of acquiring a carcinogenic venereal infection involving the various genito-urinary organs under discussion and leading to cancer. The high frequency of cancer of the cervix among prostitutes, its absence among nuns and the absence of cancer of the cervix, prostate and bladder among segregated Yemenite Jews lends further support to this theory.

What role, if any, do the common venereal infections play in the cancer process? In the cases studied in this paper, the incidence of cancer appears significantly higher in both male Jews and Non-Jews when gonorrhea had been present. Since venereal infectious organisms, as such, have heretofore not been suspected as carcinogenic, what part these might play in conjunction with the suspected cancer factors in the smegma, requires further investigation.

From the data presented, whether the specific etiological factor involved be a virus or some other factor, it appears valid to conclude that the presence of the foreskin represents a potential hazard of significant degree for the future development of genito-urinary neoplasms in both sexes.

Until a specific virus or other carcinogenic factor is isolated and appropriate immunizing measures are developed routine circumcision of new born males seems to be the most effective, readily available and rather simple harmless prophylactic measure against cancer of the prostate and penis as well as of the cervix, vulva, vagina and of the bladder in both sexes. Circumcision has been practiced for many centuries by Jews, Moslems and certain other societies without apparent ill effect. Since the emergence of prehistoric Man from the jungles and his use of protective clothing, the prepuce can be assumed to be a vestigial organ which no longer serves a necessary physiological function. Cancer of these organs represents about 1/4 of all cancers in the United States and considerably more in the Orient.

Local and international health officials and agencies can do much toward the possible prevention of these cancers through a widespread educational program to offset
the apathy, ignorance, superstition, fear and emotionalism that unfortunately still prevails in many parts of the world against the proven benefits of early circumcision.

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REFERENCES