

# Penile Carcinoma: A Retrospective Analysis of Socioeconomic, Demographic and Clinicopathological Data

**Durgesh Kumar<sup>1</sup>, Ravi Arjunan<sup>2</sup>, Ashok Kumar Singh<sup>3</sup>, Ankur Verma<sup>4\*</sup>**

<sup>1</sup>*Assistant Professor, Surgical Oncology, Kalyan Singh Superspeciality Cancer Institute, Lucknow, India.*

<sup>2</sup>*Head of Department of Surgical Oncology, Kidwai Memorial Institute of Oncology, Bengaluru, India.*

<sup>3</sup>*Assistant Professor, Surgical Oncology, Kalyan Singh Superspeciality Cancer Institute, Lucknow, India*

<sup>4\*</sup>*Assistant Professor, Surgical Oncology, Kalyan Singh Superspeciality Cancer Institute, Lucknow, India.*

*Email: <sup>1</sup>dr.durgesh06@gmail.com, <sup>2</sup>rarjunan@yahoo.com, <sup>3</sup>dr.ashokkr06@gmail.com  
Corresponding Author: <sup>4\*</sup>drvankur@gmail.com*

## **Abstract**

**Introduction-** Penile cancer is an uncommon illness in Western nations, but it accounts for around 42% of all urogenital malignancies in India. It has been connected with many variables including old age, improper hygiene, smoking, and absence of circumcision. This research aimed to examine the socio-demographic and clinical features of penile cancer patients who visited a tertiary referral hospital.

**Methods:** The records of all patients suffering from penile cancer who visited a tertiary cancer institution between the years 2009 and 2015 have been compiled into a database. In addition to describing the patients' socioeconomic, demographic, and clinical characteristics, bivariate analyses were carried out.

**Results:** 121 incidences of penile cancer were reported throughout this time. The median age was 55 years on average. A penile ulcer (78.0%) with an exophytic mass (47.1%) and bleeding was the predominant factor in consultations. The glans was the most typical position (50.4%). In our analysis, 26.4% of patients received radical amputation; of which, 54.6% underwent lymph node dissection and had lymph node metastases.

**Conclusion:** Most of the individuals with penile cancer observed in this research had elderly age and had an absence of circumcision. Patients with lymph node metastases required more aggressive surgeries and had a higher incidence of recurrence than those without lymph node involvement. Robust studies are needed to identify risk variables in low-income communities.

**Keywords:** Penile Neoplasms; Circumcision, Male; Smoking; Developing Countries.

## **1. INTRODUCTION**

Cancers of the genitourinary system are among men's most prevalent forms of the disease. According to a review of epidemiological data conducted by Nagpal et al., 16.33% of all male cancers are found in the male genital tract. Penis (42.91%), prostate (40.34%), testes

(15.92%), scrotum (0.71%), epididymis (0.36%), spermatic cord (0.09%), and urethra (0.09%) were the most common sites of malignant tumors in the male genital tract. While it is still relatively rare in the West, penile cancer is increasingly prevalent in developing nations and among immigrants from those developing nations. Less than one per cent of male malignancies are penile cancers, and the average yearly incidence rate was 0.81 per 100,000 men in the United States when adjusted for age [2,3].

According to the findings of GLOBOCAN 2020, there are around 36,000 new cases of carcinoma penis diagnosed each year, with an adjusted incidence of 0.80 and a fatality rate of 0.29 per million. It has been reported that the incidence and fatality rates are highest in South America. The age-adjusted incidence and death rates for this illness in South East Asia are 0.83 and 0.32 per million, respectively. There have been very few reports of this illness in nations like Polynesia and Micronesia.

Circumcision rates, hygiene levels, phimosis, the number of partners in a sexual relationship, the presence of human papillomavirus (HPV), and cigarette use are all variables in developing penile cancer [4,5,6]. The median age at diagnosis in the United States is 68 years, and the risk rises sharply after age 50 [7]. Although up to 15% of cases occur in males less than 50 years, penile cancer is mostly a disease of older men.

Malignant transformation of condyloma acuminata has been linked to some forms of human papillomavirus (HPV), including HPV-16 and HPV-18, found in around 50% of males with penile cancer [8]. Penile cancer risk is increased by sexual practices such as having many sexual partners throughout a lifetime [4, 5]. Human immunodeficiency virus (HIV) is linked to an 8-fold increase in the risk of penile cancer; however, the greater frequency of HPV among males with HIV may partially mitigate this association [9]. The chance of developing penile cancer is raised by three to four and a half times in cigarette smokers [5, 6] and by the same amount in abusers of some other tobacco products [10].

Data from most large series show that penile cancer is rare among neonatally circumcised individuals but more frequent when circumcision is delayed until puberty [11-13]. Similarly, Paymaster and Gangadharan reported an incidence of 3.3% among non-circumcised individuals and 0% in those circumcised after birth. [14]

### **Data collection and analysis**

This is a case series of patients hospitalized at the Department of Surgical Oncology at the Kidwai Cancer Institute in Bengaluru between 2009 and 2015 with a histological diagnosis of penile cancer. The facility in Bengaluru, where the research was conducted, admits patients from all across India and is among the most important public institutes in the nation. The patient records of individuals diagnosed with penile squamous cell carcinoma malignancy were examined. The current worldwide TNM classification was used for cancer staging.

Three categories of information were gathered: sociodemographic traits, the patient's clinical characteristics, and the tumour's characteristics. Using the Microsoft Access 2010® application, the database was built. Patients were divided into groups based on their religion (Hindu, Muslim, and others), age (more than 40 years or less), and mode of presentation (ulcer, exophytic ulcer, ulcers-proliferative) and others (phimosis, post-operative with groin nodes, etc.)

Statistical analysis:

Analysis was done both on a univariate and bivariate level. The variables were described using average and standard deviation (SD) for quantitative variables and frequencies and percentages for categorical variables. The variables' characteristics dictated the subsequent hypothesis testing procedures. The number of groups, the normal distribution, and the equal variances of the variables investigated all favoured the application of the student t-test for quantitative data. Fisher's exact test was used to examine the significance of categorical variables. Stata13® was used for all statistical analysis, and a 0.05 threshold of significance was applied to all data (StataCorp, TX, USA).

## 2. RESULTS

### Description of the Study Population

The original database had 130 clinical histories, of which 9 had to be excluded: 5 did not have penile cancer, 3 were not squamous carcinoma, and 1 had no verified diagnosis. Following the exclusions, 121 hospital notes were evaluated in total.

The range of ages ranged from 30 to 85 years, with a mean age of 55. At presentation, 11.5 percent of patients were younger than or equal to 40, while 88% were older than 40. In our sample, none were Muslims, 94.2% were Hindus, and the remaining 5% consisted of Christians, Sikhs, etc.

Table 1. Demographic and clinical data

<b>Age</b>	
<= 40 yrs	14
>40 yrs	107
<b>Religion</b>	
Hindu	114(94.2%)
Muslim	0(0%)
Other	7(5.7%)
<b>Substance abuse</b>	
Tobacco intake	47
Smoking	35
No history of tobacco/smoking	39
<b>Cause of consultation</b>	
Bleeding	4(3.3%)
Ulcer	95(78%)
Difficulty in urination	4(3.3%)
Phimosis	9(7.4%)
Groin swelling	9(7.4%)
<b>Form of presentation</b>	
exophytic mass	57(47.1%)
Ulcer	46(38%)
Other (post op groin nodes etc.)	18(14.8%)
<b>Tumour localization</b>	
Prepuce	16(13.2%)

Glans	61(50.4%)
penile shaft	26(21.4%)
<b>Sexually transmitted disease</b>	
HIV	5(4.1%)
<b>Presentation</b>	
Ulcer	4(80%)
Bleeding	1(20%)

### Clinical Features

The emergence of ulceration on the patient's penis constituted the most common reason for consultation (78%), followed by phimosis, groin oedema (7.4%), and trouble urinating, along with bleeding manifestation (3%). 47.1% of patients on the physical exam had an exophytic tumour, and 38.0% had an ulcer. 14.8% of patients were evaluated for phimosis or groin swelling. 50.4% of tumours involved the glans, 21.4% the penile shaft, and 13.2% the prepuce.

In our research, 86.7% of patients denied a history of sexually transmitted diseases (STDs); 4.1% reported a history of human immunodeficiency virus (HIV) infection, and other STDs were not reported. The average age of patients with a history of sexually transmitted diseases (STDs) was 49.8 years, significantly lower than that of patients without such a history, which was 51.4 years. Eighty per cent of patients with an STD history reported an ulcerative lesion (Table 1).

TABLE 2. Tumour characteristics and treatment

<b>Stage</b>	
TX	21(17.3%)
T1	29(24%)
T2	67(55.3%)
T3 OR MORE	11(10%)
<b>Histological grade</b>	
G1	56(46.3%)
G2	44(36.3%)
G3	17(14%)
Number of patients with palpable lymph node	95(78.5%)
Number of patients with metastatic lymph node	36(37.9%)
<b>Treatment</b>	
Partial penectomy	79(65.3%)
Total penectomy	32(26.4%)
Laser treatment	4(3.3%)

### Tumour Features

Almost half of the patients had reached an advanced clinical stage of T2 or T3 (55.3 and 10%, respectively). As per histological grade, 46.3% of cases were classified as G1, followed by 36.3% of G2.

Of the patients analysed, 78.5% had involvement of several superficial inguinal nodes; however, only 37.9% presented with metastatic disease, meaning that 62% were reactive, and those who showed metastatic disease were treated by inguinal block dissection.

Partial amputation was performed on 65.3% of patients, radical amputation on 26.4%, and laser therapy on 3.3%. Lymph node dissection was performed on 38% of these individuals (Table 2)

There was a significant difference in the number of positive lymph nodes between patients with radical inguinal dissection and those without (positive nodes: 55.0% and 13.5%, respectively,  $p=0.015$ ; ulcerative lesions: 77.8% and 29.7%, respectively,  $p=0.018$ ). Only 5.8 per cent of patients had a recurrence; 33.2 per cent were in the stump region. Lymphadenopathy ( $p=0.02$ ) and a previous circumcision ( $p=0.015$ ) were significant predictors of recurrence.

### 3. DISCUSSION

The present study allowed for a description of the sociodemographic and clinical characteristics of patients diagnosed with penile cancer who consulted to tertiary-level referral institutions in India over 7 years (2009-2015).

Patients in our research ranged in age from 30 to 85; however, 88% were above 40, which is consistent with the fact that penile cancer is more common in the over 60 years. The diagnosis of cancer of the penis in a patient younger than 40 is very rare. [15] Cancer of the penis is seldom observed in research with participants younger than 40. [16] Among our research sample, we observed that 11%, or 14 of 121 patients, were under 40. Our youngest patient was just 30 years old.

The lack of a Muslim patient population in our research may be attributable to the cultural norm of circumcision. Muslim and Jewish men who choose to circumcise have been shown to have a much lower risk of developing penile cancer. [17]

Although prior studies have shown phimosis in between 25% and 60% of penile cancer patients, this research found it present in only 7.4% of patients. [5,9] The chance of developing penile squamous cell carcinoma was shown to be considerably higher in those with phimosis (odds ratio [OR] = 3.39). [18] For this reason, circumcision, which prevents phimosis, may safeguard against the spread of invasive penile cancer. [19,20] Awareness in research is essential for health staff, particularly medical students, since there may have been a misreporting of patients with phimosis in this study owing to insufficient data entry of the physical examination results in the patient records.

Supporting the previously documented substantial connection with circumcision at birth or during childhood under sterile care and the decreased risk of penile cancer (OR = 0.41), most patients (92%) had never been circumcised at the time of diagnosis. [10,20] However, circumcision is not always protective since it only helps those with preexisting phimosis from developing cancer. [12] There is speculation that phimosis facilitates the continuous irritation of penile mucosa by the smegma components, hence setting off inflammatory processes and leading to the development of chronic lesions. [12,13]

Only 4.1% of the patients reported having a history of STDs, although earlier studies have shown that as many as 76% of patients with penile cancer had a history of STDs. Patients' reluctance to seek care, or their failure to do so because of a lack of awareness or education, might be one cause of this [21]. Several variables, including memory bias in the elderly and the absence of a definitive diagnosis or empirical treatment of potential STDs in older patients, may contribute to the observation that younger males have a higher prevalence of

STD history. Tobacco use increases the likelihood of developing penile cancer; our research found that around 68% of patients had a history of using tobacco products.

The glans penis was found to be involved in 50.4% of cases, the shaft in 21.4%, and the prepuce in 13.2%, which is consistent with the findings of most peer-reviewed studies, which indicated that the body of the penis was implicated in fewer than 5% of instances of penile cancer. [8, 18]. We found that 50% of the patients were diagnosed at T2 or T3 stage. Therefore, these numbers are consistent with our research. [22] While this suggests that most people are still presenting to doctors at a late stage of illness, it does suggest that earlier diagnosis and, maybe, better treatment and disease management are the norm today. This calls for long-term research of penile cancer's prevalence and clinical presentation in rural and urban areas so that we may assess how well we treat people as their disease advances. Penile cancer is a local-regional malignancy affecting the inguinal and pelvic lymph nodes before spreading to other body parts. This may explain why individuals with nodal involvement are more likely to have metastasis. [8, 14]

In our research, individuals with a history of STD were statistically significantly more likely to present with an ulcerative lesion than patients without a history of STD. A correlation between STD history and the kind of penile cancer lesion has not before been observed. In addition, none of our patients had a history of excision for premalignant illnesses or disorders.

Of those patients who underwent radical amputation (26.4 %) in our study, 54.6 % also had lymph node dissection, and 57% had an ulcerative type of cancer presentation. This can be correlated with the fact that more advanced stages of the disease present with greater involvement of lymph nodes and that ulcerative lesions are usually more infiltrative and therefore require more radical treatment. [23]. Partial or total penectomy with inguinal block dissection is still the standard of care at various hospitals in India. Whereas the use of sentinel node biopsy, limited groin dissections, and penile preservation in early cancer with the help of laser surgery are offered to patients to improve their quality of life and limit the morbidity of the surgery.

The nature and constraints of a retrospective analysis based on a review of medical records must be considered. The loss of data, lack of information on medical records, and inability to study risk factors and variables of interest are the primary causes of these restrictions. Some factors that may have strengthened the relevance of the correlation hypothesis were omitted. Neither the beginning age nor the Index of Packs per Year (IPA) was considered regarding smoking. To establish a stronger association between poverty and penile cancer, examining sociodemographic characteristics such as the patient's income, smoking history, educational level, marital status, and socioeconomic position would be important. Knowing the overall number of sexual partners or the age of the first sexual encounter would offer information about further exposure to behaviours that raise the risk of sexually transmitted diseases and penile cancer. There was no information on the patient's hygiene practices, which have been strongly linked to the development of penile cancer [21].

#### 4. CONCLUSION

Most penile cancer patients at this referral centre were elderly and uncircumcised. Patients who came at later stages of the illness with lymph node metastases required more aggressive procedures and had a higher recurrence incidence than those who did not have lymph node involvement. Most of the results of this study are consistent with those reported earlier in the published research; notwithstanding, a number of the limitations discovered during this

project were attributable to the improper handling of the medical records and the consequential loss of a substantial amount of valuable data. Therefore, it is vital to emphasise to the medical professionals responsible for completing medical records the significance of mentioning the least required data, such as sociodemographic variables. This allows for more robust analyses and the identification of crucial risk variables.

To have a better knowledge of penile cancer, more research is required to identify relevant variables and test the suggested hypothesis generated by this study.

### Footnotes

**Source of Support:** Nil

**Conflict of Interest:** No

## 5. REFERENCES

1. Curado MP, Edwards B, Shin HR, Storm H, Ferlay J, Heanue M, et al. Cancer Incidence in Five Continents. France: International Agency for Research on Cancer (IARC). World Health Organization; 2007p.
2. Jemal A, Siegel R, Ward E, Murray T, Xu J, Thun MJ. Cancer statistics, 2007. *CA Cancer J Clin.* 2007 Jan-Feb; 57(1):43-66.
3. Parkin DM, Ferlay J, Curado MP, Bray F, Edwards B, Shin HR, et al. Fifty Years of cancer incidence: CI5 I-IX. *Int J Cancer.* 2010 Dec 15; 127(12):2918-27.
4. Velazquez EF, Cubilla AL. Penile squamous cell carcinoma: anatomic, pathologic and viral studies in Paraguay (1993-2007). *Anal Quant Cytol Histol.* 2007 Aug;29(4):185-98.
5. Favorito LA, Nardi AC, Ronalsa M, Zequi SC, Sampaio FJ, Glina S. Epidemiologic study on penile cancer in Brazil. *Int Braz J Urol.* 2008 Sep-Oct;34(5):587-93.
6. Cubilla AL. The role of pathologic prognostic factors in squamous cell carcinoma of the penis. *World J Urol.* 2009 Apr;27(2):169-77.
7. Cubilla AL, Velazquez EF, Young RH. Epithelial lesions associated with invasive penile squamous cell carcinoma: a pathologic study of 288 cases. *Int J Surg Pathol.* 2004 Oct;12(4):351-64.
8. Kayes O, Ahmed HU, Arya M, Minhas S. Molecular and genetic pathways in penile cancer. *Lancet Oncol.* 2007 May;8(5):420-9.
9. Gross G, Pfister H. Role of human papillomavirus in penile cancer, penile intraepithelial squamous cell neoplasias and in genital warts. *Med Microbiol Immunol.* 2004 Feb;193(1):35-44.
10. van Geel AN, den Bakker MA, Kirkels W, Horenblas S, Kroon BB, de Wilt JH, et al. Prognosis of primary mucosal penile melanoma: a series of 19 Dutch patients and 47 patients from the literature. *Urology.* 2007 Jul;70(1):143-7.
11. Fetsch JF, Davis Jr CJ, Miettinen M, Sesterhenn IA. Leiomyosarcoma of the penis: a clinicopathologic study of 14 cases with review of the literature and discussion of the differential diagnosis. *Am J Surg Pathol.* 2004 Jan;28(1):115-25.
12. Daling JR, Madeleine MM, Johnson LG, Schwartz SM, Shera KA, Wurscher MA, et al. Penile cancer: importance of circumcision, human papillomavirus and smoking in in situ and invasive disease. *Int J Cancer.* 2005 Sep 10;116(4):606-16.
13. Calmon MF, Tasso Mota M, Vassallo J, Rahal P. Penile carcinoma: risk factors and molecular alterations. *ScientificWorldJournal.* 2011 Feb 3; 11:269-82.

14. Pow-Sang MR, Ferreira U, Pow-Sang JM, Nardi AC, Destefano V. Epidemiology and natural history of penile cancer. *Urology*. 2010 Aug;76(2 Suppl 1): S2-6.
15. Kamat MR, Kulkarni JN, Tongaonkar HB. Carcinoma of the penis: the Indian experience. *J Surg Oncol* 1993; 52:50–5.
16. Vedala S B, Chary K S N. A clinicopathological prospective case study of carcinoma penis. *International Journal of Surgery Science* 2021; 5(2): 35-39
17. Maden C, Sherman KJ. History of circumcision, medical conditions, and sexual activity and risk of penile cancer. *J Natl Cancer Inst* 1993; 85:19–24.
18. Barnholtz-Sloan JS, Maldonado JL, Pow-Sang J, Guiliano AR. Incidence trends in primary malignant penile cancer. *Urologic Oncology: Seminars and Original Investigations*; 2007: Elsevier; 2007. p. 361-7
19. Madsen BS, van den Brule AJ, Jensen HL, Wohlfahrt J, Frisch M. Risk factors for squamous cell carcinoma of the penis—population-based case-control study in Denmark. *Cancer Epidemiol Biomarkers Prev*. 2008 Oct;17(10):2683-91.
20. Larke NL, Thomas SL, dos Santos Silva I, Weiss HA. Male circumcision and penile cancer: a systematic review and meta-analysis. *Cancer CausesControl*. 2011 Aug;22(8):1097-110.
21. Chaux A, Netto GJ, Rodríguez IM, Barreto JE, Oertell J, Ocampos S, et al. Epidemiologic profile, sexual history, pathologic features, and human papillomavirus status of 103 patients with penile carcinoma. *World J Urol*. 2013 Aug;31(4):861-7
22. Lina M. Rengifo,1 Maria del M. Herrera et al. Penile Cancer in Cali, Colombia: 10 Years of Casuistry in a Tertiary Referral Center of a Middle-Income Country *Int J Med Students* • 2014 | Jul-Oct | Vol 2 | Issue 3
23. Guimarães GC, Rocha RM, Zequi SC, Cunha IW, Soares FA. Penile cancer: epidemiology and treatment. *Current oncology reports*. 2011;13(3):231-9.