Dissertation on

EPIDEMIOLOGY AND MANAGEMENT OF CARCINOMA PENIS IN TMCH

MS Degree Examination

Branch-I

General Surgery

Thanjavur Medical College
The Tamilnadu Dr.MGR Medical University
Chennai
March-2008

CERTIFICATE

This is to Certify that this dissertation entitled '**EPIDEMIOLOGY AND MANAGEMENT OF CARCINOMA PENIS' IN TMCH** is a bonafide record work done by Dr. M.PREMA, submitted as a partial fulfillment for the requirements of M.S. Degree Examination Branch-I, general Surgery March 2008.

Prof.Dr.T.ANANTHARAMAKRISHNAN. M.S, FICS
Prof. of operative Surgery
Professor &Unit Chief
Department of General Surgery,
Thanjavur Medical College,
Thanjavur.

Prof. Dr. G.AMBUJAM. M.S, FICS,
Prof& Head of the Department,
Department of General Surgery
Thanjavur Medical College,

Dr.R.M.NATRAJAN.M.S.,
The Dean,
Thanjavur Medical College,
Thanjavur.

ACKNOWLEDGEMENT

I express my deep sincere gratitude to Prof. Dr.T.ANANTHARAMAKRISHNAN,.M.S.,FICS my beloved teacher, unit chief and my guide for his constant guidance, encouragement and untiring help during my study.

I am deeply indebted to Prof. Dr.G.AMBUJAM. M.S.,FICS, head of the department of surgery for her guidance and suggestions through out my study.

I express my sincere thanks to Prof. Dr.MOHAMMED ISMAIL.M.S, Prof. Dr. DEVAKUMARI M.S ,D.G.O,Prof Dr. R.THIRUNAVUKARASU M.S,D.L.O, Prof. V. THIRUGNANAM. M.S, MCH, Prof.Dr G.VENKATESAN.M.S., and Prof Dr.MARUDHAVANAN.M.S.,for their help and encouragement.

I extend my thanks to Dr. G. RAVIKUMAR.M.S,MCH, Dr.ELANGOVAN.M.S, Dr.PREMALATHA.M.S.,DMRT., for their timely suggestions and guidance through out the study.

I thank the Dean, Thanjavur Medical College for permitting me to use the hospital facilities for my study. My sincere thanks to the professor, assistant professors and post graduates of pathology department and Radiotherapy department for their kind co-operation and assistance.

I express my sincere thanks to all patients who inspite of their physical and mental suffering have co-operated and obliged to my request for regular follow up.

INDEX

INTRODUCTION

Carcinoma penis although rare in Western countries, constitutes a substantial health concern in many of the developing countries including India. It accounts for 0.4 - 0.6% of all male cancers in Western countries as compared to 10-20% in developing countries of Asia, Africa where early circumcision is not routinely practiced. Development of penile carcinoma has long been associated with poor hygiene & exposure to still unidentified irritants or carcinogens in the smegma of uncircumscised men. Carcinoma penis is a potentially curable cancer attended by various modalities of treatment including surgery , radiotherapy and chemotherapy. Reports have confirmed the importance of tumour grade, depth of invasion, tumor configuration and lymph node involvement with respect to both prognosis and treatment planning in the management of penile carcinoma. As per the 2001-2002 statistics among Indian Population Based Cancer Registries (PBCR) penile cancer has been high in Chennai & Barshi. Tanjore stands 12th in the district wise comparison of age adjusted incidence rate (with incidence rate of 1.3 per 1 lakh) the highest AAIR being 3.1 per 1 lakh in Villupuram district of Tamilnadu.

AIM OF THE STUDY:

The objectives of this prospective clinical study are

(1) To analyse the epidemiological, clinical and pathological characteristics of carcinoma penis and their influence on the outcomes of management strategies adopted in Thanjavur Medical College.

(2) To demonstrate relation among tumor grade, type of growth, tumor configuration , nodal metastasis and stage of tumour and thereby its prognosis & treatment planning.

(3) To analyse the acceptability, compliance, advantages disadvantages of various modalities of treatment.

REVIEW OF LITERATURE

Development

Embryologically three erectile bodies of penis arise from genital tubercle and urethral folds. As genital tubercles enlarge and elongate they form corpora cavernosa. The urethral folds lie on either side of the endodermal lining of the phallic part of the urogenital sinus, the urethral plate. The urethral folds fuse with each other and form the penile urethra. Distal urethra is ectodermal in origin. Prepuce is formed by reduplication of the ectoderm covering the distal part of the phallus.

Anatomy of penis

Penis is the male copulatory organ and conveys urethra, the common outlet for urine & semen. Penis consists of root, body and glans. It is composed of three cylindrical bodies of erectile cavernous tissue, the paired corpora cavernosa dorsally and the single corpus spongiosum ventrally.

Root

Root of the penis is the attached part consists of two crurae, a bulb, ischiocavernosus and bulbospongiosus muscles. Root is located in the superficial perineal pouch. Each crux is attached to

inferior part of internal surface of the corresponding ischial ramus. The enlarged part of bulb of penis is penetrated by the urethra.

Body

Body is the free pendulous part that is suspended from the pubic symphysis. Body of penis consists of thin skin, connective tissue, blood & lymphatic vessels, fascia, two corpora cavernosa and one corpus spongiosum containing spongy urethra. Each cavernous body has an outerfibrous covering or capsule the tunica albugenia, superficial to the outer covering is the deep fascia of penis the Buck's fascia, the continuation of deep perineal fascia. Buck's fascia forms a strong membranous covering and acts a natural barrier to the spread of carcinoma. Internally cavernous tissue of corpora is separated by septum penis.

Glans:

Distally corpus spongiosum expands to form the conical glans of the penis or head of the penis. The margins of the glans project beyond the ends of corpora cavernosa to form corona of the glans. The corona overhangs an obliquely grooved constriction, the neck of the glans which separates the body from glans. The slit like opening of the spongy urethra the external urethral orifice is near the tip of the glans. At the neck of glans, skin and fascia of the penis are

prolonged as a double layer of skin the prepuce or foreskin which covers glans to a variable extent. The frenulum of the prepuce is a median fold that passes from the deep layers of the prepuce to the urethral surface of the glans.

Suspensory ligament of penis is a condensation of deep fascia that arises from the anterior surface of public symphysis.

ARTERIAL SUPPLY OF PENIS

Penis is supplied mainly by branches of internal pudendal artery

1. dorsal arteries of penis: run on each side of deep dorsal vein
2. deep arteries of penis: pierce the crura proximally. These are the major vessels that run near the center of the corpora cavernosa supplying the erectile tissue on the corpora cavernosa.They are involved in erection of penis
3. artery of bulb of the penis: supplies posterior part of corpus spongiosum and bulbourethral gland

In addition superficial and deep branches of the external pudendal arteries supply penile skin anastamosing with branches of internal pudendal artery.

VENOUS DRAINAGE

Blood from cavernous spaces is drained by a venous plexus that join the deep dorsal vein of penis which drains into prostatic

venous plexus. Blood from superficial coverings of the penis drain into superficial dorsal veins which drain into superficial external pudendal vein.

LYMPHATIC DRAINAGE

Daseler described inguinal and iliac lymph nodes lying in a quadrilateral area bounded superiorly by a 12cm line 1 cm above and parallel to inguinal ligament, medially a 15 cm line vertically down from the public tubercle, laterally a 20 cm line from superior horizontal line, inferiorly a line joining medial and lateral line.

Superficial nodes are divided into 5 groups superolateral superomedial, inferolateral, inferomedial and central. The sentinel node is found in the superomedial zone. Deep inguinal nodes lie under the fascia lata medial to the femoral vein. A most constant node is found is the femoral canal between the femoral vein and the lacunar ligament, the cloquet node

Iliac nodes consists of 3 groups

1) external iliac nodes 2) hypogastric 3) common iliac.

External iliac are further divided into lateral medial and obturator nodes.Skin of the prepuce is drained primarily to superficial

inguinal nodes. Lymphatics of glans drain into deep inguinal nodes. Lymphatics of corporal bodies may drain to superficial or deep inguinal nodes or external iliac nodes.

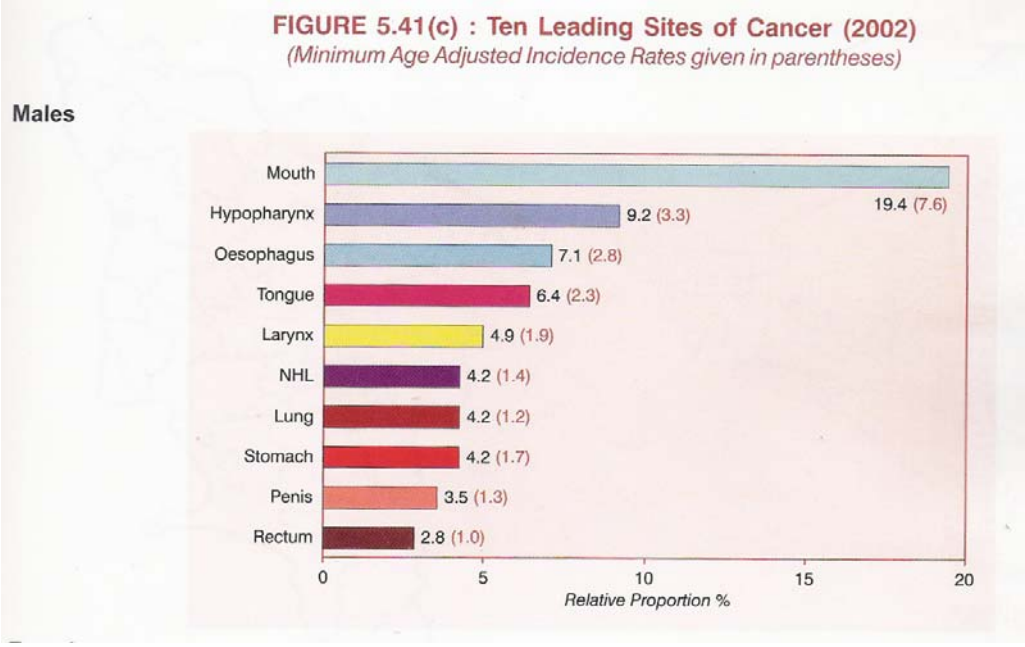
Innervation

Efferent nerve impulses pass down the spinal cord to parasympathetic outflow in S2, S3, S4 segments. Parasympathetic post ganglionic fibres from hypogastric plexus reach along internal pudendal arteries to penis, sympathetic supply is from T1 to L2.

Epidemiology of carcinoma penis

Penile carcinoma accounts for 0.4 - 0.6% of all male malignancies in the developed world. But in developing countries of Asia, Africa, South America it accounts for as many as 10-20% of male cancers.As per 2001 – 2002 national cancer statistics, carcinoma penis is the ninth leading cause of cancer in men in thanjavur district, accounting for 3.5% of all cancers in men. The age adjusted incidence rate (AAIR) is 1.3 per one lakh ,the highest AAIR being 3.1 per one lakh in villupuram district of Tamilnadu.

However reports suggest that incidence of penile cancer is decreasing in many countries including India. This may be related in part to increased attention to personal hygiene.



1) Age:

Penile cancer is a disease of older men with an abrupt increase in incidence in the sixth decade of life. In two studies mean age was 58 yrs (Gursel et al 1973) and 55 yrs (Derrick et al 1973)

Risk factors

2) Absence of circumcision , phimosis & smegma :

Neonatal circumcision is a well established prophylactic measure that virtually eliminates occurrence of penile carcinoma. The chronic irritative effect of smegma a byproduct of bacterial action on desquamated cells within the prepucial sac has been proposed as an etiologic agent. Improper hygiene can lead to building up of smegma beneath the prepucial foreskin with resulting inflammation. Healing by fibrosis leads to phimosis of the prepucial skin which tends to perpetuate the cycle. Adult circumcision offers little or no protection from subsequent development of the disease.

3. Sexual promiscuity and HPV infection

Advanced molecular biologic techniques such as PCR and in situ hybridization have provided increased evidence for an etiologic role for Human Papilloma Virus by identifying specific DNA sequences from different HPV types in primary penile lesion.

HPV types 6 & 11 are most commonly associated with nondysplastic lesions such as genital warts whereas HPV types 16,18,31,33 are associated with insitu and invasive carcinomas. (Wiener & Walther 1998) Maden & colleagues found incidence of HPV infection directly correlated with the number of lifetime sexual partners and that the latter was also related to risk of penile cancer. Wiener & Walther 1995 showed that 31% - 63% of patients with penile cancer test positive for HPV.

4) Exposure to Tobacco

As proven by 4 studies, all forms of tobacco including cigarettes, tobacco chewing & snuff were significantly and independently related to incidence of penile cancer. Tobacco products can act in the presence of HPV infection or bacteria associated with chronic inflammation to promote malignant transformation.

5) UV radiation :

Patients treated with PUVA and methoxy psoralen have increased incidence of ca penis.

No convincing evidence have been found linking penile cancer to other factors like other sexually transmitted diseases, alcohol intake

Premalignant Conditions of Carcinoma Penis

1. Balanitis xerotica obliterans

This is a genital variation of lichen sclerosis et atrophicus which presents as a whitish patch on the prepuce or glans often involving the meatus and sometimes extending into fossa navicularis. It is associated with squamous cell carcinoma of penis.

2**. Condyloma acuminata** are soft papillomatous growths that are considered to be benign but have been reported to undergo malignant transformation. (Boser, Skinner 1977)

3**. Leukoplakia** : Solitary or multiple whitish plaques. This disorder has been associated with both in situ carcinomas and verrucous carcinoma of penis.

4**. Bowenoid papillosis**

Present as multiple papules on penile skin. A causative role for Human papilloma virus is suspected. Although histologically this condition is carcinoma in situ clinical course of bowenoid papullosis is invariably benign.

5**. Penile cutaneous horn**

6**. Pseudoepitheliomatous micaceous keratotic balanitis**

7**. Erythroplasia of queyrat.**

8. **Buschke-lowenstein tumour :** It differs from condyloma acuminata in that condyloma regardless of size always remains superficial & never invades adjacent tissue whereas Buschke-Lowenstein tumour displaces, invades, destroys adjacent structures by compression. Apart from this unrestrained growth it demonstrates no signs of malignant change on histologic examination and does not metastasize.

Differential Diagnosis :

1. Chancre
2. Chanchroid
3. Lymphogranuloma venerum
4. Chronic balanoposthitis
5. Condyloma acuminata
6. Buschke Lowenstein lesion

Natural History and Clinical Presentation

Spectrum of clinical presentations range from seemingly innocuous areas of indurations or small warty growth to obvious extensive destruction of the organ with sloughing and auto amputations.

Earliest symptoms are itching or burning under the foreskin, ulceration, discharge or foul smell. But later develop lump, nodule, or cauliflower like growth, bleeding, until total destruction of phallus occurs. Bucks fascia acts as a temporary natural barrier to local extension of the tumor, protecting corporal bodies from invasion. penetration of Buck's fascia and tunica albugenia permits invasion of the vascular corpora and establishes the potential for vascular dissemination. Urethral involvement is late & presents with obstruction or fistula. Bladder and prostatic involvement may also occur.

In advanced stages in presents as mass, ulceration, suppuration or haemorrhage in inguinal area due to the presence of nodal metastasis from a lesion concealed within a phimotic foreskin.

Metastatic involvement of the regional nodes eventually leads to skin necrosis, chronic infection and death from inanition, sepsis or haemorrhage secondary to erosion into femoral vessels. Clinically detectable distant metastatic lesion to the lung, liver, bone or brain are uncommon and may occur late in the course of the disease.

Pathology :

95 % of the penile cancers are squamous cell carcinomas. The rest is formed by adenocarcinoma, melanoma , basal cell carcinoma, lymphoma , sarcoma etc.,

Morphologically, squamous cell carcinomas usually starts as a small crusted papule on the glans or prepuce. As the plaque grows the lesion may be papillary and exophytic or flat and ulcerative. The ulcerative type has a tendency towards earlier nodal metastasis (Ornellas, 1994, Dean, 1935, Marcial 1962). Lesions larger than 5 cm and those extending over 75% of the shaft (staubitz et al, 1955) are associated with an increased incidence of metastasis and decreased survival (Puras et al 1978)

Histologically, 60 % of squamous cell carcinomas resemble those in other areas demonstrating keratinisation, epithelial pearl formation, various degrees of mitotic activity.An in situ tumour shows replacement of full epidermal thickness by atypical and dysplastic cells with nuclear pleomorphism, hyperchromasia, abnormal mitotic figures and intact basement membrane. Invasive tumour penetrates the basement membrane and surrounding structures.

From a histological stand point squamous cell carcinoma are graded using Broder's classification to define the level of differentiation based on keratinisation , nuclear pleomorphism and number of mitoses.

Broder's system of grading of Squamous cell carcinoma

Grade	**Differentiation**	**Histological features**
I	Well differentiated	Prominent intercellular bridges. Prominent Keratin pearl formation. Minimal atypia Rare mitotic figures
II / III	Moderately differentiated	Occasional intercellular bridges. few Keratin pearls Great nuclear atypia increased mitotic figures.
IV	Poorly differentiated	Marked nuclear pleomorphism numerous mitotic figures Necrosis No Keratin pearls Lymphatic, Perineural invasion.

Low grade lesions (grade 1 & 2) constitute 70-80% of the reported cases. Low grade lesions typically demonstrate keratin, prominent intercellular bridges & keratin pearls. Only 10% tumor located in the prepuce are high grade tumors. Whereas half the

tumours originating from the shaft are poorly differentiated. (Maiche et al 1998). Thus grade & stage are often correlated.

Maiche & colleagues proposed a more objective form of histologic evaluation. This modified system uses an overall score based on the degree of keratinisation, number of mitoses, cells per high power field, cellular atypia and presence of inflammatory cells to grade the tumour.

Histological grade, depth of invasion and vascular invasion by tumour cells have significant prognostic importance and need to be fully evaluated before initiation of therapy.

STAGING OF PENILE CARCINOMA

From a historical prospective **Jackson's staging system** represents the original penile cancer staging system. (Jackson 1966).

Stage I Tumour confined to glans, prepuce or both.

Stage II Tumour extending to shaft of penis

Stage III Tumour with inguinal metastasis that are operable.

Stage IV Tumour involving adjacent structure, tumour associated with inoperable nodal metastasis or distant metastasis.

TNM Classification

The 1978 TNM version is favoured by Horenblas (1994) because it is a clinical stage that can be assigned before definite therapy. It has prognostic significance.

TNM classification (1978)

Primary tumour (T)

Tis - preinvasive carcinoma

To -No evidence of primary tumour

T1- Tumour 2 cm in greatest dimension, superficial exophytic.

T2 - Tumour > 2 cm but < 5 cm in the greatest dimensions or tumour with minimal extension.

T3 - Tumour >5 cm in greatest dimension or tumour with deep extension, including the urethra.

T4 Tumour infiltrating neighbouring structures.

Tx - Minimal requirements to assess the primary tumour cannot be met

Nodal disease (N).

No – no evidence or regional lymphnode involvement.

N1- evidence of involvement of movable unilateral regional lymph node.

N2 - evidence of involvement of movable bilateral inguinal lymph nodes.

N3 - evidence of involvement of fixed regional lymph nodes.

Nx- Minimum requirements to assess the regional lymphnodes cannot be met.

Metastatic disease (M)

Mo- No evidence of distant metastasis.

M1- evidence of distant metastasis

Mx- Minimum requirements to assess the presence of distant metastasis cannot be met.

The current TNM (1989) system represents a pathologic staging in which nodal histology must be assessed. In 1997 AJCC / UICC TNM staging system the primary tumour stage is assigned by biopsy and additional factors like tumour grade and vascular invasion are also assessed.

AJCC staging for penile Cancer

Primary tumour (T)

Tx - primary tumour cannot be assessed.

To - No evidence of primary tumour

Tis - carcinoma in situ

Ta - Non invasive verrucous carcinoma

T1 - Tumour invades subepithelial connective tissue.

T2 - tumour invades corpus spongiosum or cavernosum.

T3 - tumour invades urethra or prostrate

T4 - tumour invades other adjacent structures.

Lymph nodes (N)

Nx - Regional nodes cannot be assessed.

No - No regional lymph node metastasis

N1 - metastasis in a single regional lymph node.

N2 - metastasis in multiple or bilateral superficial inguinal lymph nodes.

N3- metastasis in deep inguinal or pelvic lymphnodes unilateral or bilateral.

Distant metastasis (M)

Mx - Distant metastasis cannot be assessed.

Mo - No distant metastasis

M1 - distant metastasis

Staging

Stage 0	Tis	No	Mo
Stage I	Ta	No	Mo
Stage II	T1	No	Mo
Stage III	T1	N1	No
	T2	No	Mo
	T3	No	Mo
	T3	N1	Mo
	T3	N2	Mo
Stage IV	T4	any N	Mo
	any T	N3	Mo
	any T	any N	M1

INVESTIGATIONS AND DIAGNOSIS

In patients with penile cancer both primary tumour and inguinal lymph nodes are readily assessed by clinical examination. The penile lesion is assessed with regard to size, location, fixation, involvement of corporal bodies and scrotum. Per-rectal examination is done to detect involvement of perineal body and pelvic nodes. However to evaluate the extent of the primary penile tumour and nodal involvement, the following imaging studies can be done.

1**) cavernosography:** not widely used due to its invasive nature

2**) ultrasonogram** with 7.5 MHZ linear array small parts probe USG cannot differentiate invasion into subepithelial connective tissue from corpus spongiosum involvement of glans but detects corpus cavernosum invasion with 100% sensitivity.

3) CT and MRI

Both CT & MRI solely depend on lymph node enlargement for detecting metastasis. CT scan is often the chosen modality for examining pelvic and inguinal areas as well to rule out distant metastasis. Use of CT is limited in primary lesion, whereas MRI provides superior tissue contrast and is promising in the screening of primary lesion

4) Lymphangiography

Has been used in the localization of inguinal & pelvic nodes to direct needle biopsy. Because of the irregular & inconsistent nodal filling the technique has limited usefulness. Three major nodal groups external iliac, common iliac and obturator nodes are demonstrated but hypogastric and presacral nodes are not seen. Sensitivity is only 31% because of irregular & inconsistent nodal filling.

5) **Radio nucleotide bone scan & chest x ray** are indicated to stage the extent of disease in patients suspected of having widespread metastasis.
6) **Biopsy of primary:** incisional biopsy or excisional biosy is done.
7) **FNAC/ biopsy of lymph node:** CT guided pelvic node **FNAC** can be done

Sentinel node biopsy: there is a node or a group of nodes lying between superficial external pudendal vein and superficial epigastric vein where the earliest metastasis from a penile tumour occurs consistently. A negative sentinel node biopsy in the presence of clinically negative groin was thought to indicate further dissection inguinal unnecessary but several reports have proved it unreliable due to existence of skip metastasis

Minimal diagnostic criteria for Ca penis :

primary tumour (T).

- Clinical examination
- Incisional / excisional biosy of the lesion and histologic examination for grade, anatomic structure involved and vascular invasion.

Regional and juxta regional lymph node (N) :

- clinical examinations
- CT scan if palpable inguinal adenopathy
- Superficial inguinal node dissection (for high grade, vascular invasion or invasive histology)

-Aspiration cytology (as indicated)

Distant metastasis (M)

-Clinical examinations

-Biochemical determinations (liver function, calcium)

bone scan.

Treatment of Penile Carcinoma

Unlike cancer of the bladder, prostrate & kidney where metastases to regional lymph nodes portend incurable disease, penile tumours may sometimes be cured by a regional lymphadenectomy.

Management of Primary growth:

The options available are

1) Total penectomy with perineal urethrostomy:

It is indicated in lesions whose size or location precludes adequate excision with a functional residual remnant by partial penectomy.ensures complete removal of tumour. Complications are psycosexual morbidity, urethrostomy sticture, wound infection and flap necrosis.

2) Partial penectomy

Successful local control by partial penectomy depends on division of the penis atleast 2 cm proximal to the gross tumour extent while providing sufficient penile length for a directable urinary stream.

3) Moh's micrographic surgery

Allows retention of function and anatomic integrity of penis without compromising local control rates.

4) Laser therapy

For Ta and T1 penile cancers. It preserves normal surrounding structure & function.

5) Topical 5 FU cream: for insitu lesions

Management of Regional Lymph nodes

Selection of patients for ilioinguinal block lymphadenectomy is an area of controversy because lymph node enlargement and lymphangitis due to infection of the primary tumour is common. Only 30-60% of patients with palpable nodes will actually have metastatic cancer ,on the other hand patients without palpable lymph node may harbour micrometastasis. Considering the morbidity associated with lymphnode dissection it is necessary to determine which patients actually benefit from it and what is the extent of lymphadenectomy to be done, unilateral or bilateral, and whether to remove iliac nodes or not. Another area of controversy is in the role of prophylactic inguinal dissection.

It is generally accepted that patients with persistant palpable lymph node after a course of antibiotic therapy following primary tumour control should undergo lymphadenectomy. Whereas patients with clinically negative groin at presentation or after a course of antibiotic therapy can be observed during follow up. But some studies have demonstrated improved survival rates in patients

undergoing prophylactic inguinal block dissection than a delayed one . So evolving indications for lymphadenectomy in patients without palpable adenopathy include adverse tumour histology like high grade and vascular invasion.

Goals of lymphadenectomy are to eradicate all obvious cancer provide coverage for exposed vasculature, provide rapid wound healing. The options available are :

1) Classical inguinal lymphadenectomy

This removes superficial, deep inguinal nodes fascia, fat and lymphatic chain extending along external iliac vessels upto bifurcation of common iliac veins.

2) Modified complete inguinal dissection

Removal of those nodes deep to fascia lata contained within the femoral triangle as well as pelvic nodes.

3) Superficial inguinal dissection

Removal of those nodes superficial to fascia lata.

Complications of lymphadenectomy:

1) Wound infection

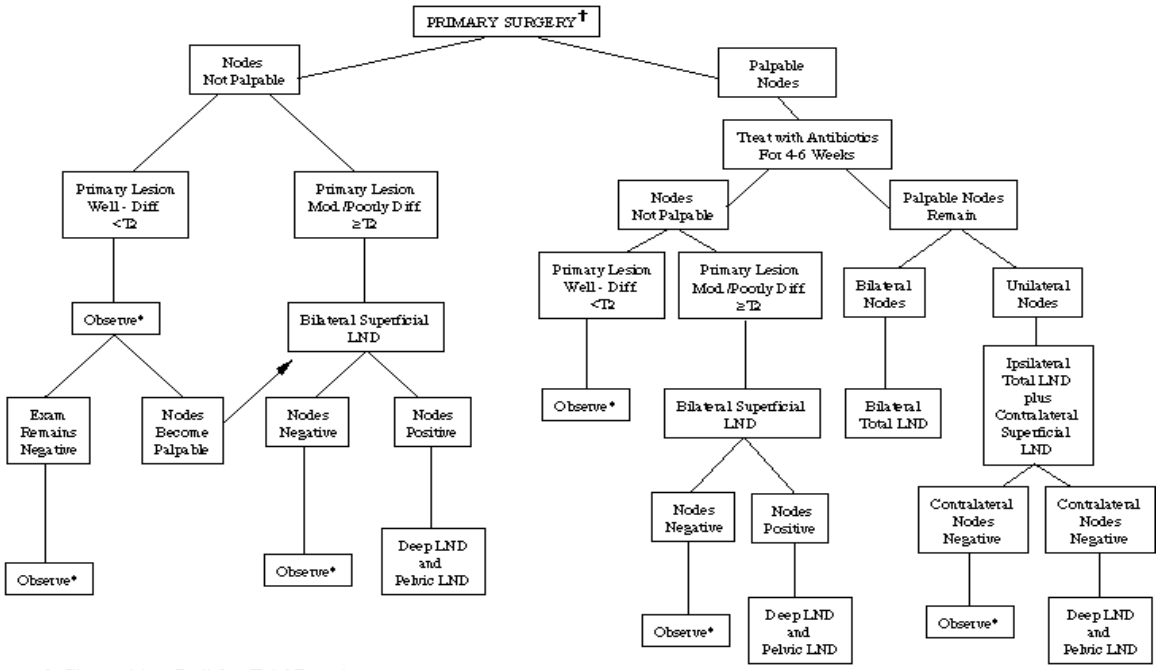
2) Flap necrosis

3) Lymphedema of lower limb

4) Lymphorrhea

5) Scrotal edema

ALGORITHM FOR INGUINAL LYMPHADENECTOMY FOLLOWING SURGERY FOR CARCINOMA OF THE PENIS



† Circumcision, Partial or Total Penectomy
* Exam every 2 months for two years, then every six months
Superficial LND: Nodes Superficial to Fascia Lata
Deep LND: Nodes deep to Fascia Lata
Pelvic LND: External Iliac and Obturator Nodes
Total LND: Superficial, Deep and Pelvic LND

Radiotherapy

Surgery is the effective mode of therapy. But viewing its psychosexual morbidity, radio therapy is an alternative but control of primary occurs much less frequently than when surgery is employed. Pre-treatment circumscision is essential.

Radiation therapy of the primary may be considered in :

1) young individuals presenting with small (2-4 cm) superficial exophytic non invasive lesions of glans / coronal sulcus.

2) Patients refusing surgery.

3) Patients with inoperable tumour or distant metastasis who need local therapy to primary tumour but wish to retain the penis.

Options are : I) External Radiotherapy

II) Brachy therapy

1. Plesio brachytherapy

2. Interstitial brachytherapy

External irradiation:

Total dose of 5000 to 5500 cGy (daily fraction is 250 –300 cGy) delivered by specially designed accessories like the box technique or Perspex tube.

Plesiobrachytherapy :

Surface moulds containing radioactive materials are used. Timing and length of wire are designed to give 60gy to the tumour. Iridium 192 wire is used commonly.

Radiation therapy of inguinal areas is not as effective therapeutically as lymph node dissection but it may be useful for palliation in situation of inoperable nodes because

1) Inguinal areas tolerate radiation poorly.
2) Infection and perilymphatic fat reduces effectiveness of radiotherapy.
3) Clinical evaluation following radiation to groin is difficult and complications with groin dissection after radiation can be significant.

Complications of radiotherapy:

1. swelling , maceration , necrosis of penis.
2. urethral stenosis , fistula.
3. fibrosis and retraction of penis.

Chemotherapy : Adjuvant & Neoadjuvant

Patients with multiple nodal metastasis, bilateral nodal involvement or positive pelvic nodes may benefit from adjuvant therapy.

Combination chemotherapy with vincristine, bleomycin, methotrexate and cisplatin based therapies are often used.

Penile reconstruction technique:

After partial penectomy , free flap reconstruction of the penis with radial forearm flap is the procedure of choice. After total penectomy, cutaneous arterialised flap (superficial groin flap), superficial perineal artery flap, musculocutaneous flapsdhave been used.An ideal penile reconstruction technique should be:

1. a one – step procedure ;
2. create a normal competent urethra to achieve normal voiding;
3. restore tactile erogenous sensibility;
4. allow implantation of prosthetic stiffener for vaginal penetration
5. give aesthetic appearance

Materials & Methods

68 consecutive cases of histologically proven squamous cell carcinoma of penis admitted in Thanjavur medical college during the period of 1.6.05 to 31.09.07 were included in the study of which 1 case of inguinal recurrence following total amputation and 1 case of stump recurrence following partial amputation were also included in the study. One case of tumour penis which turned out to be non – hodgkin's lymphoma was not included in the study.

At presentation , a thorough history was taken and clinical examination done. Patients were staged clinically by Jackson's staging as well as by (1978) IUAC TNM classification pathological staging (AJCC TNM staging 1997) was done only for those who underwent surgery with inguinal node dissection. Diagnosis was confirmed histologically, histological features like grade depth of invasion, vascular invasion, extranodal extension were noted.

Special attention was given to duration of symptoms, morphology of tumour (its size, ulcerative or proliferative type ,shaft involvement) and histological grade(by Broder's grading) and nodal involvement (clinical & pathological).

In TMCH, modality of treatment was decided based on stage of presentation , operability and patient's wishes.

In addition to basic investigations to asses fitness for surgery and radiotherapy, USG abdomen and pelvis in all patients. CT abdomen and pelvis in selected patients were done. Lymphangiography, MRI, sentinel node mapping could not be done due to non-availability.

Patients with clinically negative groin and those with clinically palpable but pathologically negative (by FNAC) nodes in the groin were subjected to surgery in the form of partial or total amputation based on the length of tumour free stump available. Inguinal block dissection was offered only to selected patients with pathologically positive inguinal nodes who were fit for a major surgical procedure as this. In unfit patients Radiotherapy to groin was adopted.

All cases were followed up using out-patient facilities at intervals of 1 month. During each visit, enquiry was made regarding physical and psychological symptoms.clinical examination was done to detect local or inguinal recurrence,imaging studies done when needed. Data obtained were recorded in a specific proforma designed for the purpose and analysed in a systematic way.

Observations & Results

Patient selection:

- Histologically proven cases of carcinoma penis in patients presenting with growth, discharge, phimosis, nodal metastasis etc.
- incidentally found carcinoma penis in biopsy following circumscision.

Exclusion criteria:

(1) 1 case of tumour penis whose biopsy turned out to be Non Hodgkin lymphoma

(2) Those with histologically proven Carcinoma penis who absconded before full clinical evaluation.

Limitations of the study:

Due to poor education and low socio economic status many patients were lost to follow up, hence management outcomes could not be fully evaluated.

Results obtained were compared with those of similar studies across the world.

I **Agewise distribution of cases** :

Age-wise distributon of cases showed increased incidence in 40-60 age group (69%). Youngest one was 30 yrs and the oldest one 77 yrs old.

Age in years	No. Of patients	Percentage
31-40	6	9%
41-50	23	34%
51-60	24	35%
61-70	12	18%
71-80	3	4%

Mean age was 54 yrs which is comparable to mean age of 58 yrs (Gursel et al 1973). & 56 yrs (Derrick et al 1973)

II Socio economic status :

Majority of the patients were of low socio economic status and this may be the cause of poor hygiene, ignorance , delay in presentation associated with penile cancer. But a definite relation could not be established because majority of patients attending our hospital are of low socio-economic status.

III . Religion:

63 patients were hindus, 5 patients were Christians.none of the patients were muslims,but the relation could not be established.

IV Mode of presentation:

Commonest symptoms at presentation was in growth with discharge.

Symptoms	**No. of Persons**	**percentage**
Growth	60	88%
Discharge	56	82%
Nodal involvement	12	18%
Phimosis	10	15%
Urinary disturbances	7	10%
Wt loss, malaise etc	6	9%

Urinary disturbances were present in only 10% of cases.One case presented with acute retention of urine for which supra pubic cystostomy was done. One case presented with multiple urinary fistulae.

Nodal involvement was present in 18% of cases. Three cases presented with fungating secondaries in the groin where the growth was concealed under phimotic skin.

Phimosis was present in 15% of cases.several series have reported incidence of phimosis ranging from 25 to 75%.

Five cases of incidentally detected Carcinoma penis (during HPE of circumcision specimen) were also included.

V.Delay in presentation:

Mean duration from onset of symptom to presentation to a surgeon was 7 months (20 days to 3 yrs). Given the obvious visibility and daily handling of the organ such a delay is significant. Reasons for such a delay in presentation were varied attributable to fear, ignorance , illiteracy and low socioeconomic status and relatively painless nature of the disease.5 patients had a delay of more than 1 yr.

VI. Risk factor analysis:

Of the 68 patients 7 (10%) patients had premalignant lesion in the form of leukoplakia, bowenoid papulosis and squamous papilloma . This is low compared to the reported 42% of pre existing penile lesions (Bouchet et al 1989) in one large series.

Tobacco consumption was found in 59% of patients in various forms. Harsh & Ravi (1995) showed that all forms of tobacco were significantly and independently related to the incidence of penile cancer None of the patients gave history of exposure to sexually transmitted diseases. No convincing evidence has been found linking penile cancer to sexually transmitted diseases (Maclus et al 1993) .

None of the patients had history of circumcision except one who underwent circumcision 3 months back during which he was found to have carcinoma penis. Recurrent tumour was treated by partial amputation

VII . **Distribution of the site of origin:**

Glans and prepuce together accounted for 81 % 0f all sites

Site of origin	**No. of patients**	**Percentage**
Glans	35	52%
Prepuce	9	14%
Glans & prepuce	10	15%
Corona	2	4%
Shaft	10	15%

One case was a stump recurrence following partial amputation another was inguinal recurrence following total amputation and radiotherapy.

As per studies by Sufrin & Huben et al in 1991 the percentage of involvement of various sites were as follows:

Glans - 48% ,

Prepuce - 21%,

Glans & prepuce - 9%,

Coronal - 6%,

Shaft - <2%

Reason for increased involvement of shaft in our study was not known. Involvement of shaft increases chances of nodal involvement and hence the stage.

VIII .Type growth:

36 % of tumours were of ulcerative variety and the rest were of proliferative variety.

Nature of growth	No. of Patients	Percentage
Ulcerative	25	36%
Proliferative	43	64%

Ulcerative tumour has a tendency towards earlier nodal metastasis and associated with a poor 5 - year survival rates. (Ornellas et al 1994)

IX. **Stage at presentation:**

Commonest stage at presentation was stage III (53 %)

Jackson staging	No. of patients	Percentage	IUAC /TNM	No. of patients	Percentage
I	9	13%	I	5	7%
II	23	36 %	II	17	27%
III	25	38%	III	37	53%
IV	9	13%	IV	9	13%

Though in western studies stage I is the commonest stage at presentation, result obtained by Dr. N. Ananthakrishnan at JIPMER, Pondicherry showed that commonest stage at presentation was stage III. where most of the cases were in stage III.

X. **Size of growth :**

60 % of tumours measured less than 5 cm, rest more than 5 cm.

Size of tumor	no. of patients	Percentage
< 5 cm	40	60%
> 5 cm	27	40%

Beggs & Spratt (1964) showed that size >5 cm is associated with increased incidence of metastasis and decreased survival rate.

XI. Shaft involvement

Shaft Involvement	No. of patients	Percentage
Proximal	10	9%
Mid	15	22%
Distal	31	49%
No shaft involvement	11	20%

One case which presented with inguinal recurrence was excluded . Extension over 75% of shaft (staubitz et al 1955) is associated with increased incidence of metastasis and decreased survival rate.

XII. Nodal involvement:

Of the 68 cases, 48 cases (70%) presented with palpable lymph inguinal nodes either on one side or both sides. But pathological examination (by FNAC, biopsy or superficial inguinal block dissection showed positive nodes in only 31 cases (45%) . five cases were inoperable out of which three were fungating nodes. Other 2 were fixed nodes.

All patients with pathological positive nodes could not be subjected to inguinal block dissection because of co-morbid illness. Radiotherapy was given to all patients with positive nodes. Prophylactic block dissection was not adopted in any case.

XIII . Grade of tumour

Grade of tumor	**No. of Patients**	**Percentage**
Ca insitu	5	7%
Well differentiated	26	38%
Moderately differentiated	37	55%
Poorly differentiated	Nil	Nil

Maiche et al 1991b reported incidence of low grade carcinomas as 70 - 80%. But in our studies only 45% were of low grade.

XIV Treatment adopted in TMCH:

49 cases (72%) underwent surgery in the form of circumscision, partial or total amputation with or without inguinal block dissection. 21 cases underwent radiotherapy.

Treatment Modality	No of patients	Total
Surgery :		
1. Circumscision	6	
2. PA	11	
3. PA + IBD	0	33(49 %)
4. TA	11	
5. TA + IBD	5	
Surgery + RT		
1. PA + RT	3	
2. PA + IBD + RT	0	16(24 %)
3. TA + RT	12	
4. TA +IBD+RT	1	
Primary RT	5	5(7 %)
Chemotherapy	2	
Absconded	14	14 (22 %)

One fifth (22%) of the patients were not willing for any form of treatment and absconded.

Out of the five patients subjected to primary RT, three had co-morbid conditions that precluded surgery, one was not willing for surgery and one was recurrence in inguinal region.

Five cases of incidentally detected carcinoma in situ with areas of invasion were also included in the study.3 were lost to follow up.2 were not willing for further surgery and did not develop any recurrence during follow up.resected margins were positive for malignancy in two cases and they underwent radiotherapy.

In TMCH surgery is the prime modality of treatment as patients presented late. Non compliance among penile cancer patients needs special mention indicating the need for counselling patients and penile reconstruction surgery.

XV. Complications of surgery

Wound infection	-	43
Wound dehiscence	-	3
Flap necrosis	-	4
Urethral retraction	-	2
Urethral stenosis	-	4
Lymphedemascortum & lower limb	-	1
Mortality	-	0

43 out of 49 patients subjected to surgery had wound infections. Compared to other surgical site infection this is of major concern considering the morbidity associated with such wound infection.

Complications of radiotherapy:

penile edema and skin changes were noted in five patients

.

XV Distant metastasis :

In our study ,one case had metastasis to the liver. No other case had clinically detectable metastasis to lung, liver , bone or brain. Incidence is said to be 1% to 10% in most large series (staubitz et al 1955).There was no mortality from carcinoma penis reported in our study.

XVI. Recurrence

Mean period of follow up was 5 months. (1 month to 2 yrs). About 5-15% of patients have been reported to develop second primary neoplasm (Beggs & Spratt 1964, Gursel et al 1973). In our study one case treated by partial amputation had stump recurrence 1 ½ yrs later which could be salvaged by total amputation. Two case of initially negative groin developed nodal metastasis during follow up. They were subjected to radiotherapy . another case treated by total amputation and radiotherapy developed nodal recurrence and liver metastasis.

Surprisingly none of the patients developed clinical evidence of psychological depression that required treatment.

Discussion of Results

I. Relation between tumour grade and stage

Stage	Ca in situ	Well Differentiated	Moderately differentiated	Total
I	5	0	0	5
II	0	10(58%)	7(42%)	17
III	0	15(40%)	22(60%)	37
IV	0	1(12%)	8(88%)	9
Total	5	26	37	68

All cases of Carcinoma in situ were in Stage I. Out of 9 cases in stage IV, 8 (88%) were moderately differentiated.In stage III, 60% were moderately differentiated while in stage II ,42% were moderately differentiated.

Maiche et al 1991b reported that half of tumors originating in shaft are poorly differentiated while 10% of tumours from prepuce are high grade tumours.Thus grade and stage are correlated.

II. Relation between type of growth and stage

Stage	Ulcerative	Proliferative	Total
I	0	5 (12%)	5
II	4(16%)	13 (30%)	17
III	17 (68%)	20 (46%)	27
IV	4 (16%)	5 (12%)	9
Total	25(100%)	43(100%)	68

In ulcerative variety 84% presented in late stage (68% were of stage III and 16% of stage IV) while in proliferative variety , only 58% presented in late stage (46% were of stage III and 12% were of stage IV). Thus relation was noted between type of growth and stage.

III. Relation between size of growth and stage

Stage	< 5 cm	> 5 cm	Total
I	5(13%)	0	5
II	17(42%)	0	17
III	17(42%)	20(74%)	37
IV	1(3%)	7(26%)	7
Total	40(100%)	27(100%)	67

All the tumours more than 5 cm were in stage III (74%) or stage IV(24%), whereas only 45% of tumours less than 5 cm were in stage III (42%) or stage IV (3%). Thus size and stage are correlated.

IV. Relation between grade of tumor and nodal metastasis

Grade	Node negative	Node positive	Total
Ca in situ	5 (100%)	0	5
Well differentiated	17 (65%)	9 (35%)	26
Moderately differentiated	9 (24%)	28 (76%)	37
Total	31	37	68

About 76% of moderately differentiated tumours had nodal metastasis where as only 35% of well differentiated tumors had nodal metastasis. None of the Carcinoma in situ had nodal metastasis. Thus higher the grade higher the incidence of nodal metastasis.

Conclusion:

1. Carcinoma penis was the fifth leading cause of cancer in males in Thanjavur medical college.
2. Mean age at presentation was 54 years with peak incidence observed in 40 to 60 yr age group.
3. Most of the patients were of poor socio-economic status with high rate of tobacco consumption (60%).There was no significant relation to premalignant lesion or exposure to sexually transmitted diseases.
4. Glans was the commonest site of origin. Glans and prepuce together accouted for 81% of the tumours .high rate of shaft involvement was noted.
5. 64% of tumours were of proliferative variety, and the rest were of ulcerative variety.
6. 60% of the tumours were less than 5 cm in size.
7. Commonest stage at presentation was stage III.
8. Shaft involvement was present in 80% of persons but proximal shaft involvement was present in only 9 % of patients.
9. Clinically nodal involvement was present in 70% of cases , out of which 45% turned out to be pathologically involved.

10. 45% of tumours were of low grade (carcinoma in situ or well differentiated) ,the rest were moderately differentiated.
11. None of the patients had evidence of distant metastasis, and there was no mortality from the disease.
12. Surgery was the prime modality of treatment (72%), post – operative radiotherapy was given in 24% of cases. Radiotherapy was the prime modality in 7% of cases.One fifth of the patients absconded before initiation of treatment.
13. Wound infection was the commonest complication following surgery. Urethral stenosis was the commonest late complication.
14. High grade of tumour was associated with high incidence of nodal metastasis.
15. ulcerative morphology of tumour, size more than 5 cm ,and high histological grade were associated with late stage of the disease.

Summary

1. Focusing on the unusual delay in presentation to the surgeon the general public needs education about symptoms of Carcinoma penis.

2. All cases of recent onset phimosis should be biopsied.

3. To increase the acceptability of surgery in Carcinoma penis reconstruction techniques are to be adopted.

4. Grade and stage are correlated. Higher the grade higher the incidence of nodal metastasis. So all penile carcinomas to be histologically graded accurately looking for vascular invasion also and treatment tailored accordingly.

5. Considering the curative nature of inguinal lymphadenectomy & with improved anesthetic and surgical techniques more patients to be offered inguinal block dissection.

Penile carcinoma is a potentially curable malignancy provided patients present early and the surgeon intervene appropriately.

Bibliography:

1) An approach for the treatment of penile carcinoma. Cabanas RM: Cancer 1977; 39: 456 – 459.
2) Anatomy and Surgical Techniques of Groin Dissection. Spratt JS Jr, Shieber W, Dillard BM: St Louis, CV Mosby, 1965.
3) Autologous penile corpora cavernosa replacement using tissue engineering technique,J Urol, oct 2002, pg 1754 – 1757.
4) Cabanas approach: Is sentinel lymph node biopsy reliable for staging penile carcinoma? Wespes E, Simon J, schulman CC: Urology 1986; 28: 278 – 282.
5) Campbell's Urology – 8th edition
6) Cancer – Principles and practice of Oncology,De Vitta, 7th edition
7) Cancer of the penis: A clinical study of 229 cases. Ekstrom T, Edsmyr F: Acta Chir Scand 1958; 115: 25 – 29.
8) Carcinoma of the penis : Improved survival by early regional lymphadenectomy based on the histological grade and depth of invasion of the primary lesion. McDougal WS: J Urol 1995; 154: 1364 – 1366.
9) Carcinoma of the penis. Staubitz WJ, Melbourne HL, Oberkircher OJ : Cancer 1955; 8: 371 – 374.
10) Cisplatin and 5 – fluorouracil and advanced cancer of the penis. Shammas FV, Ous S, Fossa SD: J Urol 1992; 630: 147 – 151
11) Clinically oriented anatomy – Keith Moore, 4th edition, pg 406 – 411.

12) Combination chemotherapy with methotrexate, bleomycin, and cisplatin for advanced squamous cell carcinoma of the male genital tract. Dexeus FH, Logothetis CJ, Sella A et. al.: J Urol 1991; 146: 1284 – 1288.

13) Corpus cavernosum invasion and tumor grade in the prediction of lymph node metastases. Solsona E, Jborra J, Ricos JV, et. al. : Eur Urol 1992; 22: 115 – 118.

14) Development of an atlas of cancer in India – First all India report 2001 – 2002.

15) Dynamic sentinel lymph node biopsy in carcinoma penis J. Urol March 2006; p 893 – 894.

16) Epidermoid carcinoma of the penis. Beggs JH, Spratt JS Jr: J Urol 1964; 91: 166 – 169.

17) Human embryology – Inderbir singh, 6th edition

18) Inguinal and pelvic lymphadenectomy for penile cacer. Puras A, Rivera J: Atlas Urol Clin NA 1995; 3: 81.

19) Long term follow up of penile carcinoma treated with penectomy and bilateral modified inguinal lymphadenectomy, J Urol August 2004; 174 2; 498 – 501.

20) Lymphadenectomy for cancer of the penis. Pizzocaro G, Piva L, Nocolai N: In: Donohue JP (ed), Lymph Node Surgery in Urology, Oxford, Isis Medical Media, 1995; P118 – 130.

21) Lymphangiography of the dorsal lymphatics of the penis: Technique and results. Riveros M, Garcia R, Cabanas RM: Cancer 1967; 20: 2026 – 2031.

22) Management of regional lymph nodes in penile carcinoma Five – year results following therapeutic groin dissections. Johnson DE, Lo RK : Urology 1984; 24: 352 – 355.

23) Modified inguinal lymphadenectomy for carcinoma of the penis with preservation of the saphenous veins: Technique and preliminary results. Catalona WJ: J Urol 1988; 140: 306 – 311.

24) Multi- institution long term experience with conservative surgery for invasive penile carcinoma J. Urol February 2003; 16; 2; 500 – 502

25) Murrell DS, Williams JL: Brit J Urol 1965; 37: 211 – 214

26) Neo-Adjuvant and adjuvant vincristine, bleomycin, and methotrexate for inguinal metastases from squamous cell carcinoma of the penis. Pizzocaro G, Piva L: Acta Oncol 1988; 27: 823 – 827.

27) Neoadjuvant therapy with cisplatin and 5 – fluorouracil for stage III squamous cell carcinoma of the penis. Fisher HAG, Barada JH, Horton J, et. al.: J Urol 1990; 143: 352A (abstr 653).

28) Nomogram predictive of cancer specific survival in patients under going partial or total amputation for squamous cell carcinoma of the penis : Kattan MW. Ficarra V. J Urol . June 2006 175 ; 6 ; 2103 – 2108.

29) Penile cancer: relation of extent of nodal metastases to survival. Srinivas V, Morse MJ, Herr HW, et. al.: J Urol 1987; 137: 880 – 886.

30) Predicting regional lymph node metastasis in Chinese patients with penile squamous cell carcinoma: The role of histopathological classification, tumour stage and depth of invasion ,J. Urol October 2006; 176; 4; 1431 – 1435.

31) Pre-emptive lymphadenectomy markedly improves survival in patients with patients with carcinoma penis who harbour occult metastasis J Urol, march 2005, pg 1681 – 1683

32) Principles and practice of radiation therapy, Charles M Washington, 2nd edition, pg 814 – 821.

33) Radical excision of the inguinal and iliac lymph nodes. Daseler E, Anson B, Riemann A: Surg Gynecol Obset 1948; 87: 679 – 684.

34) Radiotherapy in the treatment of carcinoma of the penis.

35) Review article: J urol March 2005 pg 1048

36) Rob-Smith operative surgery: Genitourinary surgery,vol 2 , 5th edition.

37) Role of lymphadenectomy in carcinoma of the penis. Catalona WJ: Urol Clin NA 1980; 7: 85 – 89.

38) Sentinel node biopsy for staging penile cancer. Fowler JE Jr: Urology 1984; 23: 352 – 356.

39) Sexually Transmitted Diseases, V K Sharma

40) Silverberg's Principles and practice of surgical pathology and cytopathology. Vol 2, 4th edition, pg 1768 – 1772

41) Skandalakis surgical anatomy, vol 2, pg 1379.

42) Surgical treatment of invasive squamous cell carcinoma of the penis retrospective analysis of 350 cases, Ornellas 44, Seixas AL, Morta .A et. al J. Urol. 1994; 151; 1244 – 1249.

43) The role of ilio-inguinal lymphadenectomy and significance of histological differentiation in treatment of carcinoma of the penis. Fraley EE, Zhang G, Manuvel C, Niehans GA : J Urol 1989; 142: 1478 – 1482.

44) The surgical management of squamous cell carcinoma of the penis. Skinner DG, Leadbetter WF, Kelley SB: J Urol 1972; 107: 273 – 279.

45) The treatment of carcinoma of the penis. Jackson SM, B J Urol 1966:53:33 – 35

46) Treatment of carcinoma of the penis: The case for primary lymphadenectomy. McDougal WS, Kirchner FK Jr, Edwards RH, et. al : J Urol 1986; 136: 38 – 42.

47) Tumour diagnosis – practical approach and pattern analysis 2nd edition Awatif Nafussi , pg 1204 – 1208.

48) Union Internationale Conter le cancer(UICC): TNM atlas: Illustrated guide to the TNM/pTNM classification of malignant tumours, 3rd edition New York: Springer-Verlag, 1989: 237 – 244.

49) Union Internationale Contre le cancer(UICC): TNM classification of malignant tumours, 2nd edition, Geneva: imprimerie g. de buren sa, 1974.

50) Unreliability of sentinel node biopsy for staging penile carcinoma. Perinetti EP, Crane DC, Catalona WJL , J Urol 1980; 124: 734 – 738.

51) Urological oncology: Basic principles of oncology: Droller M J J Urol February 2003; 167; 2; 774 – 780.

Proforma

Name	**Presenting symptoms**	**Past history**
age	- growth / ulcer	Premalignant conditions
IP No.	- discharge	exposure to STD
Occupation	- inguinal nodes	associated illness
Socio-economic status single		**Systematic exam**
Address	multiple B/L	Abdomen
Religion	iliac pelvic nodes	RS
DOA	- difficulty in micturition	CVS
DOD	- multiple streams of urine	G/E
	- pain	- Build ,nutrition
	- urinary retention or fistulae	- pallor
	- weight loss	- PR, BP
	- generalized weakness	

- L/E : circumcised or not

Type of growth

flat and ulcerative type of growth

papillary exophytic type of growth

site of origin : (1) glans (2) prepuce (3) both (4) corona (5) shaft

size of growth

induration, infiltration to surrounding structures (pubis, scrotum, prostrate)

Nodes : Number, site, size, consistency, ulceration / fungation, mobility.

Investigations

Hb%, Urine albumin, sugar, deposits

Blood - sugar, urea, creatinine , Liver function tests

Chest X - ray

CT abdomen and pelvis

USG abdomen and pelvis

Staging of tumour : clinical and pathological

Biopsy of growth:

Histological type, grade, involvement of shaft, invasion of Bucks fascia and corpora, vascular invasion.

FNAC / BIOPSY OF LYMPH NODE

Surgery -

(1) primary : circumcision partial or total amputation

(2) Nodes:

if positive at time of surgery

after 6 weeks of antibiotics

Radio therapy

Chemo therapy

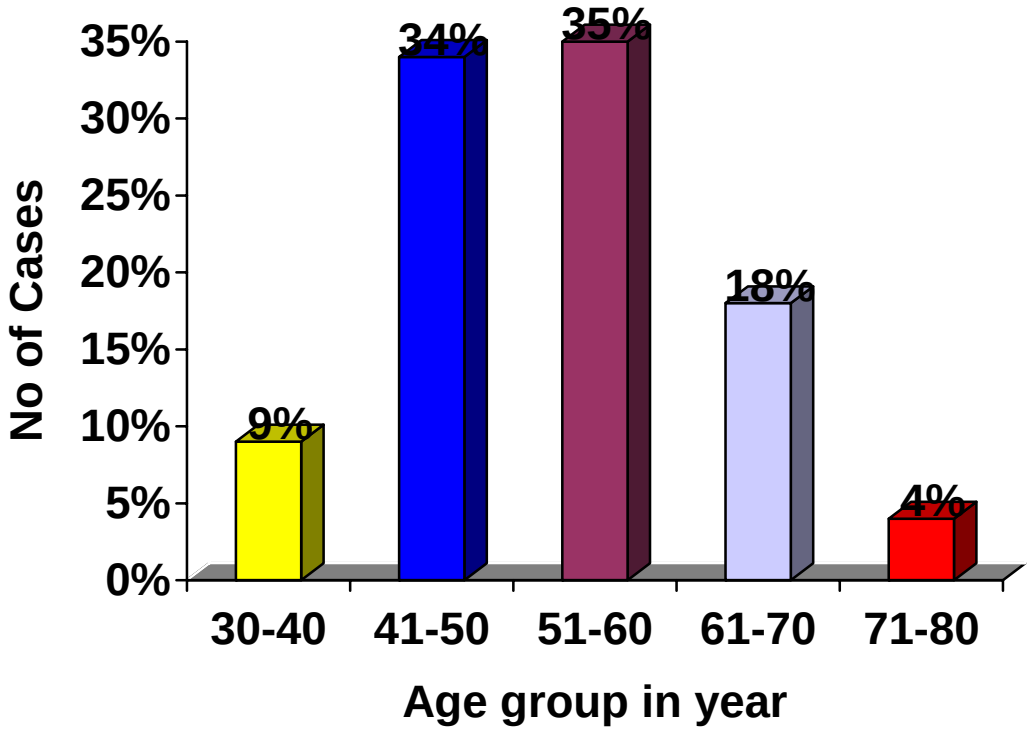
Follow up

Comments

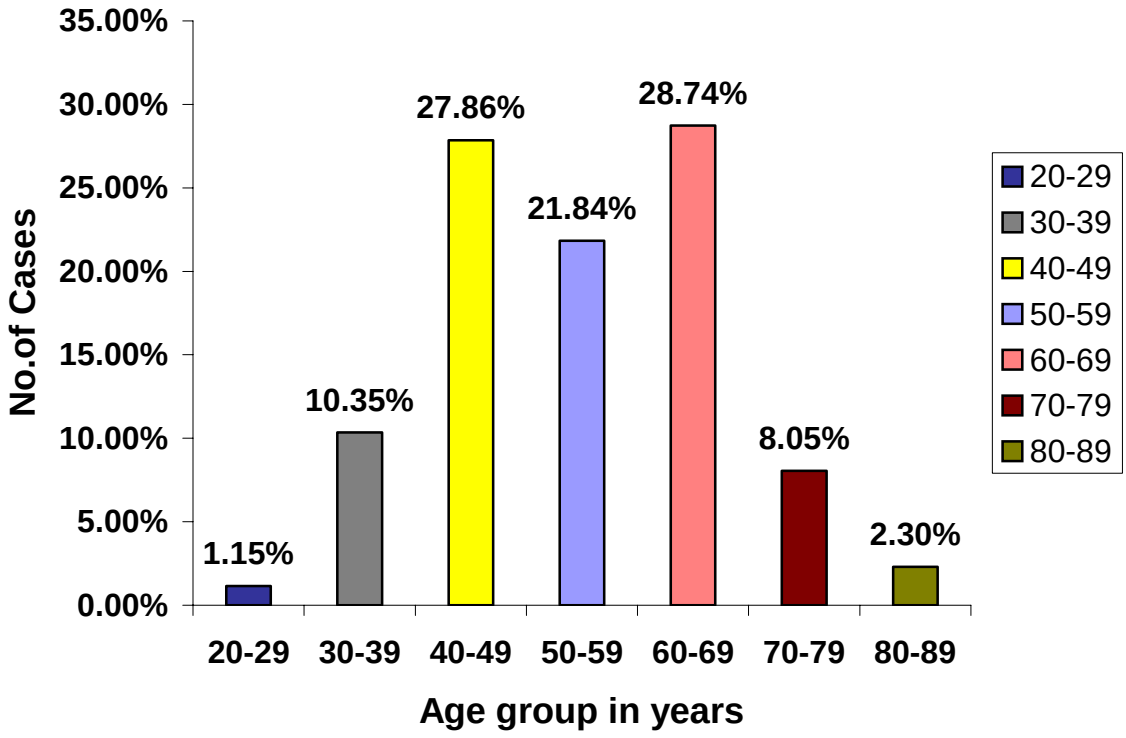
Post - Operative complications

- Wound infection and dehiscence
- Flap necrosis
- Lymph edema scrotum, lower limb
- Lymphorrhea
- Mortality, others.

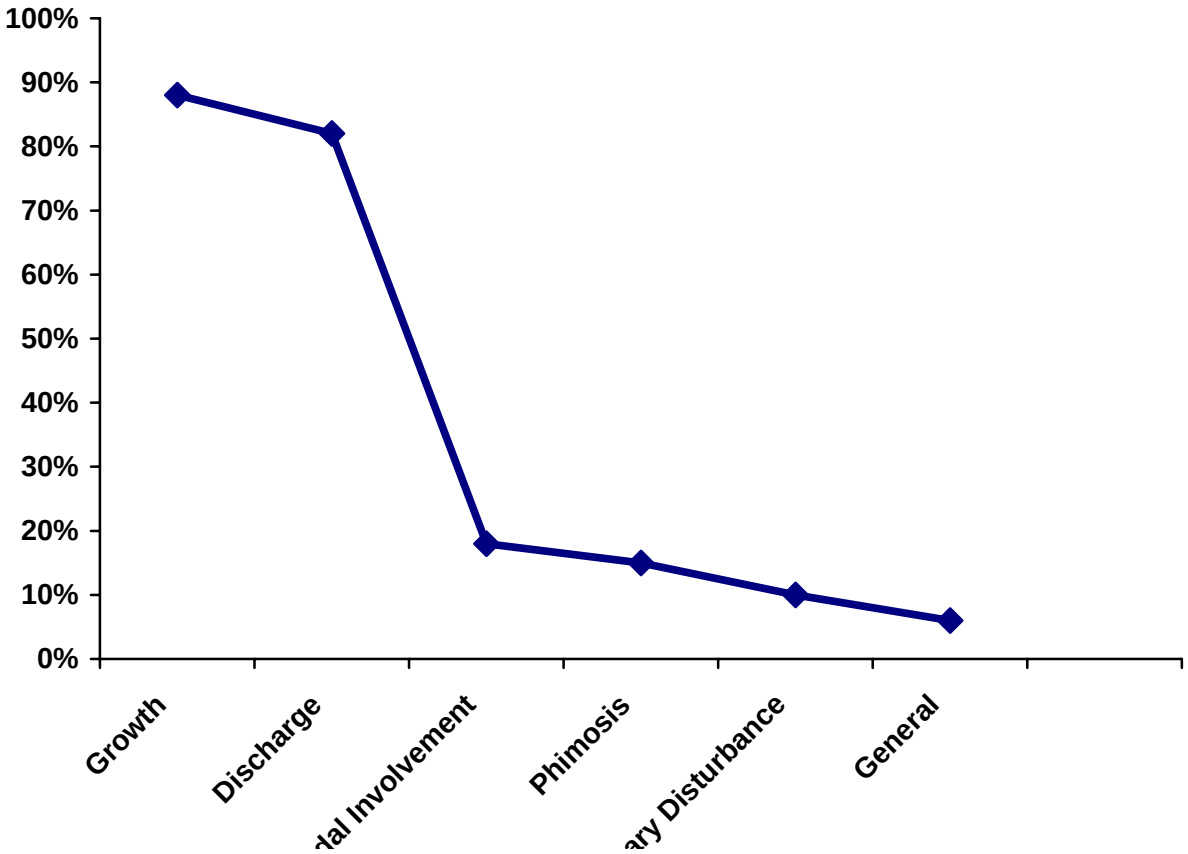
Age wise distribution of cases in TMCH



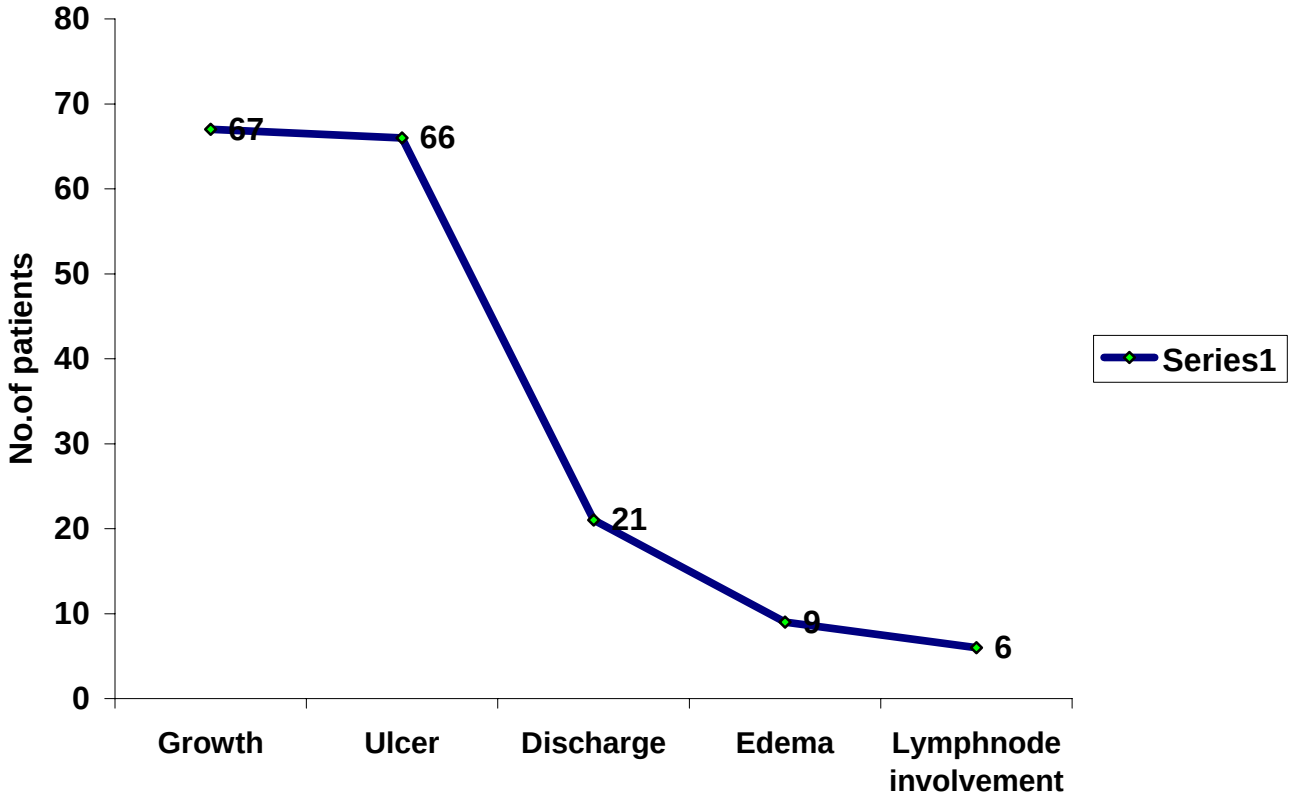
FLETCHER C.DERRICK ETAL,MEDICAL UNIVERSITY OF SOUTH CALIFORNIA



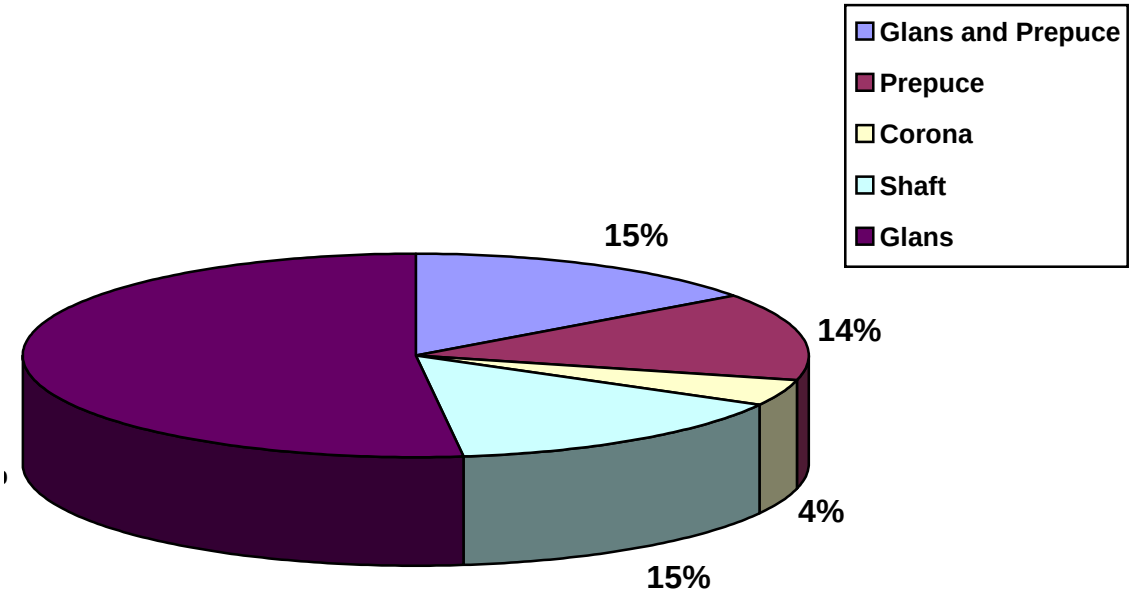
Frequency of Symptoms



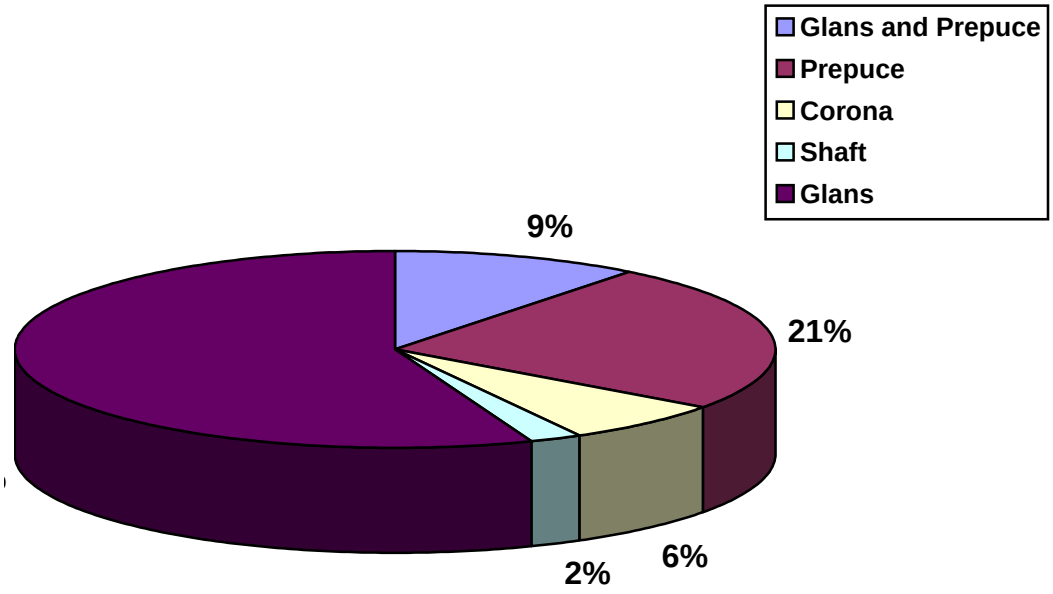
Hanash and Associates



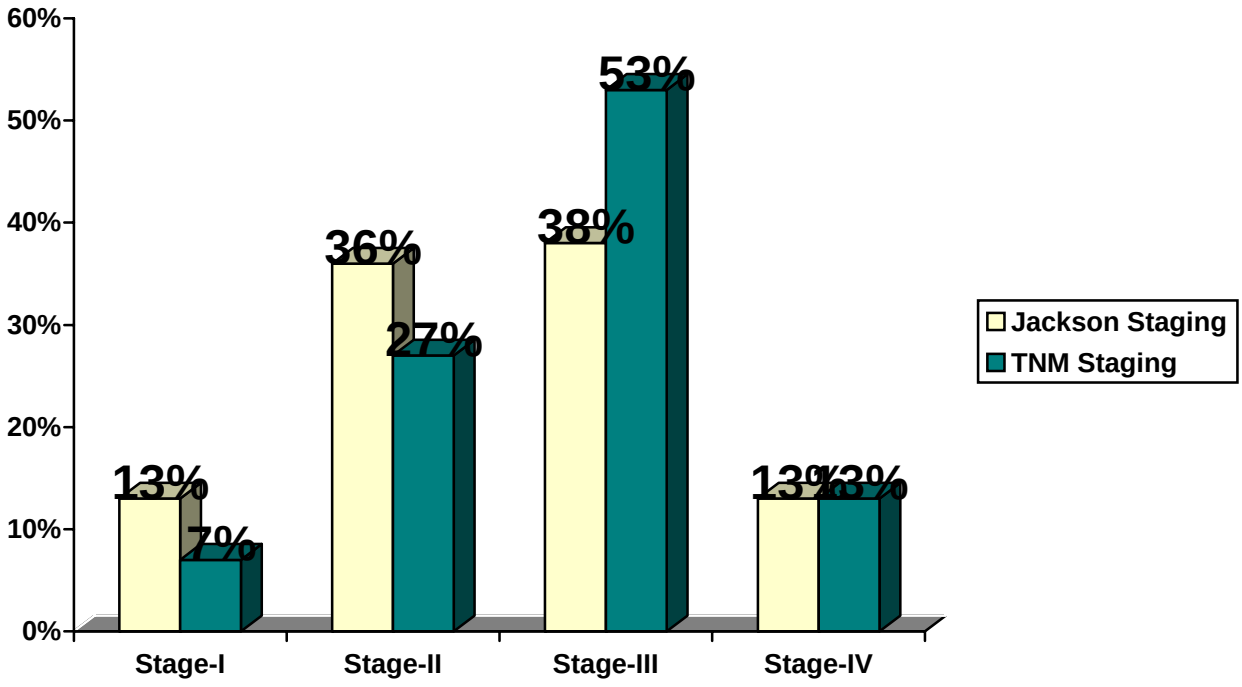
Distribution of Site of Origin in TMCH



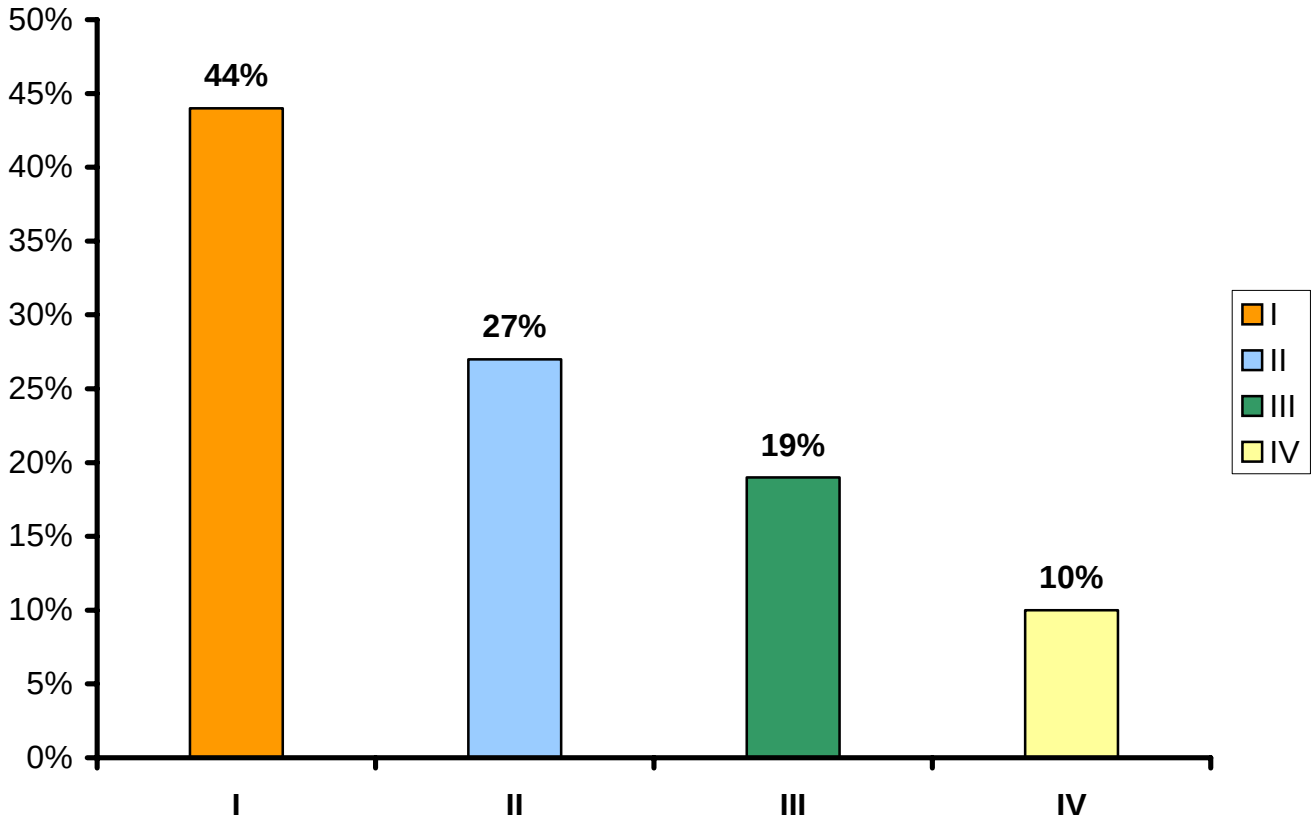
Sufrin and Huben Et al 1991



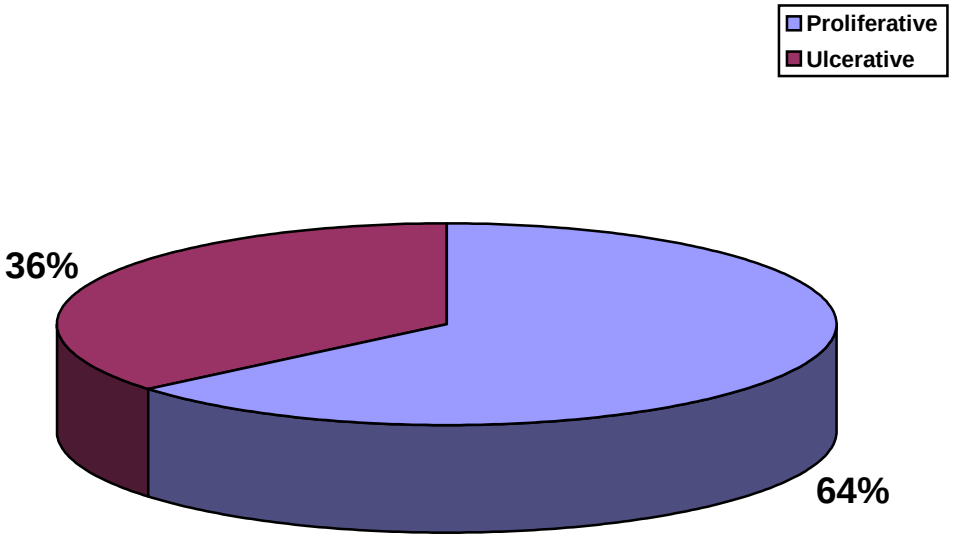
Stage at presentation in TMCH



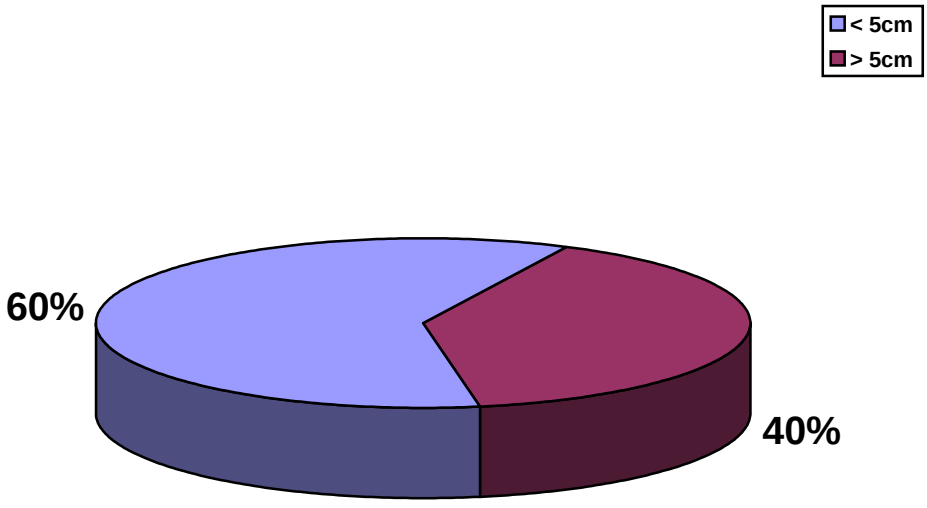
Barnes etal

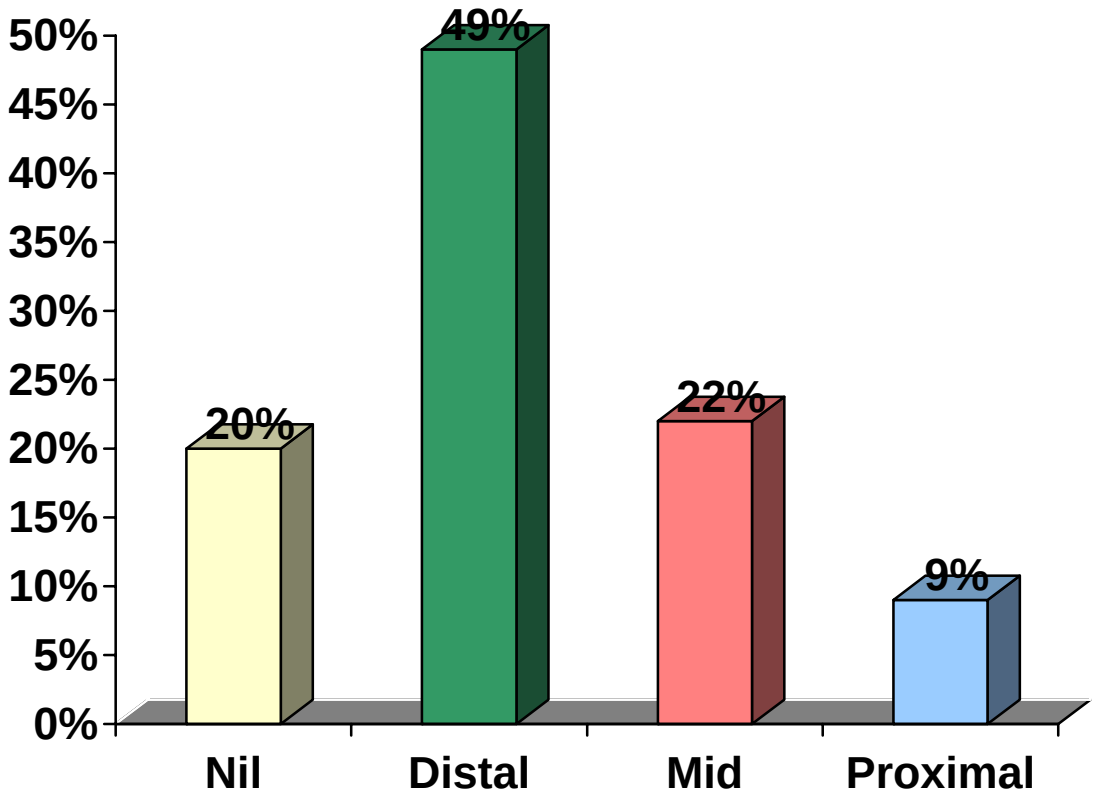


Types of Growth in TMCH

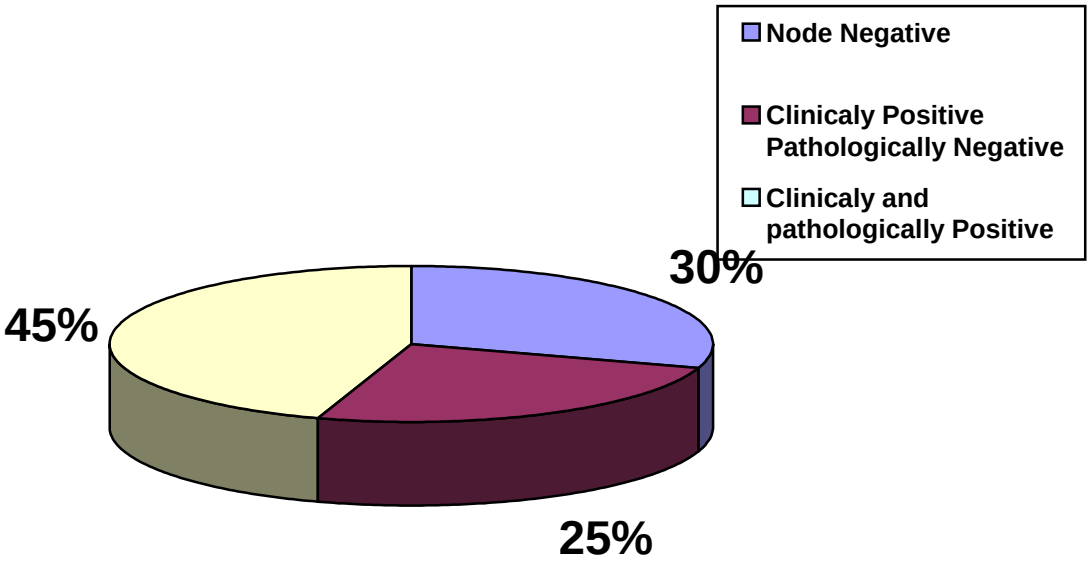


Size of Growth in TMCH

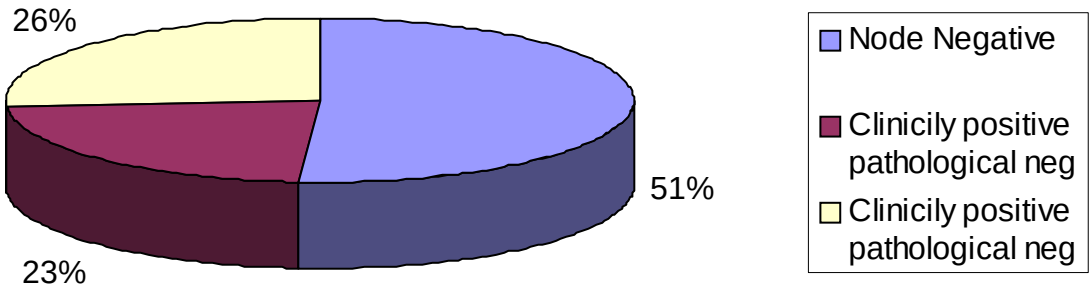


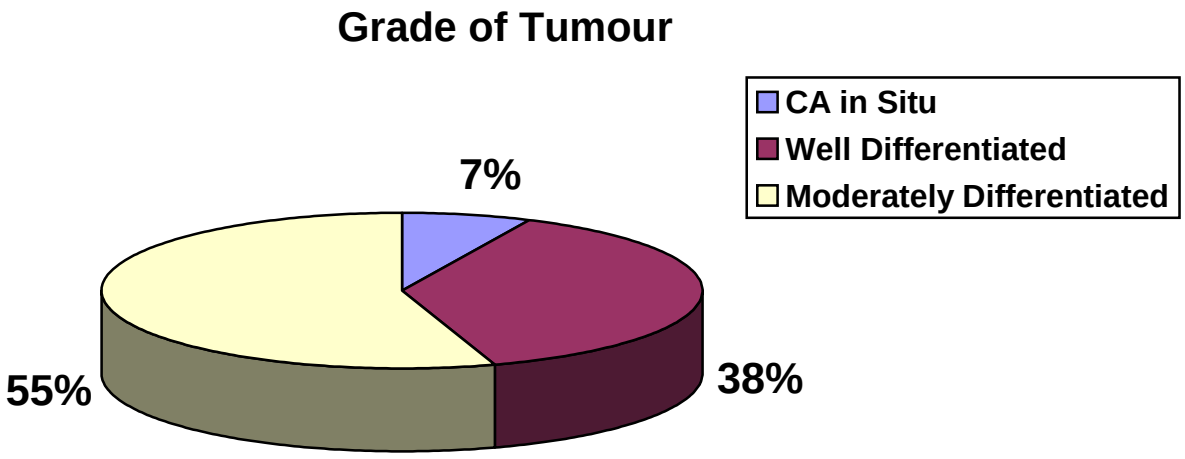

Shaft Involvement in TMCH
50%
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
20%
49%
22%
9%
Nil
Distal
Mid
Proximal

Nodal Involvment in TMCH

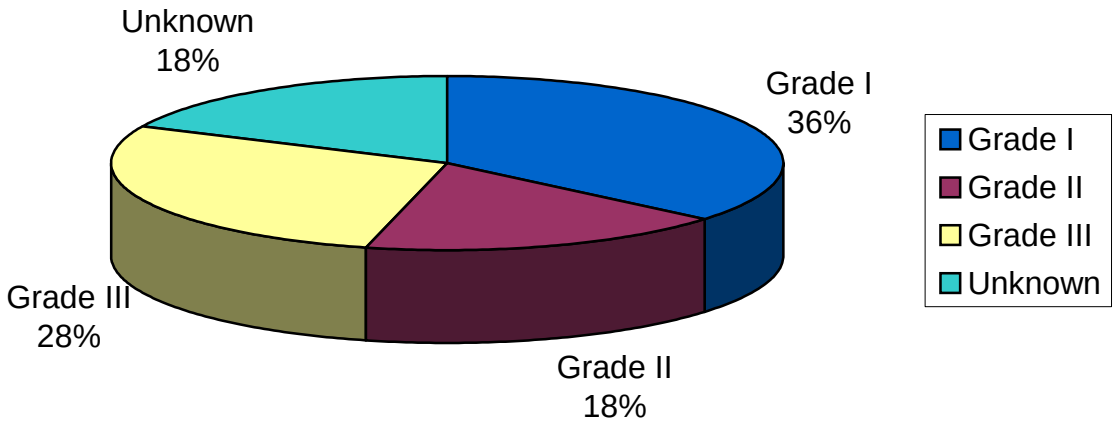


Dr.Muralirkamat,Tatamemorial Hospital Mumbay

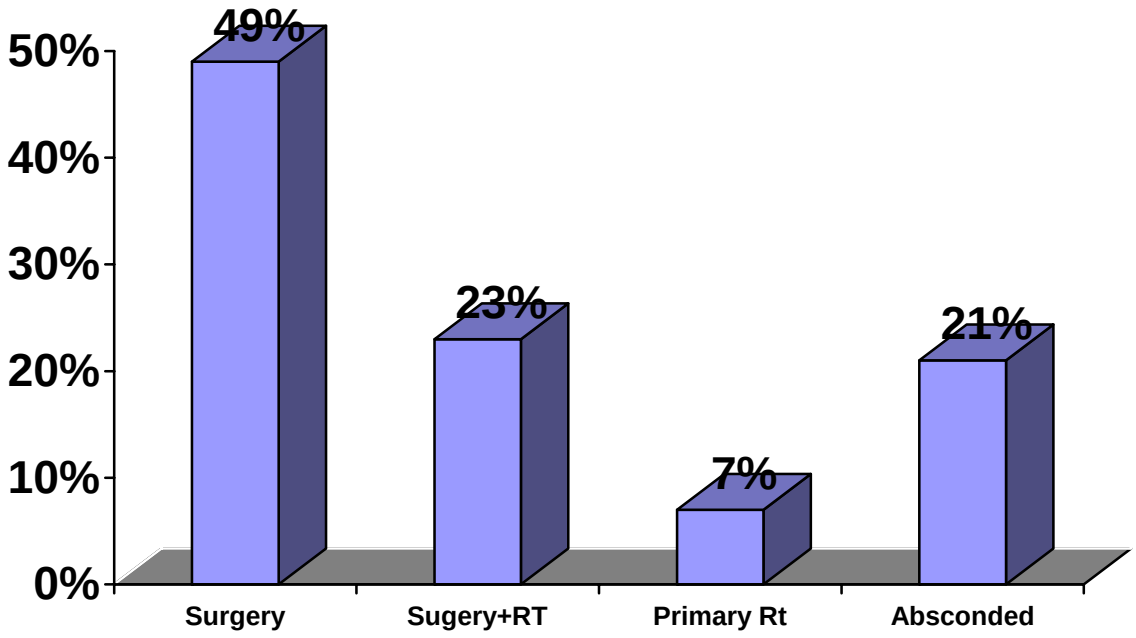




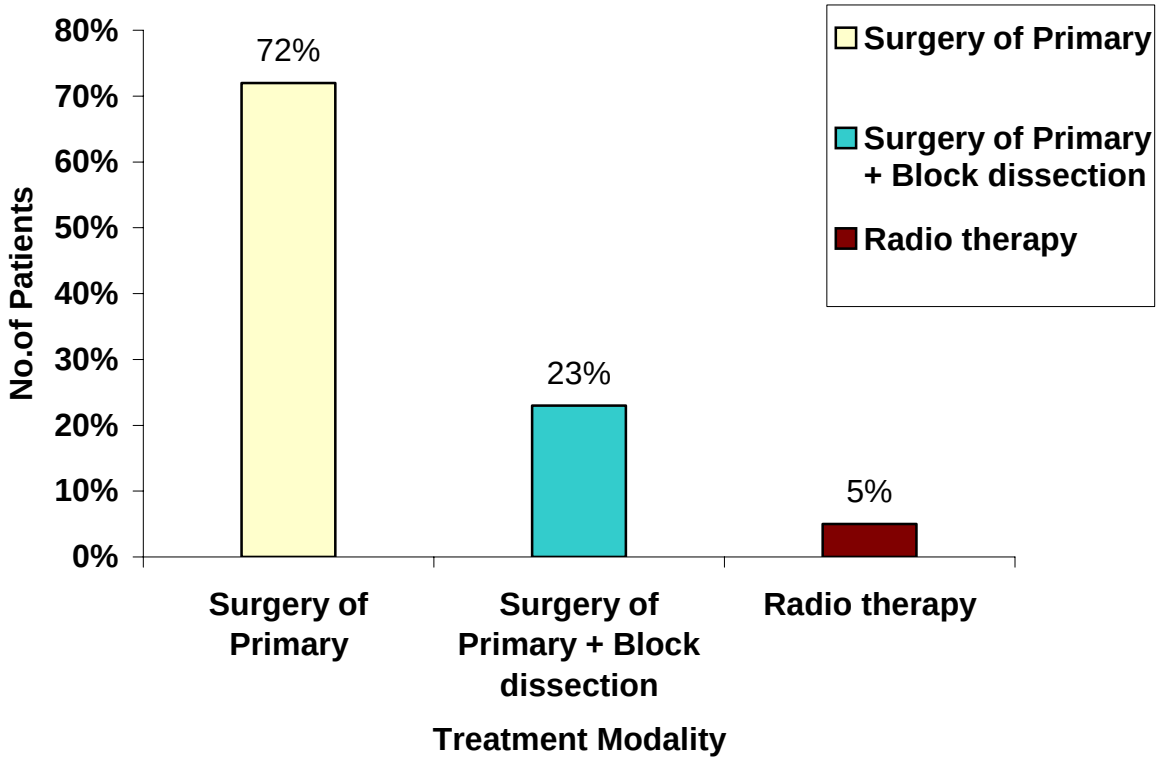
SARIN R et al Insititute of cancer Research and the Royal Marsden Hospital,Sutton,UK



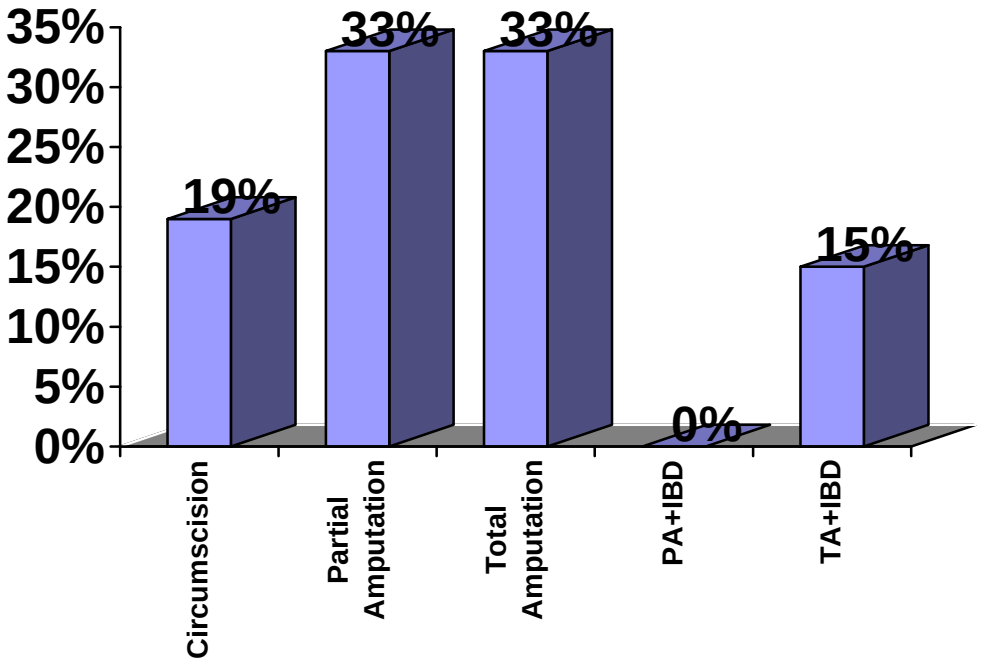
Treatment Modalities in TMCH



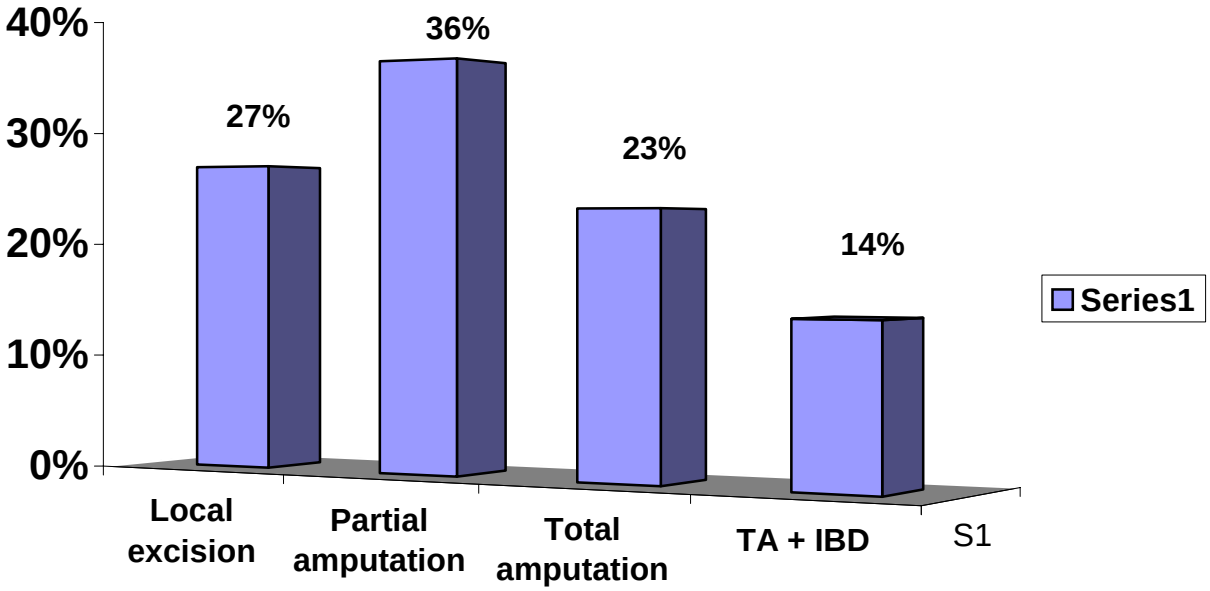
Dr.Murali R Kamat,Tata Memorial Hospital,Bombay,India



Surgery perform in TMCH



indiana university School of Medicine indianaPolis



S.No	IP.No	Name	Age	Duration of Symptoms	Presenting Complaints	Risk Factors	Site of Onset	Type of growth & size	Jackson staging	TNM Stage	shaft involvement	Grading of Tumor	Treatment Given	Follow up Comments
1	846681	DURAIRAJ	55	6 Mon	G,D	Tobacco	Glans	prolif 6cm	II	T3 N2 III	D	Well	PA	
2	944935	KALIYAMOORTHY	47	5 Mon	G.D	Tobacco	Glans	Prolif. 4 cm	III	T2 N2 III	M	Mod	TA + RT	Wound Infection
3	848136	SAIVARAJ	58	10 Mon	G.P.D	Tobacco	Glans +Prepuce	Ulcer 6 cm	III	T3 N2 III	P	Well	TA + RT	Wound dehiscence secondary suturing
4	848599	KALIAPPAN	50	8 Mon	G.D.N. W	-	Glans	Prolif. 6 cm	III	T3N1 III	M	Mod	TA + RT	Inguinal reccurrance 1&1/2 Yrs later
5	850819	DHARMARAJ	36	4 Mon	P	bowenoid papullosis	Prepuce	Prolif. 2 cm	I	T1NO I	Nil	Ca in situ	Circumci sion	-
6	851781	JEGANNATHAN	55	9 Mon	G.D	-	Glans	Ulcer 4 cm	II	T2N0 II	D	Well	TA	Wound Infection
7	857007	LAKSHMANAN	55	6 Mon	G.D	-	Glans +Prepuce	Prolif. 4 cm	II	T2N0 II	D	Well	TA	Wound Infection
8	852945	SANNASI MUTHU	60	8 Mon	G.D	Tobacco	Glans	Ulcer 5 cm	III	T2N1 III	M	Well	TA + RT	Wound Infection
9	857113	PARAMESWARAN	47	6 Mon	G.N.D	Tobacco	Shaft	Prolif. 9 cm	III	T3N2 III	P	Well	TA + B/L IBD	Wound Infection Flap necrosis
10	858929	ARUNACHALAM	70	12 Mon	G.D	Tobacco	Glans +Prepuce	Prolif. 5 cm	III	T2N2 III	M	Well	TA + ® IBD + RT	extranodal extension flap necrosis
11	867546	KUMARESAN	55	12 Mon	G.D	Tobacco	Glans +Prepuce	Ulcer 6 cm	III	T3N1 III	D	Mod	Abs conded	-
12	848798	ARUNACHALAM	45	8 Mon	G.D	Tobacco	Glans	Prolif. 3 cm	III	T2N1 III	P	Mod	Abs conded	-
13	858175	PANDIAN	50	10 Mon	G.D	Tobacco	Glans	Ulcer 4 cm	III	T2N1 III	D	Mod	Abs conded	-

S.No	IP.No	Name	Age	Duration of Symptoms	Presenting Complaints	Risk Factors	Site of Onset	Type of growth & size	Jackson staging	TNM Stage	shaft involvement	Grading of Tumor	Treatment Given	Follow up Comments
14	858144	PONNUSAMY	53	6 Mon	G.D.P.N	-	Glans	Prolif. 6 cm	IV	T3N3 IV	M	Mod	Abs conded	fixed nodes
15	861307	GOVINDARAJ	37	14 Mon	G.D	squamous papilloma	Prepuce	Prolif. 2 cm	I	T1N0 I	Nil	Ca in situ	Circumcision	-
16	863529	VEERAIYAN	50	8 Mon	G.D	Tobacco	Glans	Prolif. 4 cm	III	T2N2 III	D	Mod	Abs conded	-
17	863935	CHINNAKANNU	45	10 Mon	G.D		Glans +Prepuce	Ulcer 6 cm	III	T3N1 III	M	Mod	Abs conded	-
18	869406	IRUDAYAM	42	6 Mon	G.D	Tobacco	Glans +Prepuce	Prolif. 3 cm	II	T2N0 II	D	Ca in situ	TA	Wound Infection
19	869611	KASINATHAN	60	4 Mon	G.D.N.W	Tobacco	Shaft	Ulcer 6 cm	IV	T4N4 IV	M	Mod	Abs conded	Fixed nodes tumor extending to scrotum
20	869761	GOVINDARAJ	45	3 Mon	G.D	Tobacco	Shaft	Ulcer 3 cm	III	T2N1 III	P	Mod	TA + IBD	flap necrosis
21	870455	VEERAMANI	32	5 Mon	G.D	-	Glans	Prolif. 5 cm	III	T2N1 III	D	Well	TA + RT	Wound Infection Flap necrosis
22	873638	PAULSAMY	70	3 Mon	G.D		Glans	Prolif. 5 cm	I	T2N0 II	Nil	Well	PA	-
23	875415	GANGAMIRTHAM	63	4 Mon	G.P	Tobacco	Glans	Ulcer 3 cm	I	T2N0 II	D	Mod	PA	nodal recurrence after 6 months-
24	873135	KALYANASUNDARAM	54	6 Mon	G.D	-	Glans +Prepuce	Prolif. 4 cm	III	T2N1 III	D	Mod	TA + RT	urethral stenosis
25	880447	PANCHABAGESAN	54	6 Mon	G.D.U.N.W	Tobacco	Shaft	Prolif. 8 cm	IV	T2N2MO IV	P	mod diff	TA + RT	scrotal extension
26	880908	CHINNADURAI	55	5 Mon	G.D	Tobacco	Glans	Prolif. 6 cm	II	T3N0 III	D	Well	TA	wound infection urethral stenosis

S.No	IP.No	Name	Age	Duration of Symptoms	Presenting Complaints	Risk Factors	Site of Onset	Type of growth & size	Jackson staging	TNM Stage	shaft involvement	Grading of Tumor	Treatment Given	Follow up Comments
27	882449	AROKIASAMY	50	6 Mon	G.D		Glans	Prolif. 4 cm	II	T3N0 III	D	Mod	Abs conded	
28	884288	GOVINDARAJ	55	7 Mon	G.D.U. N	Tobacco	Shaft	Prolif. 8 cm	IV	T3N3 IV	P	mod diff	TA + RT	Margins involved fixed nodes
29	885396	NATARAJAN	63	6 Mon	P	Tobacco	Prepuce	Prolif. 3 cm	I	T2N2 II	Nil	Well Diff	Circumci sion	-
30	882862	VEERAIYAN	55	6 Mon	G.D	Tobacco	Glans	Ulcer 6 cm	II	T3N0 III	D	well diff	TA	-
31	886402	SREENIVASAN	49	8 Mon	G	leukoplakia	Prepuce	Prolif. 4 cm	II	T2N0 II	D	mod diff	Abs conded	-
32	887895	SREENIVASAN	45	6 Mon	P	tobacco, leukoplakia	Prepuce	Prolif. 2 cm	I	T1N0 I	Nil	well diff	Circumci sion	-
33	889487	RAMASAMY	47	8 Mon	G.D	Tobacco	shaft	Prolif. 2 cm	II	T2N0 II	D	well diff	TA	nodal recurrence after 8 months-
34	891550	THOMAS	45	10 Mon	G.D.U. N		Shaft	Ulcer 9 cm	IV	T4N2MO IV	P	mod diff	primary RT	Scrotal extension
35	890030	DURAIRAJ	60	6 Mon	G.D	-	Glans +Prepuce	Prolif. 3 cm	III	T2N1 III	M	mod diff	TA + RT	-
36	900534	SARATHY	60	6 Mon	G.D	Tobacco	Glans +Prepuce	Ulcer 6 cm	III	T3N2 III	D	well diff	TA + RT	wound dehiscence
37	900817	SUBRAMANI	50	5 Mon	G.D	Tobacco	Glans	Prolif. 6 cm	III	T3N0 III	D	well diff	Abs conded	-
38	903078	GOPAL	60	5 Mon	G	-	Glans	Prolif. 4 cm	I	T2N0 III	Nil	well diff	PA	-
39	901249	RENGASAMY	45	6 Mon	G.D	Tobacco	Shaft	Ulcer 7 cm	III	T3N1 III	M	mod diff	TA +Rt IBD	flap necrosis
40	906745	KALAIVANAN	38	6 Mon	G.D	Tobacco	Glans +Prepuce	Ulcer 6 cm	II	T3N1 III	D	mod diff	Abs conded	-
41	906302	MOHAN	45	5 Mon	G.D	-	Glans	Prolif. 5 cm	II	T2N0 II	D	mod diff	PA	wound Infection

S.No	IP.No	Name	Age	Duration of Symptoms	Presenting Complaints	Risk Factors	Site of Onset	Type of growth & size	Jackson staging	TNM Stage	shaft involvement	Grading of Tumor	Treatment Given	Follow up Comments
42	905521	SHANMUGAM	75	5 Mon	G.D	Tobacco	Glans	Prolif. 4 cm	III	T3N-III	M	mod diff	TA	Urethral stenosis
43	907832	PALANIVEL	70	6 Mon	G.D	-	Glans	Prolif. 3 cm	II	T2N0 III	D	mod diff	PA + RT	resection margins involved
44	911126	KALIMUTHU	50	7 Mon	G.D	Tobacco	Glans	Prolif. 4 cm	II	T3N0 III	P	well diff	TA	-
45	911967	KALIYA PERUMAL	60	5 Mon	P	Tobacco	Glans	Ulcer 5 cm	II	T3N0 III	D	well diff	Abs conded	biopsy after dorsal slit
46	920151	RENGASAMY	60	7 Mon	G.D	Tobacco	Glans	Ulcer 6 cm	II	T3N0 III	D	well diff	TA	wound Infection
47	912155	KALYANASUNDARAM	60	3 Yrs	G.D.U.N	Tobacco	Shaft	Ulcer 7 cm	III	T3N2 III	M	mod diff	TA + B/L IBD	Urethral stenosis
48	911220	MUTHUSAMY	40	3 Mon	P.N.W	Tobacco	Glans	Ulcer 3 cm	IV	T2N3 IV	D	mod diff	PA + RT	Fungating groins dorsal slit
49	911873	PAKKIRISAMY	50	5 Mon	G.D.P	Tobacco	Glans	Ulcer 7cm	IIII	T3N1 III	M	mod diff	TA + IBD(R)	Urethral withdrawl SPC
50	914507	RENGASAMY	65	10 Mon	G.D.U.N.W	Tobacco	Glans	Ulcer 6 cm	IV	T3N3 IV	D	mod diff	PA + RT	Fungating nodes
51	913683	KARUNANIDHI	45	5 Mon	G	-	stump after PA	Prolif. 4 cm	III	T2N1 III	P	mod diff	TA	Stump recurrence after PA (after 6 yrs) scrotal lymphedema after RT
52	918300	RENGARAJ	63	4 Mon	G.D	-	Prepuce	Prolif. 6 cm	III	T3N2 III	M	mod diff	TA + RT	wound Infection
53	916987	RAJAGOPAL	30	10 Mon	G.D	Squamous Papilloma Tobacco	Corona	Prolif. 10 cm	II	T3N0 III	D	well diff	TA	Urethral stenosis

S.No	IP.No	Name	Age	Duration of Symptoms	Presenting Complaints	Risk Factors	Site of Onset	Type of growth & size	Jackson staging	TNM Stage	shaft involvement	Grading of Tumor	Treatment Given	Follow up Comments
54	919667	MUNIYAN	65	6 Mon	G.D	Tobacco	Glans	Ulcer 5 cm	III	T2N1 III	M	well diff	primary RT	Pt. not willing for TA
55	919100	NALLAKANNU	60	5 Mon	G.D	leukoplakia	Prepuce	prolif 3 cm	I	T1N0 I	Nil	Ca in situ	Circumcision	-
56	921732	AMALRAJ	50	3 Mon	G.D.N	Tobacco	Prepuce	Prolif. 5 cm	IV	T2N3 IV	D	mod diff	primary RT	Fixed nodes
57	921342	KALIYAPPAN	50	18 Mon	N.W	-	-	-	IV	IV	-	mod diff	RT to groin	recurrence in inguinal nodes liver mets
58	930581	THANGAMUTHU	60	5 Mon	G	-	Glans	Prolif. 5 cm	I	T2N0 II	Nil	well diff	PA	H/O circumscision incidentally detected
59	930440	VELAYUTHAM	60	4 Mon	G.U	Tobacco	Glans	Prolif. 9 cm	III	T3N2 III	P	mod diff	Abs conded	-
60	926911	SIVASANKARAN	77	10 Mon	G.D	Tobacco	Glans	Prolif. 6 cm	III	T3N2 III	M	mod diff	Primary RT	due to co-morbid illness
61	925199	CHINNAIYAN	71	8 Mon	G.D	Tobacco	Glans	Prolif. 4 cm	I	T3N0 II	Nil	well diff	PA	-
62	931072	KRISHNASAMY	70	10 Mon	G.D	tobacco, bowenoid papullosis	Glans	Prolif. 3 cm	II	T3N0 II	D	mod diff	PA	Incidentally found during circumcision
63	930734	MURUGESAN	65	6 Mon	G.D	-	Glans	Ulcer 5 cm	II	T2N0 II	D	mod diff	PA	-
64	935440	ARUMUGAM	47	5 Mon	G.D	Tobacco	Glans	Ulcer 5 cm	II	T2N0 III	D	well diff	PA + node biopsy	node negative
65	937985	NATARAJAN	60	6 Mon	P	Tobacco	Prepuce	Prolif. 2 cm	I	T1N0 I	Nil	Ca in situ	Circumcision	-
66	936166	MAHALINGAM	65	3 Mon	G	-	Glans	Prolif. 4 cm	II	T2N0 II	D	mod diff	Abs conded	-
67	944571	THANGARAJ	41	5 Mon	G.D	Tobacco	Glans	Ulcer 4 cm	II	T2N0 II	D	mod diff	PA	-

S.No	IP.No	Name	Age	Duration of Symptoms	Presenting Complaints	Risk Factors	Site of Onset	Type of growth & size	Jackson staging	TNM Stage	shaft involvement	Grading of Tumor	Treatment Given	Follow up Comments
68	960132	KALIYAPERUMAL	62	5 Mon	G.D	Tobacco	Shaft	Prolif. 6 cm	III	T3N1 III	P	mod diff	TA + RT	Wound Infection