Tumours of the male genital tract

Marie O'Donnell

Abstract

This article discusses pathological features of tumours of the male genital tract. Carcinoma of the prostate is common and represents an increasing burden to the NHS in terms of management and treatment. We focus on recent changes to grading and discuss issues around pathological diagnosis. Tumours of the testes represent the greatest success story of cancer treatment over the past several decades. We review the pathological features of the commonest tumours focusing on prognostic features. Carcinoma of the penis is rare but appears to be increasing in incidence. It requires more awareness amongst the public and general practitioners to prevent presentation at an advanced stage. We focus on pre-invasive lesions and on the pathological staging of this disease.

Keywords Pathology; prostate carcinoma; penile carcinoma; testicular tumours

Tumours of the prostate gland

Background, epidemiology and risk factors

Prostate cancer is the most common cancer in men in the United Kingdom. It accounts for 26% of all male cancer diagnoses. One in eight men will receive the diagnosis sometime during their life paralleling breast cancer rates in women. In 2015 there were 47,151 new cancer cases in the UK, with 11,631 deaths ascribed to prostate cancer. Currently, it is estimated that men have an 84% 10-year survival from the disease. While incidence rates have started to decrease in those patients >75 years, it continues to rise in individuals between 45 and 74 years. The increasing incidence probably reflects a combination of a true increase in the number of cases as well as the incidental detection of carcinoma because of blood testing for serum PSA.

The exact cause of prostate cancer is not fully understood and is probably multifactorial. There is an association with strong family history, race, increased androgen levels, diet and probably other environmental factors. There is an increased risk in those men who have one or more first-degree relatives with prostate cancer especially if the relative had a diagnosis before the age of 60. Those men who are of Afro-Caribbean extraction have a greater risk of developing prostate cancer compared with Caucasian men, but Asian men appear to have a lower incidence of the disease. In recent years, there has been an increasing recognition that men with inherited mutation of the *BRCA2* gene have almost a 20-fold increase in prostate cancer risk. Many of these patients develop their carcinomas at an earlier age and appear to have an aggressive form of the disease. In some studies, familial prostate cancer patients were found to have alterations to chromosome 1, 17 and the X chromosome. It is possible that with increasing knowledge, selective screening and monitoring of high-risk groups may be able to be initiated.

Marie O'Donnell *MB BCh BAO (NUI) FRCPath is a Consultant in Urological Pathology at the Western General Hospital, Edinburgh, UK. Conflicts of interest: none declared.*

Diagnosis

While some patients may present with symptoms related to bladder outlet obstruction or to metastatic disease, the majority of patients with prostatic carcinomas are diagnosed following the identification of an elevated serum PSA and the subsequent performance of ultrasound guided transrectal prostatic core biopsies. Practices vary between individual units but in most cases 10–12 prostatic core biopsies are taken from prescribed areas of the peripheral zone of the prostate and also from the apex. At least 50% of those biopsied will show evidence of adenocarcinoma. If the biopsies are benign but there remains a strong clinical suspicion or the PSA remains elevated/continues to rise, the current practice in many centres is to perform a multiparametric MRI scan to try and identify any discrete abnormality that can be targeted on repeat biopsies. In some centres, there has been a recent move to perform multi-parametric MRI on all patients with an elevated PSA or abnormal DRE examination as an initial investigation. This is used to direct sampling of any abnormality detected. It may also be possible in time to avoid biopsy of individuals with minimally elevated PSA and normal scans. Transperineal biopsies can permit sampling of areas of the prostate that are not readily accessible by transrectal biopsies. It produces a greater number of biopsies to be reviewed and is said to be less painful compared with the transrectal approach. This method can target anterior located tumours which are often associated with negative TRUS prostatic biopsies. Prostatic carcinoma can also be identified on TURP specimens. Prior to the advent of PSA testing and TRUS biopsies, it was estimated that between 15% and 20% of prostate chips contained adenocarcinoma. In some cases, this was low volume well differentiated transition zone cancer and was probably incidental. In other cases, it was poorly differentiated, reflecting extension of a bulky peripheral zone carcinoma into the transition area of the prostate.

The histological diagnosis of prostate adenocarcinoma is primarily based on the abnormal architectural growth pattern of the neoplastic glands and relies less on cytological atypia. In lower grade carcinomas, the glands are typically well formed and distinct, they may contain small amounts of blue tinged mucin or crystalloid material. Unlike benign glands, they are composed of a single layer of cuboidal to low columnar epithelium without the second surrounding basal cell layer. This feature can be exploited in difficult cases where there is minimal carcinoma present. The application of immunohistochemistry against basal cell antigens can demonstrate in many cases the difference between benign glands and malignant glands. Use of racemase immunohistochemistry can also be of use as it is more likely to show stronger expression in malignant foci. Many units use combinations of both racemase and basal cell markers to investigate difficult cases. These stains are particularly helpful in benign mimickers of well-differentiated carcinoma such as atrophy, adenosis, inflammatory/reactive atypia and small fragments of seminal vesicles (Figure 1). As prostatic adenocarcinomas become less well differentiated, they show increased complexity of the

architectural growth pattern with diminished gland formation and more obvious nuclear enlargement and pleomorphism. A particularly notable feature of prostate cancers is the presence of prominent nucleoli. While acinar adenocarcinoma accounts for the majority of adenocarcinomas of prostate, less common variants are also recognized in probably 5% of cases. These include ductal adenocarcinoma of prostate which can present as a papillary lesion within the prostatic urethra and which is associated with a more aggressive course and poorly differentiated neuroendocrine/small cell carcinoma which mimic identical tumours found elsewhere in the body and which is often treated with neoadjuvant chemotherapy.

Grading

The Gleason Grading System is the most frequently used system worldwide. It divides prostatic adenocarcinoma into five distinct grades based on overall glandular differentiation and pattern. There have been modifications of the Gleason Grading System since the original publication. The most recent of these was in 2005 when a modified Gleason Grading System was published. Gleason recognized that many tumours show mixed patterns and that the overall prognosis is better reflected by using a combination of the grades present (Figure 2). He identified the dominant pattern (primary) with the second most frequent pattern present (secondary) to give an overall Gleason score. If a carcinoma is found to be composed of a single grade then the overall grade is doubled to give the final score. In addition, it is now recognized that in a portion of cases, a third or tertiary Gleason grade is present and that this should be reported if it is of higher grade than the primary or secondary elements, e.g. $3 + 4 + 5$ should be regarded as $3 + 5 = 8$. Over recent years, some deficiencies of Gleason grading have been recognized. Gleason grades 1 and 2 are not identifiable in prostatic core biopsies and Gleason pattern 2 is infrequently recognized in prostatectomy and TURP specimens. By default, the lowest score generally recorded is $3 + 3 = 6$. This can become problematic when discussing pathological findings with patients as a score of 6 out of a total of 10 is regarded as being a good prognostic carcinoma. Therefore, in recent years, a move to produce a five-tier prognostic grade grouping has been recommended and has recently been adopted by UK Uropathologists with both Gleason score and Prognostic Grade group being included in pathology reports. Group 1 which is the most favourable group represents a Gleason score of 6 or less while Group 5, the least favourable, represents a Gleason score of 9–10. These groups are very strongly associated with prognostic outcome and it is most likely that this will replace the Gleason Grading System going forward (Table 1).

Prostatic intraepithelial neoplasia (PIN) and intraductal carcinoma

Prostatic intraepithelial neoplasia is an atypical intraduct epithelial proliferation composed of atypical cells with prominent nucleoli. These ducts retain a basal epithelial layer which can be demonstrated on immunohistochemistry. While lower grades of PIN exist, inter- and intra-observer variability means that only high-grade PIN is commented upon in prostatic core biopsies. It is estimated that high-grade PIN in isolation will be seen in up to 10% of prostatic core biopsies. Invasive carcinoma can be found in up to 25% of patients with high-grade PIN on follow up. Patients with multifocal bilateral high-grade PIN have an higher risk of adenocarcinoma being found on repeat biopsy.

High-grade PIN is not to be confused with intraductal carcinoma (IDC) which represents spread of malignant cells along the large ducts of the prostate. This is almost always seen in association with invasive adenocarcinoma usually of high grade. It is recognized as an independent adverse prognostic factor with many cases having extraprostatic spread at the time of diagnosis.

Atypical small acinar proliferation (ASAP)

Atypical small acinar proliferation is not a diagnostic entity but reflects an atypical focus seen by the pathologist on biopsy. Despite the examination of multiple levels through the tissue and the performance of immunohistochemistry, the focus is too small to be confident about a definite diagnosis of adenocarcinoma. It is estimated, that an isolated diagnosis of ASAP is seen in between 1% and 5% of prostatic core biopsies. Careful follow up of this group of patients is warranted as various studies have demonstrated that in 34–60% of cases, adenocarcinoma of the prostate will be identified on subsequent biopsies. It may be worth considering MRI in these patients to target any areas of abnormality. Occasionally, the term PINATYP will be used to indicate that the focus of atypical glands is seen in close

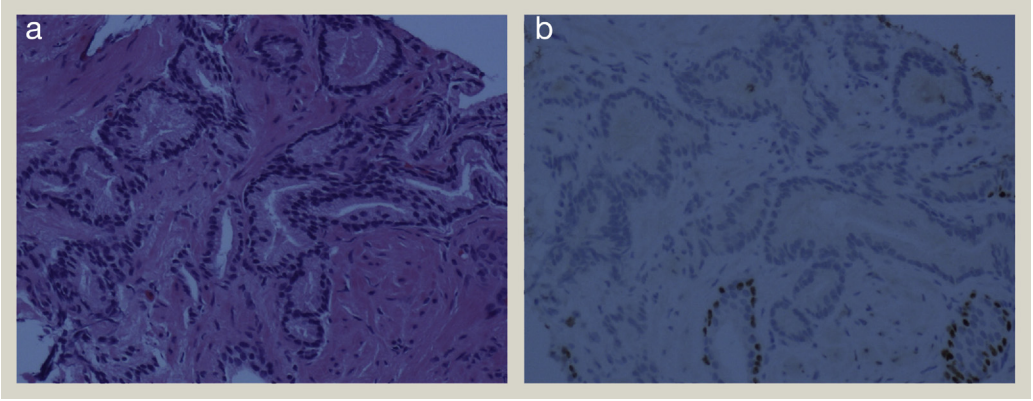

Figure 1 (**a**) H&E & (**b**) P63 immunohistochemistry. A tiny proliferation of atypical glands found in a single core of a TRUS biopsy. The neoplastic nature of the malignant glands is highlighted by the absence of basal cells surrounding the glands using immunohistochemistry to P63.

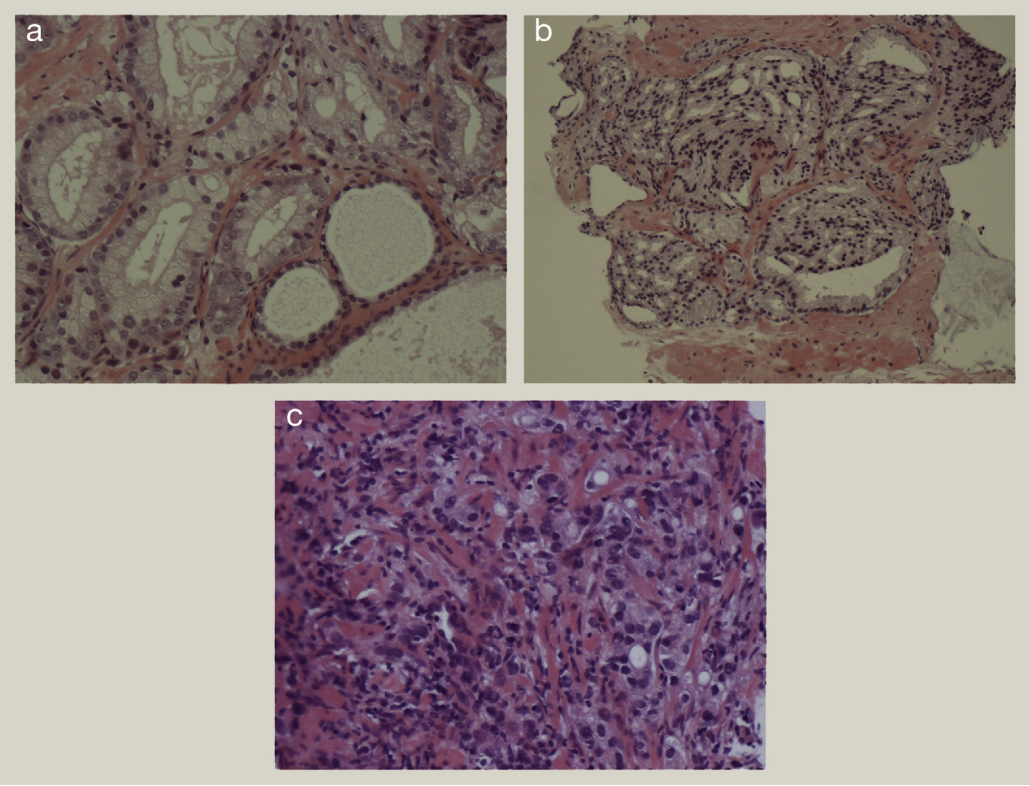

Figure 2 Representative images from three different prostatic adenocarcinomas showing (**a**) Gleason pattern 3, (**b**) Gleason pattern 4 and (**c**) Gleason pattern 5 respectively.

The 5-year biochemical recurrence-free progression probabilities for radical prostatectomy based on Pierorazio et al. BJU Int 2013 May

Prognostic grade group	Gleason score	Survival at 5 years
Group 1	$1 \leq 6$	96%
Group 2	3+4=7	88%
Group 3	4+3=7	63%
Group 4	4+4, 3+5, 5+3= 8	48%
Group 5	9–10	26%

Table 1

association with a focus of high-grade PIN and may represent an outpouching of the duct affected by dysplasia but in which a tiny focus of invasive carcinoma cannot be fully excluded.

Management issues

In patients who are found to have localized prostatic cancer, classification of their risk into low-risk disease and high-risk disease has allowed in recent years alternative treatment paradigms. Risk is calculated on the basis of serum PSA, clinical stage and both Gleason score and the number and extent of cores involved, In those patients with localized low-risk disease, active surveillance can be offered. This involves regular PSA monitoring and repeat biopsies looking for evidence of grade or stage progression. Patients with intermediate or high risk but localized disease will usually be offered active treatment in the form of prostatectomy or radiotherapy. Malignant foci can rarely be identified macroscopically by the pathologist when examining prostatectomy specimens. This means that the entire gland needs to be processed for microscopy. This is facilitated by the use of megablocks, which while technically demanding, produce single microscope slides of the prostate slices allowing accurate mapping of the disease microscopically. Prognostic features on radical prostatectomy which are of significance include Gleason score, the presence of extraprostatic spread, seminal vesicle invasion and the extent of positive surgical margins. Tumour volume may be of significance prior to surgery to access the likelihood of complete resection but still requires full evaluation as a marker of disease progression. Pathological evaluation can also provide feedback regarding surgical quality as it can give information on intraprostatic incisions and rates of positive margins in patients evaluated as pT2 prior to surgery. In patients with metastatic prostatic adenocarcinoma, recent clinical trials have indicated significant benefit to neoadjuvant taxane therapy with or without hormonal therapy. Frequently, this group have prostate biopsies to confirm their diagnosis and to have available tissue for future clinical trials they may enrol on. Occasionally, biopsies are taken post radiotherapy for radiotherapy failure. Interpretation of these can be extremely difficult. The residual benign prostatic glands can show significant cytological atypia and atrophy. If the pathologist is unaware that the patient has

had previous radiotherapy, misinterpretation of the prostatic biopsies is possible. Hormonal therapy also causes significant atrophy and condensation of chromatin which means that accurate grading of hormonally treated patients can be difficult.

Other prostatic tumours

Urothelial carcinomas of the bladder can directly invade the prostate reflecting pT4 disease. However, high-grade urothelial carcinomas can also develop within the prostatic urethra and extend down the prostatic ducts to invade the prostatic stroma which would be regarded as pT2 rather than pT4 disease. There are a variety of other rarer neoplasms affecting the prostate including stromal sarcomas, stromal tumours of uncertain malignant potential (STUMP), a variety of other sarcomas and gastrointestinal stromal tumours (GIST). It is important that the surgeon looking after the patient recognizes that these tumours are very different from typical prostate cancers and have very different management and prognostic outlooks.

Testicular tumours

Background, epidemiology and risk factors

Testicular tumours are a relatively rare malignancy accounting for 1% of cancers in men in the UK; 2288 new cases were diagnosed in 2015 with 57 deaths. The vast majority occur in the 18–35 year age group. There has been a significant increase in the incidence of testicular tumours in most Western countries over the past 30 years, such that it is now double what it was in the UK in the 1960s. There is strong evidence to suggest important environmental components to this increase associated with the affluent Western lifestyle. There are a number of clearly identifiable risks. These include testicular mal-descent, cryptorchidism, infertility, androgen insensitivity syndromes and gonadal dysgenesis. Men who have had a personal diagnosis of testicular malignancy have a twelvefold increased risk of developing contralateral disease. Men whose fathers had testicular carcinoma have a fourfold increase in risk and men with an affected brother an eightfold increase in disease risk.

Germ cell neoplasms

The majority of testicular tumours are germ cell tumours. Most are associated with the precursor lesion germ cell neoplasia in situ (GCNIS). This has previously been termed carcinoma in situ and intratubular germ cell neoplasia unclassified. This lesion represents large neoplastic cells which lie within the pre-existing seminiferous tubules. Studies from Denmark from the 1960s and 70s indicate that in that population up to 0.8% showed evidence of isolated GCNIS Follow up of these patients indicated that the majority progressed to develop invasive germ cell neoplasia within a 10 year period.

Seminoma accounts for 50% of invasive germ cell tumours of the testis. These tumours have a characteristic histological appearance consisting of sheets of cells often separated by fibrous septae and containing clusters of lymphocytes and occasional granulomata (Figure 3). Approximately 10% of cases also show the presence of isolated syncytiotrophoblasts which can result in slightly elevated serum HCG prior to surgery. Non-seminomatous germ cell tumours (NSGCT) account for 40% of germ cell tumours of the testis. The remaining 10% of cases show a mixture of both seminoma and non-seminomatous elements. NSGCTs can be pure or mixed. They show a variety of histological differentiation patterns. These include primitive epithelial tumour cells replicating an early phase of embryonal development in Embryonal carcinoma, replicating the yolk sac in yolk sac tumour and trophoblastic elements in choriocarcinoma. It also can contain teratoma consisting of various types of somatic tissue originating from different germinal layers (endoderm, mesoderm and ectoderm) which can be mature or immature. While teratomas occurring prior to puberty are benign in behaviour and do not have associated GCNIS, those occurring after puberty are almost invariably malignant. Tumours with a yolk sac component show raised serum levels of alpha-fetoprotein while those with a choriocarcinomatous component show raised levels of serum HCG. Pure choriocarcinoma is associated with dramatically increased levels of HCG often >100,000 IU/ml. Most of these tumours are metastatic at the time of presentation and have symptoms related to the metastases including CNS symptoms, haemoptysis and visceral haemorrhage. They generally affect younger men and constitute an oncological emergency. Seminoma and non-seminomatous germ cell tumours are associated with a characteristic isochrome of the short arm of chromosome 12 (i12p). This suggests that this is of crucial importance in the development of testicular germ cell tumours.

The WHO classification reflected in the discussion above has replaced the British testicular tumour panel classification which was previously used in the UK. This now allows standardization which is better for the comparison of international studies and entry into clinical trials.

Pathological staging of testicular tumours define T1 tumours as being confined to the testis and epididymis. T2 tumours show evidence of vascular invasion or invasion of the tunica vaginalis. T3 tumours show invasion of the spermatic cord. T4 disease which is now rare involves invasion of scrotal skin.

While pathological staging is of importance, most oncologists involved in the treatment of testicular disease are significantly influenced by the clinical stage at the time of diagnosis which takes into account the blood serum markers AFP and HCG and the presence of lymph node or systemic metastases on post operative CT scan.

Clinical management

The treatment of testicular malignancy has been revolutionized in the last 50 years. Currently 98% of all testicular germ cell tumours are cured. As time has gone on, patients have been stratified in to those with low-risk disease who may benefit from active surveillance, those with localized disease but with a number of known risk factors who may be given a single dose of carboplatin chemotherapy and those individuals with metastatic disease who will require a course of chemotherapy. Vascular invasion is of particular significance in patients with non-seminomatous germ cell tumours and its presence would usually initiate cisplatin therapy. A high proportion of embryonal carcinoma is also associated with an adverse prognosis. Invasion of the rete testis, a tumour size of >4 cm and invasion of the hilar

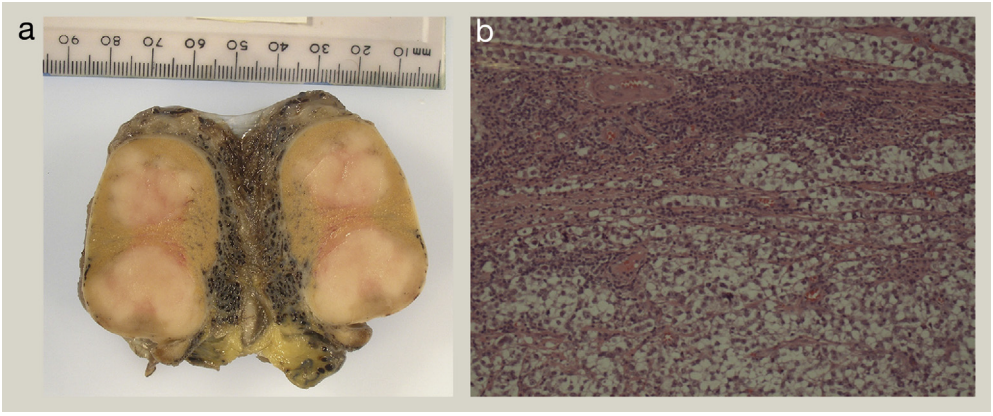

Figure 3 (**a**) Macroscopic image of a seminoma showing a uniform cream-white appearance of the tumour within the testicular parenchyma; (**b**) microscopic appearance of classical seminoma showing sheets of cells with an accompanying population of benign lymphocytes.

fat are also recognized risk factors for recurrence or progression. In patients with metastatic NSGCT, masses may reduce in size but not completely resolve following chemotherapy. In this group, resection of the residual mass is recommended. Histologically, these patients tend to show extensive necrosis of the tumour with areas of organizing fibrosis but may also show residual mature or immature teratomatous components. These components are capable of continuing growth and are unfortunately unresponsive to current chemotherapy regimes. Rarely, if not resected these teratomatous components can undergo somatic differentiation to more conventional somatic carcinomas or sarcomas.

Spermatocytic tumour

This is an uncommon variant of germ cell tumour which was previously called spermatocytic seminoma. It is not associated with GCNIS and does not show the typical risk factors for other germ cell tumours. It is not associated with loss of isochrome 12p and does not show expression of PLAP and OCT3/4 antibodies seen in other germ cell tumours. It tends to occur in older white males. It is important that it is recognized as being different by the pathologist because aside from isolated case reports, it appears to behave in a benign fashion.

Other tumours affecting the testis

The remaining tumours affecting the testis are rare. Sex cord stromal tumours include Leydig cell, Sertoli and granulosa cell tumours. Of these, Leydig cell tumours are the most common. They are often found incidentally when patients are being investigated for other symptomatology. The majority of these are benign. Histologically, features that may suggest a malignant course include large size, necrosis, prominent pleomorphism and lymphatic vascular invasion but metastatic disease is the only true indicator of malignancy. However, where concerning pathological features are observed, prophylactic retroperitoneal resection is sometimes recommended. Tumours reminiscent of ovarian epithelial carcinomas are seen rarely. Tumours of the para-testicular tissues including mesothelioma and sarcomas including liposarcoma are identified as well as rare primary adenocarcinomas of the rete testis. B-cell lymphomas are associated with the older age group and can represent either a primary neoplasm of the testis or secondary involvement with a systemic lymphoma. Metastatic disease from other locations including the prostate, bladder and kidney as well as melanoma are also occasionally identified in resected specimens.

Penile tumors

Background, epidemiology and incidence

Penile cancer is a rare malignancy accounting for approximately 600 new cases per year in the UK. For the past decade, this cancer has been treated in supra-specialist units. Some recent studies have suggested an increasing incidence. This may in part be due to infection with high-risk HPV and mimics the increase seen at other sites such as the oropharynx and anus where this is also a factor. The vast majority of penile cancers are squamous cell carcinomas (SCC) and are similar to those seen in the anus, vulva, head and neck. The majority of cases are treated with surgical intervention followed by adjuvant chemotherapy or radiotherapy. Radical penectomy is less frequently performed in recent years with the advent of partial penectomy with reconstruction and plastic surgery techniques (Figure 4).

Precursor lesions

Recent changes in the terminology used for precursor lesions of penile SCC were ratified at the ISUP/USCAP meeting in 2015. These are now divided into two subtypes: undifferentiated PEIN (penile intraepithelial neoplasia) and differentiated PEIN. These are by definition high-grade lesions. There is still a place for description of atypia/dysplasia which falls short of PEIN but the term PEIN should be reserved for those cases that would previously have been described as carcinoma in situ. Undifferentiated PEIN usually presents as a flat erythematous lesion on the glans or foreskin. It previously was described by a variety of clinical terms including squamous cell carcinoma in situ, severe dysplasia, Bowenoid papulosis, Bowen's disease, erythroplasia of Queyrat. From a pathological point of view, all of these lesions, while being slightly different clinically, have an identical histological appearance. These lesions are not associated with lichen sclerosus but are associated with high-risk HPV infections

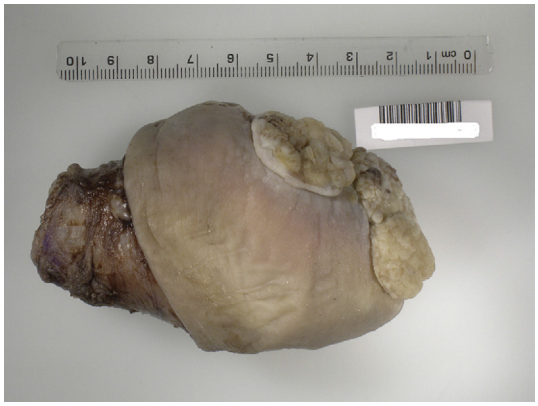

Figure 4 Macroscopic appearance of a partial penectomy specimen showing an exophytic papilliferous looking neoplasm on the glans surface.

most commonly HPV16. They are precursor lesions for invasive squamous cell carcinoma of usual type, basaloid type and warty subtype. Differentiated PEIN is usually a flat or pale white lesion. It is very similar to an identical entity which occurs in the vulva. The abnormal cells may be most marked within the basal layer of the epithelium and there is apparent 'differentiation' as the cells move to the surface. This entity is associated with lichen sclerosus. It is also negative for HPV. It can be seen as a precursor lesion to usual type squamous cell carcinoma, verrucous SCC and pseudohyperplastic SCC.

Squamous cell carcinoma

Most SCC arise on the glans but some arise from the foreskin or distal urethra. The carcinomas are graded into Grade 1 to Grade 3 based on the degree of differentiation seen in the worst area. The vast majority of SCC are of usual type amounting to 70% of cases. Ten per cent of cases have a basaloid morphology. This is an aggressive carcinoma which is of high grade and often presents as a flat ulcerated lesion. Fifty per cent of these cases will have nodal metastases at the time of presentation and vascular invasion is a notable feature. Histologically, this form of squamous cell carcinoma is composed of basaloid cells with an abrupt transition from epithelial cells to areas of necrosis. Verrucous squamous cell carcinoma amounts to 5% of cases. This has an unusual burrowing or exophytic morphology and is of low grade. It is not usually associated with distant spread. On small biopsies, this can be extremely difficult to diagnose as the nature of the squamous proliferation can be difficult to distinguish from viral warts. This explains why occasionally, pathologists may describe a small biopsy as showing a squamoproliferative lesion which requires further correlation with the clinical findings. Five per cent of cases are papillary squamous cell carcinomas which are often of low grade and stage. Less than 2% of cases have a sarcomatoid morphology. This is usually manifested by a spindle cell morphology. These are high-grade neoplasms with an aggressive course and often have disseminated metastases at the time of presentation. Approximately 30% of squamous cell carcinomas will show a mixed morphology showing variable components of the different subtypes described above. Other rarer subtypes account for <1% of all cases.

Other tumours affecting the penis

Malignant melanoma can occur as a primary neoplasm. This usually arises within the distal urethra. True sarcomas can occur within the penis but are exceptionally rare. There are occasional descriptions of neuroendocrine carcinomas including small cell carcinomas arising within the penis. Metastatic deposits, most commonly within the corpus cavernosum are well described. These are usually from the kidney but also can occur from the prostate, bladder, melanoma and lymphomas. Extramammary Paget's disease is an unusual lesion affecting the penis. This is similar to extramammary Paget's disease occurring elsewhere in the body. Its importance lies in the fact that it can be mistaken for differentiated PEIN and most instances represent spread of malignant urothelial cells in a patient with known urothelial carcinoma.

Staging

Pathological staging of penile cancers remains a very valuable prognostic indicator. Recent subdivision of pT1 disease has provided useful prognostic information. Departments in the UK use the TNM 8 (UICC) system. TIS refers to in situ disease. T1a refers to superficially invasive squamous cell carcinoma that is not of high grade and does not show lymphatic vascular or perineural invasion, T1b refers to superficially invasive disease that is of high grade or shows lymphatic vascular or perineural invasion. T2 disease represents invasion of the corpus spongiosum with or without involvement of the urethra. T3 represents invasion of the corpus cavernosum. T4 represents invasion of adjacent organs, particularly scrotal skin. In most units, pathologists use megablocks to examine resection specimens because of the complex anatomy of the penis, thus allows more accurate staging.

Lymph node status

The European Association of Urologists recommend that all high grade, Grade 3 SCC and Grade 2 SCC of pT2 or above should undergo lymphnode evaluation. In the last decade, there has been a move against inguinal lymph node dissection which is associated with significant morbidity and the risk of leg lymphoedema in favour of sentinel node biopsies in those patients who do not have any obviously involved lymph nodes. In up to 60% of those patients selected for sentinel node biopsy, the sentinel node will be negative thus preventing them from requiring any additional surgical intervention. Up to two unilateral involved inguinal nodes is regarded as N1 disease and more than three or bilateral inguinal disease as N2 disease. If there is any evidence of extra nodal spread, the disease is automatically elevated to N3 because of the adverse prognosis of this pathological feature. Involvement of any pelvic lymph node also means that the disease is upstaged to N3.

Conclusion

Malignant tumours of the male genital tract represent a diverse group of neoplasms ranging from the common carcinoma of the prostate to the rare tumours of the penis and testis. Awareness of the different entities and their pathology can lead to better understanding of prognosis and treatment. ◆

FURTHER READING

Berney D, Theaker J, Verrill C. Dataset for reporting of testicular neoplasms published by Royal College of Pathologists.

Cancer Research UK – cancer statistics for health professionals available on www.cancerresearchuk.org.

Corbishley C, Oxley J, Shanks JH, Tinwell B. Dataset for reporting of Penile and distal [Urethral cancer published by Royal College of Pathologists].

Epstein JI, Allsbrook WC, et al. The 2005 international society of uropathology (ISUP) consensus conference on Gleason grading of prostate carcinoma. *Am J Surg Pathol*, 2005; 1228–42.

Pierorazio Walsh, et al. Prognostic gleason grade grouping: data based on the modified gleason scoring system. *BJU Int* 2013 May; **111:** 753–60.

