Guidelines

EAU Guidelines on Penile Cancer: 2014 Update

Oliver W. Hakenberg a,*, Eva M. Comperat b, Suks Minhas c, Andrea Necchi d, Chris Protzel a, Nick Watkin e

a Department of Urology, University Hospital Rostock, Rostock, Germany; b Department of Pathology, Hôpital La Pitié-Salpêtrière, Université Pierre et Marie Curie University Paris VI, Paris, France; c Department of Urology, University College Hospital, London, UK; d Department of Medical Oncology, Fondazione IRCCS Istituto Nazionale dei Tumori, Milan, Italy; e Department of Urology, St George’s Hospital, London, UK

1. Introduction

Penile cancer can be cured in approximately 80% of cases but has a poor prognosis once metastatic spread has occurred. Local treatment can be mutilating and devastating for the patient. Treatment requires careful diagnosis, adequate staging, and as much organ preservation as possible.
2. Evidence acquisition

A systematic PubMed search covering the period from August 2008 to November 2013 retrieved 1602 unique records, of which 1020 were excluded (exclusion criteria: case reports, reviews, and non–English language literature). A total of 582 abstracts were assessed, resulting in 352 full-text papers for panel review. Levels of evidence (LEs) were assessed and grades of recommendation (GRs) were assigned [1]. For penile cancer, there is a lack of controlled trials or large series. The LEs and GRs are low compared with those for more common diseases.

3. Evidence synthesis

3.1. Epidemiology and risk factors

The majority of penile carcinoma is squamous cell carcinoma (SCC), but other types occur. It usually originates from the inner prepuce or the glans. There are several histologic subtypes. It shares similar pathology with SCC of other origins.

In Europe and North America, penile cancer has low incidence (<1 per 100 000) that increases with age, with a peak during the sixth decade, but it also occurs in younger men [2,3]. In South America, Southeast Asia, and parts of Africa, the incidence is much higher, accounting for up to 1–2% of malignancies in men [2].

In the United States, where the overall age-adjusted incidence rate decreased between 1973 and 2002 from 0.84 to 0.58 per 100 000, it varies by race and ethnicity, with the highest incidence occurring among Hispanics. In Europe, incidence has been stable, but increased incidence has been reported in Denmark and the United Kingdom [4].

Penile cancer is common in regions with high prevalence of human papilloma virus (HPV), and this may account for the geographic variation in incidence. One-third of cases can be attributed to HPV-related carcinogenesis. No data link penile cancer to HIV or AIDS.

HPV DNA has been identified in 30–40% of penile cancer tissue (LE: 2a) with variation among the histologic subtypes: High HPV prevalence is found in basaloid SCC (76%), mixed warty-basaloid SCC (82%), and warty penile SCC (39%). Verrucous and papillary penile SCCs are HPV negative. HPV is probably a cofactor in the carcinogenesis of only some variants of penile SCC [5]. The most frequently found HPV types in penile SCC are HPV 16 (72%), HPV 6 (9%), and HPV 18 (6%). The risk of penile cancer is increased with condylomata acuminata (LE: 2b). Better disease-specific survival has been reported for HPV-positive versus HPV-negative cases (93% vs 78%), but data are conflicting [6]. There is no association between the incidence of penile cancer and cervical cancer [7].

Phimosis is strongly associated with penile cancer (odds ratio [OR]: 11.4), but smegma is not a carcinogen [8]. Other epidemiologic risk factors include cigarette smoking (4.5-fold increased risk; 95% confidence interval [CI], 2.0–10.1) and low educational and socioeconomic status [9]. The incidence of lichen sclerosus (balanitis xerotica obliterans) in penile cancer is relatively high but is not associated with adverse features.

Neonatal circumcision reduces the incidence of penile cancer, but adult circumcision does not. The lowest incidence is reported for Israeli Jews (0.3 per 100 000 per year). Circumcision removes about 50% of the tissue from which penile cancer originates. The protective effect of neonatal circumcision (OR: 0.41) does not apply to carcinoma in situ (CIS; OR: 1.0) and is weaker when the analysis is restricted to men without phimosis (OR: 0.79; 95% CI, 0.29–2).

3.2. Pathology and classification

It is unknown how often SCC is preceded by premalignant lesions (Table 1) [10,11]. Distinct histologic variants with different growth patterns, clinical aggressiveness, and HPV association have been identified (Tables 1 and 2). Numerous mixed forms exist.

The TNM classification stratifies T1 into two risk groups depending on lymphovascular invasion and grade (Table 3). Lymph node metastasis with extracapsular extension is staged as pN3 [14]. Retroperitoneal lymph node metastases are classified as extraregional distant metastases.

Invasion of the corpus spongiosum and the corpora cavernosa are both staged as pT2, although local recurrence rate (35% vs 17%) and mortality (30% vs 21%) differ (LE: 2b). Long-term survival in T2 and T3 as well as N1 and N2 disease does not differ significantly (LE: 2a). In addition, pT3 tumours invading the distal urethra are not associated with worse outcome.

3.2.1. Biopsy and histology

The diagnosis of penile cancer is often without doubt, but in doubtful cases and if nonablative treatment is planned, histologic verification is mandatory. Small lesions should be totally included, and bigger lesions should have at least

<table>
<thead>
<tr>
<th>Table 1 – Premalignant penile lesions (precursor lesions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lesions sporadically associated with SCC of the penis:</td>
</tr>
<tr>
<td>■ Cutaneous horn of the penis</td>
</tr>
<tr>
<td>■ Bowenoid papulosis of the penis</td>
</tr>
<tr>
<td>■ Lichen sclerosus (balanitis xerotica obliterans)</td>
</tr>
<tr>
<td>Premalignant lesions (up to one-third transform to invasive SCC):</td>
</tr>
<tr>
<td>■ Intraepithelial neoplasia grade III</td>
</tr>
<tr>
<td>■ Giant condylomata (Buckeh-Löwenstein)</td>
</tr>
<tr>
<td>■ Erythroplasia of Queyrat</td>
</tr>
<tr>
<td>■ Bowen’s disease</td>
</tr>
<tr>
<td>■ Paget’s disease (intradermal ADK)</td>
</tr>
</tbody>
</table>

SCC = squamous cell carcinoma.
three or four blocks. Lymph nodes and surgical margins have to be totally included. The pathology report has to include the histologic variant, grade, perineural and vascular invasion, and surgical margins.

With an average biopsy size of 0.1 cm, there is difficulty in evaluating the depth of invasion in 91% [11]. Although a punch biopsy may be sufficient, an excisional biopsy is preferable. The width of negative surgical margins should follow a grade-based risk-adapted strategy, and a 5-mm tumour-free tissue margin is considered sufficient [15].

3.2.2. Prognostic factors
Perineural and lymphatic invasion and grade are prognostic predictors. Grading has been shown to be highly observer dependent [16]. Some types of penile SCC have good prognosis: verrucous, papillary, warty, pseudohyperplastic, and carcinoma cuniculatum. These types are locally destructive but metastasize rarely. High-risk variants are the basaloid, sarcomatoid, adenosquamous, and poorly differentiated types, which metastasize early. An intermediate-risk group comprises the usual SCCs, mixed forms, and the pleomorphic form of warty carcinomas. Carcinomas limited to the foreskin have better prognosis.

3.2.3. Molecular biology
Sparse data link chromosomal abnormalities in penile SCC to biological behaviour. DNA copy number alterations are comparable to those found in SCC of other origins. Lower copy and alteration numbers have been linked to poor survival. Alterations in the locus 8q24 seem to play a major role [17].

Epi-genetic alterations of CpG island methylation in CDKN2A have been found. This encodes for two tumour-suppressor proteins (p16INK4A and p14ARF). Moreover, 62% of invasive penile cancers display allelic loss of p16, and this has been linked to lymph node metastasis and prognosis [18]. Allelic loss of the p53 gene occurs in 42% [19] and has been linked to poor prognosis [20].

3.3. Diagnosis and staging
Physical examination should include palpation of the penis and the inguinal regions. Ultrasonic or magnetic resonance (MR) with an artificial erection can give information about infiltration of the corpora [21,22]. Penile carcinoma is often clinically obvious but can be hidden under a phimosis.

In clinically normal inguinal nodes, the likelihood of the presence of micrometastatic disease is approximately 25%. Current imaging techniques are not reliable in detecting these micrometastases. Ultrasound (7.5 MHz), computed tomography (CT), MR imaging (MRI), or F 18 fluorodeoxyglucose positron emission tomography/CT (18F-FDG-PET/CT) scans cannot detect micrometastases reliably [23–25]. An exception can be made for obese patients in whom palpation is unreliable.

The diagnostic management with normal inguinal nodes should be guided by pathologic risk factors including lymphovascular invasion, stage, and grade [26,27]. Nomograms are unreliable. Invasive lymph node staging is required in patients at intermediate or high risk of lymphatic spread.

With enlarged inguinal lymph nodes, the presence of lymph node metastases is very likely. Physical examination should note the number of nodes and whether these are fixed or mobile. Staging for pelvic nodes and systemic disease should be done with abdominopelvic CT and chest x-ray or CT [28–30] (LE: 2b). 18F-FDG-PET/CT can confirm metastases in palpable inguinal lymph nodes [25].

There is no tumour marker for penile cancer. The SCC antigen is increased in ~25% and does not predict metastatic disease but possibly predicts disease-free survival in lymph node–positive patients [31].

3.4. Treatment of the primary tumour
The aims of treatment are radical tumour removal with as much organ preservation as possible. Local recurrence in itself has little influence on long-term survival, so organ-preservation strategies are justified [32].

Table 2 – Histologic subtypes of penile carcinomas, their frequency, and outcome

<table>
<thead>
<tr>
<th>Subtype</th>
<th>Frequency, % of cases</th>
<th>Prognosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common SCC</td>
<td>48–65</td>
<td>Depends on location, stage, and grade</td>
</tr>
<tr>
<td>Basaloid carcinoma</td>
<td>4–10</td>
<td>Poor prognosis, frequently early inguinal nodal metastasis</td>
</tr>
<tr>
<td>Warty carcinoma</td>
<td>7–10</td>
<td>Good prognosis, metastasis rare</td>
</tr>
<tr>
<td>Verrucous carcinoma</td>
<td>3–8</td>
<td>Good prognosis, no metastasis</td>
</tr>
<tr>
<td>Papillary carcinoma</td>
<td>5–15</td>
<td>Good prognosis, metastasis rare</td>
</tr>
<tr>
<td>Sarcomatoid carcinoma</td>
<td>1–3</td>
<td>Very poor prognosis, early vascular metastasis</td>
</tr>
<tr>
<td>Mixed carcinoma</td>
<td>9–10</td>
<td>Heterogeneous</td>
</tr>
<tr>
<td>Pseudohyperplastic carcinoma</td>
<td>&lt;1</td>
<td>Foreskin, related to lichen sclerosus, good prognosis, metastasis not reported</td>
</tr>
<tr>
<td>Carcinoma cuniculatum</td>
<td>&lt;1</td>
<td>Variant of verrucous carcinoma, good prognosis, metastasis not reported</td>
</tr>
<tr>
<td>Pseudoglandular carcinoma</td>
<td>&lt;1</td>
<td>High-grade carcinoma, early metastasis, poor prognosis</td>
</tr>
<tr>
<td>Warty-basaloid carcinoma</td>
<td>9–14</td>
<td>Poor prognosis, high metastatic potential (higher than in warty, lower than in basaloid SCC)</td>
</tr>
<tr>
<td>Adenosquamous carcinoma</td>
<td>&lt;1</td>
<td>Central and perimeatal glans, high-grade carcinoma, high metastatic potential but low mortality</td>
</tr>
<tr>
<td>Mucoepidermoid carcinoma</td>
<td>&lt;1</td>
<td>Highly aggressive, poor prognosis</td>
</tr>
<tr>
<td>Clear cell variant of penile carcinoma</td>
<td>1–2</td>
<td>Exceedingly rare, associated with HPV, aggressive, early metastasis, poor prognosis, outcome lesion dependent, frequent lymphatic metastasis [13]</td>
</tr>
</tbody>
</table>

HPV = human papilloma virus; SCC = squamous cell carcinoma.
and a complete response rate of up to 57% [33]. It requires fluorouracil (5-FU) is a first-line treatment with low toxicity for CIS, topical chemotherapy with imiquimod or 5-fluorouracil (5-FU).

3.4.1. Treatment of superficial noninvasive disease

There are no controlled trials comparing different treatment modalities. The existing evidence must generally be regarded as low. Penile preservation appears to be superior in functional and cosmetic outcomes. Histologic diagnosis with local staging must be obtained when nonsurgical treatment modalities are considered (GR: C).

Management of regional lymph nodes is decisive for long-term patient survival. Cure can be achieved in regional lymph node disease. Radical inguinal lymphadenectomy (ILND) is the treatment of choice (GR: B), but multimodal treatment with chemotherapy is often indicated.

Lymphatic spread can be uni- or bilateral from any primary penile cancer [46]. The superficial and deep inguinal lymph nodes are the first nodal group reached, with the nodes of the medial superior and central inguinal zones most commonly affected [47]. The second regional groups are the ipsilateral pelvic lymph nodes. Pelvic nodal disease does not seem to occur without ipsilateral inguinal disease, and crossover metastatic spread has never been reported. Para-aortic and paracaval nodes are classified as systemic metastatic disease.

For small invasive lesions (Ta/T1a), a penis-preserving strategy is recommended (GR: C). Circumcision should be performed and may be sufficient for tumours confined to the prepuce.

Intraoperative assessment of surgical margins by frozen section is recommended (GR: C) [35]. Total removal of the glans (glandectomy) and prepuce has the lowest local recurrence rates among the treatment modalities for small penile lesions (2%) [35], and a negative surgical margin of 5 mm is adequate [35,36].

Treatment choice should depend on tumour size, histology, stage and grade, localization relative to the meatus, and patient preference. Laser ablation can be done with a neodymium:yttrium-aluminium-garnet (Nd:YAG) laser or a carbon dioxide (CO₂) laser [37], and visualisation may be enhanced by photodynamic diagnosis. Local recurrence rates for laser treatment of CIS/T1 are 14–23% with a CO₂ laser and 10–48% with an Nd:YAG laser [37]. Other studies using a variety of laser treatments have reported similar results [38]. Local recurrence rates of 0–6% for total or partial glans resurfacing [34,39,40] and 7–8% for glandectomy [35,41] have been reported.

Evidence is insufficient to suggest a difference regarding outcomes of different penis-sparing strategies that appear to have good oncologic results. Organ-sparing treatments including reconstructive surgery improve quality of life, but the risk of local recurrence is higher than with partial penectomy (5–12% vs 5%). Local recurrence after organ-sparing surgery has only a small effect on long-term survival.

3.4.2. Radiation therapy for T1/T2 disease

Radiotherapy gives good results in T1–2 lesions <4 cm in diameter [42,43] (LE: 2b), given as external radiotherapy (60 Gy) combined with a brachytherapy boost or as brachytherapy only [42,43]. Brachytherapy achieves local control rates of 70–90% [42–44]. Local recurrence rates are higher than after partial penectomy, but salvage surgery can achieve local control [45]. Complications are not uncommon, with urethral stenosis in 20–35% and glans necrosis in 10–20%; with brachytherapy, metal stenosis occurs in >40% (LE: 3).

3.4.3. Management of regional lymph nodes

Management of regional lymph nodes is decisive for long-term patient survival. Cure can be achieved in regional lymph node disease. Radical inguinal lymphadenectomy (ILND) is the treatment of choice (GR: B), but multimodal treatment with chemotherapy is often indicated.

Lymphatic spread can be uni- or bilateral from any primary penile cancer [46]. The superficial and deep inguinal lymph nodes are the first nodal group reached, with the nodes of the medial superior and central inguinal zones most commonly affected [47]. The second regional groups are the ipsilateral pelvic lymph nodes. Pelvic nodal disease does not seem to occur without ipsilateral inguinal disease, and crossover metastatic spread has never been reported. Para-aortic and paracaval nodes are classified as systemic metastatic disease.
Early ILND in clinically node-negative patients gives superior survival compared with therapeutic ILND when regional nodal recurrence has occurred (survival >90% vs <40%) [32,36,48]. Comparing ILND, inguinal radiotherapy, and surveillance in node-negative patients, the best overall survival was reported for surgery (74% vs 66% and 63%, respectively) [49]. Surveillance for clinically normal nodes carries the risk of nodal recurrence because 25% of patients will harbour micrometastatic disease [48,50]. Management with normal nodes depends on stage, grade, and the presence or absence of lymphovascular invasion [26]. Moreover, pTa/pTis and low-grade tumours are at low risk of lymphatic metastasis, as is well-differentiated pT1, which otherwise is intermediate risk; pT2 or higher plus all G3 tumours are high risk [51]. Surveillance should be offered only to patients with normal inguinal nodes and low-risk tumours. Fine needle aspiration cytology does not reliably exclude micrometastatic disease.

For patients with intermediate- and high-risk tumours and impalpable nodes, two invasive diagnostic procedures are available: modified ILND and dynamic sentinel-node biopsy (DSNB). Modified ILND defines a limited template whereby the superficial inguinal lymph nodes from at least the central and both superior Daseler’s zones are removed [46] (LE: 3). DSNB is based on the assumption that lymphatic drainage from penile cancer goes to only one inguinal lymph node on each side, which may be located in different positions based on individual anatomy. Technetium Tc 99 nanocolloid is injected around the cancer site, and a gamma-ray probe detects the sentinel node, which is possible in 97% of cases [52] (GR: B). Some groups have reported high sensitivity of 90–94% [52,53] (LE: 2b). In a pooled meta-analysis of 18 studies, sensitivity was 88% and was 90% with the additional use of patent blue.

Both methods can miss micrometastatic disease [32]. The false-negative rate of DSNB can be as high as 12–15% even in experienced centres [48,50], whereas that of modified ILND is not known. If lymph node metastasis is found with either method, an ipsilateral radical ILND is indicated.

With palpable inguinal lymph nodes (cN1/cN2), the likelihood of metastasis is high. Prophylactic antibiotic treatment is not indicated. Ultrasound-guided fine needle aspiration cytology can be an option. Additional staging for pelvic nodes is useful. 18F-FDG-PET/CT can identify metastases in lymph node–positive patients [54]. Dynamic sentinel node biopsy is unreliable in patients with enlarged nodes and should not be used (LE: 3).

In node-positive patients, radical ILND is indicated. Radical ILND has significant morbidity related to lymph drainage and wound healing. Although morbidity can be as high as 50%, with increased body mass index being a significant risk factor, recent studies reported a complication rate of about 25% [55,56] (LE: 2b). Radical ILND can be curative and may be underused for fear of associated morbidity. Lymph node density is a prognostic factor for complications [57].

Surgical technique should be meticulous regarding tissue handling and closure of lymph vessels, which cannot be closed by electrocautery, so ligation or clips should be used [58]. Additional measures such as inguinal pressure dressings or vacuum suction [59] and prophylactic antibiotics can reduce postoperative morbidity. The most commonly reported complications are wound infections (1.2–1.4%), skin necrosis (0.6–4.7%), lymphedema (5–13.9%), and lymphoceles formation (2.1–4%) [55,56].

The feasibility of performing laparoscopic and robot- assisted ILND has been reported. Whether this provides any advantage is unclear [60,61].

If two or more positive lymph nodes are found or if one node with extracapsular extension (pN3) is found, ipsilateral pelvic lymphadenectomy is indicated. Positive pelvic nodes were found in 23% in cases with more than two positive inguinal nodes and in 56% if three positive inguinal nodes were found or if extracapsular involvement was found [36,57] (LE: 2b).

With positive pelvic nodes, the prognosis is worse compared with pure inguinal nodal metastasis (5-yr cancer-specific survival of 71.0% vs 33.2%). Pelvic lymphadenectomy may be performed simultaneously or as a secondary procedure. It is important to avoid unnecessary delay if surgery is indicated [62].

In patients with pN2/pN3 disease, adjuvant chemotherapy is recommended (GR: C). This is based on one retrospective study in which survival with adjuvant chemotherapy was much better than without in a historical control group (84% vs 39%).

In bulky and fixed inguinal lymph nodes, metastatic disease is beyond doubt, and histologic verification by biopsy is not generally required. With reasonable doubt, an excisional or core needle biopsy may be done. These patients have poor prognosis, and primary surgery is not generally recommended because it is unlikely to be curative (GR: B). Neoadjuvant chemotherapy followed by radical ILND in responders is recommended [63,64]. For such patients, long-term survival of 37% has been reported [63].

3.4.4. Management of lymph node recurrence

Patients with regional recurrence after surveillance should be treated as patients with primary cN1/cN2 disease. Patients with regional recurrence following negative invasive staging have disordered lymphatic anatomy and are at high risk of irregular metastatic progression. Patients with inguinal nodal recurrence after therapeutic radical ILND have poor prognosis, with 5-yr survival of 16% [65]. There is no evidence for the best management, but neoadjuvant chemotherapy and radical lymph node surgery are advised.

3.4.4.1. The role of radiotherapy for the treatment of lymph node disease

Due to a lack of positive evidence, radiotherapy for inguinal nodal disease in penile cancer is not generally recommended. Neither neoadjuvant nor adjuvant radiotherapy has been reported to improve oncologic outcome in node-positive patients [66]. A prospective trial comparing inguinal radiotherapy with radical ILND reported superior results for surgery [49], and in one retrospective series, adjuvant chemotherapy was superior to adjuvant radiotherapy in node-positive patients. A Surveillance
Epidemiology and End Results database analysis of 2458 patients treated by either surgery alone or surgery combined with radiotherapy found no positive effect of adjuvant radiotherapy on cancer-specific survival [67]. Adjuvant inguinal radiotherapy may be a palliative option for surgically unresectable disease.

### 3.4.4.2. Chemotherapy

In nodal disease, adjuvant chemotherapy improves survival [63]. A triple-drug regimen containing cisplatin is recommended when the goal is curative treatment (LE: 2b). Vincristine, bleomycin, and methotrexate (VBM regimen) is also effective [63], and similar results were achieved with cisplatin and 5-FU, with lower toxicity (LE: 2b). A taxane-based regimen (cisplatin and 5-FU plus paclitaxel or docetaxel) resulted in 52% disease-free survival, and similar results were obtained with a paclitaxel–cisplatin regimen [68]. No data support adjuvant chemotherapy in stage pN1; this approach should be restricted to clinical trials.

For neoadjuvant treatment in bulky inguinal lymph nodes (cN3), a triple combination including cisplatin and a taxane is advisable (LE: 2a; GR: B). Median overall survival of 17 mo has been reported [69] (LE: 2a).

In advanced cases, the presence of visceral metastases and an Eastern Cooperative Oncology Group performance status ≥1 are independent prognostic factors. Cisplatin-based chemotherapy gives better outcomes than non-cisplatin-based regimens [70] (LE: 3), and taxanes seem to have enhanced the efficacy of the regimens used [32,64,68,69,71–74]. There is only one report of second-line therapy with paclitaxel monotherapy, showing a 30% response rate but no survival [74] (LE: 2a; GR: B).

Because epidermal growth factor receptor (EGFR) is almost invariably expressed in penile SCC [75,76], anti-EGFR targeted monotherapy with panitumumab and cetuximab has been used with modest success [77,78] (LE: 4). The same applies to tyrosine kinase inhibitors [76].

### 3.5. Follow-up

Recurrence mostly occurs within 2 yr of primary treatment. Moreover, 74% of all recurrences occur within 2 yr, as do 66% of local recurrences, 86% of regional recurrences, and 100% of distant recurrences. Overall, 92.2% of all recurrences occurred within the first 5 yr, and all seen after that were local recurrences or new primary lesions [32].

Intensive follow-up during the first 2 yr is necessary, with less intensive follow-up thereafter for a minimum of 5 yr. Follow-up should continue thereafter but may be omitted in patients who reliably carry out self-examination [32].

In node-negative patients, follow-up includes physical examination of the penis and the groins; additional imaging is of no proven value. After laser ablation or topical chemotherapy, histology may need to be obtained to ascertain a disease-free status. After curative treatment for inguinal nodal metastases, imaging by CT or MRI should be done at 3-mo intervals during the first 2 yr [79].

### 3.5.1. Recurrence

Local recurrence is more likely with all types of local organ-preserving treatment [32] and occurs during the first 2 yr in up to 27%. After partial penectomy, the risk of local recurrence is 4–5% [32]. Patient education for self-examination is important.

The highest rate of regional recurrence (9%) occurs in patients under a surveillance strategy, the lowest after invasive nodal staging with negative nodes (2.3%). Ultrasound and fine needle aspiration cytology in doubtful cases may improve early detection of regional recurrence [23,80]. After ILND with positive nodes without adjuvant treatment, the risk of regional recurrence is 19% [32].

### 3.6. Quality of life

In patients with long-term survival, sexual dysfunction, voiding problems, and cosmetic appearance are treatment consequences. In studies after laser treatment, one reported a marked decrease in some sexual practices but general satisfaction with life overall; another noted no patient-reported problems with erectile capability or sexual function [38]. After glansectomy, 79% of patients did not report any difference in spontaneous erection, rigidity, or penetrative capacity [41]. After partial penectomy, 55.6% reported erectile function that allowed sexual intercourse but markedly reduced satisfaction [81,82]. After full- or near-total penile amputation, total phallic reconstruction can be an option in selected cases.

### 4. Conclusions

Approximately 80% of penile cancer patients of all stages can be cured. Partial penectomy has negative consequences for self-esteem and sexual function. With increasing experience in the management of penile cancer, it is recognized that organ-preserving treatment allows for better quality of life and sexual function and should be offered to all patients whenever feasible. Referral to centres with experience is recommended, and psychological support is very important for penile cancer patients.

**Author contributions:** Oliver W. Hakenberg had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

**Study concept and design:** Hakenberg, Compérat, Minhas, Necchi, Protzel, Watkin.

**Acquisition of data:** Hakenberg, Compérat, Minhas, Necchi, Protzel, Watkin.

**Analysis and interpretation of data:** Hakenberg, Compérat, Minhas, Necchi, Protzel, Watkin.

**Drafting of the manuscript:** Hakenberg.

**Critical revision of the manuscript for important intellectual content:** Hakenberg, Compérat, Minhas, Necchi, Protzel, Watkin.

**Statistical analysis:** None.

**Obtaining funding:** None.

**Administrative, technical, or material support:** None.

**Supervision:** Hakenberg.

**Other (specify):** None.
Financial disclosures: Oliver W. Hakenberg certifies that all conflicts of interest, including specific financial interests and relationships and affiliations relevant to the subject matter or materials discussed in the manuscript (eg, employment/affiliation, grants or funding, consultancies, honoraria, stock ownership or options, expert testimony, royalties, or patents filed, received, or pending), are the following: None.

Funding/Support and role of the sponsor: None.

References


carthon BC, Ng CS, Pettaway CA, Pagliaro LC. Epidermal growth factor receptor-targeted therapy in locally advanced or metastatic squamous cell carcinoma of the penis. BJU Int 2014;113:871–7.


