Mini-review

Urologic cancer in Thailand

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Abstract

Cancer is a major health burden among non-communicable diseases, which has had a high impact on the healthcare system in Thailand. Based on GLOBOCAN, the prevalence of urologic cancer is increasing in Thailand. Prostate, bladder and kidney cancers are 6th, 15th and 22nd most common cancers, respectively, in both males and females. Prostate cancer is the fourth most common cancer in male. Cancer in the lower socioeconomic groups is a challenging problem due to greater exposure to the risk factors and more limited access to the healthcare service. The cancers are usually detected in advanced stages of the cancer. The most common histopathological finding of kidney cancer is a renal cell carcinoma. Transitional cell carcinoma is the most common histopathology of bladder. There is a trend of stage migration to earlier stages at first presentation, probably due to public awareness and laboratory screening. Patients with early stage are treated with minimally invasive modalities such as endoscopic, laparoscopic or robot-assisted laparoscopic surgery. Laparoscopic radical prostatectomy and robot-assisted laparoscopic radical prostatectomy is the mainstay treatment of localized prostate cancer with the better outcome and less complication. Androgen deprivation therapy is usually for elderly or unfit patients. The strategy for early detection of early cancer is the important role of Thai urologists to manage these three common urologic cancers.

Key words: kidney cancer, bladder cancer, prostate cancer, diagnosis, management

Introduction

Asia is the largest continent in the world with the countries showing a wide diversity of health resources and health-care systems. Thailand is a developing country with an upper middle-income economy. Some aspects of the resources available for healthcare, based on socioeconomic factors, are different from other countries. Thailand has been faced with social and economic transitions during the past three decades. There is an evidence of increasing life expectancy of the people and lower infant mortality rates but there is a decline in total fertility. The economic basis of the country has changed from agricultural to industrial economics. The pattern of food consumption has been reported as showing diet consisting of a higher proportion of fat and meat. There is a high prevalence of weight gain and obesity and is now commonly found in children and adolescents. The rapid changes in lifestyle, behavior and food intake have a significant impact on the transfer of the disease burden from communicable to incommunicable diseases (1).
most common cancers, respectively, in both males and females in Thailand. Prostate cancer is the fourth most common cancer in males (3).

Cancer now represents the major cause of mortality in the Thai population. To minimize this, the early detection of cancer is a very important factor in achieving a better treatment outcome. A low rate of prostate-specific antigen (PSA) screening, compared with other countries, is the main problem in detecting and treating prostate cancer. The burden of non-communicable disease is a challenging problem especially in the lower socioeconomic groups, who often have greater exposure to the risk factors and more limited access to the healthcare service. In this group of patients, the cancers are usually not detected until advanced stages of the cancer. The Bureau of Non-Communicable disease of Thailand has established the tobacco and alcohol control program in order to help in the prevention and control of lung and liver cancers and also campaigning for early detection and checkups of other cancers. According to the Thailand healthcare system, most of the urologic cancer patients are diagnosed and treated by urologists. Medical oncologists usually take a role when patients need chemotherapy in the advance stage.

The three most common urologic cancers based on the national and international publications and also from the real-life practice in Thailand have been reviewed in this article.

**Kidney cancer**

In Thailand, the overall incidence of kidney cancer is 1.6 cases/100,000 of population. The incidence shows an increase when compared with previous reports. Currently, kidney cancer is ranked as the 22nd most common cancer found in both sexes, and is relatively more common in males (3).

The most common histopathological finding is a renal cell carcinoma (RCC) including a clear-cell or non-clear-cell tumor. Sometimes, it is difficult to make a differential diagnosis between transitional cell carcinoma (TCC), angiomyolipoma and oncocytoma in the analysis of the renal mass from RCC. Wilms tumor is the cancer of kidneys that typically occurs in children. The finding of a renal pelvic tumor following the treatment of bladder cancer, TCC of the upper urinary tract is the most common diagnosis.

Early stages of kidney cancer present commonly as a small renal mass, which is identified following an initial evaluation of hematuria or as part of an annual check-up. The small renal mass is ~50% in whole RCC population in Thailand. The initial investigations include urinalysis and ultrasound of abdomen. A Computerized tomographic scan is available in hospitals around Thailand, which can be carried out to confirm a definite diagnosis of kidney cancer. This kind of imaging provides not only the stage of the cancer, but also enables a differential diagnosis from some other benign tumors such as angiomyolipoma.

RCC in the case of two Thai patient kidneys following kidney transplantation has been reported (4). A close surveillance of patients who have undergone kidney transplantation is necessary for early detection. RCC is more common in nonfunctioning kidneys with patients in the final stages of renal disease who received hemodialysis. The relationship between RCC and hepatitis C virus infection via NY-REN-54 and rare case of RCC in child with Xp 11.2 translocation were reported in Thailand (5,6). The serum calcium measurement to identify paraneoplastic syndrome of RCC is a common practice in Thailand (7). The rare sites of metastasis at pituitary gland, orbital soft tissue and pancreas were reported (8–10).

Treatment of RCC in Thailand, according to the National Comprehensive Cancer Network (NCCN) guidelines 2014, depends on the stage of the tumor, age and any comorbidity. Laparoscopic partial nephrectomy and open partial nephrectomy are common procedures for treating the RCC Stage T1a (tumor size <4 cm) or some selected cases of T1B (tumor size 4–7 cm). Active surveillance or energy ablation therapies are not popular in Thailand. Most patients with Stage T2 are treated with a laparoscopic or open radial nephrectomy. The first report of laparoscopic renal surgery in Thailand was in 2005 (11), which began with three hand-assisted laparoscopic nephrectomies and one hand-assisted partial nephrectomy in 2006 (12). Conventional laparoscopic partial nephrectomy is a very challenging procedure and was also initiated in Thailand in 2007 (13).

Laparoscopic single-site (LESS) radical nephrectomy using basic laparoscopic instruments can be performed even though this procedure is technically demanding and has required extensive steep learning curve (14). In a military teaching hospital, 70 open radical nephrectomy operations were directly compared with 75 laparoscopic radical nephrectomies. The operative time was less in open surgery. The advantages of laparoscopic surgery were found to be lower blood loss, less postoperative analgesic requirements, less time necessary for the placement of the nasogastric tube and less infection of the surgical site (15).

The procedure of open radical nephrectomy is recommended for RCC Stage T3. At this stage, some patients presented with a thrombus in the inferior vena cava (IVC). A radical nephrectomy in 12 patients with an IVC thrombus included: intrahepatic (one case), retro hepatic (two cases), suprahepatic (eight cases) and intra-atrial (one case). Only one of the patients needed a cardiopulmonary bypass. The kidneys were removed from the patients with an IVC thrombus by a transabdominal approach using the liver mobilization technique (16).

In the advanced stages of kidney cancer, a cytoreductive nephrectomy is usually performed before the systemic therapy. In the past, recombinant interferon-α 2b and megestrol acetate have been used in this stage but there has been a poor response regarding the extent of the subsequent metastasis (17). Currently, new oral targeted therapy using tyrosine kinase inhibitors as anti-cancer drugs are available. Tyrosine kinase inhibitors that are available in Thailand include sunitinib malate, sorafenib tosylate, pazopanib, temsirolimus, everolimus and bevacizumab. The choice of these drugs depends on cell type (clear cell, non-clear cell) and the current status of the patient (good, intermediate, poor). Due to the high price of these drugs, most patients do not receive the treatment even though there is a strong indication for their use. However, some patients do have a chance to join in the clinical trials and specific projects of the pharmaceutical company.

**Bladder cancer**

Bladder cancer is the eighth most common cancer with a prevalence of 4.5/100,000 in males and 1.2/100,000 in females. It is less common in women and the prevalence of bladder cancer increases with age. The mortality rate is 2.2/100,000 in males and 0.6/100,000 in females (3).

The most common histopathologic finding of bladder cancer in Thailand is TCC. Some others are squamous cell carcinoma and adenocarcinoma. Bladder cancer can be classified into non-muscle invasion bladder cancer and muscle invasion bladder cancer. This classification leads the physician to an accurate prognosis and hence appropriate treatment of the patients. An FGFR3 mutation has been reported in Thai patients with TCC of the urinary tract especially in low-grade, non-muscle invasive TCC (18). The oxidative stress and hypo-methylation of transposable long-interspersed nuclear element-1 (LINE-1) has been demonstrated to promote urothelial cell carcinogenesis through modulation of DNA methylation (19). Factors that
The outcome of immediate administration of mitomicin C plus local and systemic side effects occurred in 74.5% of cases, but the success rate in decreasing tumor recurrence and tumor progression. BCG are commonly used. ThioTEPA is seldom used due to its potential with the clinical stages Ta and T1.

Section of a bladder tumor (TURBT) is usually indicated in patients of BCG treatment, a radical cystectomy is indicated. Transurethral resection and monitoring the response to the treatment (25).

Cystoscopy, urine cytology and ultrasound scanning are the initial investigations of bladder cancer. Cystoscopy can be performed with a rigid or flexible scope at an outpatient department. Rigid cystoscopy is more commonly carried out under local anesthetic using lidocaine gel. Acetaminophen in combination with lidocaine gel is not beneficial for the reduction of cystoscopy-related pain (24). In some large hospitals, Narrow Band Imaging is used to enhance the visibility of details of the bladder cancer especially in association with CIS. This technology can provide a more accurate diagnosis of bladder cancer than that made using conventional white-light cystoscopy. Urine cytology is an important investigation for the detection of high-grade cancers especially in CIS. Although urine cytology is less sensitive, it provides a high specificity, remains a useful method and is being used routinely in Thailand. Other urine markers are not commonly used in Thailand due to the lack of cost-effectiveness of the test. The combination of urine hypothesized LINE-1 loci and the plasma protein carbonyl content determinations may be useful tools for bladder cancer screening and monitoring the response to the treatment (25).

A computed tomography (CT) scan of the whole abdomen and a bone scan are the investigations of choice for staging the bladder cancer. The TNM cancer staging classification is useful and is commonly used for the selection of appropriate treatment. On rare occasions, fine needle aspiration cytology is necessary to give a diagnosis of metastatic TCC in other organs such as the liver (26).

The prevalence of upper tract TCC of bladder cancer is ~3–4%. Upper tract evaluation is essential in all cases of TCC of the bladder including upper tract imaging, uroscopy and urine cytology (27).

A Thai version of the FACT-BL Questionnaire for evaluation of the quality of life in bladder cancer patients was validated in 2010. This tool is necessary and important for assessment of the quality of life after the treatment of bladder cancer (28).

The treatment of bladder cancer depends on the clinical stage. For patients with Tis, the treatment is a full course of intravesicle Bacillus Calmette-Guerin (BCG). If there is no improvement after two courses of BCG treatment, a radical cystectomy is indicated. Transurethral resection of a bladder tumor (TURBT) is usually indicated in patients with the clinical stages Ta and T1.

Intravesicle chemotherapy or immunotherapy post-TURBT is indicated in high-risk patients. In Thailand, intravesicle mitomycin C and BCG are commonly used. ThioTEPA is seldom used due to its potential side effects of bone marrow suppression. Intravesicle administration of BCG at least six times weekly is the most common practice due to its success rate in decreasing tumor recurrence and tumor progression. Local and systemic side effects occurred in 74.5% of cases, but the side effects are not associated with tumor recurrence or progression (29). The outcome of immediate administration of mitomycin C plus an induction course of intravesicle BCG shows no difference from treatment with intravesicle BCG alone regarding tumor recurrence (30).

The invasion of the tumor through muscularis mucosae is the sign of the cancer has become invasive. Chaimuangraj et al. reported that only 5% of biopsy specimens taken from bladder cancer patients presented as penetrating the muscularis layer (31). An adequate tissue sample from the muscularis layer with re-TURBT is very important for predicting the prognosis and modifying the treatment.

A radical cystectomy with lymphadenectomy is the procedure of choice for treating invasive bladder cancer. In general, an ileal conduit, the continent pouch and neobladder is the surgical procedure which is usually used following radical cystectomy. An ileal conduit is more commonly used than other urinary diversion. This technique is usually performed in patients that need a urethrectomy or unfit patients or patients with a deterioration of renal function.

A radical cystectomy can be performed by open technique, laparoscopic or robot-assisted surgeries. The advances in laparoscopy and robotic surgery, laparoscopic robot-assisted and laparoscopic radical cystectomies have been performed in Thailand since 2005 (32). Kijvikai et al. reported the first case of a laparoscopic radical cystectomy with an extracorporeal ileal conduit in a 55-year-old patient with T2 TCC bladder cancer. The result was comparable with treatment by open cystectomy with the advantage of a less invasive operation. Laparoscopic radical cystectomy with introduction of a total intracorporeal ileal neobladder is a challenging procedure but the advantages of this technique are good visualization and more secure Anastomosis (33,34). Ileal neobladder, Studer neobladder and Hautmann ileal neobladder procedures are all popular in Thailand (35). Health related quality of life after a urinary diversion between continent and incontinence urinary diversion is not statistically different (36).

The neobladder is used in female patients with TCC bladder. The challenge of this procedure is the risk of a urethral involvement of cancer that would affect the outcome. Kochalkarn reported that female TCC patients with a high-grade cancer, a high stage at bladder trigone or any grade/stage at the bladder neck have a high risk of urethral recurrence (37). These factors should be considered for using the ileal conduit.

Total hip reconstruction of any periaricular metastasis from bladder cancer can be performed with promising results (36).

Chemotherapy is commonly used as a neoadjuvant when the disease is T3, used as an adjuvant when lymph nodes are identified as positive after surgery. Primary chemotherapy is necessary in the advanced stages of cancer. Platinum-based chemotherapy regimen such as MVAC and gemcitabine are commonly used in Thailand.

Prostate cancer

The incidence of prostate cancer is highly variable between countries and regions in Asia. The incidence in Thailand is 7.2/100 000 of population and the mortality is 3.7/100 000 (based on GLOBOCAN 2012 data) (3). The incidence of prostate cancer is increasing. A report from the Chiang Mai Cancer Registry, Chiang Mai University Hospital in 1971, shows that penile cancer is more common than prostate cancer (38). But now, the incidence of prostate cancer is the fourth most common cancer in male. The incidence of prostate cancer in the years 1992–95, 1998–2002 and 2007–09 were 3.1, 5.0 and 7.7/100 000, respectively (39). A higher rate of advanced stage prostate cancer was detected in the study compared with the USA, Europe and developed Asian countries such as Japan, Korea and Taiwan (40–43). In the year 2000, most incidences of prostate cancer were at Stage C (7.5% in
Stage A, 1.1% in Stage B, 67.7% in Stage C and 23.7% in Stage D). The median survival rate is less in the higher stages (45 months for Stage C, 12 months for Stage D) (44). At present, there is a trend of stage migration to earlier stages at first presentation, probably due to public awareness and PSA screening. A rare case of alveolar RMS in a 28-year-old male with prostatic tumor was reported. The histo-pathologic finding in this patient was mixed between embryonal/alveolar where at the genetic level, this tumor was alveolar in nature (45).

Life expectancy and comorbidity are important factors in the evaluation and treatment of prostate cancer in Thailand. Life expectancy of Thai men is 71 years, which is slightly lower than that in some countries in Asia, USA and Europe. Several hospitals have developed multidisciplinary teams for approaching prostate cancer care including urologists, medical and radiation oncologists, radiologists, pathologists and nurses (46).

PSA testing has been available in Thailand since 1991 (47). Mass screening for prostate cancer is not recommended due to a lack of cost-effectiveness in the detection of prostate cancer (4). Nowadays, PSA is the test of choice followed by a digital rectal examination in cases where there is a suspicion of prostate cancer. The detection of prostate cancer is higher in men with a high International Prostatic Symptom Score (IPSS) (48).

A PSA level of above 4 ng/ml is an indication for a biopsy. The sensitivity, specificity, false-positive and false-negative predictive value are 95.8, 66.2, 33.8 and 4.2%, respectively (49). The disadvantage of PSA testing is that it has a high sensitivity but a low specificity in giving a diagnosis of prostate cancer which can cause a problem in clinical practice. Lojanapawat et al. reported on a total of 1116 patients who underwent a transrectal ultrasound and prostate biopsy enabling the patients who had a diagnosis of prostate cancer to be divided into subgroups by baseline PSA level as ≤4, 4–10, 10.1–20, 20.1–50, 50.1–100 and >100 ng/ml. The prevalence of prostate cancer of this cohort study was 35.39%. The PSA level corresponded well with the diagnosis of prostate cancer and a positive bone scan but only moderately corresponded with a high Gleason score (GS >7) as shown by area under the curve for an accurate diagnosis of prostate cancer (0.82), positive bone scan (0.88) and Gleason score >7 (0.78). The specificity of PSA level for the diagnosis of prostate cancer at 4.1–10, 10.1–20, 21.1–50, 50.1–100 and >100 ng/ml were 9.3, 55.8, 87.5, 98.2 and 99.7, respectively. The chance of detection of prostate cancer was greater than that of the benign prostate condition when the PSA level was higher than 20 ng/ml (50).

The derivative form of PSA was also used for the accuracy of the detection of prostate cancer in patients who had a PSA level of between 4 and 10 ng/ml, including F/T PSA, PSA density (PSAD), PSA doubling time (PSADT) and Prostate Health Index (PHI). The area under the curve of PSA and PSAD was 0.475 and 0.665, respectively. The sensitivity and specificity of PSAD at a cutoff point of 0.15 were 78 and 43%, respectively (51). The free PSA cutoff for Thai people with the highest sensitivity and specificity was at 18% (a study of 118 Thai with a total PSA between 4 and 10 ng/ml) (52). A PSA doubling time of >10 months in patients with a previous negative biopsy can be used as a guideline to avoid an unnecessary second biopsy (53).

The PHI has been available in Thailand since 2014. Patients with a PSA level of between 4 and 10 ng/ml can avoid an unnecessary biopsy due to greater specificity of this test for the diagnosis of prostate cancer.

The presenting symptoms of patients with prostate cancer vary from asymptomatic, symptoms of lower urinary tract symptoms (LUTS) to symptoms of metastasis such as bone pain or pathologic fracture. Most patients are diagnosed when PSA and DRE are checked at the screening or a LUTS check-up. A rare symptom of prostate cancer is acute appendicitis, which is caused by metastatic prostate cancer-induced appendicitis (54).

Biopsy of the prostate usually consists of 10–12 cores after undergoing a transrectal ultrasound. Transperineal prostate biopsy is not common in Thailand. Some patients need to have a second biopsy due to a persistent high PSA level after the first biopsy. For more accuracy, several techniques are used to overcome this problem, including a saturated biopsy (usually performed under general anesthesia) or a targeted biopsy under magnetic resonance imaging/magnetic resonance spectroscopic imaging (MRI/MRSI) guidance. Bhattach et al. (55) carried out a study on 21 patients who had a negative first biopsy and then underwent a second biopsy under MRI (discrete low signal intensity in T2). Two out of 21 patients were diagnosed as having prostate cancer. The sensitivity, specificity, positive predictive value, negative predictive value and accuracy of combined MRI/MRSI for the detection of prostate cancer were 100, 84, 40, 100 and 86%, respectively.

Microscopic findings of prostate cancer are based on a combination of architectural, cytological and ancillary findings including intraluminal acid mucin secretion. In the case of a doubtful diagnosis of prostate cancer by the pathologist, immunohistochemical staining (immunostaining) is a helpful technique to confirm the diagnosis. But this test is not available in most hospitals in Thailand. Noiwan et al. determined mucin production in 190 prostatectomy specimens, which were used to diagnose prostate cancer. Ninety-three percent of patients tested positive with at least one out of the three histochemical stains (88% of mucicarmine, 83% of Alcian blue at pH 2.5 and 91% of colloidal iron). All histochemical staining-positive findings were confirmed by PSA immunohistochemical staining. This technique of intraluminal acid mucin staining is useful for an accurate diagnosis of prostate cancer (56).

Transrectal ultrasound with a prostate biopsy is the recognized procedure for a diagnosis of prostate cancer. Following this procedure, serious complications especially sepsis, may occur. Due to the high rate of fluoroquinolone-resistant bacteria in most hospitals in Thailand, patients who have risk factors to develop sepsis should have rectal swab cultures for antibiotic susceptibility testing before a transrectal ultrasound with biopsy is carried out. Risk factors consist of previous antimicrobial use of fluoroquinolones. These patients should receive prophylactic antibiotics which are susceptible to the rectal swab culture to prevent serious sepsis complications (57). Other complications are minor and self-limiting with no correlation to a high PSA level and a high Gleason score (58). Periprostatic local anesthesia during a transrectal ultrasound guided prostate biopsy can decrease pain during the procedure (59).

After tissue diagnosis, radiographic staging is recommended to classify the stages of the cancer and the risk classification. A CT scan and an MRI of the pelvis and abdomen with a whole-body bone scan are investigations of choice in Thailand. These investigations can evaluate extracapsular extensions, seminal vesicle invasion, lymphadenopathy and locoregional or distant metastasis. A bone scan is the investigation of choice for the detection of bone metastasis. Chiewvit et al. reported the incidence of vertebral metastasis using MR imaging even though 99 (m) Tc-MDP bone scans showed negative results. The MRI was performed with 1.5 and 3.0T scanners using standard techniques with T1–T2-weighted images and fat-suppressed T1-weighted images with intravenous administration of gadopentetate dimeglumine. MRI alone depicts 58% of negative bone scans. The MRI also demonstrated metastatic cord compression and extradural extension that caused spinal canal narrowing (60).

Most of the bone lesions of metastatic prostate cancer are osteoblastic. Paget's disease, a condition which is rare in Asian countries. This disease can manifest as osteoblastic lesions, which lead to a suspicion of metastatic prostate cancer. One report recommends an
Treatment of prostate cancer depends on clinical risk classifications such as D’Amico risk grouping or NCCN risk grouping. In Thailand, urologists usually classify the patients following NCCN guidelines (Asian Version). The treatments consist of active surveillance, watchful waiting, radical prostatectomy (RP), radiation therapy and androgen deprivation therapy (ADT). In the case of castrate-resistant prostate cancer (CRPC) especially in metastatic CRPC, third-line hormonal therapy, 

Surgical castration, such as a bilateral orchiectomy is treatment for advanced stage prostate cancer, but can also be used as a pre-treatment which can avoid the side effects of primary ADT. Active surveillance will be started when symptoms or metastases occur. This surveillance is usually over 75 years old with extensive comorbidities. The treatment of surveillance can avoid overtreatment and over-detection of an indolent prostate cancer. This treatment should be offered to older patients and patients with multiple comorbidities. Active surveillance can avoid overtreatment and over-detection of an indolent prostate cancer.

In real-life practice, most treatment of localized prostate cancer in Thailand is a RP including ORP, laparoscopic radical prostatectomy (LRP) and robot-assisted radical prostatectomy (RARP) in any risk classification (low, intermediate, or high risk) of healthy patients younger than 70 years old. The treatment of patients younger than 70 years old with significant co-morbidity involves a radical prostatectomy (30.3%) with radiotherapy (31.5%) and hormonal therapy. Patients with the locally advanced stage usually receive surgery or radiation plus hormonal therapy (65).

Active surveillance is not popular in Thailand due to patient anxiety over an untreated cancer and worries in the loss of opportunity for a cure. Most patients are concerned about many periodic tests, digital rectal examination and repeated biopsies. This treatment is close monitoring and delayed curative treatment if necessary. One-third of patients need curative therapy following this treatment. The criteria for active surveillance are low risk of the disease with a PSA level ≤ 10 ng/ml, no Gleason score 4, 5 in prostate biopsy tissue and low volume of cancer. This treatment should be offered to older patients and patients with multiple comorbidities. Active surveillance can avoid overtreatment and over-detection of an indolent prostate cancer.

Watchful waiting is a choice for patients with limited life expectancy usually over 75 years old with extensive comorbidities. The treatment will be started when symptoms or metastases occur. This treatment can avoid the side effects of primary ADT.

Primary androgen deprivation therapy (PADT) is not only the treatment for advanced stage prostate cancer, but can also be used to treat localized prostate cancer when patients are unfit for definitive treatment (65). Surgical castration, such as a bilateral orchiectomy is the procedure of choice in provincial hospitals and is usually performed on patients who cannot afford the cost of medical castration. The LHRH agonists have been available in Thailand for more than 10 years and are fit for surgery. A radical prostatectomy (RP) can be performed by the open technique (ORP), laparoscopic approach (LRP) or robotic-assisted (RARP). Open prostatectomy can be performed in large provincial, central and university hospitals. Laparoscopic radical prostatectomy is usually performed in large central and university hospitals. Currently, six robotic machines are available in Thailand in 4 university hospitals, and one private hospital. All robot machines except one, are located in Bangkok, the capital of Thailand, the other is in Chiang Mai, a city in the northern part of Thailand. The robot-assisted laparoscopic radical prostatectomy (RARP) has gained popularity due to the advantages of less blood loss, less pain, a shorter hospital stay and a shorter catheter time compared with the same variables following an open prostatectomy (68). The major disadvantage of this technological technique is the cost of this procedure. The oncologic outcome of these techniques is no different, but RARP provides better early continence and potency.

A series of 151 prostate cancer patients with Stage T1, T2 and T3 who were treated with open radical prostatectomy was reported after a study in Thailand in 2005. The operative time was 162 min and blood loss was 1088 ml. Ninety-two percent of these patients did not have perioperative complications. They found that the morbidity of ORP in T3 prostate cancer patients were not significantly different from those of the T1, T2 patients (24). Laparoscopic and robot-assisted radical prostatectomy is also safe in the treatment of high risk localized prostate cancer (69,70). Nualyong et al. reported the initial experience of laparoscopic radical prostatectomy in 56 patients. The conversion to open prostatectomy occurred in 9 patients. The surgical margin was 29.8% and the median catheter time was 7 days (6–50 days). The continence rate at 1 year was 72.2%. This procedure is technically challenging; however, it is felt that intraoperative results would improve once experience was gained (71). Laparoscopic radical prostatectomy is safely performed via the extraperitoneal approach with a longer operative time but results in less blood loss and shorter hospital stays (72–75). The benefits of extraperitoneal RARP are the lower risk of intraabdominal organ injury and a lower possibility of affecting the Trendelenburg position.

The series of robot-assisted laparoscopic radical prostatectomies carried out was compared with a series of conventional laparoscopic...
radical prostatectomies. It was concluded that the RARP provided a shorter catheter time (76,77). A routine cystography at Post-operative day 7 was not found to be necessary following an operation involving the extraperitoneal approach in either a laparoscopic radical prostatectomy or a robot-assisted radical prostatectomy (75).

Two large long-term studies of laparoscopic radical prostatectomies in Thailand demonstrated the advantage of LRP in improvement of vision during this procedure compared with the outcome of open surgery in 559 cases carried out over a 5-year period. The oncologic functional and perioperative outcomes were comparable with the open technique (78,79). A laparoscopic prostatectomy also can be performed in small university hospitals (80) and by residents under the supervision of expert staff with acceptable results (81). The laparoscopic radical prostatectomy following a transurethral resection of the prostate is safe without compromising the oncologic and surgical outcomes (82).

Nerve sparing laparoscopic radical prostatectomy is acceptable in low-risk prostate cancer cases with a PSA level of <10 ng/ml and a Gleason score ≤8. This technique demonstrated a better outcome regarding urinary continence and erectile function without compromising control of the cancer (83). Sarema et al. reported the first case of LRP in kidney transplant patients who had had stable renal function for 9 years. The technique is challenging due to the previous surgery. No intraoperative and post-operative complications were found with stable renal function for 1 year post-operatively (84). Leewansangtong et al. (85) reported on a LESS robotic radical prostatectomy without complication. The operative time was 335 min, estimated blood loss was 250 ml and hospital stay was only 84 h.

The predictive factors for biochemical recurrence following a laparoscopic radical prostatectomy have been reported. The positive surgical margin is the only factor which affects biochemical recurrence. The positive surgical margin rates increase with the higher stages (23.1% for PT2, 63.6% for PT3 and 81.8% for PT2–3 N1) (86,87). Lower biochemical recurrence (13.9%) occurred in 944 patients who underwent laparoscopic and robot-assisted radical prostatectomy with positive surgical margins. Follow-up of patients is important to avoid unnecessary adjuvant radiation or hormonal therapy. The inclusion of an intraoperative frozen section during the laparoscopic radical prostatectomy does not decrease the positive surgical margin (88).

The incidence of urinary incontinence and some degree of erectile dysfunction (ED) at 12 post-operative following RARP is 26.7 and 92.5%, respectively. The incidence of ED is quite high, but it does depend on age, pre-operative PSA level, T stage, post-operative ADT and erectile function following bilateral nerve sparing (89). Vesicourethral stenosis following radical prostatectomy occurred in 11% of 90 patients who underwent an open radical prostatectomy. This complication can be managed by urethral dilation, internal urethrotomy and transurethral resection or laser therapy with a high success rate (90).

A cost-utility of laparoscopic radical prostatectomy and robot-assisted laparoscopic radical prostatectomy have been analyzed. The average cost of RARP is 120 359 Thai Baht higher than that of a LRP. They concluded that RARP is not cost-effective when compared with LRP if 100 cases of prostatectomy are performed each year. The cost-effectiveness of RARP can be improved by increasing the number of cases, which are performed by RARP each year (91).

Radiation therapy of prostate cancer consists of external beam radiation therapy and brachytherapy. With the new technology used at the maximum level, image-guidance radiation therapy is used for the accurate targeting of the prostate and soft tissue. Adjuvant ADT is recommended following the radiation therapy in intermediate and high-risk patients. Brachytherapy monotherapy is used in low or intermediate risk patients. Brachytherapy is the treatment of localized prostate cancer in any risk group and satisfactory outcomes and fewer complications have been reported (92). Lerrutlsayakul et al. (93) reported on 2 years of experience with three-dimensional radiation therapy and intensity-modulated radiation therapy (IMRT) treating 27 prostate cancer patients with successful outcomes.

Focal ablative therapy such as cryotherapy and HIFU are seldom used in Thailand. This technology still needs more studies to give a real risk–benefit ratio.

Patients with a recurrent tumor after a radical prostatectomy are usually treated with salvage radiation therapy with or without ADT. However, recurrence after radiation therapy is seldom treated with a salvage radical prostatectomy. ADT is usually used in this condition due to there being potentially more complications following a salvage radical prostatectomy.

CRPC is divided into non-metastatic and metastatic CRPC. Non-metastatic CRPC: non-steroidal anti-androgen treatment is used in prostate cancer patients treated by surgical castration or with LHRH agonist or antagonist monotherapy. Ketoconazole is seldom used due to its side-effects of hepatic toxicity. In the past, metastatic CRPC patients were treated with chemotherapy (docetaxel) followed by third-line hormonal therapy such as abiraterone or enzalutamide (MDV 3100) or second-line chemotherapy (cabazitaxel). Recently, it has been discovered third-line hormonal therapy can be used as prechemotherapy.

With chemotherapy or hormonal therapy, patients will also usually receive a bone targeting agent such as zoledronic acid. In Thailand, denosumab and 233Ra are not available. The selection of first-line chemotherapy or third-line hormonal therapy in chemonaive prostate cancer depends on the duration of the first-line ADT and Gleason score. If the duration of the response to first-line ADT is <1 year or the patient has a high Gleason score >7, chemotherapy should be offered.

Conclusion
There is an increasing incidence of urologic cancers in Thailand. Prostate cancer is the most common urologic cancer in males. The burden of cancer is a challenging problem especially in the lower socioeconomic groups, who have higher exposure to the risk factors and more limited access to the health service. Significant numbers of patients with advanced stages of cancer are frequently detected. The increasing numbers of early cases of kidney, bladder and prostate cancer are diagnosed due to greater public awareness and annual checkups. New technology enabling more effective investigation and better treatment is available in most hospitals giving better health care.

Conflict of interest statement
None declared.

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