Preparation and management of complications in prostate biopsies

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Abstract
Transrectal ultrasonography-guided biopsy plays a key role in prostate sampling for cancer detection. Among interventional procedures, it is one of the most frequent procedures performed by radiologists. Despite the safety and low morbidity of such procedure, possible complications should be promptly assessed and treated. The standardization of protocols and of preprocedural preparation is aimed at minimizing complications as well as expediting their management. The authors have made a literature review describing the possible complications related to transrectal ultrasonography-guided prostate biopsy, and discuss their management and guidance to reduce the incidence of such complications.

Keywords: Prostate; Needle biopsy; Interventional ultrasonography; Complications.

INTRODUCTION

Recent studies published in Brazil have highlighted the relevance of interventional radiology to collect appropriate material for the diagnosis of several diseases in different organs. In this context, transrectal ultrasonography (US)-guided prostate biopsy is one of the most common procedures, with high sensitivity for the diagnosis of prostate cancer. The prostate biopsy technique as well as its indications and results have already been widely studied.

Such procedure is relatively simple, rapid and safe, with low morbimortality. Generally, the complications are mild, but some precautions should be taken in the patients’ preparation in order to avoid more severe complications. Despite the already published guidelines, there is a lack of standardization of such procedure in Brazil, so different types of preparation are adopted by the different institutions.

The present study aimed to review the literature on complications related to transrectal US-guided prostate biopsy, discuss its management and directions to reduce its incidence.

PREPROCEDURAL ORIENTATIONS

Every patient undergoing such procedure must be previously instructed and informed about risks and possible complications. The patients’ preparation for transrectal US-guided prostate biopsy is still a controversial issue.

Antibiotic prophylaxis
Preprocedural antibiotic prophylaxis is recommended for all patients. This concept is based on the fact that 16% to 100% of cases of biopsy with no prophylaxis presented either asymptomatic bacteriuria or transient bacteremia, increasing the risk for infectious complications such as urinary tract infection, sepsis and Fournier’s syndrome. The antibiotic must have a spectrum for bacteria from the flora of the skin, rectum and genitourinary tract. Studies describe Escherichia coli as the main etiologic agent of infections after biopsies, but Streptococcus faecalis and bacterioid organisms are also frequently reported. The utilization of broad spectrum antibiotics is a common practice, but guidelines should be locally developed according to the microbiological profile, taking the regional antibiotic resistance into consideration.

In a meta-analysis, Zani et al. have demonstrated that preprocedural antibiotic prophylaxis reduces significantly the risk for bacteriuria, bacteremia, fever, urinary tract infection and hospitalization. No signifi-
The wide utilization of quinolones has increased the rate of infections by resistant strains of *E. coli*. The additional utilization of intravenous aminoglycoside reduces the risk of such infection in institutions where this problem has been documented."16,17"

Patients under risk for development of endocarditis or infection of prosthetic heart valves, cardiac pacemakers or implanted cardiac defibrillators, benefit from the associated use of intravenous ampicillin and gentamicin before the procedure, followed by oral quinolone for 2–3 days.

**Bowel preparation**

Bowel preparation before transrectal biopsy of prostate, either by means of enema, suppository or povidone lavage, is based on the assumption that such preparation would reduce the incidence of infectious complications by bacteria present in the rectal ampulla. Considering the fact that the rectum contains feces only during defecation, the routine utilization of pre-biopsy bowel preparation is questionable. Some authors believe that such preparation might even increase the level of bacteria in the rectum since it liquidizes the feces in the sigmoid colon and also impairs the quality of the sonographic images because of the air inserted during the preparation."18"

Evidences demonstrate that there are no significant difference in the rates of infectious complications among patients submitted or not to bowel preparation, since they have undergone antibiotic prophylaxis."18,19" Thus, some authors support that bowel preparation increases the cost of the procedure and the discomfort of the patient with no additional benefit. For this reason, patients submitted to appropriate antibiotic prophylaxis do not require pre-biopsy bowel preparation.

**Anticoagulant and antiplatelet agents**

Many of the patients submitted to prostate biopsy present with increased cardiovascular risk and continuously use anticoagulant agents or antiplatelet therapy. The decision about discontinuing or continuing such therapies should be made in conjunction with the assisting physicians, taking the risks for bleeding and cardiovascular events into consideration.

Although prospective studies with patients under continuous use of low doses of acetylsalicylic acid (AAS) submitted to transrectal prostate biopsy have not demonstrated any increase in the incidence of severe hemorrhagic complications,"20,21" most urologists recommend discontinuation of the therapy. AAS and other nonsteroidal anti-inflammatory drugs should be discontinued three to five days before the biopsy, while clopidogrel should be discontinued seven days before, and ticlopidine, 14 days before the procedure."22,23"

As regards the use of anticoagulant therapy with coumarins, the lack of evidences about post-biopsy hemorrhagic complications in such patients suggests that such therapy should be discontinued four to five days before the procedure."24,25" Further studies are necessary to change such practice and establish some recommendations according to the risk for thrombosis and indication for anticoagulation."26" Patients with history of acute venous or arterial thromboembolism in the last month preceding the biopsy should undergo the procedure as an inpatient, and with the anticoagulant therapy replaced by intravenous heparin. In cases of patients with other indications for anticoagulant therapy (for example, metal heart valves, recurrent venous thromboembolism or atrial fibrillation) and lower risk for embolic events, the therapy may be changed to subcutaneous or low-molecular-weight heparin.

**Anesthesia**

Although transrectal prostate biopsy is generally well tolerated without the use of anesthesia,"27" the pain and anxiety related to the procedure may lead to unfavorable outcomes besides influencing the decision of the patient about undergoing a new biopsy. Randomized studies have demonstrated that the use of topic anesthetics alone does not reduce the pain."28-30" Thus, local anesthesia or sedation should be routinely performed in order to reduce the patient’s discomfort during the procedure, particularly in younger patients and during procedures requiring the collection of a greater number of specimens.
Sedation with a hypnotic agent (for example, midazolam or propofol) is generally performed by an anesthetist. Such technique promotes great satisfaction and is widely accepted by patients for reducing the discomfort secondary to the transducer positioning and the patient’s fear in relation to the procedure, providing a calm environment for its performance. However, an anesthetic agent should be associated to prevent postoperative pain; fentanyl is the most utilized in such cases. But such association is not free from risks, as cases of respiratory depression may occur due to the interaction between fentanyl and propofol. It is important that patients that are candidates to biopsy with sedation undergo a preanesthetic assessment to determine the surgical risk and for a better anesthetic planning. The patient must be appropriately monitored during the procedure which should be preferentially performed in a hospital environment.

In cases where sedation is not performed, local anesthesia with periprostatic nerve block is highly recommended. Several techniques have been described; among them the most accepted one is the injection of 5 ml of 2% lidocaine using a 7 in / 22 gauge spinal needle into the periprostatic nerve pathway, at the junction between the seminal vesicles and the base of the prostate, bilaterally (Figure 1). Evidence demonstrates that such a technique allows for a satisfactory management of the pain, without increasing the incidence of complications.

**Systemic arterial hypertension**

No evidence is found in the literature to indicate an increase in the risk for complications after transrectal prostate biopsy in patients with high arterial pressure levels during the procedure. But, theoretically, there is an increased risk for bleeding in such cases. Additionally, the presence of arterial hypertension increases the risk for cardiovascular events during surgical procedures. Special care should be taken with patients undergoing procedures under sedation, considering that anesthetics may increase the systemic arterial pressure and the cardiac frequency.

In general, such procedure should be avoided in patients with systolic pressure > 170 mmHg or diastolic pressure > 110 mmHg. Patients under chronic use of antihypertensive drugs should maintain their regular medication, even in the day of the procedure. The reduction of blood pressure levels could be achieved with either oral or parenteral administration of antihypertensive drugs.

**POSTPROCEDURAL ORIENTATIONS**

The patients should be advised about rest, liquids ingestion, antibiotic prophylaxis and post-biopsy follow-up. At any
patient discharge after transrectal US-guided prostate biopsy, one must be sure that he has understood the potential complications from the procedure, requiring medical assistance in case of fever or other signs of infection, urinary obstruction/retention or persistent bleeding. Patients with urethral catheter or diabetes mellitus require a more strict monitoring in relation to signs of sepsis.

**COMPLICATIONS**

Transrectal US-guided prostate biopsy is generally a well-tolerated procedure with no complication. The rates of discomfort and major complications do not depend on the number and site of punctures made with the biopsy needle and their incidence is not higher in patients submitted to an initial biopsy or rebiopsy after some weeks.

**Minor complications**

A small urinary and/or rectal bleeding is expected after prostate biopsy, but is generally self-limited and does not require any intervention. Hematospermia is the most frequent complaint from patients (6.5% to 74.4% of cases), followed by hematuria (up to 14.5% of cases) and rectal bleeding (2.2% of cases). Such complications may persist for up to two weeks, with a progressive decrease in their intensity.

**Major complications**

The rate of severe complications related to transrectal US-guided prostate biopsy is low. Infection, hemorrhage and urinary obstruction are the most common severe complications from such procedure. Hospitalization is required in up to 1.6% of patients.

Infections related to the procedure or febrile episodes are reported in up to 6.6% of cases, with urosepsis caused by aerobic bacteria in 0.3% of cases. In the literature, septicemia caused by anaerobic organisms is reported with low frequency. Prebiopsy antibiotic prophylaxis reduces the rate of urinary tract infection, but some patients are at risk for severe infectious complications independent of the prophylaxis. The main risk factors that are predictive for sepsis include the presence of urethral catheter and diabetes mellitus. The treatment of urinary infection related to prostate biopsy with oral antibiotics (such as quinolones and sulfamethoxazole-trimethoprim) is generally sufficient, although hospitalization and intravenous antibiotic therapy may be necessary. Antimicrobial treatment may be altered on the basis of the clinical response and the results of uroculture and antibiogram. Acute bacterial prostatitis is relatively uncommon and is characterized by perineal pain, fever, chills, irritative micturition symptoms (micturition urgency, polacyuria and dysuria) and even acute urinary retention. Such complication must be promptly assessed and treated otherwise there is a risk for progressing to sepsis, development of prostatic abscess and dissemination to adjacent organs such as epididymis and testis.

Urinary obstruction/retention (including obstruction by clot or secondary to the local postbiopsy inflammatory alterations themselves) is described in 0% to 4.6% of cases. The assessment of post micturition residue must be made in symptomatic patients. Therapy with alpha-adrenergic blockers may be initiated in patients with residual urinary volume < 100 ml, while insertion of a low-caliber urethral catheter or cystostomy may be necessary in patients with greater residual volumes.

Severe rectal bleeding requiring intervention is a rare complication, occurring in up to 1% of cases. The management of patients with significant hemorrhage at the moment of biopsy is described in the algorithm below. In hemodynamically stable patients with active rectal bleeding, manual (digital) compression of the prostate (or compression with the sonographic transducer) is the primary strategy line. A set of gauzes applied to the rectum may be utilized. As direct pressure is applied over the prostate, the vital signs of the patient are monitored and the coagulation parameters are verified and corrected as necessary. The rectal insertion of a Foley catheter with an inflated (50 ml) balloon has shown to reduce hemorrhage, but the routine use of such technique to prevent bleeding is not supported, since it causes unnecessary discomfort for a borderline benefit. Nevertheless, such technique may be used for temporary management of the bleeding until a resolutive intervention is performed. In case the bleeding remains active or the patient is hemodynamically unstable, an endoscopic intervention (for epinephrine injection or clipping) or surgery (for example, ligature) should be performed.

Any patient with a major complication related to the procedure should be assessed and followed-up by an experienced urologist.

**CONCLUSIONS**

Radiologists involved in the performance of transrectal US-guided prostate biopsy should know the complications related to the procedure as well as their management. The guidance on preprocedural preparation is fundamental to reduce the
incidence of severe complications. In such a context, antibiotic prophylaxis should be routinely performed.

REFERENCES