

About A Clinical Case: Sepsis Post Prostate Biopsy Puncture

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Abstract

Introduction: Prostate cancer is generally diagnosed through a rectal examination, although sometimes the support of complementary tests is necessary, such as a prostate biopsy. The most widely used biopsy around the world is transrectal and is used to obtain samples of prostate tissue in patients with suspected prostate cancer. However, this procedure has a post-procedure sepsis rate of 0.3% to 0.8%, with a 1.1% hospitalization rate due to post-biopsy infections.

Presentation of the case: A 71-year-old patient with a history of prostatic hyperplasia, went to a private hospital in Quito to undergo a transrectal prostate biopsy on an outpatient basis, stable in recovery and later discharged. Two days after the intervention, she presents a clinical picture for which she is admitted to the emergency area, she is unstable and enters the intensive care area with a diagnosis of septic shock plus multiple organ dysfunction, for which antimicrobial therapy is started with meropenem. However, she did not have a favorable evolution, for which linezolid was added on the fourth day, evidencing a decrease in the white series and compensation of the patient, who stabilized after 12 days and was transferred to hospitalization.

Conclusion: Transrectal biopsy is an invasive method in which septic complication is frequent. However, if they are not treated with expertise and attention, they can seriously compromise the patient's life and even lead to death.

Keywords: prostate cancer; transrectal biopsy; septic shock

1. Introduction

Prostate cancer (PC) is one of the most common malignancies around the world, affecting men with more than 1,100,000 new cases and having a mortality rate of 300,000 deaths worldwide each year [1].

Furthermore, it is the disease that most commonly affects older men, with a median age at the time of diagnosis of around 60 years with high morbidity [2].

PC is generally diagnosed through the patient's clinical symptoms (rectal examination) and the support of complementary examinations. These can be non-invasive, such as a blood test to measure prostate-specific antigen levels, and invasive, such as a prostate biopsy, which is the only one that gives the definitive diagnosis of PC. The biopsy in turn can be performed using two techniques, the Transperineal Prostatic Biopsy (TPBP) or the Transrectal Prostatic Biopsy (TRBP) [3].

BPTR is the "classic" technique; it has great sensitivity and specificity in PC screening. Furthermore, the lack of ionizing radiation, the low cost, and the proximity of the prostate to the rectal wall, made this technique the most used for decades in oncological detection [4].

BPTR is an innovative technique in the field of urology; However, it is the least used by medical personnel due to its recent immersion in clinical practice [5].

On the other hand, BPTR continues to be the most used technique around the world to obtain prostate tissue samples in patients with suspected prostate cancer [6].

However, this procedure has a post-procedure sepsis rate of 0.3% to 0.8%, with a 1.1% hospitalization rate due to post-biopsy infections. Because septic complications are common after this diagnostic procedure, it leads us to the question of what is the importance of antibiotic prophylaxis prior to the procedure as well as asepsis and antisepsis measures to avoid this complication.

Generally, Gram-negative bacilli have been isolated in blood cultures, being *Escherichia coli*, the most representative microorganism and the most frequent cause of urosepsis (67%). Therefore, it leads us to question the timely management and what is the best choice of antibiotics in these cases [7, 8].

Complications secondary to BPTR have a low incidence worldwide. However, they can be fatal in case of appearance and poor medical

management, which is where the importance of the following clinical case falls. The objective is to publicize the timely clinical intervention in septic shock secondary to BPTR through the presentation of a real case, to prevent serious complications derived not only from its dissemination but also from its symptoms that threaten the patient's life.

2. Information of the patient

71-year-old patient, male, married, basic education, retired from the police, recognized as mestizo, born and resides in the Riobamba canton. With a personal pathological history of Prostatic Hyperplasia, repeated urinary infections, surgical history not mentioned and no allergic history. Family pathological history: siblings with type 2 Diabetes Mellitus.

Family and patient, after scheduling and preparation, go to a private hospital in Quito, for an outpatient BPTR procedure, patient stable in recovery and discharged. Two days later he presented a clinical picture of fatigue, general malaise and suffered a fall from his own height, the kinematics were not specified, pain in the cervical region with a Visual Analogue Scale (VAS) of 10, he went to a doctor, in the afternoon he suffered loss of vision, consciousness, relaxation of sphincters, vomiting on 4 occasions and bloody urine. He is admitted to the emergency area, the patient is unstable and enters the intensive care area with the diagnosis of septic shock plus multiple organ dysfunction, prerenal renal failure, hyponatremia, acidemia with metabolic acidosis plus respiratory alkalosis, lactatemia. APACHE 17 points mortality of 17.2%, SOFA 8 points mortality in ICU 32-35%. Therefore, antimicrobial therapy with Meropenem was started.

3. Clinical findings

3.1. General physical examination

There is evidence of a normal patient who walks with difficulty, conscious, sleepy, oriented, hydrated, and afebrile. Facies and gait without pathological processes. BP: 90/50 mmHg, mean arterial pressure (MAP): 54mmHg, HR: 51 bpm, O₂ saturation: 95% FiO₂: 27%, RR: 22rpm, Temperature: 36.5 °C.

3.2. Physical examination by systems

Neurological: at the moment with a tendency to drowsiness, lethargic movements with Glasgow 12/15, central reflexes remain unchanged, reactive pupils, right eye (od): 2 mm, left eye (oi): 2 mm. With decreased musculoskeletal reflexes, corneal reflex present, plantar reflexes indifferent.

Cardiovascular: no cardiological history, currently hemodynamically unstable, requiring vasopressor support to maintain MAP above 60 mmHg, with systolic blood pressure (SBP) greater than 90mmHg. norepinephrine vasopressor support infusion 0.06 µg/kg/min. It is maintained with palpable distal pulses, capillary refill of less than three seconds. Invasive approaches are performed such as the placement of an arterial line and a posterior jugular central venous catheter.

Respiratory: maintains saturation greater than 92%, at the moment there are no signs of air trapping, respiratory sounds preserved in both lung fields, no central or peripheral cyanosis, with supplemental oxygen via nasal cannula at 4L/min for saturation above 90%.

Gastrointestinal: soft depressible abdomen, not painful on superficial or deep palpation, no peritoneal resistance evident, decreased RHA, no deposition evident.

Metabolic: capillary blood glucose of 99 mg/dL, cutting will be made according to the insulin schedule when required.

Renal: patient in previous laboratory tests showed no alteration of nitrogen, but there was electrolyte disorder Na: 130.8 K: 3.70 Ca: 1.09, intravenous compensation and hydration was started, patient presented hematuric diuresis for which continuous irrigation with saline solution was started 0.9% 100 ml/h.

Urological: rectal examination: prostate enlarged, no pain on palpation, rubbery consistency. PSA: 6ng/ml.

Infectious: febrile, previous laboratory tests show leukocytes: 19,840 segmental: 95.4% CRP: 43.49mg/dL,

4. Time line / chronological line

Day 4: 01/25/2023

Patient with pain management through opioid fentanyl, hemodynamically unstable with requirement for high-dose vasopressor support to maintain MAP between 65-70 mmHg, with SBP ranging between 75-80 mmHg. Once his preload status has been optimized, his fourth hemodynamic echocardiographic monitoring control shows a hypodynamic pattern with a low cardiac index, a vasoplegic pattern with a low vascular resistance index and a normal pulmonary capillary pressure, which concludes with a distributive shock, and vasopressor drugs are titrated. and another second vasopressor is added with infusion of adrenaline at 0.37 µg/kg/min and infusion of norepinephrine 0.44 µg/kg/min, with the requirement of supplemental oxygen via nasal cannula at 4 L/min for SatO₂ over 95% rising, tomography computed axial (CT) scan shows bilateral pleural effusion, there is evidence of nitrogen with rising creatinine despite maintaining large diuretic volumes, tests show rising leukocytes, on his fourth day of carbapenem, so it is decided to expand antibiotic therapy coverage for gram positive cocci and antifungal coverage, it was decided to modify the regimen and linezolid plus fluconazole was started with a Seville score of 3 points.

Day 6: 01/27/2023

It was decided to change pain management to a minor opioid, slow decrease in vasopressor support, TP: 17.1, TTP: 121.5, INR: 1.4, HB: 11.5 g/dL, HCTO: 31.94%, PLQ: 99 x 10⁹/L, evidence of disorder in coagulation times, with preserved microdynamics, increasing platelets, alteration in liver profile is evident: TGO: 323 U/L, TGP: 236U/L, BT: 6.4, BD: 3.88 mg/dL, BI: 2.52 mg /dL, amylase: 54 U/L, lipase: 55 U/L, hepatic steatosis is evident, with predominantly direct hyperbilirubinemia, attributed to liver damage induced by sepsis, patient with altered renal function: urea: 282 mg/ dL, creatinine: 5.77mg/dL, glomerular filtration rate 9.5 mL /min/1.73m², dose of antibiotic and antifungal treatment is maintained.

Day 9: 01/30/2023

Patient with minor opioid for pain management with good tolerance, progressive decrease in vasopressor adrenaline 0.1 µg/kg/min, more consistent stable blood pressures, with oxygen supply, with absence of bowel movements despite the use of laxative, presented electrolyte disorder in compensation, with free water intake orally. The patient remains afebrile, leukocytes are decreasing, the antibiotic dose is corrected in relation to the new creatinine clearance and corticosteroid infusion is ruled out. Removal of central venous catheter, arterial line and change of urinary catheter, diuretic on schedule with the aim of optimizing negative balance.

Day 12: 02/02/2023

Patient with hemodynamic recovery without vasopressor, sporadically delirious with adequate neurological response, supplemental oxygen provision through a low-flow device at 4L/min, no tachypnea, with nasogastric tube for gastric emptying, preserved renal function with adequate urinary volume, serving days antibiotic regimen with: meropenem 1 g intravenously every 12 hours (11/11) and linezolid 600 mg intravenously every 12 hours (8/10) does not present febrile peaks, patient meets discharge criteria and goes to hospital.

5. Diagnostic evaluation

In the complementary admission studies, the following are obtained: Arterial blood gases: PH: 7.20, PCO₂: 26.9 mmHg; PO₂: 47.8 mmHg, HCO₃: 10.7 mmol/L, BE: -15.9 mmol/L. Lactate: 6.79 mmol/L. Troponins: <0.10 ng/ml, PROBNP: 9132.54 pg/ml, procalcitonin: 100ng/ml, Prothrombin time (PT): 14.3sec, Partial thromboplastin time (PTT): 36.7sec, INR: 1.16, glucose: 96.10mg /dl, urea: 99.9 mg/dL, creatinine: 3.73 mg/dL, uric acid: 8.31 mg/dL. sodium (Na): 130.8 mEq/L, potassium (K): 3.70 mEq/L, Calcium I: 1.09 mEq/L. Leukocytes: 19,840, Segmental 95%, Hemoglobin: 14.6 g/dL, Hematocrit: 40.73%, Platelet: 181 x 10⁹/L, CRP: 43 mg/dL, while progressing, elevation of the white line is evident with values of up to 41 120

with segmented 96.9% with subsequent decrease in relation to the rotation of the antibiotic regimen, evidencing its decrease to 6,780 and segmented 80% complying with the broad-spectrum antibiotic regimen based on meropenem and linezolid. Platelet values decreased due to sepsis status up to 46 x 10⁹/L. Elevated creatinine values throughout his admission up to 7.06 mg/dL with a reduction in MAP response and diuresis values.

6. Therapeutic intervention

The patient's management was based on intensive organic, electrolytic, hemodynamic and infectious support. Based on the results of complementary examinations, multiple antimicrobial regimens were used during his 12 days in intensive care hospitalization: vancomycin, meropenem + linezolid + fluconazole.

7. Monitoring and results

The patient presented a torpid but satisfactory evolution, through his process he recovered from most of his organic failures, with clear improvement after overcoming his intercurrences. infectious diseases after antibiotic treatment (meropenem + linezolid), with recovery of oxygenation, electrolyte, hemodynamic parameters and complications typical of the stay in the Intensive Care Unit (ICU), the patient continues to have sleep disorders without drug support, with these criteria The patient is discharged from the ICU and is admitted to hospital.

8. Discussion

BPTR guided or not by ultrasound is an invasive procedure and a fundamental pillar for the diagnosis and staging of PC in most centers in the world [9]. Post-biopsy infections have been increasing in recent years, infectious complications represent the main adverse events with up to 7% of infections and 3.1% of sepsis depending on the antibiotic prophylaxis regimens used [10].

Although statistically BPTR is associated with a greater risk of infectious complications and sepsis, as confirmed by several meta-analyses, such as that of Benjamín Pradere et. al, where they reported after reviewing 7 randomized clinical trials that included 1,330 patients and where they compared the impact of the biopsy route on infectious complications, they reported that there were significantly fewer infectious complications when the transperineal route was performed (22 events between 673 men) compared to the transrectal route (37 events among 657 men), concluding that infectious complications depending on the biopsy route did not report a significant difference, however, both antibiotic and non-antibiotic prophylaxis strategies do determine an important route to prevent post-biopsy [11] complications.

Based on the objective set in the present study, we can elucidate that one of the most important factors for the complications of the prostate biopsy procedure is antibiotic prophylaxis; however, several meta-analyses conclude that antibiotics may have a minimal impact on the prevention of serious infectious complications after prostate biopsy [12], as reported in the study carried out by Danielle Castellani et. al, where they analyzed the infection rate after prostate biopsy with and without prophylactic antibiotics, where eight studies with 2,368 cases were included; in the group with antibiotic prophylaxis and 1,294 in the group without antibiotic prophylaxis. The incidence of post-biopsy genitourinary infections was 0.11% in the group with antibiotic prophylaxis, concluding that the combined incidence of sepsis after BP was very low, with only 4 cases of sepsis out of 3,662 patients. Secondly, the difference in the incidence of post-biopsy sepsis between cases that used antibiotic prophylaxis and without antibiotic prophylaxis was not statistically significant [13].

In relation to antibiotic strategies, the misuse of antimicrobials, specifically fluoroquinolones and trimethoprim sulfamethoxazole antibiotics, types of antimicrobials most used for BPTR prophylaxis, have ceased to be as effective due to the constant increase in bacterial resistance in recent years, leading to a global increase in post-biopsy sepsis due to 22 resistant strains of *Escherichia coli* [14].

Thus, one in four men on active surveillance for prostate cancer now harbors rectal flora resistant to fluoroquinolones [15]. This bacterial adaptation has resulted in the emergence of multidrug-resistant organisms in the hospital and community, particularly bacteria that produce extended-spectrum beta-lactamases. This is how it is reported that complicated cases lead to a length of hospitalization of 1.1 to 14 days and up to 25% of admissions require intensive care units [16,17].

Despite the issue of the number of biopsy cores taken and its association with sepsis and infectious complication being controversial, as reported in the study by Spyridon P et. al., about the role of prophylactic antibiotics in prostate biopsy where they state that when the transrectal approach is performed, the number of nuclei does not have a significant relationship with post-biopsy infection rates. Although the transrectal route requires passing the biopsy needle through a contaminated field, adequate antimicrobial prophylaxis significantly reduces infections compared with placebo, and augmented prophylactic regimens have demonstrated superiority over single-agent empiric prophylaxis. to reduce infections [18,19].

Antibiotic prevention strategies are more studied than non-antibiotic strategies that include the risk of periprostatic nerve block, the number of cores, rectal preparation and type of needle used, however, despite the lack of evidence from studies that address these technical sections, it is very important to emphasize that rectal preparation with povidone-iodine is recommended, which is significantly associated with a lower risk of infection [20].

The other non-antibiotic strategies mentioned are reported not to significantly influence infection and hospitalization after prostate biopsy. It should be noted that lately the trend in practice to reduce post-biopsy sepsis events is leaning towards antibiotic interventions such as targeted PA based on rectal swab culture, as well as the use of more than 1 antibiotic to reduce infectious complications [21,22].

The infectious complication and sepsis that the patient presented in this clinical case could have been prevented if certain recommendations for performing BPTR, which are presented in the discussion, had been applied, however, in this case outside of the application of PA, it may be related to the increase in bacterial resistance of rectal flora to fluoroquinolones reported in several articles [23,24].

In these cases, with a critical condition of septic shock where the application of an initial antibiotic therapeutic scheme against Gram negative does not provide a response, the literature supports starting a prolonged infusion dosage of beta-lactams in accordance with the guidelines for surviving sepsis, such as was applied in the case presented, since it is more likely that this type of infection is related to resistant [25,26] gram- negative bacteria.

The guideline to follow is Carbapenem antipseudomonas, for example, extended infusion doses of Imipenem or Meropenem or standard infusion doses of Imipenem (500 mg every six hours) or Meropenem (1 to 2 g every eight hours, with the higher dose for more critically ill patients who have an increased risk of drug-resistant [27]. *P. aeruginosa*) Additionally, additional antibiotic coverage for resistant gram-positive organisms with Vancomycin is recommended until cultures have been completed [28,29].

On the other hand, it should be noted that in the case presented there was adequate action regarding the initiation of antibiotic therapy, since as supported by several studies, there is an increase in mortality with each hour of delay in starting antibiotics. as reported in one study, where they used risk-adjusted linear models at time intervals from 6 to 12 h, which are likely influenced by the higher odds of mortality associated with long delays in starting antibiotics [30].

Conclusion

Transrectal biopsy is an invasive method in which septic complications are common. However, if they are not treated with expertise and attention, they can seriously compromise the patient's life and even lead to death.

9. Gratitude

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10. Ethical considerations

This clinical case is published after obtaining the informed consent of the patient in question.

11. Interest conflict

The authors report no conflict of interest in carrying out this work.

12. Limitations of liability

All points of view expressed in this article are the sole responsibility of the authors and not of the institution to which they belong.

13. Support sources

None

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