BRIEF ORIGINAL

Acute prostatitis in men with urinary tract infection and fever: diagnostic yield of rectal examination findings in the emergency department

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None

Objective: The diagnosis of acute bacterial prostatitis (ABP) in men with a urinary tract infection (UTI) and fever is based on a finding of a painful prostate on rectal examination. This study aimed to assess the sensitivity, specificity, positive and negative predictive values (PPV and NPV), and positive and negative likelihood ratios of rectal examination findings in the diagnosis of ABP associated with UTI and fever.
Methods: We prospectively included 48 men with community-acquired UTI with fever. Clinical evaluation included a rectal examination and prostate-specific antigen (PSA) determination which was considered ten reference test for ABP.
Results: Twenty-three patients (47.9%) had a painful prostate on rectal examination and 30 (62.5%) had elevated PSA levels. Thirteen (27.1%) had a positive lumbar fist percussion; PSA was elevated in 9 (30.7%) of those patients. The sensitivity of rectal examination findings for a diagnosis of ABP was 63.3%; specificity, 77.7%; PPV, 82.6%; NPV, 56%; positive likelihood ratio, 2.85; and negative likelihood ratio, 0.47.
Conclusions: A finding of painful prostate on rectal examination in men with UTI with fever strongly suggests a diagnosis of acute bacterial prostatitis. The low sensitivity and NPV of this finding means that an absence of pain does not rule out a diagnosis of ABP. Therefore men with UTI with fever should be treated as if they had ABP. [Emergencias 2012;24:292-295]

Key words: Acute bacterial prostatitis. Urinary tract infection with fever. Painful prostate.

Introduction

Determining the location of infection in men with febrile urinary tract infection (FUTI) can be difficult. Transrectal ultrasound (TRU) and indium^{111}-labeled leukocyte scintigraphy (In^{111}LLS) have shown that the prostate gland is most frequently involved in FUTI in men[1,2]. Increased levels of total prostate-specific antigen (tPSA) are found in over 80% of men with FUTI, as there is good correlation with prostate involvement by TRU[1,3]. Therefore, most of these cases of FUTI are considered to have acute bacterial prostatitis (ABP).

In clinical practice, the diagnosis of ABP is based on clinical history and physical examination.

The most important exploratory finding is the presence of a painful prostate on digital rectal examination (DRE)[4]. The diagnosis of ABP is important because these patients often need antibiotic treatment for longer periods than in other forms of UTI[5]. The presence of prostate pain on DRE may be absent despite prostate involvement. In this regard, Velasco et al. showed that 50% of men with prostate involvement evidenced by In^{111}LLS had no pain on DRE[2]. The objective of this study was to evaluate the usefulness of DRE for the diagnosis of ABP in men with FUTI, taking tPSA as the test of reference.

Method

We performed a prospective observational, analytical, non-interventional study of adult men > 18 years diagnosed with community-acquired FUTI, between January 2008 and October 2011. FUTI was defined as the presence of axillary temperature > 38°C plus one or more symptoms of urinary tract infection (UTI) in the absence of other sources of infection. The study was approved by the hospital Ethics Committee.

We collected the following variables: age, place where FUTI was acquired [community-acquired (CA) versus healthcare-related (HC)], dementia, diabetes mellitus, chronic renal failure, cirrhosis, active neoplasia, chronic obstructive pulmonary disease (COPD), congestive heart failure, immunosuppressive, steroid or antibiotic treatment in the previous 30 days before FUTI, and Charlson index values. History of urological disease and previous UTI was also recorded. We evaluated whether FUTI was complicated or not, the former being defined as involving functional or structural urinary tract disorders, with a recent history of urinary tract intervention and/or bladder probe or underlying disease[6].

Physical examination included DRE and lumbar fist percussion (LFP) performed solely by the ED physician responsible for the patient. Urine cultures were considered positive when bacterial growth was greater than 103 CFU/mL. At 12-24 h after admission, and not before as emergency PCR was not possible, patients underwent protein C reactive immunoassay and PSAt by chemiluminescence (Access Hybritec® PSA; Beckman Coulter, Inc.). PSAt values > 4 ng/ml were considered elevated3. PSAt was repeated in the first 3 months in patients with elevated FUTI during episode, to confirm normalization or return to previous values. We excluded from the analysis patients with prostate cancer, bladder probes and those who did not complete follow-up.

Qualitative data are expressed as percentages and quantitative variables as mean ± standard deviation. Continuous variables were compared with Student t test or Mann- Whitney U test, and for categorical variables we used chi2-test or Fisher's exact text. We calculated the sensitivity, specificity, positive predictive values and negative predictive values, and positive and negative likelihood ratios (PLR and NLR). All analyses were performed using SPSS version 15.0. Differences with a P value < 0.05 were considered significant. PSAt was taken as the reference test, using the program EPIDAT 3.1.

Results

The study included 48 men with FUTI. Twenty three (47.9%) were older than 65 years (mean age: 64.5 ± 13.5 years) and 37 (77%) had some comorbidity. Of the 35 (72.9%) patients with uropathy, 24 (68.5%) had benign prostatic hyperplasia (BPH). Urine culture was positive in 42 (87.5%) episodes, and E. coli was isolated most frequently (32, 76.2%). Blood cultures were positive in 11 of 41 patients (26.8%) and E. coli was isolated in 7 (63.6%) cases. DRE was positive in 23 cases (47.9%), LFP in 13 (27.1%) and both were negative in 17 (35.4%). After DRE, no episodes of bacteremia were observed.

Table 1 shows the analysis based on DRE results. Patients with painful DRE were younger and had more voiding symptoms, although none was a carrier of urinary catheter and painful DRE was less frequently related with FUTI-HC than in those with non-painful DRE. However only the differences in frequency of voiding symptoms were significant.

tPSA levels were higher than 4 ng/ml in 30 cases (62.5%). Table 2 shows the analysis of tPSA levels. Patients with elevated PSA levels were older and more frequently had previously been diagnosed with benign prostate hypertrophy (BPH) and less frequently with non-prostate active neoplasia, although only the latter differences were significant. They consulted more frequently for

Table 1. Univariate analysis of different clinical characteristics according to digital rectal examination (DRE) results*

Characteristic*	Painful DRE (n = 23) n (%)	Painless DRE (n = 25) n (%)	p value
Age (years)	61.74 ± 10.54	67.2 (15.47)	NS
Charlson índex	2.74 ± 2.07	3.56 (2.31)	NS
Diabetes mellitus	9 (39)	6 (24)	NS
Active neoplasia	0	4 (16)	NS
Liver cirrhosis	1 (4.3)	0	NS
COPD	4 (17.4)	1 (4)	NS
Chronic renal failure	2 (8.7)	1 (4)	NS
Immunosuppression	1 (4.3)	0	NS
Dementia	1 (4.3)	2 (8)	NS
Previous antibiotic treatment	8 (34.8)	8 (32)	NS
Previous urological disease	18 (78.3)	17 (68)	NS
BPH	12 (52.2)	12 (48)	NS
Previous UTI	10 (43.5)	14 (56)	NS
Urinary catheter	0	5 (20)	NS
Complicated UTI	18 (78.3)	21 (84)	NS
HC-FUTI	3 (13)	9 (36)	NS
Voiding symptoms	20 (87)	15 (60)	< 0.05
Lumbalgia	6 (26.1)	5 (20)	NS
LPF positve	5 (21.7)	8 (32)	NS
Leukocytes (cells/mm^3)	14.106 ± 5.826	13.043 ± 5.937	NS
Creatinine (mg/dl)	1.19 ± 0.47	1.44 (0.98)	NS
CRP (mg/l)	177.8 ± 69.47	167.13 (84.12)	NS
tPSA (ng/ml)	19.55 ± 17.71	11.63 (19.85)	NS
Positive blood cultures	3 (15.8)	8 (36.4)	NS
Infection by GNB	21 (95.5)	20 (95.2)	NS
Infection by *E. coli*	18 (81.8)	15 (71.4)	NS
Antibiotic treatment duration (days)	23.05 ± 6.68	16.91 (4.09)	0.001

*Data are presented as frequency (percentage) and mean ± standard deviation. NS, not significant; COPD chronic obstructive pulmonary disease; DRE: digital rectal examination; UTI: urinary tract infection; FUTI-HC: febrile urinary tract infection related to health care; BPH: benign prostatic hypertrophy; DRE: digital rectal examination, LFP: lumbar fist percussion, CRP: C-reactive protein; GNB: Gram negative bacteria; tPSA: total prostate-specific antigen.

Table 2. Univariate analysis of different clinical characteristics according to total prostate-specific antigen levels during the episode of febrile urinary tract infection*

Characteristic*	tPSAc ≥ 4 ng/ml (n = 30)	tPSAc < 4 ng/ml (n = 18)	p value
Age (years)	65.77 (11.35)	62.61 (16.61)	NS
Charlson index	3 (1.94)	3.44 (2.64)	NS
Diabetes mellitus	10 (33.3%)	5 (27.8%)	NS
Active neoplasia	0	4 (22.2%)	< 0.05
Liver cirrhosis	0	1 (5.6%)	NS
Tratamiento antibiótico previo	12 (40%)	4 (22.2%)	NS
COPD	5 (16.7%)	0	NS
Chronic renal failure	2 (6.7%)	1 (5.6%)	NS
Immunosuppression	1 (3.3%)	0	NS
Dementia	1 (3.3%)	2 (11.1%)	NS
Previous antibiotic treatment	12 (40%)	4 (22.2%)	NS
Previous urological disease	24 (80%)	11(61.1%)	NS
BPH	18 (60%)	6 (33.3%)	NS
Previous UTI	13 (43.3%)	11(61.1%)	NS
Urinary catheter	3 (10%)	2 (11.1%)	NS
Complicated UTI	26 (86.7%)	13 (72.2%)	NS
HC-FUTI	7 (23.3%)	5 (27.8%)	NS
Voiding symptoms	26 (86.7%)	9 (50%)	< 0.01
Lumbalgia	4 (13.3%)	7 (38.9%)	NS
TR positivo	19 (63.3%)	4 (22.2%)	< 0.01
LPF positve	4 (13.3%)	9 (50%)	< 0.01
Leukocytes (cells/mm^3)	13.874 (6.384%)	13.062 (4.985%)	NS
Creatinine (mg/dl)	1.25 (0.45%)	1.43 (1.13%)	NS
CRP (mg/l)	173.61 (67.85%)	169.01 (92.95%)	NS
Positive blood cultures	7 (26.9%)	4 (26.7%)	NS
Infection by GNB	26 (96.3%)	15 (93.8%)	NS
Infection by *E. coli*	22 (81.5%)	11 (68.8%)	NS
Antibiotic treatment duration (days)	21.5 (6.3%)	17 (5.12%)	< 0.05

*Data are presented as frequency (percentage) and mean ± standard deviation. NS, not significant; COPD chronic obstructive pulmonary disease; DRE: digital rectal examination; UTI: urinary tract infection; FUTI-HC: febrile urinary tract infection related to health care; BPH: benign prostatic hypertrophy; DRE: digital rectal examination, LFP: lumbar fist percussion, CRP: C-reactive protein; GNB: Gram negative bacteria; tPSA: total prostate-specific antigen.

fever and mictional symptoms, and had painful DRE more often. In contrast, men with tPSA levels below 4 µg/mL mainly consulted for fever and urinary symptoms together, and showed a greater tendency to have low back pain, and LFP was positive in 50% of episodes.

Of the 30 patients with elevated tPSA, 19 had painful DRE (true positives) and 11 painless DRE (false negatives). Of the 18 with tPSA less than 4 ng/ml, 4 had painful DRE (false positives) and 14 had painless DRE (true negatives). DRE showed a sensitivity of 63.3% (95% CI 44.4-82.2), specificity 77.7% (95%CI, 55.8-99.7), positive predictive value 82.6% (95% CI 64.9-100), negative predictive value 56% (95% CI 34.5-77.4), positive likelihood ratio 2.85 (95% CI 1.15-7.05) and negative likelihood ratio 0.47 CPN (95% CI 0.28-0.8). Figure 1 shows the ROC curve of the diagnostic capacity of DRE compared to tPSA, in which the area under the curve was 0.71 (95% CI 0.55-0.86).

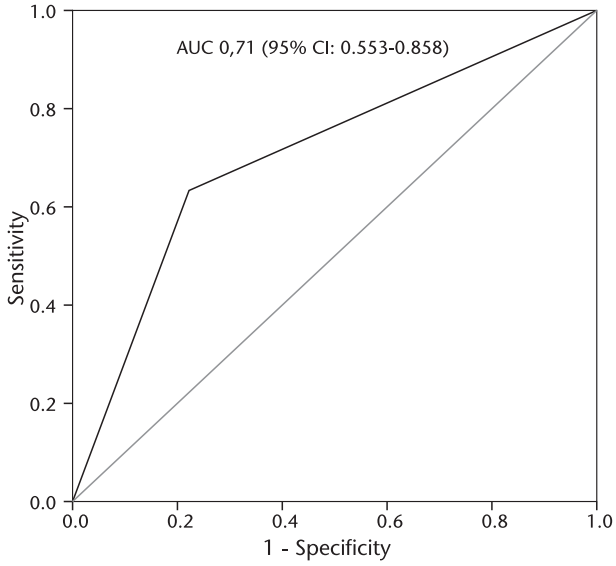

Figure 1. ROC curve showing the diagnostic capacity of digital rectal examination for acute bacterial prostatitis. AUC: area under the curve. CI: confidence interval.

Discussion

This is the first study to evaluate the diagnostic capacity of digital rectal examination for ABP in men with FUTI. Almost half (47.9%) of the patients had painful DRE, somewhat lower than that found in some studies[1,7], but higher than in others3. Regarding the degree of prostate involvement, 62% had elevated tPSA, which is similar to that found in previous studies[8], but rises to 90% in others[3]. DRE was negative despite the existence of prostate involvement in 44% of patients, 63% of whom were over 65 years of age and also showed a lower frequency of voiding symptoms (data not shown). DRE was also negative in all urinary catheter carriers, although 60% of these patients had prostate involvement. Almost a third (30%) of patients with positive LFP had prostate involvement.

tPSA is a protease produced in prostate cells, whose blood levels increase with increased vascular permeability, as in ABP[9]. As in previous studies, most patients' (86.6%) tPSA values normalized or returned to previous values within three months[10].

The sensitivity of DRE for the diagnosis of ABP was 63.3%, indicating that nearly 4 in 10 patients with ABP were not detected by DRE. PPV was 82%, indicating that a man with FUTI and positive DRE is highly likely to have ABP. As for NPV results, virtually the same considerations apply as for sensitivity. The problem with PPV and NPV is that they depend on the prevalence of the dis-

ease, so likelihood ratios are currently used. In our study, PLR was 2.85 whereas NLR was 0.47, indicating poor capacity of DRE to confirm or rule out ABP[11]. The area under the ROC curve was 0.71, indicating low-moderate accuracy for diagnosing ABP[12]. Given that DRE was negative in a large proportion of patients despite prostate involvement, it is probably not a recommended procedure, and male patients with FUTI should be treated as ABP. Although treatment duration in ABP remains to be completely defined, it should not be less than[14] days, and a fluoroquinolone should be used[13].

This study has several limitations. Firstly, the sample size was low. Secondly, DRE was only assessed by the attending physician. Thirdly, samples for the determination of tPSA were only obtained after completion of DRE, although according to the literature DRE does not cause a significant increase in tPSA[14]. Finally, tPSA was considered as the gold standard, but its good correlation with TRU[1,3] supports that decision.

In conclusion, the demonstration of a painful prostate using DRE in male FUTI patients is highly suggestive of ABP. But the absence of pain does not rule out ABP, especially in patients over 65 years of age or carriers of a urinary catheter, so men with FUTI should be treated as having ABP.

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Infección urinaria febril en hombres: rentabilidad del tacto rectal para el diagnóstico de prostatitis aguda en urgencias

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Objetivo: El diagnóstico de prostatitis aguda bacteriana (PAB) en hombres con infección del tracto urinario febril (ITUF) se basa en la presencia de una próstata dolorosa al tacto rectal (TR). Se evaluó la sensibilidad (S), especificidad (E), valores predictivos positivo y negativo (VPP y VPN) y los coeficientes de probabilidad positivo y negativo (CPP y CPN), del TR en el diagnóstico de PAB en hombres con ITUF.
Método: Se incluyó de forma prospectiva 48 hombres con ITUF comunitaria. La valoración clínica inicial incluyó la realización del TR y la determinación del control prostático específico total (PSAt) que se consideró la prueba de referencia.
Resultados: Veintitrés (47,9%) pacientes tenían una próstata dolorosa al TR y 30 (62,5%) niveles elevados de PSAt. Trece (27,1%) de los pacientes presentaron una puñopercusión lumbar positiva, 9 (30,7%) de ellos con valores elevados de PSAt. El TR tuvo una S del 63,3%, una E del 77,7%, un VPP del 82,6%, un VPN del 56%, un CPP del 2,85 y un CPN del 0,47 en el diagnóstico de PAB.
Conclusiones: La demostración de una próstata dolorosa al TR en hombres con ITUF es un dato altamente sugestivo de PAB, pero debido a la baja S y VPN del TR, la ausencia de dolor no la descarta por lo que los hombres con una ITUF deberían ser tratados como una PAB. [Emergencias 2012;24:292-295]

Palabras clave: Prostatitis aguda bacteriana. Infección urinaria febril. Próstata dolorosa.