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Full Length Research Paper

A microbiologic evaluation of patients with chronic prostatitis and relation with clinical symptoms

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In this study urine and prostatic secretion samples of patients with chronic prostatitis were investigated for various prostatitis pathogens and the correlation between clinical symptoms. A total of 60 patients with chronic prostatitis were examined, prostatic secretion and urine specimens were evaluated under direct microscopy after staining with Giemsa and Gram. The selective media were used to investigate the presence of bacterial pathogens, *Mycoplasma hominis* and *Ureaplasma urealyticum*. Based on the laboratory findings of patients, 11(18.3%) were found to have chronic bacterial prostatitis, 49 (81.7%) were found to have chronic pelvic pain syndrome. Organisms isolated in patients with chronic bacterial prostatitis included *Escherichia coli* in four cases, *Staphylococcus aureus* in two cases and *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, coagulase- negative staphylococci, *Enterococcus faecalis* and diphtheroids in one case each. Of the 49 patients with chronic pelvic pain syndrome, *U. urealyticum* was isolated in seven and *M. hominis* in one of the patients. Premature ejaculation was more frequently detected in the patient group with chronic bacterial prostatitis than the patient group with chronic pelvic pain syndrome. Analysis of etiology of chronic prostatitis in our patients showed that *U.urealyticum* and *E. coli* were common pathogens of chronic prostatitis. We concluded that chronic bacterial prostatitis may increase the risk of premature ejaculation.

Key words: Chronic prostatitis, etiology, Ureaplasm urealyticum, Mycoplasma hominis, premature ejaculation.

INTRODUCTION

The term prostatitis is employed clinically to describe a condition in a large group of adult men with a variety of complaints related to the lower urogenital tract and perineum (Krieger, 2000) . It is the most common urological diagnosis in men younger than 50 years of age and the third most common urological diagnosis in men older than 50 years of age (Naber, 2001). It has been estimated that up to half of all men suffer from symptoms of prostatitis at some time in their lives. Patients characteristically experience perineal, suprapubic, genital and ejaculatory pains, voiding or sexual dysfunction (Riley et al., 1998). Generally accepted classifications of prostatitis syndrome differentiate between: (i) acute bacterial prostatitis (ii) chronic bacterial prostatitis (iii) nonbacterial prostatitis and (iv) prostatodynia (Drach et al., 1978) . However, a novel classification of prostatitis according to the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) of the National Institute of Health (Workshop Committee of the National Institute of Diabetes and Digestive and Kidney Diseases, 1995) differentiates between (i) acute bacterial prostatitis (ii) chronic bacterial prostatitis (CBP) (iii) chronic pelvic pain syndrome (CPPS), (iii a) inflammatory CPPS (white cells in prostatic secretions (EPS)/ urine specimens (VB_3) were taken after prostatic massage) (iii b) non-inflammatory CPPS (no white cells in EPS/VB3) and (iv) asymptomatic inflammatory prostatitis.

The categories of prostatitis that are associated with a bacterial cause are much less prevalent than those believed to have a nonbacterial etiology (Weidner et al.,

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1991). Several mechanisms have been suggested for the pathogenesis of bacterial prostatitis, but no pathogenic mechanism has been proven to date. It is generally believed that infection ascends from the distal urethra and/or urethral meatus, but it is possible that infection spreads to the prostate from the bladder, blood or lymph system, or even from the bowel (Nickel and Moon, 2005).

Quantitative bacteriologic cultures confirm the diagnosis of bacterial prostatitis when the infectious agent(s) is localized to the prostate gland (that is, segmented cultures). The technique for obtaining segmented cultures from the male lower urinary tract was first described by Meares and Stamey (1968). This method is still considered by many to be the "gold standard" for localizing infection to the prostate gland (Domingue and Hellstrom, 1998).

The aim of this study was to investigate the etiology and the role of some unusual pathogens in chronic prostatitis and to assess the data together with the clinical symptoms of patients.

MATERIALS AND METHODS

Patient population

We examined total of 60 patients between the ages of 20 - 70 (45.93 ± 13.93 years) with symptoms of chronic prostatitis and with no evidence of structural or functional lower genitourinary tract abnormalities who attended the department of Urology clinic at Gaziantep University Hospital between January 2005 and December 2006. A full urological anamnesis was reported for all patients. Patients were considered to have chronic prostatitis if they met three criteria: (i) the patient attended the specialized clinic for prostatitis, (ii) symptoms had persisted for at least 3 months and (iii) the patient had been told that he had prostatitis and been treated previously by at least one physician (Krieger and McGonagle, 1989). Erectile dysfunction, defined as the consistent inability to obtain and/or maintain a penile erection sufficient for adequate sexual relations (Müller and Mulhall, 2005) . Premature ejaculation was defined as an intravaginal ejaculation latency of less than 2 min occurring in more than 50% of sexual encounters. Inclusion criteria were a steady relationship with a female partner for at least one year and premature ejaculation of at least six months duration (Screponi et al, 2001).

Diagnostic criteria

A standard set of definitions was applied by the same urologist, who evaluated all the patients. The inclusion criteria for CBP were as follows:

i.) A bacterial count of 10^3 cfu/ml or more (if only Gram-positive cocci are found in EPS, a bacterial count of 10^4 cfu/ml or more is required), and 10 or more WBC/hpf (including macrophages) in EPS or VB_3.
ii.) Finding of ten or many times greater number of bacteria in EPS and urine bladder sample collected immediately after prostatic massage, than in first voided urine or midstream urine (Meares and Stamey, 1968; Skerk et al., 2004).
The inclusion criteria were the presence of Ureaplasm *urealyticum* or Mycoplasma *hominis* in EPS or VB_3 and the absence of other possible pathogens of chronic prostatitis in EPS or VB_3 for chronic prostatitis caused by *U. urealyticum* or *M. hominis*; the presence of ten or more WBC/hpf in EPS or VB_3 and the absence of any evidence of bacterial prostatitis for nonbacterial prostatitis or inflammatory CPPS; and the presence of clinical symptoms of prostatitis syndrome and the absence of any white cells in EPS or VB_3 for non-inflammatory CPPS (Skerk et al., 2004).

Sample collection

The glands was cleaned with sterile water and dried prior to obtaining the first specimen. After the preliminary urine stream (VB_1) specimen and the midstream urine (VB_2) specimen were collected, the patient was instructed to stop voiding, and any residual urine was stripped from the urethra. EPS were obtained by massage, followed by the VB_3 specimen. All the specimens were transferred to suitable transport media and immediately sent to the microbiology laboratory for analysis. The protocol focused on detecting the presence of leukocytes and bacteria in urine specimens and prostatic secretions by direct microscopy and Gram staining. The Gram-stained smears were examined at × 400 magnification and areas with maximal concentrations of cells and/or organisms were quantified under oil immersion (×1,000). The presence of any cells and/or organisms was reported. In addition, urine and EPS specimens were analyzed with a Giemsa stain in terms of *Trichomonas vaginalis.*

Cultures and growth conditions

The urine was quantitatively cultured with 0.1 ml samples of urine, each delivered by a micropipette to an entire brain-heart infusion agar plate containing 5% defibrinated sheep blood, entire eosin methylene blue agar (EMB) plate, entire chocolate agar plate and entire sabouraud dextrose agar plate. The EPS samples were cultured in an identical fashion, unless there was < 0.1 ml. In this case, 0.01 ml samples were delivered by a micropipette to an entire blood agar plate, entire EMB agar plate, entire chocolate agar plate and entire Sabouraud dextrose agar plate. The chocolate agar plate was incubated at 37°C, 5 - 10% CO_2 atmosphere media. The other cultures were incubated at 37°C under aerobic conditions for 24 to 48 h.

In the identification of microorganisms that reproduced in these media, in addition to conventional methods, VITEK 2 (bioMerieux, St. Louis, MO, ABD) an automated system were used.

Evaluation of the specimens in terms of *Mycoplasma* and *Ureaplasma*

For *M. hominis* isolation M broth and M agars were used and, for *U. urealyticum* isolation, U broth and U agars were used. The cultures and identification of organisms in urine and EPS specimens in the SP-4 transport medium were performed according to the reference (Winn et al., 2006).

Statistical evaluation

Results were analyzed using Chi-square test. Statistical analysis was performed with Epi Info (version 3.4.3) values of $p < 0.05$ were considered to indicate statistical significance.

RESULTS

Of 60 patients with chronic prostatitis, 21 (35%) had 10 or

Table 1. Ages of patients with chronic prostatitis and the isolated microorganisms.

Age	Patients infected with										
(years)	UU	EC	SA	PA	KP	CNS	EF	D	MH	None	Total
20 - 29	2	-	1	1	-	-	-	-	1	6	11
30 - 39	-	-	1	-	1	1	-	-	-	6	9
40 - 49	4	2	-	-	-	-	-	-	-	5	11
50 - 59	1	2	-	-	-	-	-	1	-	16	20
60 - 69	-	-	-	-	-	-	1	-	-	7	8
70 - 79	-	-	-	-	-	-	-	-	-	1	1
Total	7	4	2	1	1	1	1	1	1	41	60
N (%)	(11.6)	(6.6)	(3.3)	(1.7)	(1.7)	(1.7)	(1.7)	(1.7)	(1.7)	(68.3)	(100)

UU, *U. urealyticum*; EC, *E. coli*; SA, *S. aureus*; PA, *P. aeruginosa*; KP, *K. pneumoniae*; CNS, Coagulase-negative staphylococci; EF, *E. faecalis*; D, Diphtheroids; MH, *M. hominis*

Table 2. Distribution of clinical symptoms detected in patients with CBP and CPPS.

	CBP n = 11	CPPS n = 4 9	P
Dysuria	11 (100 %)	44 (89.8 %)	0.349
Pollakiuria	4 (36.4 %)	11 (22.4 %)	0.273
Premature ejaculation	7 (63.6 %)	11 (22.4 %)	0.011
Erectile dysfunction	1 (9.1 %)	5 (10.2 %)	0.698

CBP: Chronic bacterial prostatitis; CPPS: Chronic pelvic pain syndrome.

more WBCs/hpf, including macrophages, in EPS or in voided bladder collected immediately after prostatic massage.

Based on the laboratory findings, of 60 patients, 11(18.3%) were found to have CBP, 49(81.7%) were found to have CPPS. Organisms isolated in patients with CBP included *Escherichia coli* in four cases, *Staphylococcus aureus* in two cases and *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, coagulase-negative staphylococci, *Enterococcus faecalis* and diphtheroids in one case each. In the above cases inflammatory findings were regularly found in EPS or VB_3.

Of the 49 patients with CPPS, *U. urealyticum* was isolated in seven and *M. hominis* in one of patients. Inflammation findings were not detected in three of patients in whom *U. urealyticum* was isolated. However, in 41 of the patients with CPPS no growth was observed but inflammation findings were detected in only five patients. These five cases were defined as inflammatory CPPS; the remaining 36 cases are defined as non-inflammatory CPPS.

An infectious aetiology was determined in 19(31.7%) patients and *U. urealyticum* and *E. coli* were common pathogens of chronic prostatitis in our patients. The age of patients with chronic prostatitis and isolated microorganisms were shown in Table 1. *T. vaginalis* was detected in neither of the patients.

The symptoms of dysuria, premature ejaculation, pollakiuria and erectile dysfunction were detected in 55 (91.7%), 18 (30%), 15 (25%) and 6 (10%) of patients respectively. The distribution of these symptoms according to CBP and CPPS patients has been demonstrated in Table 2. Premature ejaculation was more frequently detected in the patient group with CBP than the patient group with CPPS (p = 0.011), however, no statistical differences were found between CBP and CPPS groups with respect to the presence of dysuria (0.349), pollakiuria (0.273) and erectile dysfunction (0.698).

DISCUSSION

Prostatitis is generally considered to be the most common outpatient condition seen in urologic practice in men younger than 50 years old. Data from epidemiologic studies have suggested that 11 - 16% of men have a current, or have had a previous, diagnosis of prostatitis (Collins et al., 2002) . The categories of prostatitis that are associated with a bacterial cause are much less prevalent than those believed to have a nonbacterial etiology. CBP is the least common form of chronic prostatitis (Weidner et al., 1991). In our study of the 60 patients with chronic prostatitis only 11(18.3%) patients had chronic bacterial prostatitis. Our results are in accordance with above findings.

Early in the 20th century, it was believed that chronic prostatitis was always secondary to a bacterial (usually gram-positive) etiology. As data accumulated, some investigators questioned the existence of CBP as a disease entity (Nickel and Moon, 2005). Stamey et al. (1965) suggested that CBP could only be diagnosed by bacteriologic identification of pathogenic bacteria (typically gram-negative) localized to the prostate. They presented a technique designed to distinguish urethral from prostatic infection in males (Stamey et al., 1965). Meares and Stamey (1968) modified this technique to include a quantitative culture of pure prostatic secretion, in addition to the 10 ml sample of urine obtained after prostatic massage. Microorganisms such as *E. coli*, *Klebsiella* species, *Proteus* species, *P. aeruginosa* which are defined as uropathogen and cause urinary tract infections were considered to be responsible for CBP (Terai et al., 2000). Bacteria causing prostatitis are capable of replicating in the prostate, causing relapsing urinary tract infections and may be detected in expressed prostatic excretions. Therefore, it is questionable whether coagulase-negative staphylococci, *S. aureus,* micrococci, streptococci other than group D and diphtheroids, can be considered to be pathogens of bacterial prostatitis (Krieger, 2000; Schaeffer, 2000). However, Gram-positive cocci such as *E. faecalis* or, perhaps, *S. saprophyticus* may be the etiologic organisms in a few cases (Krieger, 2000). Nickel and Costerton isolated 68% coagulase-negative staphylococcus in prostatic secretion cultures and have suggested that this bacterium was important in CBP etiology (Nickel and Costerton, 1992). In our study, *E. coli, S. aureus, P. aeruginosa, K. pneumoniae, E. faecalis,* coagulase negative staphy-lococci and diphtheroids were isolated from the patients with CBP. In addition to urinary tract infections, microorganisms which are defined as uropathogens, may also cause CBP. Lee et al. (2003) concluded that the bacteria in the urethra, particularly in older males, established itself within the prostate over a period of time. However, as it did not respond as a host, symptomatic infection did not develop. Even if pathogenic bacteria settle in the prostate, as long as an acute urinary tract infection does not develop, chronic pelvic pain symptoms will not emerge (Schaeffer, 2003).

The etiological organisms of prostatitis syndrome suggested as important in the literature include *C. trachomatis*, *U. urealyticum*, *M. hominis* and *T. vaginalis* (Krieger and McGonagle, 1989; Skerk et al., 2004; Naber and Weidner, 2000; Skerk et al., 2002; Badalyan et al., 2003; Mander et al., 2005). Additionally studies by Weidner and Brunner (Brunner et al., 1983; Weidner et al., 1988) provide evidence that *U. urealyticum* and *C. trachomatis* must be considered as etiological agents in many cases of CBP, with the pathway of prostate invasion being intracanalicular, ascending from the urethra. *U*. *urealyticum* and *M. hominis* were found in eight of our patients presenting with chronic prostatitis. Thus our results suggest that *U.urealyticum* is one of the causative pathogens in chronic prostatitis syndrome.

Patients with CPPS are the largest population of patients with prostatitis. Although, the causes of CPPS remain uncertain, different mechanisms other than those related to microorganisms were held responsible, including prostaglandins, autoimmunity, psychological abnormalities, neuromuscular dysfunction of the bladder neck or urogenital diaphragm and allergy to environmental agents (Krieger, 2000). In more than two third of our patients no growth was observed. In some of these patients *C. trachomatis* might be the causative pathogen or the above mentioned etiologic factors might be responsible from the symptoms of chronic prostatitis. The limitation of our study is that *C. trachomatis* was not investigated in the etiology of chronic prostatitis.

In this study the rate of premature ejaculation was found to be 63.6% in patients with CBP and 22.4% in patients with CPPS. Premature ejaculation turned out to be the dominant sexual disorder in several studies investigating patients with CP/CPPS. Liang et al. (2004) reported that the prevalence of premature ejaculation and erectile dysfunction (49%) is greater in Chinese men with chronic prostatitis than it is in persons in the general population. In a study performed in Turkey the rate of premature ejaculation was found to be 77.3% in 66 patients with CPPS (Gonen et al., 2005). This study revealed that the patient group with CBP had statistically significant complaints of premature ejaculation more frequently ($p = 0.011$) than the patient group with CPPS. Screponi et al. (2001) found prostatic inflammation in 56.5% and chronic bacterial prostatitis in 47.8% of their 46 patients with premature ejaculation. On account of a significant higher occurrence of chronic prostatitis in men with premature ejaculation than in men in the control group, the study supposes a role for chronic prostate inflammation in the pathogenesis of some cases of premature ejaculation (Screponi et al., 2001). Shamloul et al. (2006) examined 153 consecutive heterosexual men, aged 29 - 51 years with premature ejaculation, who revealed prostatic inflammation in 64% and CBP in 52%. The similarity between these data and our results suggest that the examination of CBP patients with the complaints of premature ejaculation can be useful.

Conclusion

Analysis of etiology of chronic prostatitis in our patients showed that *U.urealyticum* and *E. coli* were common pathogens of chronic prostatitis. In light of our findings, it is evident that we only managed to show positive cultivation results in one-third of the patients who presented symptoms related to prostatic infection. We believe this relates to the multi-factored etiology of prostatic pathology, including not only species but also different mechanisms other than those related to micro-

organisms.

Additionally, the detection of premature ejaculation in CBP patients more frequently than in CPPS patients suggests bacterial factors develop increasing risk of premature ejaculation.

REFERENCES

Badalyan RR, Fanarjyan SV, Aghajanyan IG (2003). Chlamydial and ureaplasmal infections in patients with nonbacterial chronic prostatitis. Andrologia, 35: 263-265.

Brunner H, Weidner W, Schiefer HG (1983). Studies on the role of *Ureaplasma urealyticum* and *Mycoplasma hominis* in prostatitis. J. Infect. Dis., 147: 807-813.

Collins MM, Meigs JB, Barry MJ, Walker Corkery E, Giovannucci E, Kawachi I (2002). Prevalence and correlates of prostatitis in the health professionals follow-up study cohort. J. Urol., 167: 1363-1366.

Domingue GJ, Hellstrom WJ (1998). Prostatitis. Clin. Microbiol. Rev. 11(4): 604-613.

Drach GW, Meares EM Jr, Fair WR, Stamey TA (1978). Classification of benign disease associated with prostatic pain: Prostatitis or prostatodynia? J. Urol., 120: 266.

Gonen M, Kalkan M, Cenker A, Ozkardes H (2005). Prevalence of premature ejaculation in Turkish men with chronic pelvic pain syndrome. J. Androl., 26: 601-603.

Krieger JN (2000). Prostatitis, epididymitis, and orchitis. In: Principles and Practice of Infectious Diseases, 5th ed, Edited by Mandell, G.L., Bennett, J.E., Dolin, R. Churchill Livingstone, Philadelphia, pp.1243-1250.

Krieger JN, McGonagle LE (1989). Diagnostic considerations and interpretation of microbiological findings for evaluation of chronic prostatitis. J. Clin. Microbiol., 27(10): 2240-2244.

Lee JC, Muller CH, Rothman I, Aknew KJ, Eschenbach D, Ciol MA, Turner JA, Berger RE (2003). Prostate biopsy culture findings of men with chronic pelvic pain syndrome do not differ from those of healty controls. J. Urol., 169(2): 584-588.

Liang CZ, Zhang XJ, Hao ZY, Shi HQ, Wang KX (2004). Prevalence of sexual dysfunction in Chinese men with chronic prostatitis. BJU Int., 93: 568-570.

Mander R, Raukas E, Türk S, Korrovits P, Punab M (2005). Mycoplasmas in semen of chronic prostatitis patients. Scand. J. Urol. Nephrol., 39(6): 479-482.

Meares EM Jr, Stamey TA (1968). Bacteriologic localization patterns in bacterial prostatitis and urethritis. Invest. Urol., 5: 492-518.

Müller A, Mulhall JP (2005). Sexual dysfunction in the patient with prostatitis. Curr. Opin. Urol., 15: 404-409.

Naber KG (2001). Prostatitis. Nephrol Dial Transplant. 16 (Suppl 6): 132-134.

Naber KG, Weidner W (2000). Chronic prostatitis-an infectious disease? J. Antimicrob. Chemother., 46: 157-161.

Nickel JC, Costerton JW (1992). Coagulase-negative staphylococcus in chronic prostatitis. J. Urol., 147: 398-400.

Nickel JC, Moon T (2005). Chronic bacterial prostatitis: an evolving clinical enigma. Urology, 66(1): 2-8.

Riley DE, Berger RE, Miner DC, Krieger JN (1998). Diverse and related 16s rRNA- encoding DNA sequences in prostate tissues of men with chronic prostatitis. J. Clin. Microbiol., 36(6): 1646-1652.

Schaeffer AJ (2000). Diagnosis and management of prostatitis. Braz. J. Urol., 26: 122-31.

Schaeffer AJ (2003). Editorial: Emerging concepts in the management of prostatitis/ chronic pelvic pain syndrome. J. Urol., 169: 597-598.

Screponi E, Carosa E, Di Stasi SM, Pepe M, Carruba G, Jannini EA (2001). Prevalence of chronic prostatitis in men with premature ejaculation. Urology, 58: 198-202.

Shamloul R, El -Nashaar A (2006). Chronic prostatitis in premature ejaculation: a cohort study in 153 men. J. Sex. Med., 3: 150-154.

Skerk V, Krhen I, Schonwald S, Cajic V, Markovinovic L, Roglic S, Zekan S, Andracevic AT, Kruzic V (2004). The role of unusual pathogens in prostatitis syndrome. Int. J. Antimicrob. Agents., 24S: S53-S56.

Skerk V, Schönwald IK, Markovinovic L, Beus A, Kuzmanovic NS, Kruzic V, Vince A (2002). Aetiology of chronic prostatitis. Int. J. Antimicrob. Agents., 19: 471-474.

Stamey TA, Govan DE, Palmer JM (1965). The localization and treatment of urinary tract infections: The role of bactericidal urine levels as opposed to serum levels. Medicine (Baltimore) 44: 1-36.

Terai A, Ishitoya S, Mitsumori K, Ogawa O (2000). Molecular epidemiological evidence for ascending urethral infection in acute bacterial prostatitis. J. Urol., 14: 1945-1947.

Weidner W, Schiefer HG, Krauss H (1988). Role of *C. trachomatis* and Mycoplasmas in chronic prostatitis. A review. Urol. Int., 43: 167-173.

Weidner W, Schiefer HG, Krauss H, Jantos C, Friedrich HJ, Altmannsberger M (1991). Chronic prostatitis: A through search for etiologically involved microorganisms in 1461 patients. Infection 19 (Suppl 3): 119-125.

Winn W Jr, Allen S, Janda W, Koneman E, Procop G, Schreckenberger P, Woods G (2006). Koneman's Color Atlas and Textbook of Diagnostic Microbiology. Lippincott Williams & Wilkins, Philadelphia, 6th ed, pp. 1022-1063.

Workshop Committee of the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) (1995). Chronic Prostatitis Workshop, Bethesda, MD.