Possible asymptomatic carrier of salmonella typhimurium in the preputium: A case report

Ferah Sönmez[1], Mesut Yazıcı[2], Neriman Aydın[3], Mete Eyigör[3], Tolga Ünivar[1]
Gülten İnan[1], Mustafa Gürel[3]

Departments of [1]Pediatrics, [2]Pediatric Surgery, and [3]Microbiology, Adnan Menderes University Faculty of Medicine, Aydın, Turkey

SUMMARY: Sönmez F, Yazıcı M, Aydın N, Eyigör M, Ünivar T, İnan G, Gürel M. Possible asymptomatic carrier of Salmonella typhimurium in the preputium: a case report. Turk J Pediatr 2001; 43: 76-78.

Salmonella infections lead to several clinical syndromes such as acute gastroenteritis and bacteremia. Less frequent manifestations are extraintestinal focal infections, including urinary tract infections. A 10-month-old boy was admitted to the hospital with recurrent urinary tract infections treated with antibiotics. Salmonella typhimurium was isolated from the urine samples obtained in urine bags. The organism was also grown from a suprapreputial swab, but was not grown in the suprapubic urine specimen. Renal ultrasonography, intravenous pyelography and voiding cystourethrogram were found normal. The patient was then circumcised, following with no uropathogens were isolated from the urine. It is believed that circumcision not only prevented further urinary tract infection and protected the case from becoming a carrier of Salmonella typhimurium, it also halted a possible spread of Salmonella infection to the general public.

Key words: Salmonella typhimurium, antibiotic resistant, preputium, circumcision.

Salmonella infections develop worldwide[1]. Several distinct clinical syndromes can occur in children depending on host factors and specific serotype involved[1]. Although acute gastroenteritis and bacteremia are the most common presentations[1,2], less frequent manifestations are extraintestinal focal infections, including urinary tract infections[3-5]. Chronic enteric state is more common; however, urinary tract carrier state may also occur, though rarely[3,5]. Chronic urinary carriers may continue to excrete a large number of bacilli in their urine for months or years[5]. Chronic carrier state of the urinary tract is supposed to occur in individuals with structural or functional abnormalities of the urinary tract[4]. In addition, many studies have reported that uncircumcised boys have an increased risk of urinary tract infections[6,7].

Isolation of Salmonella from urine is reported as a rare event, even in areas endemic for this infection[4]. To our knowledge, there is no report about the carrier state of Salmonella in the preputium.

We present an infant who was a possible asymptomatic carrier of Salmonella typhimurium in the preputium.

Case Report

A 10-month-old boy was admitted to the hospital with recurrent urinary tract infections. Three episodes of urinary tract infections with coagulase-negative staphylococci at the age of four, five and six months were treated with antibiotics due to antibiotic susceptibility tests. He also had phimosis and balanitis on these three occasions. Renal sonography, intravenous pyelography and voiding cystourethrogram were found normal. To prevent the recurrences of urinary tract infection, nitrofurantoin (2 mg/kg/day) was given once a day at bedtime for two months. At the age of 10 months, Salmonella typhimurium was isolated from the urine samples obtained in urine bags on three consecutive occasions during a month. The organism was also grown from a subpreputial swab, but was not grown in the suprapubic urine specimen.

It was then learned that the patient and his mother had acute gastroenteritis for two days, when the child was three months old. They had no stool culture and both recovered without any treatment.

Routine urine analysis and serum concentrations of blood urea nitrogen, creatinine and immunoglobulins were normal. Widal's reaction was negative. No pathogenic organism was found in the stool of the patient or from his family members on three consecutive tests.

Urine samples were collected by sterile perineal bags and 10 µl of specimens were inoculated onto blood agar and eosin methylene blue (EMB) agar plates. The specimens were cultured at 35 °C and were interpreted following an incubation period of 18 to 24 hours. Salmonella species were isolated $4x10^4$, $3x10^5$ and $5x10^4$ CFU/ml on blood agar and EMB agar plates on 1st, 3rd, and 8th day of three consecutive urine specimens. This strain was identified by conventional tests and Api 20 E (bioMerieux) and serogrouped polyvalent antisera (Difco Laboratories), primarily. Further identification and serotyping of this strain was performed, and it was serotyped as Salmonella typhimurium 1,4,5,12:i:1,2. Antibiotic susceptibility testing was done by disc diffusion methods on Mueller-Hinton agar with commercial antibiotic discs (Oxoid) according to the recommendation of the National Committee for Clinical Laboratory Standards[8]. These isolates were resistant to ampicillin, ceftriaxone, cefotaxime, cefoperazone and susceptible to trimethoprim-sulfamethoxazole, chloramphenicol, tetracycline, cefoxitin and nitrofurantoin. The extended-spectrum beta-lactamases (ESBL) were performed by double-disc synergy test with discs of cefotaxime/ceftazidime and amoxicillin-clavulanic acid, and were positive.

Cefoxitin (30 mg/kg/day) was administered intramuscularly due to antibiotic susceptibility test. After the antibiotic treatment, Salmonella typhimurium was still isolated from the urine. The patient then underwent circumcision at the age of 14 months at the Department of Pediatric Surgery. Three postoperative urine cultures were normal. During the one-year follow-up after circumcision, no uropathogens were isolated from the urine.

Discussion

Isolation of Salmonella from the urine and urinary tract carrier state occur only rarely[3,5]. We could not find another reference in the literature to the isolation of this organism from the subpreputial area. This patient was noteworthy for localization of Salmonella typhimurium in the preputium. Although it is suggested that the patient was one of solely subpreputial carriage because of negative stool cultures, it is also well known that the excretion of the organism is intermittent and may be missed even on three consecutive stools. The accepted definition of a Salmonella 'chronic carrier' is someone harboring the organism for more than one year[1,2,5]. It is hard to describe the patient as a chronic carrier of Salmonella, because it was isolated from the urine for only a month. It is also difficult to determine the primary source of Salmonella typhimurium in this patient. It may be speculated that the source of the organism was the feces of the infant or his mother, since there is a strong association of periurethral flora with stool flora. Many studies have reported that uncircumcised boys are at an increased risk for urinary tract infection[5,6]. Because our patient was an uncircumcised boy with phimosis, we thought the foreskin was the most important risk factor. Chronic carrier state of the urinary tract is supposed to occur in individuals with structural or functional abnormalities of the urinary tract[4]. This boy had no urogenital abnormalities on renal imaging and no other factors predisposing to Salmonella in the urine, such as renal tuberculosis, Schistosomal infections or immunosuppression. Functional abnormalities and/or antibiotic therapies for recurrent urinary tract infections might play a role in the occurrence of the carrier state. The role of sterile perineal collectors in the diagnosis of urinary tract infections is controversial. Isolation of bacteria in amounts of $4x10^4$, $3x10^5$, $5x10^4$ CFU/ml quantitatively in bag specimens and no growth in suprapubic aspiration suggest that false positive results may be caused by sampling in bag specimens. The microbiological quantitative count does not seem to related to carrier state. However, it may be better for urine collectors to resample the urine by suprapubic aspiration technique in such positive cases[9].

Salmonella typhimurium is the most common Salmonella species isolated in Turkey[2,10]. Unfortunately, an increased multiple antibiotic resistance to S. typhimurium has been reported[10-13]. ESBL test is made to determine the existence of the extended spectrum beta-

lactamase enzyme. Even when the ESBL-positive species are evaluated as in vitro effective, they are accepted as resistant to all large spectrum penicillins, cephalosporins and monobactams, except cefamycine and carbapenems. Furthermore, transfer of this resistance from ESBL-positive species to other bacteria by conjugation may result in an increase of resistant species[14-15]. Vahaboğlu et al.[11] reported that ESBL was found as PER-1 beta-lactamases in S. typhimurium strains in Turkey. S. typhimurium strain isolated from our patient produced ESBL and was susceptible to chloramphenicol, gentamicin, tobramycin, amikacin, and trimethoprim-sulfamethoxazole. It is obvious that Salmonella infection is an important epidemiological problem. Asymptomatic urinary excretion of nontyphoidal Salmonella is significant for its potential transmission of the infection to other individuals[4]. Although patients who excrete nontyphodial Salmonella usually do not need antimicrobial therapy, public health implications stress the need for treatment of the asymptomatic carrier of Salmonella typhi[3]. This child did not respond to appropriate medical therapy alone. Circumcision was successful in eliminating Salmonella typhimurium from the preputium. During the one-year follow-up period after circumcision, no uropathogens were isolated from the urine of the patient.

In conclusion, since circumcision was helpful in our case in preventing urinary tract infection with Salmonella typhimurium, it may represent an adjunctive treatment for infants who are asymptomatic subpreputial carriers.

Acknowledgement

We thank Professor Birsel Erdem from the Microbiology Department of Ankara University for the further identification and serogrouping of Salmonella typhimurium.

REFERENCES

1. Ashkenazi S, Cleary T. Salmonella infections. In: Berman RE, Kliegman RM, Arvin AM (eds). Textbook of Pediatrics. Philadelphia: WB Saunders Company; 1996: 784-788.
2. Çetingül N, Akıllı M, Sönmez F, et al. Cases of Salmonella infection in the Aegean region of Turkey. Turkish J Infect 1990; 4: 21-28.
3. Pickering LK. Salmonella, Shigella, and enteric E. coli infections. In: Rudolp AM, Hoffman JIE, Rudolph CD (eds.) Rudolph's Pediatrics. USA: Appleton and Lange; 1996: 592-601.
4. Mathai E, John TJ, Rani M, et al. Significance of Salmonalla typhi bacteriuria. J Clin Microbiol 1995; 33: 1791-1792.
5. Hook EW. Salmonella species (including typhoid fever). In: Mandell GL, Douglas RG, Bennett JE, (eds). Principles and Practice of Infectious Diseases (3rd ed). New York: Churchill-Livingstone; 1990: 1700-1716.
6. Craig JC, Knight JF, Sureshkumar P, Mantz E, Roy LP. Effect of circumcision on incidence of urinary tract infection in preschool boys. J Pediatr 1996; 128: 23-27.
7. Serour F, Samra Z, Kushel Z, Gorenstein A, Dan NM. Comparative periurethral bacteriology of uncircumcised and circumcised males. Genitourin Med 1997; 73: 288-290.
8. National Committee for Clinical Laboratory Standards. Performance Standard for Antimicrobial Susceptibility Testing; Eighth Informational Supplement M100-S8, NCCLS, Pennsylvania, 1998.
9. Martin Puerto MJ, Cela de Julian ME, Mendozo Soto A, Sançez del Pozo J, Ramos Amador JT. Perineal bag versus urethral catherization of suprapubic aspiration for the diagnosis of urinary tract infections in infants in emergency units. An Esp Pediatr 199; 50: 447-450.
10. Dinçer N, Öner YA, Büget E, Anğ Ö. Susceptibility of 80 Salmonella strains from different groups to various antibiotics. J Turkish Microbiol Soc 1995; 25: 37-39.
11. Vahaboğlu H, Dodanlı S, Eroğlu C, et al. Characterization of multiple-antibiotic-resistant Salmonella typhimurium strains: molecular epidemiology of PER-1-producing isolates and evidence for nosocomial plasmid exchange by a clone. J Clin Microbiol 1996; 34: 2942-2946.
12. Abacıoğlu YH, Aslani Mehr M, Gülay Z. Multiple resistant Salmonella typhimurium outbreak in a Children's Hospital in İzmir-Turkey. Turkish J Infect 1995; 9: 71-73.
13. Tatman Otkun N, Özkan E, Öztürk D, Dündar V, Tuğrul M. Salmonella serotypes isolated from feces in the 1995-1997 period and their antibiotic susceptibility. Turkish J Infect 1998; 12: 181-185.
14. Bal Ç. B-Laktamaz testleri ve rutinde kullanımları. Gür D, Söyletir G, Bal Ç, Dündar V, Sümerkan B, Köksal İ, Çiftçi U (eds): Antibiyotik duyarlılık testlerinin standardizasyonu toplantısı. İstanbul: Türk Mikrobiyoloji Cemiyeti Yayın No: 33; 1997: 101-111.
15. Mhand RA, Soukri A, Amarouch H, Mdaghri NE, Benbachir M. Typing of extended-spectrum beta-lactamase-producing Salmonella typhimurium strains isolated in a pediatric unit. Sante 1999; 9: 341-344.