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= Abstract =

### Antibiotic Sensitivity Test of *Streptococcus pyogenes* Obtained in Patients with Streptococcal Infections, 2000

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**Purpose :** About 41% of obtained group A streptococci in the 1998 was reported as erythromycin-resistant streptococci in Seoul, Korea. The most common T serotype was T12, followed by T4 and T28. We'd like to monitor the serological changes and antibiotic sensitivity test of *Streptococcus pyogenes* obtained from the patients with pharyngotonsillitis and invasive diseases from 1999 through 2001. Also, it could be proposed to choose the proper antibiotic selection in the area where the rate of erythromycin-resistant streptococci is high.

**Methods :** From Jan. 1999 to Oct. 2001, 208 isolates of group A streptococci were collected from inpatients and outpatients with pharyngotonsillitis, scarlet fever, and invasive infections in Seoul and Southern part of peninsula. All isolates were serotyped by T-agglutination, minimum inhibitory concentrations(MICs) which were determined by agar dilution methods, according to the guidelines of the National Committee for Clinical Laboratory Standards (NCCLS).

**Results :** The most common T serotype was T12(29.8%), followed by T1(23.1%), T4 (14.9%). T1 was prominent serotype compared with previous year. T serotyping, among 25 isolates obtained from the patients with scarlet fever in Southern part of peninsula mostly, was T12, T1, and T4 in order of frequency. All the isolates tested were susceptible to penicillin, cefprozil, vancomycin, ceftriaxone, and chloramphenicol. However, 23 isolates(14.2%) was resistant to erythromycin and 18 isolates(11.1%) was resistant to clarithromycin. Serotype T12 was found to be the most resistant serotype to erythromycin and/or clarithromycin.

**Conclusion :** High rate of erythromycin-resistant streptococci which surveyed in 1998 were reduced to 14.2% in this study. We should have to further evaluate the reason of de-

creased resistant strains and consider the resistant strains of streptococci in choosing the antibiotics. There was no serological characteristics according to the types of disease entities. Between the serologic distributions in Seoul and the Southern part of peninsula area are same, we could presume that the serological typing of strains obtained over the country may be not different.

**Key Words** : *Streptococcus pyogenes*, Antibiotic sensitivity test, Serotype, Erythromycin

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1980 A 162 A

(acute necrotizing fasciitis)<sup>1)</sup>

(streptococcal toxic shock syndrome)<sup>2, 3)</sup>

가 , A 1 (streaking) 37.2

가 bacitracin disk

M T 가 type-specific antisera(Institute of Sera and Vaccine, Prague, Czech Republic)<sup>5, 6)</sup> slide agglutination

가 50% , T National committee for clinical laboratory standards(NCCLS)<sup>7)</sup>가 agar dilution method minimal inhibitory concentrations

가 90% 가 가

Erythromycin(EM) A 1998

41.3%<sup>4)</sup> T- T12, T4, T28

가 EM 가

2 EM A 2000 162 가

T- T1(25.16%), T4(12.58%) (Table 1).

1998<sup>4)</sup> 5 T12가 가 , T1

가

Table 1. T-Protein Patterns of 162 Isolates of *Streptococcus pyogenes* (2000)

T serotype	Seoul	Masan	Total(%)
T12	26	19	45( 27.8)
T1	24	17	41( 25.3)
T4	13	8	21( 13.0)
T3	7	8	15( 9.3)
T2/28	6	5	11( 6.8)
T6	7	3	10( 6.2)
Others	13	6	19( 11.7)
Total	96	66	162(100.0)

Table 2. T-Protein Patterns of 162 Isolates of *Streptococcus pyogenes* According to Age of Patients (2000)

Serotype	Age (years)				Total
	Less than 6 years	6-10 years	11-15 years	More than 15 years	
T12	12	21	7	5	45
T1	14	19	5	3	41
T4	12	6	2	1	21
T3	5	9	1	0	15
T6	6	3	1	0	10
T2/28	2	8	1	0	11
T2	1	6	1	0	8
NT	0	4	0	1	5
Others	1	3	1	1	6
Total(%)	53 (32.7)	77 (47.5)	19 (11.7)	11 (6.8)	162 (100)

Table 3. T-Protein Patterns of 25 Isolates of Scarlet Fever(2000)

Serotype	Total(%)
T12	7( 28.0)
T1	5( 20.0)
T4	4( 16.0)
T3	3( 12.0)
NT	1( 4.0)
Others	5( 20.0)
Total	25(100.0)

가 14 (56%) 가  
 , EM 23 (14.2%)  
 T12 가 11 가  
 . Clindamycin  
 17 (10.5%) T12 가 14  
 83.2% , Clarithromycin  
 18 (11.1%) T12 가 7  
 38.8% .  
 Penicillin, Cefprozil, Vancomycin, Ceftriaxone,  
 Chloramphenicol

가 (Table 4).  
 1998 <sup>4)</sup> EM

1990

T typing

6 10

, 1998

<sup>4)</sup> 15

<sup>8)</sup>,

(Table 2).

162

25 ,

T T12, T1, T4

(Table 3).

Tetracyclin

25 (15.4%) T12

가 . EM 가

<sup>9)</sup>.

가 1990

가 <sup>10 15)</sup>,

가 <sup>16 18)</sup>.

Table 4. In-vitro Susceptibilities to 9 Antimicrobial Agents, of 162 Clinical Isolates of *Streptococcus pyogenes* (2000)

Antimicrobial agent	MIC (µg/mL) <sup>*</sup>			Susceptible (%)	Susceptibility Breakpoint (µg/mL) <sup>†</sup>
	Range	MIC <sub>50</sub>	MIC <sub>90</sub>		
Penicillin G	<0.125- >0.25	<0.125	<0.125	100.0	0.12
Erythromycin	0.125- > 128	<0.25	16	85.8	0.25
Clindamycin	0.125- > 128	<0.125	32	89.5	0.25
Clarithromycin	0.125- > 128	<0.125	2	88.9	0.25
Tetracycline	0.5- > 128	<1	128	84.6	2
Cefprozil	<0.125	<0.125	<0.125	100.0	0.25
Vancomycin	0.5	0.5	>1	100.0	1
Ceftriaxone	<0.125	<0.125	<0.125	100.0	0.5
Chloramphenicol	0.5	<0.5	2	100.0	4

<sup>\*</sup>MIC<sub>50</sub> and MIC<sub>90</sub> : Concentration of the drug which inhibited 50% and 90% strains tested, respectively

<sup>†</sup>Based on NCCLS interpretative guidelines

가 . T12, T4 가

1994 <sup>19)</sup> EM

2% , 1998 <sup>20)</sup>

M 16% 가 <sup>21)</sup>

T 가 . T 가 가

1998 <sup>4)</sup> 41.3%

90% 가 가

가 2

, M 50% 14.2%

M (expression) 가

M 가

Kim <sup>16)</sup> 1992

M78 M28 1970

가 가 , 84.4% M 1971 <sup>22)</sup>

가 가 . T (predominant

77.9% 가 , T11 T28 가 strain) (shift) , EM 가

. 1998

<sup>4)</sup> T12가 44.6% 가 <sup>23)</sup>

T4, T1 . T12가 25% 가 T12 ,

27.8% 가

, T1, T4 , 1998

T1 가 가 가



- 9) . . . . . 1999;17:255-96.
- 10) , , . . . . . 1987;19:117-21.
- 11) , , , , , . . . . . 1992;24:143-51.
- 12) , , . . . . . 1993;13:395-401.
- 13) , , , , . . . . . 가. 1995;38:895-900.
- 14) , , , . . . . . 가. 1995;2:180-5.
- 15) , , , , , . 1996 . A . . . . . 1998;41:585-92.
- 16) Kim SJ, Cha SH, Kim EC, Kaplan EL. Serotypes of *Streptococcus pyogenes* isolated from healthy school children in Kangwon-do. *J Korean Med Sci* 1994;9:52-6.
- 17) Kim SJ, Kim EC, Cha SH, Kaplan EL. Comparison of M-serotypes of *Streptococcus pyo-* genes isolated from healthy elementary school children in two rural areas. *J Korean Med Sci* 1996;11:133-6.
- 18) , , , Johnson D. 1996 . A . . . . . 1998;30:19-23.
- 19) , , , . *Streptococcus pyogenes* *Streptococcus agalactiae* . . . . . 1994;12:111-5.
- 20) , , , . A . . . . . 1998;30:419-25.
- 21) , , , , . *Streptococcus pyogenes* macrolide . . . . . 1998; 18:S496.
- 22) Miyamoto Y, Takizawa K, Matsushima A, Asai Y, Nakatsuka S. Stepwise acquisition of multiple drug resistance by beta-hemolytic streptococci and difference in resistance pattern by type. *Antimicrob Agents Chemother* 1978;13:399-404.
- 23) Maruyama S, Yoshioka H, Fujita K, Takimoto M, Satake Y. Sensitivity of Group A streptococci to antibiotics. *Am J Dis Child* 1979; 133:1143-5.