MULTIDRUG RESISTANT STREPTOCOCCUS PNEUMONIAE IN A CASE OF SPLENECTOMY

Surg Cdr R N MISRA^{*}, Dr RACHNA KAIRON⁺,
Lt Col YOGESH CHANDER^{*}, Brig VC OHRI[#]

MJAFI 1998; 54: 280-281

KEYWORDS:

Introduction

Following splenectomy there is a small but life long susceptibility to sepsis, particularly involving *Streptococcus pneumoniae*. Risk of infections is related to age, the underlying reason for splenectomy and time elapsed since splenectomy. Majority of infections occur within a few years of splenectomy, but can occur at any stage. Most of the infections are due to *Strep pneumoniae* followed by *Haemophilus influenzae* and *Neisseria meningitidis*. Other organisms of special importance include *Plasmodium spp*, *Babesia spp*, *Capnocytophaga* and *Canimorsus* (DF2) following dog bites [1].

The recent reports of infections with penicillin resistant *Strep pneumoniae* which is also resistant to other antibiotics is a disturbing trend which needs special attention in treating such infections [2]. It becomes all the more important when a splenectomised individual becomes a victim to these infections.

Case Report

A 23-year-old serving soldier with history of splenectomy 6 months back reported with high grade fever. On examination temperature was 103F, pulse 116/min, regular, BP 110/60 mm of Hg. On the abdomen there was a well healed splenectomy scar. In the hospital, he developed vomiting, loose motions and epistaxis. He became toxic in spite of treatment, developed right hypochondrial tenderness with icterus and abnormal liver functions. Subsequently he developed disorientation and neck rigidity. His CSF examination was consistent with acute pyogenic meningitis. Blood culture and CSF culture grew *Strep pneumoniae* which was sensitive to penicillin, erythromycin, ciprofloxacin and ofloxacin but resistant to trimethoprim, tetracycline, chloramphenicol and norfloxacin by disc diffusion method. The antibiotic discs were procured from Hi Media. Minimum inhibitory concentration (MIC) was carried out in Mueller Hinton broth with 5 per cent sheep blood [3]. The MIC was 1mg/L for penicillin, ofloxacin 0.5 mg/L, norfloxacin 2 mg/L, ciprofloxacin 0.25 mg/L, trimethoprim 32 mg/L, and tetracycline 4 mg/L. Plasmid extraction was tried by alkaline denaturation method but could not be detected [4]. The patient was treated with oral ciprofloxacin and ampicillin but as the condition deteriorated, parenteral injections of sodium penicillin 2 megaunits 2 hourly

and chloramphenicol 1g 6 hourly was administered. Patient apparently recovered but succumbed to an upper GI bleed.

Discussion

Infection with *Strep pneumoniae* in post splenectomy individuals is quite common (50-60%) followed by *H influenzae* particularly in children [1]. Infection with *N meningitidis*, *E coli* and *Pseudomonas aeruginosa* are the next most prevalent and the latter two though much less common are associated with highest mortality. In a recent analysis of 1490 splenectomised patients in Western Australia who had received no prophylaxis, the incidence and mortality of severe late post-splenectomy infections were shown to be 0.42 and 0.08 per hundred person years. Overall this represented a 12.6 fold increased incidence as compared to general population [5]. However in another study the incidence of pneumococcal bacteremia or meningitis is increased hundred fold in children who have sickle cell disease with splenic dysfunction [6]. The infection also spreads rapidly inside the body because spleen is the principal site of clearance of non-opsonised pneumococci from the blood stream due to the prolonged contact with reticuloendothelial cells while passing through the cords of Billroth and splenic sinuses [7].

Though penicillin has been the standard drug to treat pneumococcal infections for nearly half a century. But lately intermediate (MIC 0.1-2 mg/L) to high (MIC > 4mg/L) level resistance to penicillin by this organism has been reported [6]. Cates et al [8] had reported high level resistance to penicillin in *Strep pneumoniae* in a case of post-splenectomy meningitis. This strain was also resistant to fusidic acid, ampicillin, methicillin, cloxacillin, cephalothin, tetracycline, gentamicin, streptomycin and carbenicillin. The prolonged use of low dose prophylactic penicillin in an individual with extreme susceptibility to pneumococcal infection may have led to selection of this resis-

^{*}Reader, ⁺Post graduate student, [#] Consultant and Head, Department of Microbiology, Armed Forces Medical College, Pune 411 040

tant organism. In vitro studies have shown that pneumococci grown in the presence of sub-inhibitory concentration of penicillin acquire resistance to this drug. Acquisition of high grade resistance to penicillin and to other antibiotics like erythromycin, chloramphenicol and clindamycin has probably originated from horizontal transfer of genetic material by means of plasmids from other bacteria [6]. The rate of resistance to other commonly used antibiotics such as erythromycin (MIC > 4mg/L), tetracycline (MIC > 2mg/L) and trimethoprim/sulphamethoxazole (MIC > 0.5/0.95 mg/L) is much greater in penicillin resistant strains than in penicillin susceptible strains [2]. Newer macrolides such as azithromycin, clarithromycin are also ineffective in these isolates. Since it results from alteration of penicillin binding proteins, it is not surprising that cephalosporins are much less effective against penicillin resistant isolates [6]. The present isolate was moderately resistant to penicillin (MIC 1mg/L) and resistant to fluoroquinolone norfloxacin besides resistant to other drugs e.g. trimethoprim, tetracycline, and chloramphenicol. Resistance of *Strep pneumoniae* to norfloxacin could be due to energy dependent efflux mechanism which play an important role in both intrinsic and acquired resistance [9].

Chemoprophylaxis with penicillin V or erythromycin may be given to patients with high risk of pneumococcal sepsis. However, compliance and development of antibiotic resistance may be the future problems. Immunoprophylaxis against *Strep. pneumoniae* with 14 valent pneumococcal polyvalent vaccine should be considered in splenectomised cases as an alternative. The limitations being its lack of efficacy below 2

years of age and 64 per cent effectiveness in patients > 2 years age [1,2].

REFERENCES

1. Read RC, Flinch RG. Prophylaxis after splenectomy. *J Antimicrob Chemother* 1994; 33: 4-6.
2. Jacobs MR. Treatment and diagnosis of infections caused by Drug-Resistant *Streptococcus pneumoniae*. *CID* 1992; 15: 119-27.
3. Thrupp LD. Susceptibility testing of antibiotics in liquid medium. In: Lorian V (editor). *Antibiotics in laboratory medicine*. 2nd Ed. London: Williams and Wilkins. 1986; 93-150.
4. Harris RJ, Gowans E, Lanser J. Nucleic acid techniques in diagnostic microbiology. In: Collee JC, Fraser AG, Marmion BP, Simmons A, editors. *Mackie & McCartney Practical Medical Microbiology*. 14th Edn. New York: Churchill Livingstone. 1996; 205-42.
5. Wong WY, Overturf GD, Powers DR. Infection caused by *Streptococcus pneumoniae* in children with sickle cell disease, epidemiology, immunologic mechanism, prophylaxis vaccination. *Clin Infect Dis* 1992; 14: 1134-6.
6. Dowson CG, Hutchinson A, Brannigan JA et al. Horizontal transfer of protein binding pro genes in penicillin resistance clinical isolates of *Streptococcus pneumoniae*. *Proc Natl Acad USA* 1989; 86: 8842-6.
7. Musher DM. *Streptococcus pneumoniae*. In: Mondell GL, Bennett JE, Dolin Raphael, editors. *Principle and practice of Infectious Diseases*. 4th Edn. Newyork:Churchill Livingstone 1995; 1811-26.
8. Cates KL, Gerrad JM, Giebink GS, Lund ME, Bleeker EZ, Lau S et al. A penicillin resistant pneumococcus. *J Pediatr* 1978; 93: 624-6.
9. Baranova N, Neyfalk AA. Apparent involvement of a multidrug transporter in the fluoroquinolone resistance of *Streptococcus pneumoniae*. *Antimicrob Agents Chemother*. 1997; 41: 1396-8.