STUDIES ON POST-OPERATIVE WOUND INFECTION: ISOLATION OF MICROORGANISMS AND THEIR ANTIBIOTIC SENSITIVITY

Pages with reference to book, From 163 To 165

M. Afzal, R.A. Chaudhry (Department of Pathology, University of Agriculture, Faisalabad.)
S.Z.H. Naqvi, S. Mehdi (Department of Zoology, Government College, Faisalabad.)

Abstract

Present study was undertaken to determine the relative incidence of different micro-organisms in post-operative wound infections and their in vitro antibiotic sensitivity. Swab samples from 50 patients were examined. The per cent incidence of different micro-organisms was: Gram-negative bacilli 33.34, Staphylococcus spp. 30.67, Bacillus spp. 13.33, Streptococcus spp. 12.00, Candida spp. 5.33 and Corynebacterium spp. 5.33. Gentamiein was found to be the drug of choice as micro-organisms from 81.25 per cent cases were sensitive to it. The least effective drugs were streptomycin and oxytetracyclinc each inhibiting the growth of micro-organisms in 14.58 per cent cases (JPMA 30:163, 1980).

Introduction

Surgical wounds usually become infected with resistant micro-organisms lurking in hospital wards and operation theatres. The wound discharge of patient may also serve as a source of cross infection for others. Berbee et al (1975) reported Staphylococcus aureus as the single most important pathogen in hospital wards, though Gram-negative bacilli and B-haemoIytic streptococci were also encountered. Raahave (1976) observed that Staphylococcus aureus, Staphylococcus albus and Escherichia coli were the most predominant organisms in post-operative wound infections in hip and ankle region. Rains and Ritchie (1977) reported Staphylococcus aureus and Gram-negative bacilli as the most important hospital infections. The present study was undertaken to determine the relative incidence of various micro-organisms associated with wound infections following laparotomy and in vitro sensitivity of these organisms to commonly used antibiotics.

Material and Methods

This study was conducted on 50 patients undergoing laparotomy and developed wound infection during hospitalization at Mian Mohammad Trust Hospital and District Headquarters Hospital, Faisalabad. A swab sample from each patient was taken as recommended by Cruickshank et al (1975) and brought immediately to the laboratory for processing.

Each swab sample was streaked on three medium-sized petri plates containing Blood agar. Two of these plates were used for testing antibiotic sensitivity while the remaining one was used for isolation of pure cultures. Pure cultures of the isolates were identified by morphological, cultural and biochemical tests.

In vitro antibiotic sensitivity test was performed using disc method as recommended by Cruickshank et al (1975). Commercially availablesensitivity discs of doxycycline HCI, kanamycin, kanacillin, septran, velosef, keflex, lincomycin, ampicillin, carbenicillin, gentamycin, erythromycin and nalidixic acid were used in the study while sensitivity discs of penicillin (10 i.u./disc), streptomycin (30 ug/disc), oxytetracycline (10 ug/disc), neomycin (30 ug/disc) and chloramphenicol (30 ug/disc) were prepared in

the laboratory as described by Gould and Bowie (1952).

Results and Discussion

A total of 75 strains of different microorganisms were isolated from 50 cases of postoperative wound infections. These included 23 cases infected with single species, 23 infected with two species and only 2 cases infected with three different species of organisms. Swab samples from remaining 2 cases were found to be sterile. This may be attributed to the fact that organisms were destroyed by antimicrobial treatment given during this period. The relative incidence of different micro-organisms has been shown in Table I.

Table I: Relative Incidence of Different Organisms in Post-operative Wound Infections

Organism	*Number of isolates*	*Percentage*
Bacillus spp.	10	13.33
Candida spp.	4	5.33
Corynebacterium spp.	4	5.33
Gram-negative bacilli	25	33.34
Streptococcus spp.	9	12.00
Staphylococcus spp.	23	30.67
Total	75	100.00

The most predominant organisms were Gram-negative bacilli (33.34 per cent) and Staphylococcus spp. (30.67 per cent). The incidence of Bacillus and Streptococcus spp. was 13.33 and 12.00 per cent respectively while Candida and Corynebacterium spp. each were isolated from 4 cases only. The findings substantiated those of Raahave (1976) and Rains and Ritchie (1977) who also reported that Gram-negative bacilli and staphylococci were the most prevalent pathogens in post-operative wound infections. The presence of streptococci as observed in this study has also been reported by Berbee et al (1975). Furthermore, Streptococcus and Corynebacterium spp. are known pathogens of wound sepsis and can be transmitted from an infected patient to others. Bacillus spp. are widely distributed in nature and their infection may result from inadequate sterilization of instruments, cotton or gauze used in operation or dressing.

In vitro antibiotic sensitivity revealed that no single drug was effective in all cases. Organisms from 43 cases were sensitive to the drugs used in the study while isolates from 5 cases were resistant to all the drugs. Gentamycin was found to be the drug of choice as it was effective in 81.25 per cent cases (Table II).

Table II: *In vitro* Antibiotic Sensitivity in Post-operative Wound Infections

Antibiotic	Per cent antibiotic sensitivity		
	Sensitive	Moderately sensitive	Resistant
Penicillin	4.17 (2)*	12.50 (6)	83.33 (40)
Streptomycin	6.25 (3)	8.33 (4)	85.42 (41)
Oxytetracycline	6.25 (3)	8.33 (4)	85.42 (41)
Chloramphenicol	14.85 (7)	14.85 (7)	70.84 (34)
Neomycin	8.33 (4)	22.92 (11)	68.75 (33)
Kanamycin	16.67 (8)	6.25 (3)	77.08 (37)
Kanacillin	18.75 (9)	4.17 (2)	77.08 (37)
Septran	18.75 (9)	6.25 (3)	75.00 (36)
Doxycycline HCI	10.42 (5)	8.33 (4)	81.25 (39)
Velosef	25.00 (12)	16.67 (8)	58.33 (28)
Keflex	16.67 (8)	6.25 (3)	77.08 (37)
Lincomycin	18.75 (9)	2.08 (1)	79.17 (38)
Ampicillin	12.05 (6)	4.17 (2)	83.33 (40)
Carbenicillin	14.58 (7)	27.08 (13)	58.34 (28)
Gentamycin	60.42 (29)	20.83 (10)	18.75 (9)
Erythromycin	18.75 (9)	16.67 (8)	64.58 (31)
Nalidixic acid	8.33 (4)	20.83 (10)	70.84 (34)

*Values in parentheses indicate the number of cases.

The drugs next in order of efficacy were carbenicillin and velosef, each being effective in 41.67 per cent cases. Streptomycin and oxytetracycline each proved effective in 14.58 per cent cases only. Similar findings have also been reported by Yunina and Veo (1971) who observed that intramuscular injection of penicillin and streptomycin did not have a noticeable effect in post-operative wound infections. Furthermore, most of these drugs have been extensively used in Pakistan and organisms might have developed resistance against these drugs. Griffiths et al (1976) reported that a single intravenous dose of tobramycin and lincomycin given at the start of gastrointestinal operations significantly reduced the post-operative wound infections. In this study, lincomycin was effective in 20.83 per cent cases while tobramycin was not used.

References

1. Bcrbee, G.A., Van Furth, R.V. and Noble, W.C. (1975) Endemic infections in surgical wards. J. Hgy., 75:185.
2. Cruickshank, R., Duguid, J. P., Marmion, B.P. and Swain, R.H.A. Medical Microbiology Vol. II 12th Ed. Churchill Livingstone, Edinburgh Churchill Livingston 1975, pp. 190-207.
3. Gould, J.C. and Bowie, J.H. (1952) Determination of bacterial sensitivity to antibiotics. Edinb. Med. J., 59: 178.
4. Griffiths, D.A., Simpson, R.A., Shorey, B.A., Speller, D.C.E. and Williams, N.B. (1976) Single-dose post-operative antibiotic prophylaxis in gastrointestinal surgery. Lancet, 2:325.
5. Raahave, D. (1976) Postoperative wound infection after implant and removal of osteosynthetic material. Acta. Orthop. Scand., 47:28.
6. Rains, A.J.H. and Ritchie, H.D. Bailey and Love's Short Practice of Surgery. 17th Ed.London, Lewis 1977 PP. 19-20.
7. Yunina, A.I. and Vevo, V.V. (1971) Antibiotikoterapiya posteooperatsionnykhran gortani trakhei (Antibiotic treatment of postoperative wounds of larynx and trachea). Zh. Ushn. Nos. Gorl. Bolezn. 31:82.