Correlation of Medical Treatment for Wound Infection with Isolated Bacteria and Antibiotics Sensitivity Profile in Baqubah Teaching Hospital

Ammar A Mohammed(MD,CABM)[1],**Mohamed A Al-karkhi** (PhD)[2],**Firas A Al-Taie**(MSc)[3]**and Imad Ahmed Lateef** (MD,CABM)[4]

Abstract

Background: Despite of the advancement in surgery, surgical techniques and use of antibiotics prophylaxis, postoperative infections remain the commonest postoperative complications and one of the most frequently encountered nosocomial infections worldwide. These infections lead to increase morbidity with the attendant increase in cost of therapy.

Objective: To evaluate the antimicrobial susceptibility pattern among the most common bacteria associated with postoperative wound infections.

Patients and Methods: (126) swab specimens were cultured and isolates were identified by gram stain ,morphological and cultural characteristics of the colonies. The standard disc diffusion methods were done for determination of Antibiotics Resistance of all isolates as described by the Clinical Laboratory Standard Institute (CLSI)16.

Results: A total of (126) patients presented with infected wounds were enrolled in this study. Out of (126) patients studied (43)patient(34%) had no growth. While the others (83) patient (66%) had positive bacterial isolate. From those with positive isolates (47) patient(57%) were male and 36 (43%) were female.The common bacterial isolate were E.coli (29%) then Staphylococcus aureus and Acinetobacter spp.(19%).Sensitivity testing show that E.coli had high resistance to Piperacillin, Aztreonam, Ticarcillin and Sulfamethoxazole. And Staphylococcus aureus had high resistance to Erythromycin and Sulfamethoxazole.

Conclusion: The common pathogen was E.coli and it was resistant to the commonly used antibiotics. While Staph.aureus was still sensitive to many antibiotics.

Keywords: Baqubah, Surgical wound, Antibiotics profile

Corresponding Author: Ammaralshummary72@yahoo.com

Received: 13th June 2019

Accepted: 18th June 2019

DOI:https://doi.org/10.26505/DJM.18014740613

[1,2,3,4]Baquba Teaching Hospital-Diyala Health Directorate-Health Ministry-Diyala-Iraq.

Introduction

In spite of the progress in surgery, surgical techniques and antibiotic prophylaxis[1,2,3]. postoperative infections remain the commonest postoperative complications and one of the most frequently encountered nosocomial infections worldwide[4,5]. These

infections lead to increase morbidity with the attendant increase in cost of therapy[6].

The high incidence and prevalence of postoperative wound infections also result in increasing demand on the limited resources available to healthcare delivery eventually resulting in high degree of mortality[1,6]. The widespread use of antibiotics, together with the length of time over which they have been available have led to major problems of resistant organisms, contributing to morbidity and mortality.

Pathogens that infect surgical wounds can be part of the patient's normal flora (endogenous source) or acquired from the hospital environment or other infected patients (exogenous source).The skin bacteria comprise commensals, transients and pathogens. The transient organisms include S.aureus, the hospital acquired methicillin-resistant forms (MRSA) and coliforms. Identification of a microbe that has been recovered from a clinical specimen is beneficial to the patient and assists in selection of chemotherapy[7].

Patients and Methods

Identification of isolates

The identification of bacterial isolates was done by standard biochemical tests on the isolates and these include;(1)gram stain (2) morphological and cultural characteristics of colonies on blood agar MacConkey agar, Brilliant Green Agar, Eosin Methylene Blue agar, and Mannitol Salt Agar, also hemolysis, production of oxidase, catalase and Coagulase tests were done to confirm pathogenic staphylococci. Further tests carried out for gram negative microorganisms included, nitrate reduction, motility test and hydrogen sulphide production, indole production, Methyl Red – Voges Proskauer tests and other tests were done included citrate utilization, fermentation of sugar tests using maltose, mannitol, mannose, sorbitol, glucose, arabinose ,raffinose also Triple – Sugar Iron Agar tests was done .

Antibiotic resistance testing

The standard disc diffusion methods were done for determination of antibiotics resistance of all isolates as described by the Clinical Laboratory Standard Institute (CLSI). The test media was Isosensitest Agar supplemented with whole blood for aerobes and chocolate agar for anaerobes. Samples were collected prior to the antibiotics supplementations.

The antibiotic discs employed include:
Ciprofloxacin(cip) (5µg),Amikacin(AK) (30 µg),Erythromycin(E) (15 µg),Tetracyclin(TE) (30µg),Vancomycin(VA)(30µg)Levofloxacin (LEV)
at(µg5),Imipenem(IMP((10µg),Ampicillin(AM)(25µg,Ticarcillin(TIC)
(75µg),Cefotaxime(CTX)(30µg),Trimethoprim(TIM)
(85µg),Sulfamethoxazole(SXT)(25µg),Doxycyclin(DO)(30µg),Chloramphenicol(C)(30µg, Piperacillin(PRL) (100µg),Ofloxacin(OFX) (5µg), Aztreonam(ATM) (30µg).

Measurement and interpretation for inhibition zones was done in accordance with manufacturers' instructions AB, Biodisc; PDM Interpretative chart. Cultures for

anaerobes and for fungal infections were not done in our hospital at the time of the study.

Statistical analysis

Data were collected on a specific questioners and an Excel Microsoft 2010 program used for data analysis.

Results

A total of (126) patients presented with infected wounds were enrolled in this study. Out of (126) patients studied (43)patient(34%) had no growth. While the others (83) patient (66%) had positive bacterial isolate. From those with positive isolates (47) patient(57%) were male and (36) (43%) were female.

The common bacterial isolate were E.coli (29%) then Staphylococcus aureus and Acinetobacter spp.(19%) as shown in Table(1).

Table (1): Bacterial isolates recovered from surgical wound infections

Organism	NO.(%)
Escherichia coli	24(29%)
Staphylococcus aureus	16(19%)
Acinetobacter spp.	16(19%)
Pseudomonas aeruginosa	11(13%)
Proteus mirabilis	9(11%)
Streptococcus spp.	6(8%)
Klebsiella pneumonia	1(1%)
Total(%)	83(100%)

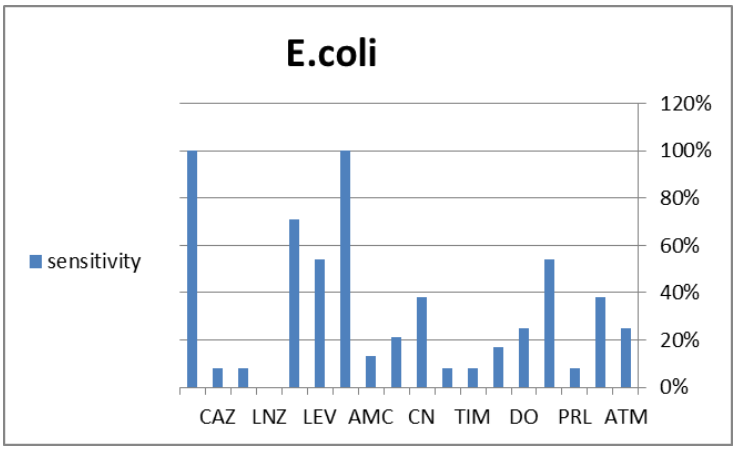
These bacterial isolates were tested for sensitivity against many commonly used antibiotics and show variable resistance profile to many antibiotics as in E.coli which show high resistance to Piperacillin, Aztreonam, Ticarcillin and Sulfamethoxazole. And Staphylococcus aureus which show high resistance to Erythromycin and Sulfamethoxazole. And as shown in Table(2).

Table (2): Sensitivity profile of bacterial isolates from Surgical Wound infections

Organism	No. of Isolates	N0. Of Isolates resistant (%)															
		CIP	AK	E	TE	VA	LEV	IPM	AM	TIC	CTX	TIM	SXT	DO	C	PRL	OFX	ATM
Escherichia coli	24	5(21%)	5(21%)	ND	ND	2(8%)	4(17%)	0	11(46%)	13(54%)	10(42%)	6(25%)	12(50%)	4(17%)	2(8%)	18(75%)	8(33%)	14(58%)
Staphylococcus aureus	16	ND	4(25%)	7(44%)	1(6%)	2(13%)	3(19%)	1(6%)	2(13%)	1(6%)	1(6%)	1(6%)	6(38%)	1(6%)	3(19%)	1(6%)	ND	ND
Acinetobacter spp.	16	ND	5(31%)	12(75%)	5(31%)	10(63%)	2(13%)	0	10(63%)	ND	8(50%)	10(63%)	14(88%)	3(19%)	ND	15(94%)	ND	ND
Pseudomonas aeruginosa	11	2(18%)	1(9%)	1(9%)	1(9%)	ND	3(27%)	0	ND	4(36%)	ND	3(27%)	8(72%)	ND	4(36%)	3(27%)	1(9%)	1(9%)
Proteus mirabilis	9	3(33%)	3(33%)	ND	ND	ND	1(11%)	0	6(67%)	5(56%)	7(78%)	ND	7(78%)	8(89%)	8(89%)	5(56%)	4(44%)	4(44%)
Streptococcus spp.	6	ND	ND	5(83%)	2(33%)	0	0	0	2(33%)	ND	2(33%)	ND	ND	ND	0	ND	0	ND
Klebsiella pneumonia	1	1(100%)	ND	ND	ND	ND	0	0	0	0	0	1(100%)	ND	ND	ND	0	0	ND
Total	83	11(13%)	18(22%)	25(30%)	9(11%)	14(17%)	13(16%)	1(1%)	31(37%)	23(28%)	28(34%)	21(25%)	47(57%)	16(19%)	17(20%)	42(51%)	13(16%)	19(23%)

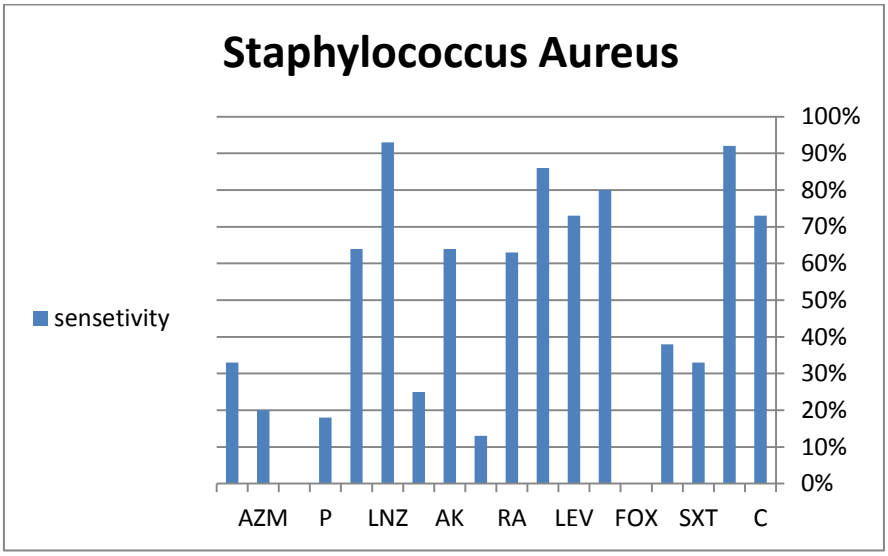
*Ciprofloxacin(cip),Amikacin(AK),Erythromycin(E),Tetracyclin(TE),Vancomycin(V),Levofloxacin(LEV),Imipenem(IMP),Ampicillin(AM),Ticarcillin(TIC),Cefotaxime(CTX),Trimethoprim(TIM),Sulfamethoxazole(SXT),Doxycyclin(DO),Chloramphenicol(C),Piperacillin(PRL),Ofloxacin(OFX), Aztreonam(ATM).

The sensitivity profile of *E.coli* show high sensitivity to Imipenem and meropenem and as shown in Figure(1).



Figure(1): The antibiotic sensitivity of the E.coli isolates

While Staphylococcus Aureus show high sensitivity to Linezolid, Doxycycline and Vancomycin and as shown in Figure(2).



Figure(2): The antibiotic sensitivity of the Staphylococcus Aureus isolates

Discussion

In this study the commonest bacteria isolated were *E.coli*(29%) followed by Staphylococcus Aureus (19%)and Acinetobacter species (19%) and this differ from the study done by Farrag and his colleagues in Egypt 2016[8], which show that the common organism was Klebsiella pneumonia (24%) and also differ from studies done by Akinkunmi and his colleagues in Nigeria 2014[9], Anguzu and Olila in Uganda 2007[10], Shriyan and his colleagues in India 2010[11] and Giacometti and his colleagues in Italy 2000[12] which show the commonest organism were Staphylococcus aureus in (18.2%,45.1%, 63%and 28.2%)respectively.

The *E.coli* isolates in this study were resistant to many commonly used antibiotics such as piperacillin(75%), Aztreonam(58%), Ticarcillin(54%),andSulfamethoxazole(50%). And this differ from the findings of Akinkunmi and his colleagues in Nigeria 2014[9],which show that *E.coli* isolates were resistant to Pencillin V,pepracillin,Cephalothin,Cefadroxil and Trimethoprim in 100% of the isolates.And a study done by Anguzu and Olila in Uganda 2007[10], which show that *E.coli* isolates were resistant to Amoxacillin and Chloroamphinicol in 100%,and Ampicillin 80% of the isolates. And the study done by Shriyan and his colleagues in India 2010[11]which show that *E.coli* were resistant to Cephalosporins in 40%of the isolates.

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While Staphylococcus Aureus show good sensitivity profile to many antibiotics such as Linezolid(93%),Doxycycline(92%),Vancomycin(85%),Imipenem(80%),Levofloxacin(72%),Chloramphenicol(72%),andAmikacin(63%) .And this findings were differ from that reported by Akinkunmi and his colleagues in Nigeria 2014[9],which found that Staph.aureus were sensitive to Ciprofloxacin and ofloxacin in 100%,and sensitive to Chloramphinicol 65%,Fucidic acid 55% and Tobramycin 55%.And another study done by Anguzu and Olila in Uganda 2007[10],which show Staph.aureus sensitive to Gentamycin 87.5%,Methicillin 75%and Ciprofloxacin 68.7%. And another study done by Shriyan and his colleagues in India 2010[11],which show that Staph.aureus were sensitive to Vancomycin100%,Teicoplanin100%,Linzold 100%,Clindamycin 100%,Gentamycin 98.2% and Cephazolin 98.2%. In this study 34% of cases they had no growth of organisms which most probably due to antibiotics used prior to surgery.

Conclusions

The common pathogen was *E.coli* and it was resistant to the commonly used antibiotics. While Staph.aureus was still sensitive to many antibiotics.

Recommendation

Future studies should be extended to include fungal cultures and cultures under anaerobic conditions to establish the presence of other organisms that require such environment for growth. A regular surveillance should be carried out to monitor the susceptibility of these pathogens and chose appropriate regimens both for prophylaxis and treatment of surgical wound infections.

Antibiotics misuse prior to surgery should be avoided as possible as we can to minimize antibiotics resistance.

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