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Study of Klebsiella Species Producing ESBL Isolated from USG Probes

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Abstract

Ultrasonography machines are ideal vectors for cross infections. A busy machine may be used to scan many patients a day. The infections can be transmitted via ultrasound probes & coupling gel. Klebsiella species are frequent cause of infection in both community & Hospital. Klebsiella isolated from US probe is an important nosocomial pathogen & infections due to it are difficult to manage due to resistance to multiple antibiotics. So this study aimed to determine the percentage ESBL producing Klebsiella species isolated from US probes & to determine the antibiotic sensitivity pattern.

Keywords: Ultrasonography; US Probes; ESBL.

Introduction

Diagnostic equipment can be found every day in patient care centres in emergency rooms & impatient rooms & ICUs. Ultrasound is most commonly used diagnostic equipment. It has been used to image the human body over half a century [1]. However infections caused by diagnostic equipment as a result of contamination markedly threaten the health of patients especially of ICU. Surveillance studies have shown that contaminated medical devices act as source of infection [2].

Nosocomial infections have become an increasingly recognise problem with Ultrasonography probes can be one of the vehicles for spread of infections [3]. The finite studies are conducted in the field of possibility of hospital infection transmission by US probes and coupling gel [4,5].

With the increase in number of post operative and Immuno compromised patients being scanned effective guidelines for prevention of infection and Disinfection are necessary [4]. Literature shows limited studies regarding infection in post operative patients following ultrasonography [6,7].

Klebsiella pnemoniae resistant to Ceftazidime was isolated from US probes and Coupling gel in emergency rooms. A number of organisms such as Klebsiellia Acinetobactor baumannii, Enterococcus, Staphylococcus aureus have been isolated from gel 4. Gel and the probes have been traced to be a source of infection [6-10]. Present study is therefore carried out to determine the presence of the ESBL producing Klebsiella contamination on the US probes and also to determine the Antibiotics sensitivity pattern of isolates.

Materials & Methods

Prospective observational study was carried out in department of Microbiology, PDVVPF's Medical

College, & Hospital, Ahmednagar from Aug 2015 to Dec 2015. Total 220 swabs were taken randomly from from unclean US Probes of patients attending the radodiagnostic department. After ultrasound was carried out specimens were send to Microbiology Laboratory. Grams Stain was done, followed by culture on Blood agar and Mac Conkey agar at 37^{0}C for 24 Hrs. All strains were isolated as Klebsiella species by colony morphology and biochemical tests. (Indole, MR, Urease, Citrate, Glucose manitol, lactose, sucrose TSI, Catalase.) [11]. Total 25 Klebsiella which were isolated from Unclean Ultrasound probes out of 220 specimens were screened for ESBL production by using cefatazidime disc and those positive for screening test were subjected to confirmatory Phenotypic test for ESBL production as per CLSI gridlines. Out of 35 isolates of Klebsiella 20 were controls as ESBL producer while 15 were non ESBL producer. Antibiogram of the isolates was done by Kirby bauers disc diffusion method using antibiotic disc of Himedia.

All the klebsiella isolates having zone size less than < 22 m for ceftazidime were selected as suspicious for ESBL production by CLSI guidelines and these potential ESBL producing strains were further tested by phenotypic confirmatory test [12]. (CLSI performance standard.)

Phenotypic confirmatory test -Laun culture of the test isolates were done on MH agar. Antibiotic used were Ceftazidime(30 mcg) and combination of ceftazidime/ Calvulanic acid discs have placed opposite to each other in MH agar and incubated overnight at 37^{0}C. Next day zone of inhibition around ceftazidime and Calvulanic acid was measured. Zone of inhibition around ceftazidime/Calvulanic acid is increased more than 5mm than that of ceftazidime alone. It is confirmed as ESBL Producer.

Klebsiella Pneumoniae ATCC 700603 was used as ESBL positive Control & E coli ATCC 25922 were used as ESBL negative control.

Results

Out of 220 specimens taken from unclean Ultrasound probes. 35 Klebsiella isolated from unclean Ultrasound probes. Amongst their 210 were isolated as control ESBL producer by phenotypic method.

Table 1: Percentage of Klebsiella Pneumoniae isolated from specimen

Total Specimens	Klebsiella Pneumoniae	Other	No Growth
220	35(15.9%)	55	130

Table 2: Percentage of ESBL Producing Klebsiella by screening test

Total Klebsiella Pneumoniae Isolated	ESBL by screening method
35	25

Table 3: Percentage of ESBL producing by phenotypic confirmatory test

Total Positive by ESBL Screning test	ESBL positive by phenotypic confirmatory test
25	18(51.4%)

Table 4: Antibiogram of ESBL producers

Antibiotic Name	Sensitive	Resistant
Ciprofloxacin	55.5%	44.4%
Amikacin	0%	100%
Cotrimoxazole	16.6%	83.3%
Amoxacilin/ Clavulanic acid	33.3%	66.6%
Piperacillin/ tazobactum	27.7%	72.2%
Imipenem	94.4 %	5.5%
Cefpodoxime	16.6%	83.3%
Ampicilin /Sullbactum	33.3%	66.6%
Colistin	100%	0%
Polymyxin B	100%	0%

Discussion

Present study detected 35 Klebsiella pneumoniae from 220 specimens from unclean ultrasound probes. Only 35 klebsiella isolates, 25 were ESBL producers by screening test. Total ESBL producing Klebsiella Pneumoniae were 18 out of 25 by phenotypic confirmatory test.

Nosocomial outbreaks due to ESBL producing Enterobactericeae have been described for ICU, Nursing homes, Obst. & Gynac wards [13]. In a study conducted by Oliver Gaillot [6] on 8 ESBL klebsiella were isolated from contaminated Ultrasound coupling gel. The common factor in their study, the hospital history of adult patients was USG performed on arrival in emergency room. Risk of contamination in Obstetric USG was recently emphasised by storment et al [14]. Because of the unusual mode of transmission of infection control measures such as isolation of colonised patients, use of gloves and hand washing did not halt the outbreak in the study. ESBL producing strains were resistant to variety of commonly used antimicrobials. Guntal et al [15] Akata F. et al [16]. Reported high prevalence of ESBL producing Klebsiella (19and 24).

The methods using US probes cleaned dry & neat cloth after each process as a standard method for probe decontamination but similar to other studies Ultrasound probes cleaned with dry & neat cloth could be a source of potential hospital infection. The use of 70% alcohol is used to clean the probes but its use is not recommended because it's shortens the life of probes. Muradeli et al [10] concluded that single paper probe cleaning was effective as immersion in chlorhexidine which reduce the bacterial contamination. In our study all ESBL producing isolates were 100% sensitive to Colistin and Polymyxin B followed by Imipenum 94.4%. All the strains were resistant to Amickacin.

Spencer and Spencer et al [17] also concluded that alcohol wipe can reduce the transmission of bacteria from ultrasound probes. Similar recommendations were given by Yasmin et al [18].

Conclusion

It has been found that ESBL producing klebsiella isolated from ultrasound probes is an important nosocomial pathogen & infection due to it can be hazardous. ESBL producing Klebsiella can be transmitted by Ultrasound probes and coupling gel. It is highly recommended that ultrasound departments must have their probe cleaning & sterilization procedures to assess whether they are safe in particular environment. And practitioners should ensure that risk of cross infection should minimize.

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