

Bacteriological Profile of Unclean Ultra Sonography Probes with Antibigram

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Reprint Request

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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 infection can be transmitted via ultrasound probes and coupling gel. Staphylococcus aureus, Enterococci, Klebsiella, Pseudomonas, E. coli are frequent cause of infections in both community and hospital. Organisms isolated from unclean US probe are important nosocomial pathogens and infections due to it are difficult to manage due to resistance to multiple antibiotics. So this study aimed to determine the percentage of bacteria isolated from unclean US probes and to determine the antibiotic sensitivity pattern.

Keywords: Ultrasonography; Bacteria; Antibigram.

Introduction

Ultra sonography machines are ideal vectors for cross infections. Busy machines may be used to scan many patients a day including both patients who may act as a source of infection and those who are vulnerable. Probe of US machines could act as a vector between these groups unless there is effective cleaning. To our knowledge best practice is yet to be established [1]. Radio-diagnosis department can be source of transmitting nosocomial infection as it is a integral part of medical services for admitted as well as for walk in patients particularly in ultrasound (including bed side portable scan) and intervention division. Many studies have shown that US probe are ideal vector for transmitting pathological organism from one patient to other patient unless there is effective cleaning methods [2-9]. The infection can be transmitted via ultrasound probes and coupling gel. Connection cord comes in contact with patient's skin and often due to length it is contact with floor [10]. Gel left on probe for prolonged periods

can harbor bacteria [11]. Best practice are yet to be established however lack of effective cleaning methods for the probes may place the patients at risk[12]. Paper wipes and alcohol wipes have been recommended as sufficient to clean USG probes hence reducing the cross infections. Use of dry wipes is effective for abdominal scanning where as alcohol wipes are recommended for the axillary and the inguinal regions [13].

Materials and Methods

Prospective observational study was carried out in dept of microbiology in PDVVPF'S Medical College & Hospital, Ahmednagar from Aug 2015 to Dec 2015. Total 120 Swabs were taken from unclean ultrasound probes of patients attending in radio diagnostic department. After the ultrasound was carried out samples were send to microbiology laboratory which were obtained from USG probes after scanning the patients. Gram stain of swab was done followed by

culture on blood agar and MacConkey agar at 37 degree Celsius for 24 hrs. Organisms obtained were subjected for biochemical tests for identification. Study group includes minimum of 120 patients presenting the department of radiology for USG of various body parts. Antibiotic sensitivity testing was carried out using the kirby- Bauer disc diffusion technique on Muller Hinton agar as per CLSI guidelines [14]. Antibiotic disc were obtained from high media company. Turbidity of the broth was compared to 0.5 macfarlands standards. Control strains used were Staphylococcus aureus ATCC 25923, E. coli ATCC 25922, Pseudomonas aeruginosa ATCC 27853.

An inclusion criterion was probes used for USG of IPD and OPD patients.

Exclusion criteria was probes which are used for USG of immuno compromised patients and neonates.

Results

Table 1 Shows total no of bacteria isolated from

Table 1:

S. No.	Total number of samples (from probe) before cleaning	No of isolates obtained before cleaning	Sterile Samples
	120	68 (56.6%)	52 (43.3%)

Table 2: Type of organisms isolated before cleaning

Organisms	Total No
Staphylococcus aureus	18 (26.5%)
Pseudomonas aeruginosa	2 (2.9%)
Enterococcus species	5 (7.3%)
E. coli	6 (8.8%)
Coagulase negative staph	30 (44.1%)
Klebsiella species	7 (10%)
Total	68

Table 3: Antibiotic sensitivity pattern of gram Positive isolates

Antimicrobial	Staphylococcus aureus (n =18)		Enterococcus (n = 5)		Cons (n = 30)	
	No of isolates sensitive	Percentage sensitivity	No of isolates sensitive	Percentage sensitivity	No of isolates sensitive	Percentage sensitivity
Amoxyclav	8	44%	3	60%	24	80 %
Ceftazidime/ clav	9	50%	2	40%	20	66.7 %
penicillin	10	55.6%	3	60%	20	66.7%
Cefazolin	5	27.8%	2	40%	12	40%
Cefoxitin	8	44%	2	40%	12	40%
Linezolid	15	83.3%	5	100%	30	100%
Vancomycin	13	72.2%	4	80%	20	66.7%
Azithromycin	12	66.7%	1	20%	8	26.7%
Tetracycline	13	72.2%	1	20%	10	33.3%
Cotrimoxazole	12	66.7%	2	40%	15	50%
Ofloxacin	9	50%	1	20%	13	43.3%
Erythromycine	4	22.2%	1	20%	7	23.3%

the 120 specimens that is 68 (56.6%) & 52(43.3%) samples were sterile.

Table 2 shows type of the organisms isolated before cleaning probes. Total number of bacteria isolated was 68 [56.6%]. Staphylococcus aureus was the commonest bacteria isolated 18 (26.5%), followed by coagulase negative Staphylococcus 30 (44.1%). Klebsiella species was the commonest amongst gram negative bacteria 7 (10%).

Table 3 shows Antibiotic sensitivity pattern of gram positive isolates. In our study Staphylococcus aureus showed maximum sensitivity towards Linezolid (83.3%). Enterococci & Cons were 100% sensitive to Linezolid.

Table 4 shows Antibiotic sensitivity pattern of gram negative isolates. All the gram negative isolates (Klebsiella, Pseudomonas, E. coli) were 100% sensitive to Imepenem. Pseudomonas also showed maximum sensitivity towards Pepracilin. All the three isolates showed maximum sensitivity towards Gentamycin.

Table 4: Antibiotic sensitivity pattern of gram negative isolates

Antimicrobial	Klebsiella species (n =7)		E. coli (n =6)		Pseudomonas (n = 2)	
	No of isolates sensitive	Percentage sensitivity	No of isolates sensitive	Percentage sensitivity	No of isolates sensitive	Percentage sensitivity
Ampicilin	0	0%	0	0%	1	50%
Pepracilin	1	14.2%	1	16.7%	2	100%
Ceftazidime/ Clav	5	71.4%	5	83.3%	1	50%
Cefipime	3	42.9%	2	33.3%	1	50%
Cefoperazone	4	57.1%	1	16.7%	1	50%
Gentamycin	5	71.4%	5	83.3%	2	100%
Amikacin	5	71.4%	4	66.7%	1	50%
ciprofloxacin	3	42.9%	1	16.7%	1	50%
Cloramphinicol	4	57.1%	5	83.3%	1	50%
Cotrimoxozole	5	71.4%	3	50%	1	50%
Imepenem	7	100%	6	100%	2	100%
Meropenem	5	71.4%	5	83.3%	1	50%

Discussion

In our study total percentage of the organisms obtained from unclean US probes were 68 (56.6%). 52 (43.3%) out of 120 specimens before cleaning were sterile. Spencer and Spencer has found that 66% of swabs taken at random from US machines showed growth of bacteria which is in accordance with our study 56.6%. Similar observations were seen in study conducted by Tesh c Froschiea and Spencer. In a study Moradeli concluded that single paper wipe was effective as immersion in chlorhexidine. Similar observations were seen by Spencer and spencer. In our study commonest gram positive a bacterium isolated was staphylococcus aureus 18(26.5%) followed by CONS 30(44.1%) & Enterococcus 5(7.3%). Amongst Gram negative rods maximum isolation was of Klebsella species 7(10%) followed by Ecoli 6(8.8%) and Pseudomonas aeruginosa 2 (2.9%).

The study carried out in 1998 confirmed that it was apparent that ultrasound procedures transferred colonizing staphylococci from patient's skin on to the ultra sound instruments [10]. It has been also demonstrated that bacterial colonization of probes with pathogenic bacteria occurs under in-use conditions [15]. Study conducted by Hutchinsun etal has incriminated the ultrasound gel as a potential source of infections [16].

Paper wipe & alcohol wipes have been recommended as sufficient to clean the ultrasound probe, hence reducing risk of cross infections [13]. Paper wipe followed by normal saline wipe is 76% effective and appear to be better as compared to simple paper towel cleaning. However soap wipe technique was found to be most effective of the cleaning methods tested with effectiveness of 98% & this is comparable to the alcohol effectiveness of 99%.

as per the study conducted by Schabrun etal & Abdullah etal [17,18]. In our study Staphylococcus aureus showed maximum sensitivity towards Linezolid (83.3%). Enterococci & Cons were 100% sensitive to Linezolid. In Enterococcus & Cons showed maximum resistance to Azithromycin, Tetracyclin, and Ofloxacin & Erythromycin. All the gram negative isolates were 100% sensitive to Imepenem. All the three isolates showed maximum sensitivity towards Gentamycin. Appropriate cleaning method needs to be tailored for clinical situation to prevent transmission of bacteria.

Conclusion

It has been found that Bacteria isolated from unclean US probe are Important nosocomial pathogens and infection due to it can be hazardous. Bacteria can be transmitted by ultrasonographic probes and coupling gel, it is highly recommended that ultrasound departments must revive their probe cleaning and sterilization procedures to assess whether they are a safe in particular environment. And practitioners should ensure that risk of cross infection should minimize. Applying simple cleaning methods can

Prevent nosocomal infections from ultrasound probes. Special infection control measures should also be taken in high risk group of patients.

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