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Isolation of Potentially Pathogenic Bacteria from Reusable Venesection Tourniquets in a Tertiary Care Hospital

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A B S T R A C T

Tourniquets used repeatedly on patients for blood sampling are a potential source of Nosocomial infections. Reusable venesection Tourniquets are often used consecutively on multiple patients without disinfection between uses. The present study was conducted to isolate the potentially pathogenic bacteria from reusable Tourniquets and to study their antibiotic resistance pattern. The study was conducted in King George Hospital (KGH), tertiary care teaching hospital in Vizag, Andhra Pradesh. Swabs from 50 Tourniquets of various areas in the hospital were taken for the study in December 2015. The samples were transported immediately to the lab in BHI broth and inoculated onto sheep blood agar and McConkey's agar, incubated at 37°C for 24 to 48 hours. Isolation and identification of the organisms were done by a standard procedure in the laboratory. Antibiotic sensitivity testing was done by Kirby-Bauer disc diffusion method on Muller Hinton Agar. Cefoxitin (30mcg) was used to detect MRSA and Ceftazidime and Ceftazidim+Clavulonate (30/10mcg) discs were used for ESBL producers and the zones of inhibition were interpreted as per CLSI guidelines. Out of the 50 Tourniquets, 8 were from sample collection sites, 9 from ICU's, 2 from casualty and 31 from various wards. Potentially pathogenic bacteria were isolated from 36 (72%) Tourniquets out of 50 and non-pathogenic environmental commensals were isolated from 14 (28%). Gram positive cocci were the predominant isolates 19 (52.8%) followed by gram-negative bacilli 17 (47.2%). Among total isolates 44.4% and among GPC 84.2%were staph aureus and 13.6% (3) were enterococci. Among GNB, klebsiella species were predominant (10) followed by E.coli (5), Pseudomonas species (2) and acinetobacter species (2). MRSA was detected in 2 (12.5%) strains of Staph aureus and ESBLs were detected in 3 (17.6%). All the 3 Enterococci were sensitive to vancomycin. 1. Tourniquets are a potential reservoir and vehicle for the spread of nosocomial infections, including MROs. 2. Regular surveillance and sterilisation or disinfection policy for Tourniquets are recommended in Infection Control programme to decrease hospital acquired infections and multi-drug resistant organisms.

Introduction

Tourniquets used repeatedly on patients for blood sampling are a potential source of Nosocomial infections (Zara Mehmood *et al.*, 2014). Reusable venesection

Tourniquets are often used consecutively on multiple patients without disinfection between uses. Hospital infection control policies attempt to minimise cross transmission of Multi-Resistant Organisms (MROs), which include Methicillin-Resistant Staphylococcus aureus (MRSA), Vancomycin-Resistant Enterococci (VRE), and Enterobacteriaceae harbouring transmissible Extended-spectrum beta-lactamases(ESBLs) and Metallo-beta-lactamases (MBLs). (Angle N Pinto *et al*., 2011) Surfaces such as keyboards, (Simmons, 2006) stethoscopes, (Marinella *et al*., 1997; Bernard *et al*., 1999; Varghese *et al*., 1999; Kennedy *et al*., 2003) ties, (Dixon, 2000; Ditchburn, 2006; Day, 2006; Biljan *et al*., 1993; Steinlechner *et al*.,) 2002 lanyards, and Tourniquets, have the potential to act as fomites and can harbour pathogenic microorganisms. The present study was conducted to isolate the potentially pathogenic bacteria from reusable Tourniquets and to study their antibiotic resistance pattern.

Materials and Methods

The study was conducted in KGH, tertiary care teaching hospital in Vizag, Andhra Pradesh. Swabs from 50 Tourniquets of various areas in the hospital were taken for the study in December 2015. To obtain the samples swab sticks moistened with sterile saline were rotated over both sides of the Tourniquets at the distal and proximal ends which are most frequently touched by contaminated fingers. The samples were transported immediately to the lab in BHI broth and inoculated onto sheep blood agar and McConkey's agar incubated at 37°C for 24 to 48 hours, Isolation and identification of the organisms were done by a standard procedure in the laboratory. Antibiotic sensitivity testing was done by Kirby-Bauer disc diffusion method on Muller Hinton Agar. Cefoxitin disc (30mcg) was used to detect MRSA and Ceftazidime(30mcg) and Ceftazidim+Clavulonate (30/10mcg) discs were used for ESBL producers and the zones of inhibition were interpreted as per CLSI guidelines

Results and Discussion

Out of the 50 Tourniquets, 8 were from sample collection sites, 9 from ICU's, 2 from casualty and 31 from various wards (Table 1).

Potentially pathogenic bacteria were isolated from 36 (72%) Tourniquets out of 50 and non-pathogenic environmental commensals were isolated from 14 (28%). Gram positive cocci were the predominant isolates 19 (52.8%) followed by gram-negative bacilli 17 (47.2%). Among total isolates 44.4% and among GPC 84.2%were *Staph aureus* and 13.6% (3) were Enterococci.

Among GNB Klebsiella species were predominant - 10 (27.8%), followed by E.coli - 5 (13.9%), Pseudomonas species - 2 (13.6%) and Acinetobacter species - 2 (13.6%). (Table 2).

MRSA was detected in 2 (12.5%) strains of *Staph aureus* and ESBLs were detected in 3 (17.6%). All the 3 Enterococci were sensitive to vancomycin. The two MRSA strains isolated were, one from ICU and one from the ward. Out of the three ESBL strains, two were isolated from ICUs and one from the ward.

Many Tourniquets had mixed pathogenic and non-pathogenic bacterial growth.

After sterilisation by autoclave for the Tourniquets which are autoclavable and disinfecting other Tourniquets with 70% alcohol, the swabs were collected and

processed for culture. All the swabs were sterile, as there was no growth.

Tourniquets are often used consecutively on multiple patients, regardless of their infective status and with no disinfection between uses, although the WHO, the National Association of Phlebotomists in England and Australian Healthcare guidelines (National Health and Medical Research Council, 2010) recommended that Tourniquets and other non-critical items be cleaned between uses. Numerous studies have indicated reusable venesection Tourniquets as a potential source of significant bacterial colonisation and MROs. (Pinto *et al*., 2011; Elhassan *et al*., 2012)

Table.1 Tourniquet Collection Data

S.No	Area	No of Tourniquets
1.	Sample Collection Sites	8
2.	ICU's	9
3.	Wards	31
4.	Casualty	2
Total		50

Table.2 Microbial Colonisation of Tourniquets

S.No	Tourniquets collected	Wards	Sample Collection	ICUs	Casualty	Total
		31	8	9	2	50
1.	*Micrococci +bacillus species*	5	1	0	0	6
2.	*CONS*	4	2	2	0	8
3.	*Staph aureus*	10	2	3	1	16
4.	*Enterococci*	3	0	0	0	3
5.	*Klebsiella spp*	4	2	2	1	9
6.	*E.coli*	2	1	1	0	4
7.	*Pseudomonas spp*	2	0	0	0	2
8.	*Acinetobacter spp*	1	0	1	0	2

In the present study 36 (72%) Tourniquets showed bacterial growth which correlates with Angle N Pinto *et al* who reported 61%. *Staph aureus* was the predominant isolate (44.4%) which correlates with Zara Mehmood *et al* who reported 43%. In the present study, GNB were isolated in 47.2% which correlates with Angle N Pinto *et al* who reported 44.5%. MRSA was isolated in 12.5% which correlates Zara Mehmood *et al* who reported 18.2% of MRSA. ESBLs were isolated in 17.6% in the present study whereas Angle N Pinto *et al* reported around 5%.

In conclusion, tourniquets are a potential reservoir and vehicle for the spread of nosocomial infections, including MROs. Regular surveillance and sterilisation or disinfection policy for Tourniquets are recommended in Infection Control programme to decrease hospital acquired infections and multi-drug resistant organisms.

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