

# IS SONICATION OF NEEDLELESS CONNECTORS USEFUL TO PREDICT CENTRAL VENOUS CATHETER COLONIZATION?

M. GUEMBE, M.J. PÉREZ-GRANDA, R. CRUCES, P. MARTÍN-RABADÁN, E. BOUZA  
HOSPITAL GENERAL UNIVERSITARIO GREGORIO MARAÑÓN

Hospital General Universitario Gregorio Marañón  
Doctor Esquerdo 46, 28007  
Madrid, Spain +34-91586027  
mariaguembe@hotmail.com

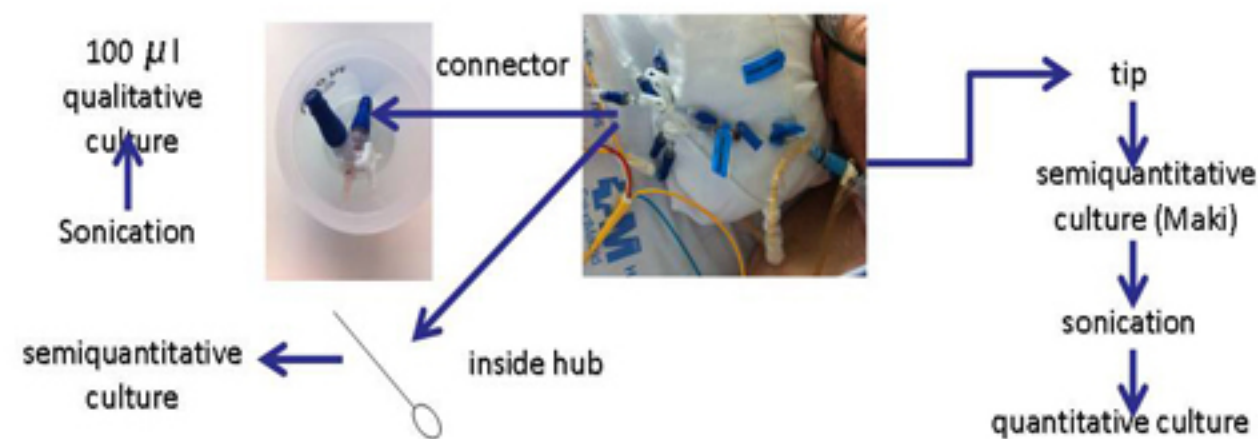
Poster No. P1358

## INTRODUCTION AND PURPOSE

- Semiquantitative cultures of skin surrounding intravascular catheter entrance and the catheters hubs ("superficial cultures") demonstrated to have a high negative predictive value to assess catheter tip colonization (CC) without catheter withdrawal (Bouza E, Crit.Care.Med.2005). However, culturing the inner side of the hubs (hub cultures) requires catheter manipulation that could be a risk for microorganisms migration to the bloodstream.
- Hubs are nowadays closed by needleless connectors (CONs) that could be purportedly predictors of catheter colonization.
- The **purpose** of our study was to evaluate the yield of culture of sonicates of CONs for the prediction of CC in comparison to hub cultures.

## METHODS

- During 6 months we prospectively collected all central lines and systems (SYS) removed from patients admitted to the cardiac surgery postoperative care unit irrespective of the reason of withdrawal.
- Hub cultures were obtained immediately before catheter withdrawal and cultured by the semiquantitative method (positive:  $\geq 15$  cfu/plate). Catheter tip culture was performed by the roll-plate technique and sonication (positive culture:  $\geq 15$  cfu/plate and/or  $\geq 100$  cfu/catheter segment, respectively) and whole CONs were cultured by semiquantitative culture after sonication ( $\geq 20$  cfu/CON). We defined colonization of the CON when  $\geq 1$  cultures of all CONs were positive (figure).



## RESULTS

- We collected a total of 73 SYS (198 Hubs, 184 CONs, and 73 tips) from 49 patients (table 1). The CC rate was 8.2% (6/73). The hub and CON colonization rates were, respectively: 6.8% (5/73) and 9.6% (7/73). The validity values of hub and CON to predict CC Hub cultures are detailed in table 2.
- In table 3 we detailed the microorganisms recovered in the CC.

Table 2. Validity values for hub cultures and CONs to predict catheter colonization

CULTURE	SN%	SP%	PPV%	NPV%	Validity Index	Prevalence	LR+	LR-
	95% CI	95% CI	95% CI	95% CI	95% CI	95% CI	95% CI	95% CI
Hub	25.0 (0.0-61.3)	95.5 (89.8-100)	40.0 (0.0-92.9)	91.4 (84.2-98.7)	88.0 (79.9-96.0)	10.7 (3.0-18.3)	5.58 (1.09-28.56)	0.79 (0.52-1.18)
CON	87.5 (58.3-100)	97.0 (92.2-100)	77.8 (45.0-100)	98.5 (94.8-100)	96.0 (90.9-100)	10.7 (3.0-18.3)	29.31 (7.30-117.68)	0.13 (0.02-0.81)

Table 3. Microorganisms with positive counts isolated in colonized SYS

Sample No.	Significant Microorganisms		
	Catheter tip	Hub	CON
40	<i>Staphylococcus capitis</i> <i>Staphylococcus hominis</i>	<i>Staphylococcus epidermidis</i> <i>Staphylococcus hominis</i>	<i>Staphylococcus capitis</i> <i>Staphylococcus hominis</i> <i>Klebsiella pneumoniae</i>
67	<i>Staphylococcus epidermidis</i>	<i>Staphylococcus epidermidis</i>	<i>Staphylococcus epidermidis</i>
97	<i>Rhodotorula mucilaginosa</i>	-	-
53	<i>Staphylococcus epidermidis</i> <i>Corynebacterium tuberculostearium</i>	-	<i>Staphylococcus epidermidis</i>
36	<i>Staphylococcus epidermidis</i> <i>Enterococcus faecalis</i> <i>Klebsiella pneumoniae</i>	-	<i>Staphylococcus epidermidis</i>
31	<i>Staphylococcus epidermidis</i>	-	<i>Staphylococcus epidermidis</i>
109	<i>Staphylococcus aureus</i>	-	<i>Staphylococcus aureus</i>
110	<i>Staphylococcus aureus</i>	-	<i>Staphylococcus aureus</i>

## CONCLUSIONS

- ✓ Closed needleless connectors can be used as an alternative conservative diagnostic procedure to predict CC.
- ✓ Clinical trials are required to assess the impact of periodic surveillance cultures of closed needleless connectors in the policy of catheter maintenance or withdrawal.

Table 1. Main patients' and catheters' characteristics

Characteristics	N (%)
<b>Patients (N=49)</b>	
Mean (SD) age, years	64.47 (14.2)
Sex male/female	28/21
<b>Underlying conditions</b>	
Myocardial infarction	10 (20.4)
Congestive heart failure	18 (36.7)
Central nervous system (ACVA)	2 (4.1)
Chronic obstructive pulmonary disease	11 (22.4)
Diabetes mellitus	18 (36.7)
Peptic ulcer disease	7 (14.3)
Peripheral vascular disease	5 (10.2)
Renal dysfunction	8 (16.3)
EuroSCORE (SD)	6.68 (3.1)
Mean (SD) comorbidity index (Charlson's criteria)	2.18 (1.7)
Nonfatal underlying disease (McCabe & Jackson)	45 (91.8)
Mean (SD) APACHE II at admission	8.67 (3.4)
Median (IQR) length of ICU stay, days	8.5 (5.2-13.0)
C-RBSI episodes	3 (6.1)
Crude mortality	8 (16.3)
<b>Central venous systems (N=75)</b>	
<b>Type of catheter</b>	
Non-tunneled central venous catheter	57 (60.0)
Swan-Ganz	1 (1.3)
Arterial	2 (2.7)
Shaldon	4 (5.3)
Introducer sheath	11 (14.7)
<b>Location</b>	
Jugular	60 (80.0)
Subclavian	8 (10.7)
Femoral	7 (9.3)
Total parenteral nutrition/propofol	13 (17.3)
<b>Reasons for catheter withdrawal</b>	
End of use	50 (66.7)
Suspicion of infection	12 (16.0)
Others	13 (17.3)
Mean (SD) days of catheter exposure	10.8 (9.4)
<b>Catheter colonization</b>	8 (10.7)
Catheter colonization density per 1,000 catheter-days	9.91