

Can catheter slicing be replaced by sonication for the diagnosis of neonatal intravascular catheters' colonization?

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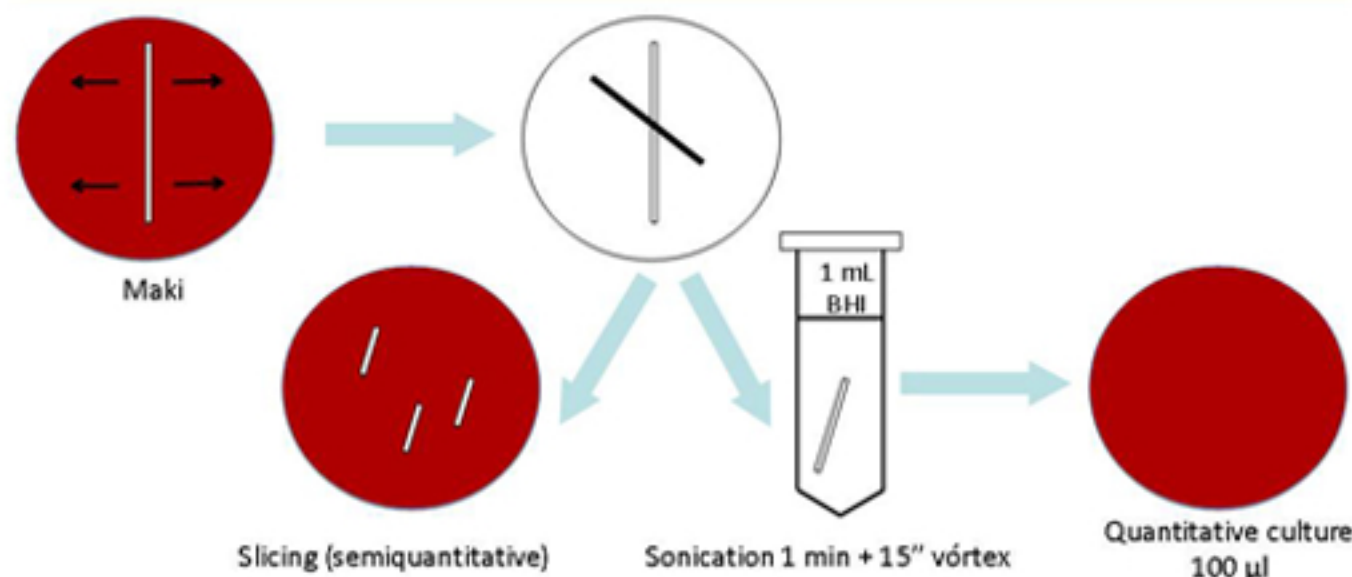
INTRODUCTION AND PURPOSE

- A recent study of our group demonstrated that slicing longitudinally, before culture, silicone neonatal peripherally inserted central catheters (SN-PICCs) showed better results than the roll-plate technique (Maki) to detect catheter colonization tips (Martín-Rabadán et al. ECCMID 2014, O189).
- However, this laboratory procedure can represent a risk for healthcare workers. Then, finding a safer and easier alternative procedure to process the SN-PICCs is required.
- The **purpose** of our study was to assess the improvement of sonication for the detection of colonization and catheter-related bloodstream infection (C-RBSI) in SN-PICCs in comparison to the roll-plate technique before and after slicings.

METHODS

- During 6 months we prospectively performed in the Microbiology laboratory catheter tip cultures of SN-PICCs withdrawn from pediatric patients admitted to our institution. The diagnostic procedure is shown in figure 1.
- The gold standard for catheter colonization was the presence of ≥ 15 cfu/plate in Maki and/or ≥ 15 cfu/plate in slicing and/or ≥ 100 cfu/catheter segment in sonication. C-RBSI was defined as the isolation of the same microorganism(s) both in the catheter tip and in blood cultures obtained 7 days before or after catheter withdrawal.

Figure 1. Microbiological procedure



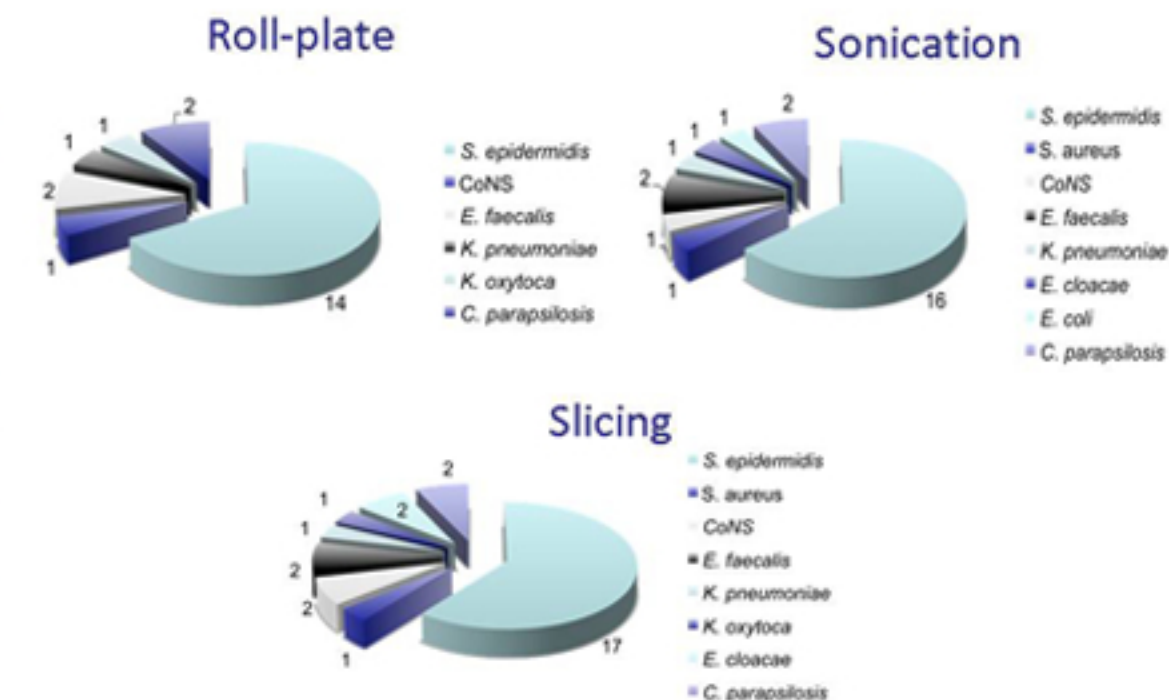
RESULTS

- We included a total of 90 SN-PICCs.
- The prevalence of colonization and C-RBSI was 32.2% (29/90) and 23.3% (21/90), respectively. The rate of colonized catheters detected only by roll-plate, sonication, and slicing was, respectively: 17/29 (58.6%), 24/29 (82.7%), and 26/29 (89.6%). The rate of C-RBSI episodes detected only by roll-plate, sonication, and slicing was, respectively: 14/21 (66.7%), 18/21 (85.7%), and 19/21 (90.5%). Figure 2 shows the microorganisms distribution of colonized catheters detected by each technique.
- When we compared the validity values to predict CC and C-RBSI of the three techniques, we found that sonication and slicing were significantly better than roll-plate ($p < 0.001$) (table 1).

Table 1. Validity values of the laboratory procedures to predict catheter colonization and C-RBSI

	S% 95% CI	SP% 95% CI	PPV% 95% CI	NPV% 95% CI	Validity Index 95% CI	Prevalence 95% CI	LR+ 95% CI	LR- 95% CI
Catheter colonization								
Roll-plate	58.6 (38.9-78.2)	100 (99.2-100)	100 (97.0-100)	83.5 (74.3-92.7)	86.7 (79.0-94.2)	32.2 (22.0-42.4)	NA	0.41 (0.27-0.64)
Sonication	82.7 (67.3-98.2)	100 (99.2-100)	100 (97.9-100)	92.4 (85.2-99.5)	94.4 (89.1-99.7)	32.2 (22.0-42.4)	NA	0.17 (0.08-0.38)
Slicing	89.6 (76.8-100)	100 (99.2-100)	100 (98.0-100)	95.3 (89.3-100)	96.6 (92.4-100)	32.2 (22.0-42.4)	NA	0.10 (0.04-0.30)
C-RBSI								
Roll-plate	66.7 (44.1-89.2)	100 (99.3-100)	100 (96.4-100)	90.8 (83.6-97.9)	92.2 (86.1-98.3)	23.3 (14.0-32.6)	NA	0.33 (0.18-0.61)
Sonication	85.7 (68.4-100)	100 (99.3-100)	100 (97.2-100)	95.8 (90.5-100)	96.7 (92.4-100)	23.3 (14.0-32.6)	NA	0.14 (0.05-0.41)
Slicing	90.5 (75.5-100)	100 (99.3-100)	100 (97.4-100)	97.2 (92.6-100)	97.8 (94.2-100)	23.3 (14.0-32.6)	NA	0.10 (0.03-0.36)

Figure 2. Microorganisms distribution according to each diagnostic procedure



CONCLUSION

- ✓ Demonstration that Silicone-Neonatal Peripherally Inserted Central Catheters (SN-PICCs) are causative of episodes of CR-BSI requires tips cultures not only by the Maki's Roll-Plate technique but also cultures of catheter strips sliced from the tip (and rolled) or sonication.
- ✓ The risk of sticks of Health Care Workers with the slicing blades suggest that sonication is an acceptable alternative.