Continuous infusion of low-dose heparin for maintaining PICC in neonates: a continuous debate?

Tim Hundscheid¹, Ilja E. Heijting¹, Joris Fuijkschot², Tim Antonius¹

¹Radboud university medical centre, Radboud Institute for Health Sciences, Amalia Children's Hospital, Department of Paediatrics, Division of Neonatology, Nijmegen, The Netherlands; ²Radboud university medical centre, Radboud Institute for Health Sciences, Amalia Children's Hospital, Department of Paediatrics, Nijmegen, The Netherlands

Background and aims

Peripherally inserted central catheters (PICC) are often used in neonatal care. Two major complications are catheter occlusion and central line associated bloodstream infections (CLABSI). In our neonatal intensive care unit continuous infusion of low-dose heparin (0.5 unit/kilogram/hour) is used for PICC maintenance.

As heparin is considered a high-alert drug, the continuous low-dose infusion of heparin is terminated when patients are transferred to our paediatric, medium care, ward.

Aims
Efficacy and safety of continuous low-dose heparin infusion for PICC maintenance in neonates.

Methods

We searched for randomised controlled trials (RCTs) in PubMed, EMBASE and the Cochrane library with the search terms PICC, heparin and neonate. References from reviews and included articles were analysed for additional RCTs. We performed a meta-analysis (Mantel-Haenszel (M-H)/inverse-variance (IV), fixed effect) for continuous low-dose heparin infusion (treatment) versus no heparin (control). Outcome is presented as risk ratio or mean difference [95% confidence interval].

Methods
Systematic literature review with meta-analysis of available RCTs.

Results

A total of four RCTs (n=716) could be included for the meta-analysis. These RCTs were of good quality, with a low risk of bias (FIGURE I). Small (23 to 27G) PICC were used. The treatment group (n=355) had a significantly better efficacy in PICC maintenance (TABLE I), without a difference in safety outcome parameters (TABLE II).

References
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TABLE I – Efficacy of continuous low-dose heparin infusion (treatment) versus no heparin (control) in neonates with PICC

Outcome	Studies	Patients	Statistical method	Effect estimate
Days of catheter patency	4	716	Mean Difference ¹	2.09 [1.21-2.97]
Catheter occlusion	4	716	Risk Ratio ²	0.41 [0.29-0.57]
Elective PICC removal	4	716	Risk Ratio ²	1.42 [1.23-1.65]

TABLE II – Safety of continuous low-dose heparin infusion (treatment) versus no heparin (control) in neonates with PICC

Outcome	Studies	Patients	Statistical method	Effect estimate
Episodes of CLABSI	4	716	Risk Ratio ²	0.77 [0.42-1.40]
New or progression of IVH	4	627	Risk Ratio ²	0.57 [0.5-1.33]
Mortality	4	716	Risk Ratio ²	0.91 [0.45-1.84]

IVH intraventricular haemorrhage;
¹ IV, Fixed Effect [95% confidence interval]; ² M-H, Fixed Effect [95% confidence interval]

FIGURE I – Risk of bias table of included RCTs

Conclusions

- Continuous low-dose heparin infusion prolongs the duration of PICC patency, hereby increasing the chance of completion of therapy and elective PICC removal, at least in small (23-27G) PICC.
- Continuous low-dose heparin infusion is not associated with an increase in adverse effects.

Conclusion
Continuous low-dose heparin infusion for small PICC in neonates leads to increased duration of patency, less catheter occlusions and increased elective PICC removal without an increase in adverse effects.

Tim Hundscheid, MD
Paediatric resident in training, PhD student BeNeDuctus trial
Radboudumc – Amalia Children's Hospital
Geert Grooteplein Zuid 10
6525 GA Nijmegen, The Netherlands
✉ tim.hundscheid@radboudumc.nl

Amalia Children's Hospital
Institute for Health Sciences
Radboudumc