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Impact of needle type on substitution volume during online hemodiafiltration: Plastic cannula versus metal needles

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Objectives: Plastic cannulae have attracted increasing interest as an alternative to traditional metal needles with the aim of reducing cannulation-related complications and improving vascular access outcomes. We investigated whether the substitution volumes during hemodiafiltration differ between the use of these two types of needles in dialysis patients.

Methods: A prospective observational study involving 26 hemodialysis patients was conducted in Korea between March and September in 2021. Patients first received online hemodiafiltration using traditional metal needles and thereafter plastic cannulae were used in a stepwise protocol. A repeated-measures design and linear mixed-effect models were used to compare substitution volumes between the two types of needles.

Results: The mean patient age was 62.7 years and their mean dialysis vintage was 95.2 months. Most patients (92%) had an arteriovenous fistula as the vascular access. The substitution volume increased as blood flow and needle size increased for both plastic cannulae and metal needles. For 16G needles, the substitution volume was significantly higher with plastic cannulae than with metal needles at blood flow rates of 280, 300, and 330 mL/min. Similar results were obtained for 15G needles at a blood flow rate of 330 mL/min. However, the patient ratings of pain on a visual analog scale were higher for plastic cannulae.

Conclusions: Higher substitution volumes were obtained at the same prescribed blood flow rate with plastic cannulae than with metal needles during online hemodiafiltration. Plastic cannulae are an option for achieving high-volume hemodiafiltration for patients with a low blood flow rate.