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Abstract Title	Intravenous delivery dynamics of viscous fluid for pediatric patients: Comparison between a newly developed cylinder pump and a traditional syringe pump
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Background and Aims

◆ In pediatric care, intravenous drugs are preferably administered using infusion devices.

- Prompt and accurate drug delivery: highly important
- The delay and the variability in speed of the delivery: a serious problem in pediatric patients, especially when the drug is viscous or thick fluid

◆ A cylinder pump has been recently introduced in critical care.

- Delivers predetermined volume according to the movement of the cylinder (Fig. 1)
- As yet, its performance in pediatric care has not been investigated.

Fig. 1 The mechanism of a cylinder pump

In this study, we compare the performance of cylinder pump with a widely used syringe pump in aspect of drug delivery performance using highly viscous, thick intravenous fluid in a range of pediatric dose.

Methods and Results

◆ Traditional syringe pump (PerfusorSpace™, Bbrn) and a recently developed cylinder pump (Anyfusion V-100™, Meinntech) were compared (Fig. 2).

- To simulate the delivery of highly viscous, thick intravenous drug to a pediatric patient of 3 Kg, 15% mannitol with flow rate of 10.0 ml/hr was delivered.
- The delivered fluid was collected within a collecting burette with 0.1 ml graduations.
- The pump's output in each minute and the volume lag (expected deliver volume - actual delivered volume; expressed as percentile) was calculated.
- Start-up delay, and time lag in completion (set completion time of 60 min – actual completion time) were recorded.
- Statistic comparisons between the two pumps were made with Mann-Whitney test.

Fig. 2 Anyfusion V-100

◆ Fig. 3 presents volume lag of the two pumps.

- At each time point, syringe pump (black bar) presents larger volume lag compared to cylinder pump (grey bar) ($P < 0.01$).

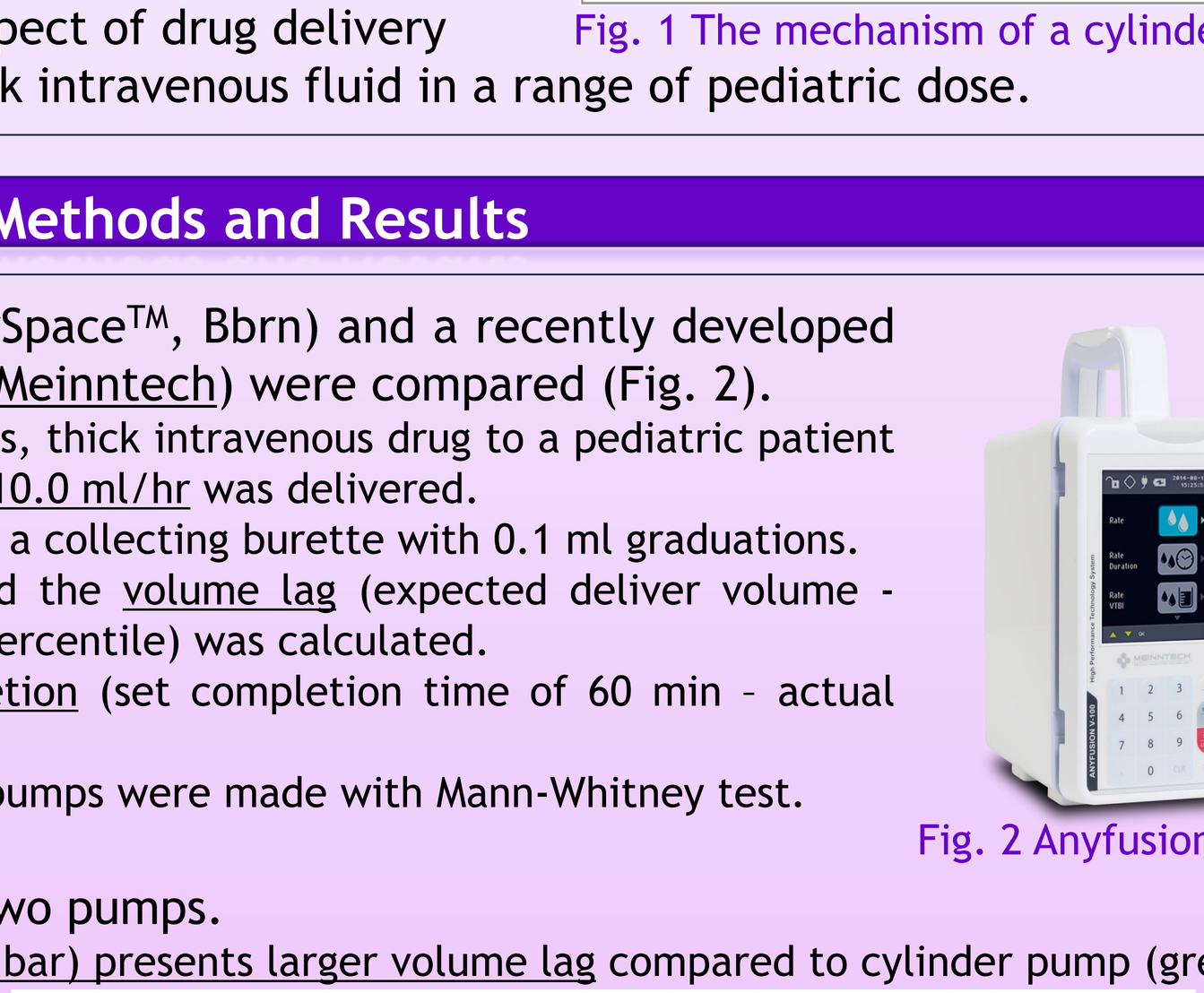

Fig. 3 Volume lag (percentile) during 60-minute infusion with the two pumps

◆ Cylinder pump showed shorter start-up delay (6.9 ± 1.7 vs. 59.9 ± 43.3, $P < 0.01$) and shorter time lag in completion (14.2 ± 36.8 vs 224.6 ± 121.2, $P < 0.01$).

Conclusions

The difference between the pre-set volume and actual deliver volume was smaller in cylinder pump than syringe pump throughout the experiment. Thus, the cylinder pump can be adopted in pediatric care with better safety profile when compared to syringe pump.

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