



THE EFFECT OF INFUSION PUMP ON MANNITOL DELIVERY IN PEDIATRIC NEURO CRITICAL CARE

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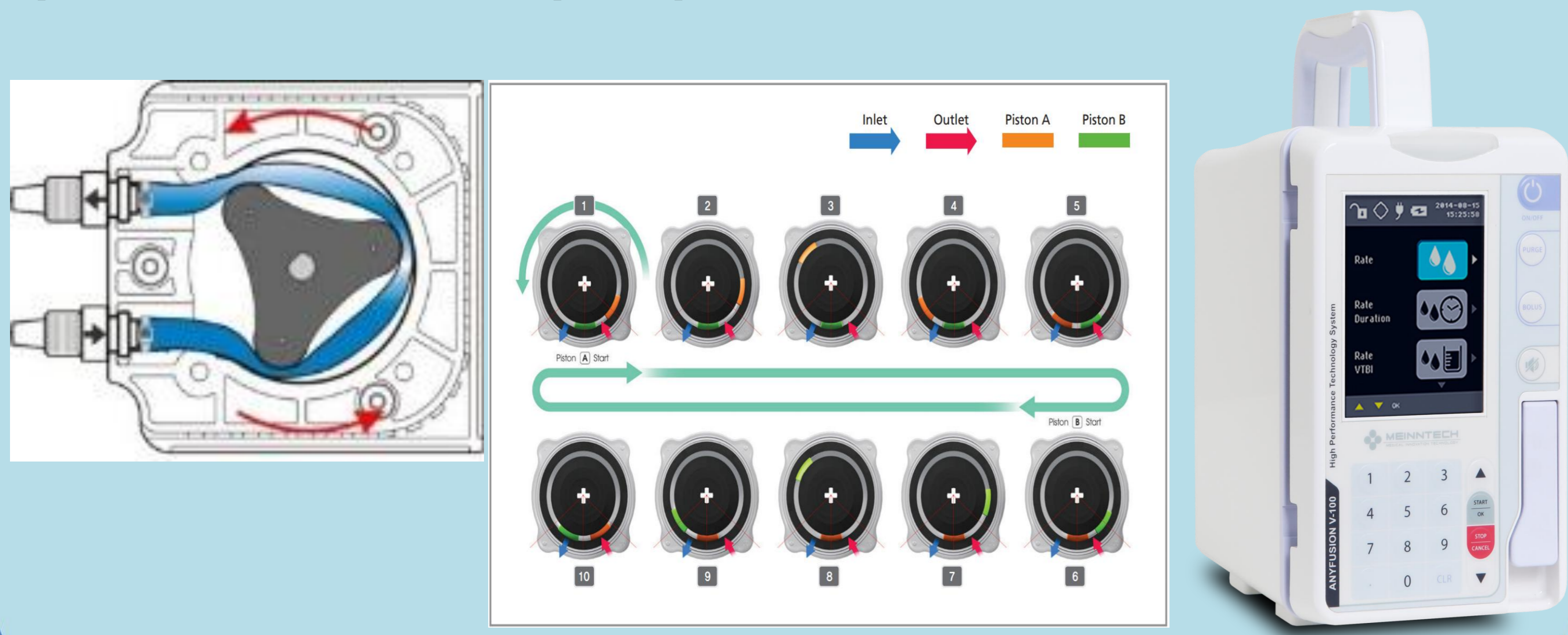


Background

In pediatric neurocritical care, mannitol is preferably administered using an infusion pump. Delay in drug delivery with infusion pump is a serious safety concern in pediatric critical care especially when delivering at low flow rate or viscous or thick fluid (1,2). Recently, a cylinder-type intravenous infusion pump has been introduced in critical care. As yet, its performance on mannitol (high viscosity), in a range of pediatric dose (low flow rate) has not been tested.

Objective

In this study, we investigated the performance of cylinder infusion pump in drug delivery dynamics of pediatric dose of mannitol by comparing to conventional peristaltic infusion pump.

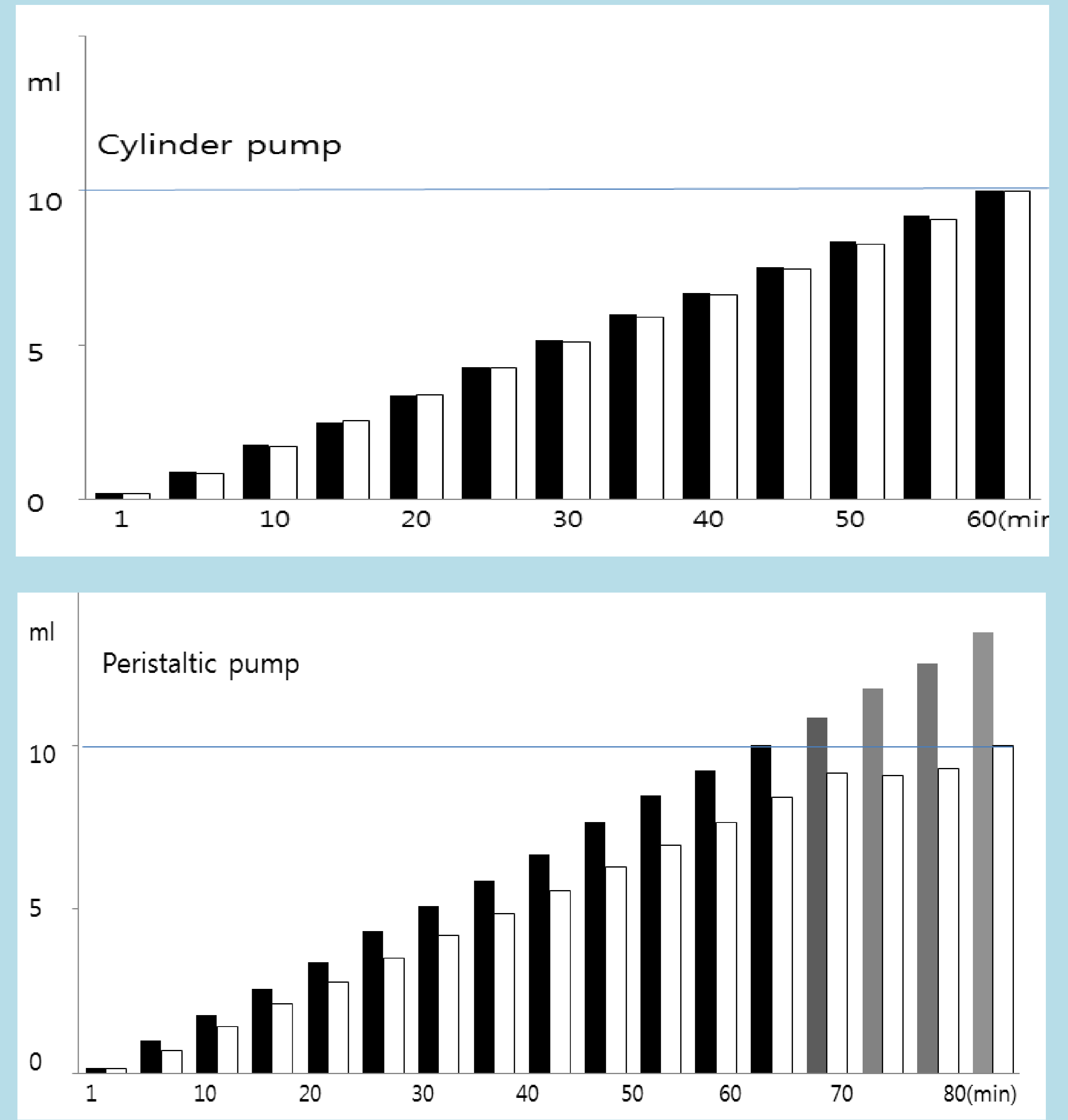


Materials and Methods

To simulate delivery of the 15% mannitol to a neonatal patient of 3 Kg, flow rate of 10.0 ml/hr was delivered using peristaltic pump (InfusomatP™, Bbrn) and cylinder pump (Anyfusion V-100™, Meinttech). The actual volume of delivered fluid in each minute, start-up delay, and the time to completion (delivery of 10 ml mannitol) were recorded. Each test repeated 7 times and Mann-Whitney test was used for comparison.

Results

Fig. 1 shows the difference between the actual (grey column) / expected (black column) volume of delivered fluid. Peristaltic pump shows considerable time lag.



Start up delay is significantly shorter in cylinder driven pump than peristaltic pump (8.1 ± 3.9 s vs. 19.4 ± 12.3 s, $P = 0.002$). Time to completion of cylinder pump (60.3 ± 0.9 min) is similar to the expected completion time of 60 min. In contrast, that of peristaltic pump was significant longer (71.0 ± 6.0 min, $P = 0.01$) with considerable variation (min-max = 67- 81 min).

Conclusion

The peristaltic pump shows considerable delay in delivery of pediatric dose of mannitol. In contrast, the cylinder pump shows more accurate delivery in terms of actual delivered volume and start up delay, and can be a better choice for mannitol delivery in pediatric neurocritical care.

Reference

- 1) 2016 FDA. <http://www.fda.gov/MedicalDevices/Safety/AlertsandNotices/ucm518049.htm>
- 2) Crit Care Med 2010;11:282

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