

Contents lists available at [ScienceDirect](http://ScienceDirect.com)

American Journal of Emergency Medicine

journal homepage: www.elsevier.com/locate/ajem

Case Report

An alternative for rapid administration of medication and fluids in the emergency setting using a novel device ☆,☆☆



Abstract

Routes of administration for medications and fluids in the acute care setting have primarily focused on oral, intravenous, or intraosseous routes, but, in many patients, none of these routes is optimal. A novel device (Macy Catheter; Hospi Corp) that offers an easy route for administration of medications or fluids via rectal mucosal absorption (proctoclysis) has recently become available in the palliative care market; we describe here the first known uses of this device in the emergency setting. Three patients presenting to the hospital with conditions limiting more typical routes of medication or fluid administration were treated with this new device; patients were administered water for hydration, lorazepam for treatment of alcohol withdrawal, ondansetron for nausea, acetaminophen for fever, aspirin for antiplatelet effect, and methimazole for hyperthyroidism. Placement of the device was straightforward, absorption of administered medications (judged by immediacy of effects, where observable) was rapid, and use of the device was well tolerated by patients, suggesting that this device may be an appealing alternative route to medication and fluid administration for a variety of indications in acute and critical care settings.

Routes of administration for medications and fluids in the acute care setting, such as emergency departments (EDs) and intensive care units (ICUs) have primarily focused on oral, intravenous (IV), or intraosseous routes, but, in many patients, none of these routes is optimal. Patients who are volume depleted, with difficult vascular access, and poor oral tolerance are often not sick enough to require central line placement or sedated enough to tolerate intraosseous placement.

A novel device (Macy Catheter; Hospi Corp) that offers an easy route for administration of medications or fluids via rectal mucosal absorption (proctoclysis) has recently become available in the palliative care market. The catheter is a thin silicone tube 14F in diameter with a 15-mL balloon at the tip (sized to allow secure retention yet also provide for ready elimination in the event of need for defecation), multiple exit ports for fluid and medication passage, and an internal 1-way check valve to prevent backflow of fluids. Hypothesizing the potential benefits of this approach in a wider patient population, we describe here the first known uses of this device in the acute care (ED and ICU) setting.

An 80-year-old man with multiple medical comorbidities (obesity, chronic leg wound, skin grafts, hypertension, coronary artery disease, and chronic obstructive pulmonary disease) presented to the ED via ambulance with fever, decreased mental status, and cough. Attempts at IV access by ambulance personnel were unsuccessful. Initial vital signs were blood pressure (BP), 124/68 mm Hg; heart rate (HR), 98 beats per minute; temperature (T), 38.4°C; oxygen saturation of 92% on 2-L nasal cannula; and Glasgow Coma Scale of 14 (due to confusion). Because the patient's mental status was felt to preclude oral administration, but his BP and clinical condition did not warrant central IV access, we began treatment via placement of the Macy Catheter, whereas laboratories were drawn, and peripheral IV access was attempted in the ED. After the Macy Catheter was placed in the rectum, the balloon was inflated with water, and we administered a total of 50 mL of fluids and medications, including water, aspirin tablets dissolved in water, and acetaminophen (oral formulation), whereas peripheral IV access was established. Approximately 90 minutes later, the patient was afebrile (36.5°C), alert, and oriented, with laboratories showing an elevated white blood cell count and chest x-ray demonstrating pneumonia. After demonstrating the ability to tolerate oral liquids, the Macy Catheter was removed.

A 41-year-old woman presented via ambulance in alcohol withdrawal with vital signs of BP, 110/78 mm Hg; HR, 120 beats per minute; T, 36.9°C; and oxygen saturation of 98% on room air. Her Clinical Institute Withdrawal Assessment of Alcohol score was 9. Attempts at obtaining IV access for administration of fluids and benzodiazepines were unsuccessful, and the patient was deemed too disoriented and agitated to safely tolerate oral administration. The Macy Catheter was consequently placed without difficulty, and 2 mg of lorazepam were administered, resulting in immediate improvement of the patient's agitation, orientation, and tachycardia. The patient was then given 4 mg of ondansetron via the Macy Catheter, along with multiple aliquots of tap water at a rate of 10 mL every 2 to 10 minutes over the subsequent hour, resolving her tachycardia and eliminating her nausea. Her Clinical Institute Withdrawal Assessment of Alcohol score decreased to zero.

A 25-year-old woman presented via ambulance with acute confusion, agitation, and tachycardia resulting from substance abuse (cocaine and heroin) with an underlying untreated hyperthyroidism for which the patient was previously taking methimazole. Her vital signs were BP, 118/73 mm Hg; HR, 117 beats per minute; T, 37.4°C; and oxygen saturation of 97% on room air. Intravenous access was established with some difficulty; however, the patient remained too confused and agitated to safely tolerate methimazole, which is only available in tablet form. To administer her methimazole, the Macy Catheter was easily placed; the methimazole tablets were administered after being crushed and

☆ Funding: None.

☆☆ Conflicts of interest: None.

suspended in water. The Macy Catheter remained in place in the ICU for subsequent administrations every 6 hours, until the patient improved sufficiently to begin tolerating oral intake the day after admission.

The absorption of fluids and a wide variety of medications by the rectal mucosa is well described [1–5]. In fact, the administration of fluids for hydration is specifically referred to as proctoclysis or rectoclysis and has a long history of use, dating back to at least the early 1900s [6–9]. A recent report highlights the potential of this approach in emergent and remote settings because no sterility or complex training is required [10]. However, practical use of this route has been limited due to the lack of a simple, effective means of administration with the ability to ensure secure retention of the administered fluids or medications.

The Macy Catheter became available in 2014, intended for palliative care and hospice patients. Because of its simplicity and potential attractiveness for use with our acute care patient population, our hospital recently began trialing the Macy Catheter for emergency and intensive care patients and has identified a number of benefits to this approach. Placement is easy and fast, with no need for sterility or advanced training, as the device is placed analogously to a standard Foley catheter but in the rectum rather than bladder. Absorption through rectal mucosa is rapid, with blood levels of many drugs (aqueous and alcoholic solutions in particular) becoming therapeutic very rapidly (potentially due to avoidance of the first-pass effect) [11]. Our experience has found that noticeable effects of lorazepam occurred less than 1 minute after rectal administration via the Macy Catheter and that the antipyretic effects of acetaminophen and antiemetic effects of ondansetron also appeared soon after administration. The avoidance of the need for repeated attempts at difficult vascular access or placement of central venous access is appreciated by nurses, physicians, and patients alike.

Limitations of this report include the inherent retrospective nature of a case series. We did not perform a formal measurement of the total volumes of fluids administered or obtain a robust quantification of the timing between administration and observation of effects. We did not perform any pharmacokinetic laboratory measures to determine efficacy of administered medications and relied solely on clinical response. As recommended by the manufacturer, we used plain tap water for all of our flushes and to dissolve the oral formulations of aspirin and methimazole. Absorption from suppositories is generally slower than aqueous solutions and is dependent on the nature of the suppository base [11], but subtle influences on absorption rates from other unmeasured factors may influence our findings.

In summary, a novel rectal administration device appears to offer an appealing alternative route to medication and fluid administration for a variety of indications in acute and critical care settings.

Neal Lyons, PharmD
Department of Pharmacy Services
Advocate Christ Medical Center, Oak Lawn, IL 60453

Daniel Nejak, MD
Department of Emergency Medicine
Advocate Christ Medical Center, Oak Lawn, IL 60453

Nadine Lomotan, PharmD
Robert Mokszycki PharmD
Department of Pharmacy Services
Advocate Christ Medical Center, Oak Lawn, IL 60453

Stephen Jamieson, MD
Department of Emergency Medicine
Advocate Christ Medical Center, Oak Lawn, IL 60453

Marc McDowell, PharmD
Department of Pharmacy Services
Advocate Christ Medical Center, Oak Lawn, IL 60453

Erik Kulstad, MD, MS*
Department of Emergency Medicine
Advocate Christ Medical Center, Oak Lawn, IL 60453

*Corresponding author. Tel.: +1 708 684 3889;
fax: +1 708 684 1028
E-mail address: kulstad@uic.edu

<http://dx.doi.org/10.1016/j.ajem.2015.01.028>

References

- [1] Chiang LM, Wang HS, Shen HH, Deng ST, Tseng CH, Chen YI, et al. Rectal diazepam solution is as good as rectal administration of intravenous diazepam in the first-aid cessation of seizures in children with intractable epilepsy. *Pediatr Neonatol* 2011;52:30–3.
- [2] Pasero C. Perioperative rectal administration of nonopioid analgesics. *J Perianesth Nurs* 2010;25:5–6.
- [3] Fouad EA, El-Badry M, Alanazi FK, Arafah MM, Al-Ashban R, Alsarra IA. Preparation and investigation of acetyl salicylic acid-caffeine complex for rectal administration. *Pharm Dev Technol* 2010;15:249–57.
- [4] Zweig SB, Schlosser JR, Thomas SA, Levy CJ, Fleckman AM. Rectal administration of propylthiouracil in suppository form in patients with thyrotoxicosis and critical illness: case report and review of literature. *Endocr Pract* 2006;12:43–7.
- [5] Nabil N, Miner DJ, Amatruda JM. Methimazole: an alternative route of administration. *J Clin Endocrinol Metab* 1982;54:180–1.
- [6] Needham D. Proctoclysis for hydration. *Lancet* 1995;345:596.
- [7] Bruera E, Schoeller T, Pruvost M. Proctoclysis for hydration of terminal cancer patients. *Lancet* 1994;344:1699.
- [8] Trout HH. Proctoclysis: some clinical and experimental observations. *J Am Med Assoc* 1912;LVIII:1352–4.
- [9] Murphy JB. Proctoclysis in the treatment of peritonitis. *J Am Med Assoc* 1909;LII:1248–50.
- [10] Tremayne V. Emergency rectal infusion of fluid in rural or remote settings. *Emerg Nurse* 2010;17:26–8.
- [11] de Boer AG, Moolenaar F, de Leede LG, Breimer DD. Rectal drug administration: clinical pharmacokinetic considerations. *Clin Pharmacokinet* 1982;7:285–311.