cle that appropriate one-time doses of long-acting parenteral antibiotics were more frequently given in the cephalosporin group compared to the FQ/TMP-SMX group (78% vs. 53%, respectively). It would be of interest to see an analysis that separates patients discharged on TMP-SMX and FQ who received appropriate one-time doses of parenteral antibiotics from those who did not. This would allow for a clearer assessment into identifying any relationship between treatment failure and resistance (as mentioned above) or receipt of one-time dose antibiotics. We believe these are important parameters that the authors should have explored to determine why patients in the FQ/TMP-SMX group were less likely to be given an appropriate one-time dose of a long-acting parenteral antibiotic and perhaps address this through appropriate intervention at their institution.

Ultimately, the study demonstrated no treatment failures with oral cephalosporin therapy. Nevertheless, the conclusion that oral cephalosporins may be more appropriate therapy for uncomplicated pyelonephritis compared to FQs and TMP-SMX should be interpreted with caution.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Potential conflicts of interest

William R. Truong: No conflict.
Kimberly J. Won: No conflict.
Jason Yamaki: No conflict.

Acknowledgments

None.

William R. Truong PharmD
Department of Pharmacy, St. Joseph Hospital, Orange, CA, USA

Kimberly J. Won PharmD
Jason Yamaki PharmD, PhD *
Department of Pharmacy Practice, Chapman University School of Pharmacy, Irvine, CA, USA
Corresponding author.
E-mail address: Yamaki@chapman.edu (J. Yamaki)

30 March 2019

https://doi.org/10.1016/j.ajem.2019.04.008

References

[1] Vogler S, Pavich E. Pyelonephritis treatment in the community emergency department: cephalosporins vs. first-line agents. Am J Emerg Med 2018;36(11):2054–7.
[2] Gupta K, Hooton TM, Naber KG, et al. International clinical practice guidelines for the treatment of acute uncomplicated cystitis and pyelonephritis in women: a 2010 update by the Infectious Diseases Society of America and the European Society for Microbiology and Infectious Diseases. Clin Infect Dis 2011;52(5):e103–20.

A-scan ultrasonography to detect intracranial hypertension in patients with hyponatremia

Dear Editor,

We read with great interest the significant paper written by Demir et al. concerning predictive and prognostic value of optic nerve sheath diameter (ONSD) measurement associated with hyponatremia in emergency department [1].

We congratulate the authors for the originality of their article, but we would like to comment some aspects regarding the ONSD ultrasound evaluation.

In their study, Demir et al. utilized B mode ultrasound to measure ONSD in patients with hyponatremia, to detect potential intracranial pressure elevation. However, we consider this ultrasound technique unreliable for this purpose, because of the blooming effect [2-9]. B mode has been used for more than 50 years to diagnose several ocular and orbital diseases [10-12], but for measurements of small structures, such as ONSD, it has proven to be quite untrustworthy due to this effect. In fact, with decreasing the gain, the ONSD appears larger, so the absence of a standard gain setting when performing the examination means we cannot calibrate the author's results with others already published.

This effect may be overlooked with large structures, but not when resolution below 0.5 mm is assumed, as for ONSD appraisal.

For this reason we suggest the use of Standardized A Scan technique, a blooming effect free ultrasound method that displays easily noticeable high spikes from the interface between arachnoid and subarachnoidal fluid, making these measurements more accurate and objective [13,14]. Moreover, A scan examination also allows the "30 degrees test", which can discriminate between ONSD increase caused by raised intracranial pressure, and ONSD increase associated with other diseases, such as optic neuritis or optic nerve meningioma [15-18].

Furthermore, we would like to advise performing ocular ultrasonography with open eyelids, using methylcellulose and anesthetic drops, to clearly visualize the eye, making the probe orientation much more accurate, avoiding errors in detecting gaze direction [19,20].

Livio Vitiello MD
Maddalena De Bernardo MD, PhD *
Nicola Rosa MD
Department of Medicine, Surgery and Dentistry, "Scuola Medica Salernitana", University of Salerno, Salerno, Italy
* Corresponding author at: Department of Medicine, Surgery and Dentistry, "Scuola Medica Salernitana", University of Salerno, Via S. Allende, 84081 Baronissi, Salerno, Italy.
E-mail address: mdebernardo@unisa.it (M. De Bernardo)

26 March 2019

https://doi.org/10.1016/j.ajem.2019.04.009

References

[1] Demir TA, Yılmaz F, Sönmez BM, Karadaş MA, Okudan RN, Keskin O. Association of optic nerve sheath diameter measurement withhyponatremia in emergency department. Am J Emerg Med 2018. https://doi.org/10.1016/j.ajem.2018.12.054.
[2] De Bernardo M, Rosa N. Transbulbar B-mode sonography in multiple sclerosis: clinical and biological relevance. Ultrasound Med Biol 2018;44(2):508.
[3] De Bernardo M, Rosa N. Clarification on using ultrasonography to detect intracranial pressure. JAMA Ophthalmol. 2017;135(9):1004–5.
[4] De Bernardo M, Marotta G, Rosa N. Sonography of the optic nerve sheath diameter. J Ultrasound Med 2018;37(7):1845.
[5] De Bernardo M, Rosa N. Transorbital sonography to evaluate optic nerve in hypertensive encephalopathy. J Stroke Cerebrovasc Dis 2018;27(4):1124.
[6] Rosa N, De Bernardo M. Measurement of the optic nerve in a resource-limited setting. J Neurosci Rural Practice 2017;8(2):310–1.
[7] Tenuta M, De Bernardo M, Rosa N. Comments on "Neuromuscular ultrasonography of cranial nerves". J Clin Neurol 2017;13(2):212–3.
[8] De Bernardo M, Vitiello L, Rosa N. Optic nerve ultrasonography to predict increased intracranial pressure in idiopathic intracranial hypertension. Neuroradiol J 2019. https://doi.org/10.1177/1971400919832001.
[9] De Bernardo M, Vitiello L, Rosa N. Optic nerve ultrasound measurement in multiple sclerosis. Acta Neurol Scand 2019;139(4):399–400.

[10] Rosa N, Lanza M, Borrelli M, De Bernardo M, Palladino A, Di Gregorio MG, et al. Low intraocular pressure resulting from ciliary body detachment in patients with myotonic dystrophy. Ophthalmology 2011;118(2):260–4.
[11] De Bernardo M, Salerno G, Cornetta P, Rosa N. Axial length shortening after cataract surgery: new approach to solve the question. Transl Vis Sci Technol 2018;7(6):34.
[12] De Bernardo M, Vitiello L, Rosa N. Comment on "Effectiveness and safety of accelerated (9 mW/cm(2)) corneal collagen cross-linking for progressive keratoconus: a 24-month follow-up". Eye (Lond) 2019. https://doi.org/10.1038/s41433-019-0370-x.
[13] Rosa N, De Bernardo M. Ultrasound assessment of optic nerve sheath diameter in healthy volunteers. J Crit Care 2017;40:279.
[14] De Bernardo M, Rosa N. Measuring optic nerve sheath diameter as a proxy for intracranial pressure. JAMA Ophthalmol 2018;136(11):1309–10.
[15] De Bernardo M, Rosa N. Optic nerve sheath diameter measurement in patients with idiopathic normal-pressure hydrocephalus. Eur J Neurol 2018;25(2):e24.
[16] De Bernardo M, Rosa N. Comment on 'Invasive and noninvasive means of measuring intracranial pressure: a review'. Physiol Meas 2018;39(5):058001.
[17] De Bernardo M, Rosa N. Comment on "Optic nerve sheath diameter ultrasound evaluation in intensive care unit: possible role and clinical aspects in neurological critical Patients' daily monitoring". Biomed Res Int 2018;2018:6154357.
[18] Iaconetta G, De Bernardo M, Rosa N. Coronal axis measurement of the optic nerve sheath diameter. J Ultrasound Med 2017;36(5):1073.
[19] De Bernardo M, Vitiello L, Rosa N. Intracranial pressure evaluation in acute liver failure. Neurocrit Care 2019;30(2):495–6.
[20] De Bernardo M, Vitiello L, Rosa N. Ocular ultrasound assessment to estimate the risk of increased intracranial pressure after traumatic brain injury in prehospital setting. Prehosp Emerg Care 2019:11:1–2.

Safety and effectiveness of intravenous prochlorperazine for intractable vomiting in children with gastroenteritis

Prochlorperazine (PCZ) was first introduced as an anti-psychotic in the 1950s, and subsequently found to be effective to control vomiting. It is a weak dopamine receptor blocker and depresses the chemoreceptor trigger zone (1). Although pediatric studies are limited, research suggests the medication is effective to prevent vomiting, the need for intravenous fluids, and hospital admission. The majority of recent literature has focused on the use of PCZ for the treatment of migraine headaches in young people [2-4]. While PCZ has been noted to be fairly well tolerated by children, it has been found that for some it is only effective as a short-term treatment, some children may not respond to the drug, and there are possibly severe and worrisome side effects such as akathisia and dystonia [1-3]. One study noted that 5% of children treated with PCZ had a definitive diagnosis of akathisia, and 34% presented symptoms suggesting a possible diagnosis of akathisia [1]. Another study on adult patients noted that 16% of patients developed akathisia and 4% developed dystonia, and frequently the onset of these side effects occurred after discharge from the emergency department (ED) [5]. While more definitive trials are needed to discover a more accurate frequency of side effects, treatment with PCZ for migraine or vomiting in children continues. In this study, we will report our results on the effectiveness and tolerability of IV PCZ in consecutive children seen in the ED for a severe, intractable vomiting.

We conducted a retrospective, cohort analysis set in an academic, tertiary-care pediatric emergency department over a one-year study period. All pediatric patients (<18 years) who received IV PCZ for treatment of nausea/vomiting associated with gastroenteritis were included in the study. The diagnosis of gastroenteritis was based on the *International Classification of Diseases, Ninth Revision* (*ICD-10*) code. The initial dosage of PCZ (0.1–0.2 mg/kg) was chosen at the discretion of the treating physician and infused by slow intravenous injection at a rate not exceeding 2.5 mg/min. Treatment failures were defined as any patient who failed to respond to PCZ or required an additional anti-emetic within 60 min. Secondary endpoints were akathisia (a strong subjective feeling of restlessness) and dystonia (involuntary muscle spasms or rigidity) documented during the patient's stay in the ED. To assess accuracy of the data collection, 10% of the records were randomly selected and reexamined by one investigator. The consistency of the recording of data was excellent, with a median kappa statistic of 0.87. Data are reported with 95% confidence intervals (CIs), comparisons were analyzed using chi-square and *t*-tests.

A total of 390 patients were enrolled, representing 18% of the children who presented to the ED with gastroenteritis during the study period. The mean age was 14.3 ± 2.7 years old (range 2–17). Overall, 202 patients (52%) were initially treated with 0.1 mg/kg PCZ; 188 (48%) received 0.15–0.2 mg/kg PCZ (Table 1). Patients receiving the higher IV dose tended to be older (15.2 vs. 13.5, $P < 0.001$). There were no other differences in demographics, presence of fever, diarrhea, duration of symptoms, or degree of dehydration between the two groups. Overall, IV PCZ acted rapidly and effectively to decrease the intensity of nausea and vomiting in 88% (95% CI 81% to 89%) of the patients at 1 h and 92% (95% CI 88% to 94%) at 3 h. Twenty-four patients (6%) required a second dose of PCZ to control nausea. Thirty-three patients (8%, 95% CI 6% to 12%) required another antiemetic and were considered treatment failures. Fourteen patients experienced akathisia in the ED, one patient subsequently returned to the ED within 24 h with delayed akathisia (4%). One patient had a dystonic reaction in the ED (0.3%). Three patients returned to the ED within 72 h. All had recurrent vomiting and diarrhea requiring rehydration and were able to return home.

Prochlorperazine has been accepted as an effective antiemetic in adults for more than 60 years. This study demonstrates that PCZ is a useful therapeutic approach in the treatment of vomiting in children with gastroenteritis who cannot tolerate oral rehydration. Despite the retrospective design, our data suggests that intravenous dosing results in a relatively small incidence (4–6%) of akathisia and dystonia. A common belief is that the frequency of adverse effects with PCZ is dose related. Our data failed to find a dose related increased frequency of adverse reactions, but these results may have been limited by sample size considerations (Table 1). One patient experienced a delayed reaction to PCZ and returned to the ED with symptoms of akathisia. We also found that akathisia occurred in seven children despite the use of concomitant diphenhydramine. These findings are consistent with other studies evaluating the use of PCZ in children with migraine [2,3]. Emergency clinicians should be aware of the frequency of adverse reactions to PCZ and educate patients and families about the possibility of delayed adverse reactions even after their discharge from the ED [5]. Children with acute illnesses such as gastroenteritis may be more susceptible to neuromuscular reactions, particularly dystonias, than adults [1]. In almost all cases, complete resolution occurred after administration of an antihistamine such as diphenhydramine. Serious adverse effects (e.g., neuroleptic malignant syndrome, seizure, autonomic collapse, tardive dyskinesia) are rarely associated with PCZ use in children [6].

Antiemetics in children with gastroenteritis have not been well studied and their use is somewhat controversial [1]. Recent practices have placed more emphasis on rehydration measures and less emphasis on pharmacologic interventions, however 79% of surveyed emergency medicine physicians reported using antiemetics for children with gastroenteritis in their practice [4]. The most common indications for antiemetic use were to prevent worsening dehydration, avoid hospital admission, patient comfort, and parenteral concerns [4]. Although PCZ may not be the first choice of treating physicians, it is an effective treatment, although the rate of adverse reactions appears slightly higher than with other