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CASE REPORT

Bedside ultrasound as a simple non-invasive method of assessing intracranial pressure in a limited resource setting

L'échographie au chevet des patients comme méthode non-invasive pour évaluer la pression intracrânienne dans un contexte caractérisé par des ressources limitées

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Introduction: Increased intracranial pressure is usually measured with invasive methods that are not practical in resource-limited countries. However, bedside ultrasound, a non-invasive method, measures the optic nerve sheath diameter and could be a safe and accurate alternative to measure intracranial pressure, even in children.
Case report: We report a case of a 15-year old patient who presented with severe headache, projectile vomiting, and neck pain for two months. The bedside ultrasound showed a 10 mm optic nerve sheath diameter and a Computed Tomography scan of her brain revealed obstructive hydrocephalus secondary to a mass in the fourth ventricle. After intervening, we were able to monitor the decrease in her optic nerve sheath diameter with ultrasound.
Conclusion: Performing invasive procedures continues to be a challenge in the resource limited setting. However, bedside ultrasound can be a useful tool in emergency centres for early detection and monitoring of intracranial pressure.

Introduction: L'hypertension intracrânienne (HTIC) est généralement mesurée au moyen de méthodes invasives qui ne s'avèrent pas pratiques dans des pays caractérisés par des ressources limitées. Cependant, l'échographie au chevet des patients, une méthode non invasive, mesure le diamètre de la gaine du nerf optique (DGNO) et pourrait constituer une alternative sûre et précise pour mesurer l'HTIC, même chez les enfants
Étude de cas: Nous avons étudié le cas d'une patiente de 15 ans qui s'était présentée souffrant de violents maux de tête, de vomissements en jets et de douleurs au cou depuis deux mois. L'échographie au chevet de la patiente a révélé un DGNO de 10 mm et la tomodensitométrie du cerveau a révélé une hydrocéphalie obstructive associée à une masse dans le quatrième ventricule. Après intervention, nous avons pu surveiller la réduction de son DGNO à l'aide de l'échographie
Discussion/Conclusion: La réalisation de procédures invasives reste un défi dans les contextes caractérisés par des ressources limitées. Cependant, l'échographie au chevet du patient peut être un outil utile dans les services d'urgence pour permettre la détection précoce et le suivi de l'HTIC.

African relevance

- Bedside ultrasound can potentially be used to measure increased intracranial pressure in resource-limited settings.

Introduction

Increased intracranial pressure (ICP) is usually measured using invasive methods, which is not practical in Emergency Centres (ECs) in resource limited countries.[1] Bedside ultrasound measuring the optic nerve sheath diameter (ONSD) has been used increasingly and advocated as a non-invasive method to measure ICP even in children.[2–4] This method has been validated to indicate direct ICP and has been successfully used in trauma and intensive care patients and in patients with hydrocephalus.[5–8]

Case report

A 15-year-old female patient presented to the EC with severe headache, projectile vomiting, and neck pain for two months. The headache was global and she rated it as six out of ten pain that was worsening. She also reported blurry vision. She denied trauma to the head, fever, cough, night sweats, weakness and numbness of the extremities, and changes in bowel or bladder habits.

On examination, she was in moderate distress from pain. Her vital signs were as follows: blood pressure 100/70 mmHg, pulse rate 105 beats per minute, respiratory rate 20 breaths per minute, temperature 36.4 °C, and oxygen saturation of 94% on room air. Her physical examination was unremarkable except for photophobia. She had no neck mass, no conjuncti-

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val injection or proptosis. Her extraocular movements were intact and her pupils were equal, round and reactive to light bilaterally.

A complete blood count, chemistry, and hepatic panel were unremarkable. A bedside ultrasound examination (using the 7 MHz linear probe of the portable SonoSite 180plus machine) showed an enlarged ONSD of 10 mm with prominent papilla bilaterally (red arrow in Fig. 1A). The patient was examined in the supine position (head of bed approximately 30–45 degrees of elevation). The probe with ultrasound gel was placed lightly over each closed eye after covering each eye with Tegaderm (3M, St. Paul, MN). To align the optic nerve directly opposite to the probe, the patient was directed to look forward with closed eyes. The ONSD was 3 mm behind the optic disc in both transverse and sagittal planes. Three measurements were averaged and recorded after scanning the largest viewed diameter.

The increased ONSD prompted obtaining a Computed Tomography (CT) scan of the brain which demonstrated a cerebellar mass originating from the fourth ventricle with obstructive hydrocephalus (Fig. 1A–D).

The patient was evaluated by the neurosurgery team and received a ventriculoperitoneal-shunt. Her symptoms improved significantly and a repeat measurement 16 h post-operatively

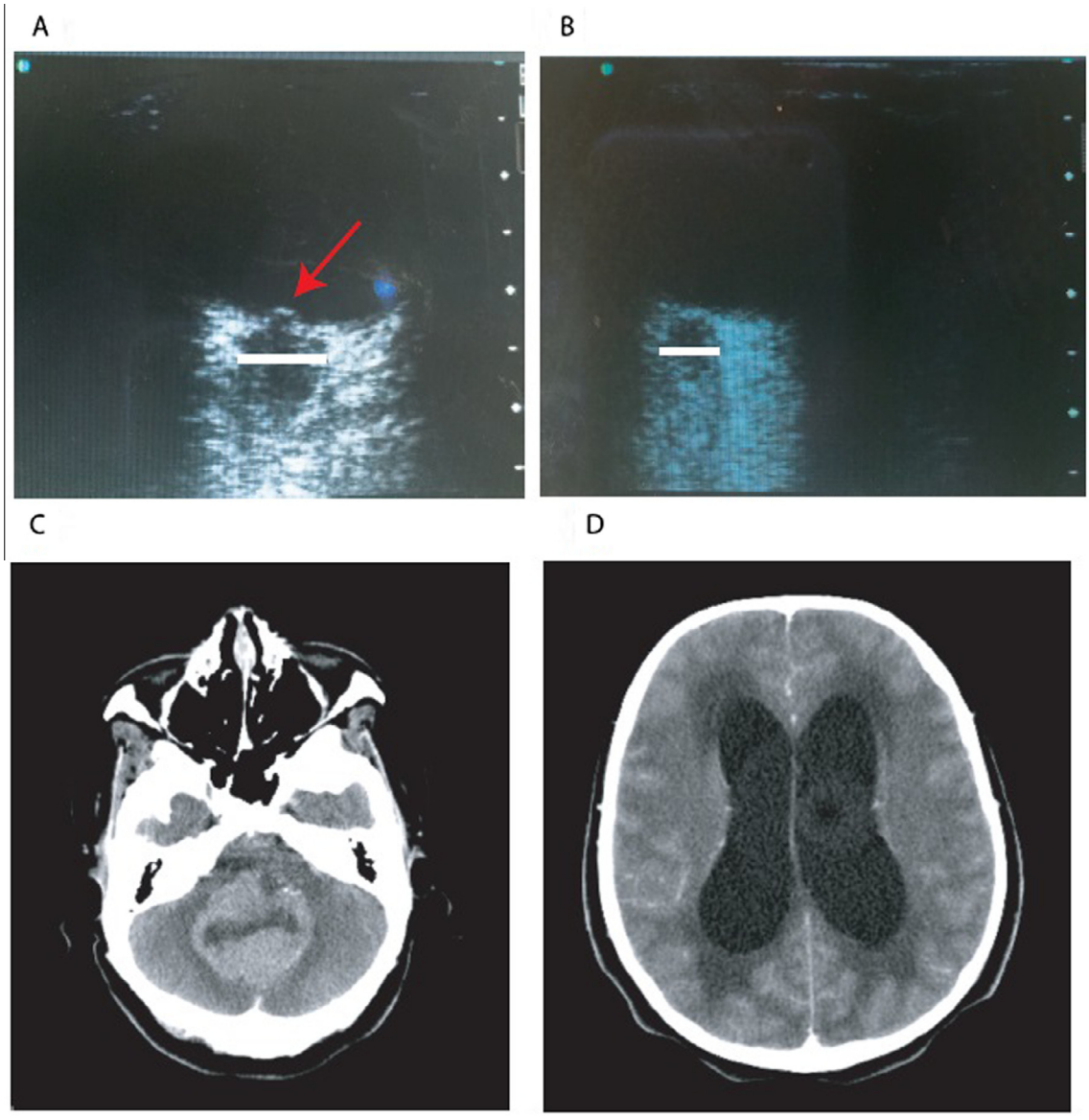

Figure 1 Ultrasound and Computed Tomography scan images of a patient with obstructive hydrocephalus. (A) Ultrasound image showing enlarged optic nerve sheath diameter of 10 mm with prominent papilla (red arrow) pre-operative; (B) Ultrasound image showing diminished optic nerve sheath diameter of 6 mm with resolution of the papilla prominence post ventriculoperitoneal-shunt insertion; (C) Computed Tomography scan images showing a mass in the fourth ventricle causing obstruction; (D) Computed Tomography scan images showing hydrocephalus.