



Transcranial color-coded duplex sonography for bedside monitoring of central nervous system infection as a consequence of decompressive craniectomy after traumatic brain injury

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A young man was admitted to the intensive care unit for severe traumatic brain injury.

Intracranial hypertension was refractory to medical treatment; therefore, he underwent temporo-parietal decompressive craniectomy. After bone repositioning, he became pyrexial and deteriorated neurologically. Transcranial colour-duplex Doppler (TCCD) showed enlarged cerebral ventricles (Fig. 1, ESM1), and hyperechogenic vegetations fluctuating in the posterior horns of the lateral ventricles (Fig. 1, ESM2). Computed tomography (CT) of the head with contrast confirmed the presence of hydrocephalus and severe ventriculitis, with bilateral endo-ventricular vegetations. An external ventricular

drain was inserted and intrathecal antibiotic therapy was started.

Over several days, TCCD showed a marked improvement of the endo-ventricular vegetations. The ventricles remained dilated as the patient developed normotensive hydrocephalus (ESM 1). This case demonstrated that bedside TCCD enables assessing the progression of cerebral complications and their evolution over time, as well as monitoring the position of the EVD's tip; when a good temporal window is available, TCCD can minimize the number of head CTs and the exposure of the patient to radiation.

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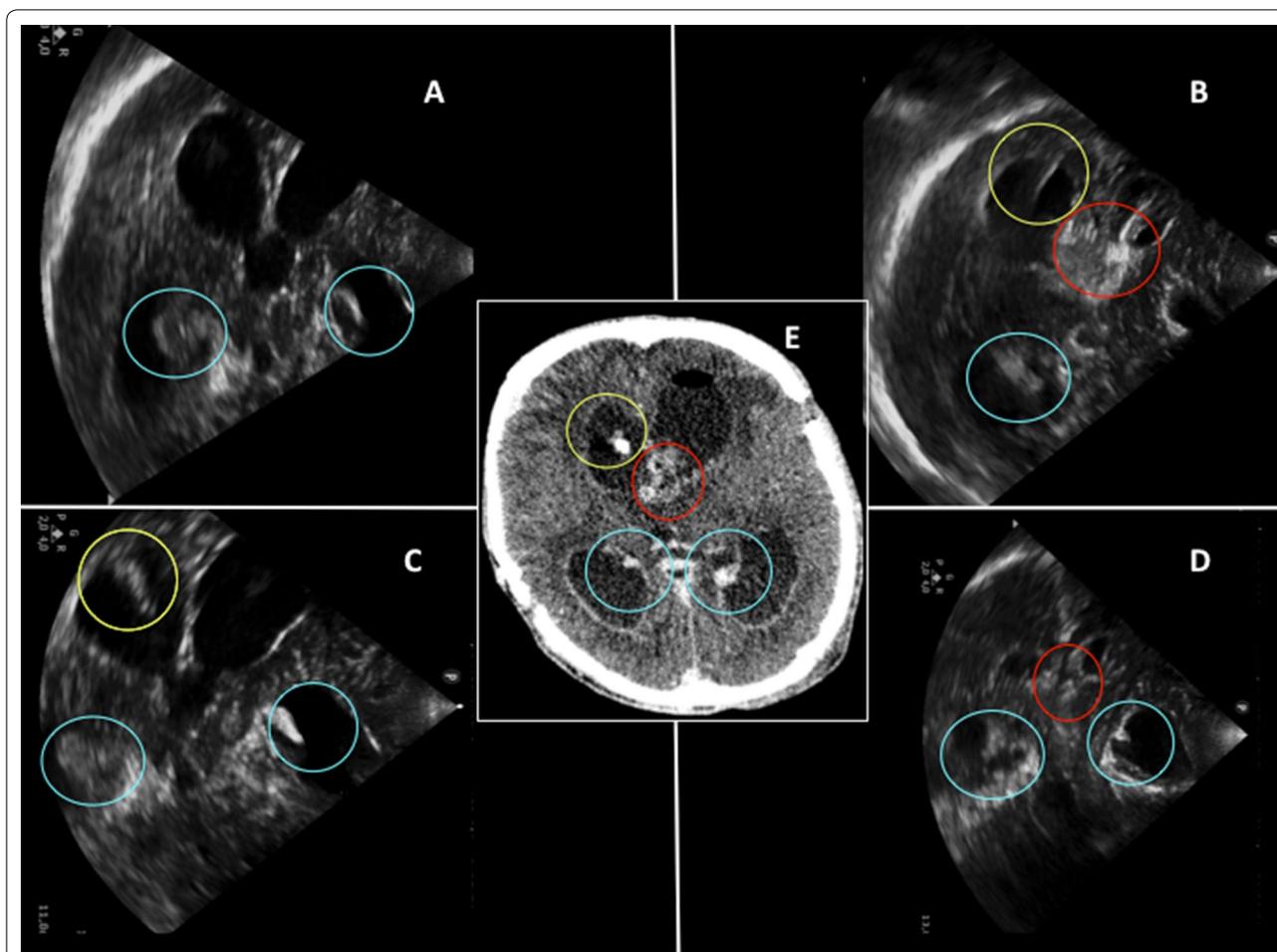


Fig. 1 **a** TCCD performed after the patient's neurological deterioration on the right temporal window at a diencephalic plane showed an altered brain anatomy with hydrocephalus (dilated third and lateral ventricles) and bilateral endo-ventricular vegetations in the posterior horns of the lateral ventricles (blue circles). **b** An external ventricular drain (EVD) was inserted (yellow circle) and was clearly visible using TCCD in the anterior horn of the left lateral ventricle. A hypothalamic haemorrhage, as a consequence of EVD insertion was visible on TCCD as a hyperechogenic structure (red circle) and then confirmed on CT (panel E). **c** TCCD confirmed the correct positioning of the tip of the EVD (yellow circle), and the persistence of the endoventricular vegetations in the posterior horns of the lateral ventricles (blue circle). **d** After a week of intrathecal antibiotic therapy, TCCD showed a clear reduction of the size of the endo-ventricular vegetations (blue circle), and a nearly complete reabsorption of the intracranial haemorrhage. **e** CT head with contrast confirmed the presence of hydrocephalus, (the image has been turned over to better compare it with the TCCD images), correct EVD positioning (yellow circle), hypothalamic haemorrhage (red circle) and ventriculitis with bilateral endo-ventricular vegetations in the posterior horns of the lateral ventricles (blue circles)

Electronic supplementary material

The online version of this article (<https://doi.org/10.1007/s00134-018-5405-4>) contains supplementary material, which is available to authorized users.

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Funding

None.

Compliance with ethical standards

Conflicts of interest

The authors have no conflict of interest.

Ethical approval

Ethical requirement adhered to ethical standards according to local institutional protocol.

Received: 19 September 2018 Accepted: 1 October 2018

Published online: 9 October 2018