
CASE REPORT

Intrauterine Foetal Subdural Haemorrhage Visible on Computed Tomography Scan

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ABSTRACT

Traumatic intrauterine foetal subdural haemorrhage is a rare condition. It is unusual to diagnose this condition by computed tomography scan because of the ionizing radiation hazard. This report describes the radiological findings of intrauterine foetal subdural haemorrhage on computed tomography images. The controversy surrounding computed tomography for pregnant patients is also discussed.

Key Words: Fetus; Hematoma, subdural; Prenatal diagnosis; Tomography, X-ray computed; Wounds and injuries

INTRODUCTION

Trauma to a pregnant woman can result in maternal or foetal injury or both. Intrauterine foetal subdural haemorrhage (SDH) after maternal trauma is a rare entity.^{1,2} Intrauterine foetal SDH has been recognised by ultrasound and magnetic resonance imaging (MRI),^{1,3-8} but it is unusual to diagnose the condition by computed tomography (CT) scan because of the ionizing radiation hazard. This report describes the CT findings of intrauterine foetal SDH. The controversy surrounding CT scan for pregnant patients is also discussed.

CASE REPORT

A 31-year-old woman in the 32nd week of gestation presented in 2008 after being involved in a high-impact road traffic accident. She was a front-seat passenger and was ejected for more than 10 ft from car after a collision with another vehicle. At arrival in the Accident and Emergency Department, Queen Elizabeth Hospital, Hong Kong, her Glasgow Coma Score was 5/15 (E1M3V1). Her pulse was 88 beats/minute and her blood pressure was 115/69 mm Hg. Physical examination showed that her pupils were equal and reactive to light. Extensive lacerations and abrasions were noted on her forehead, back, right forearm, and left thigh.

Focused assessment with sonography for trauma (FAST) scan showed no gross intraperitoneal fluid. A single foetus with heart beat was noted in the uterus. The patient was subsequently intubated. Initial plain radiographs of the cervical spine and pelvis showed no significant abnormality. Chest radiograph revealed a fracture of the proximal left humerus.

Urgent CT scan with intravenous contrast was performed for further assessment of her injuries, and included the brain, cervical spine, thorax, abdomen, and pelvis. Images of the maternal brain revealed bilateral frontal and right temporal bone fractures, pneumocephalus, and bilateral acute SDH. The maternal brain was swollen with midline shift. CT images of the abdomen and pelvis showed a single foetus. A hyperdense extra-axial haematoma was detected over the left cerebral convexity of the foetal head (Figure 1). No fracture of the foetal skull was detected. The rest of the CT scan was unremarkable.

The patient underwent emergency operation to create a burr hole for intracranial pressure monitoring. Foetal distress was noted during the operation, and emergency caesarean section was performed.

The baby was found to have respiratory distress and needed resuscitation and surfactant. Plain CT scan of the baby's brain performed 6 hours after birth showed a hyperdense left SDH (Figure 2). There was no significant midline shift, obliteration of basal cisterns, or hydrocephalus. No skull fracture was noted. The baby

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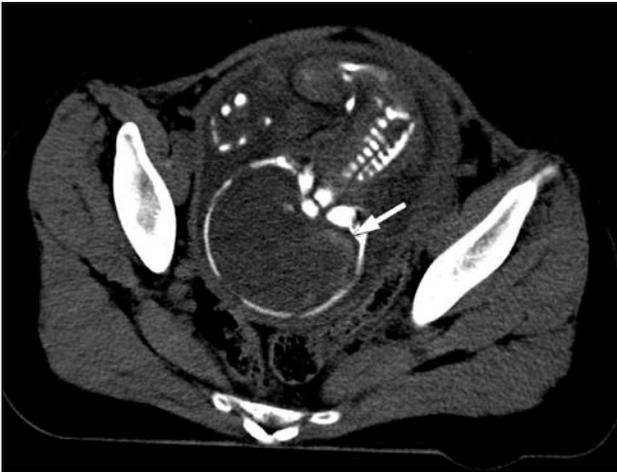


Figure 1. Axial non-contrast computed tomography image of the maternal pelvis. Extra-axial hyperdensity (arrow), suggestive of blood, is noted over the left cerebral cortex of the foetal brain.

was treated conservatively and serial CT scans of the brain showed resolution of the SDH. The baby was discharged from hospital on day 40. Follow-up MRI of the brain performed 6 months after birth showed residual haemosiderin signals and there was no abnormal intra-axial lesion (Figure 3). Follow up of the baby for 6 months showed normal development with no apparent neurological deficit. However, the mother suffered significant permanent neurological deficits in the left upper and lower limbs, requiring long-term rehabilitation.

DISCUSSION

Antenatal SDH is rare,^{1,2} and only a few patients have been reported.^{1,3-8} It is thought that trauma is the primary

cause of in utero foetal SDH,¹ although some of the reported patients had no apparent history of trauma.⁵⁻⁸

Most cases of intrauterine foetal SDH have been demonstrated by ultrasound,^{1,3-8} and MRI findings have also been described.⁵ No reports of the relevant CT findings were found during a search of the English language literature. This is anticipated because CT scan is only exceptionally performed for pregnant patients.

Investigations using ionising radiation are seldom performed for pregnant patients, largely because of the potential adverse effects for the foetus. The potential risks of radiation can be divided into deterministic effects and stochastic effects. Deterministic effects are dose-related and are seen above a certain threshold dose. An example of a deterministic effect in a foetus is abnormal organogenesis, which takes place during early pregnancy. Stochastic effects are not related to radiation dose and can occur at any level of radiation exposure, although the likelihood increases with dose. An example of a stochastic effect is the development of neoplasia. The type and severity of potential deterministic effects and the likelihood of a stochastic effect in a foetus varies with the gestational age and the effective dose at the uterus. According to data by the American College of Radiology (ACR), there are usually no deterministic effects in foetuses older than a gestational age of 27 weeks for normal diagnostic radiological investigations.⁹ For this group, the risks from diagnostic imaging with ionising radiation are stochastic effects. These are discussed in

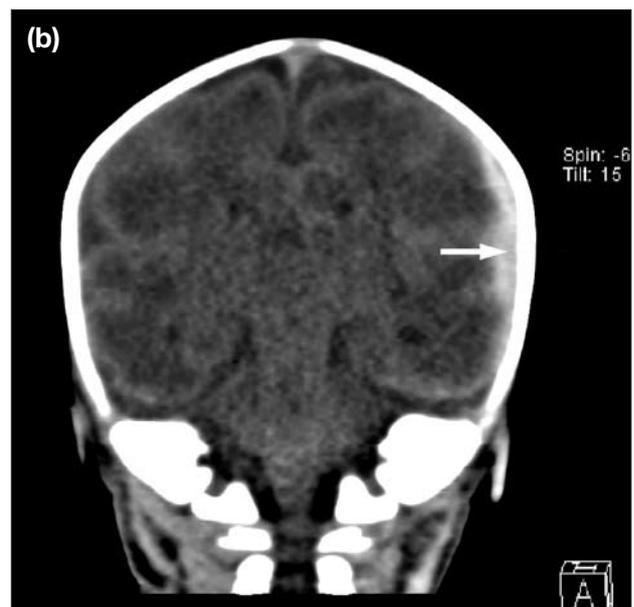
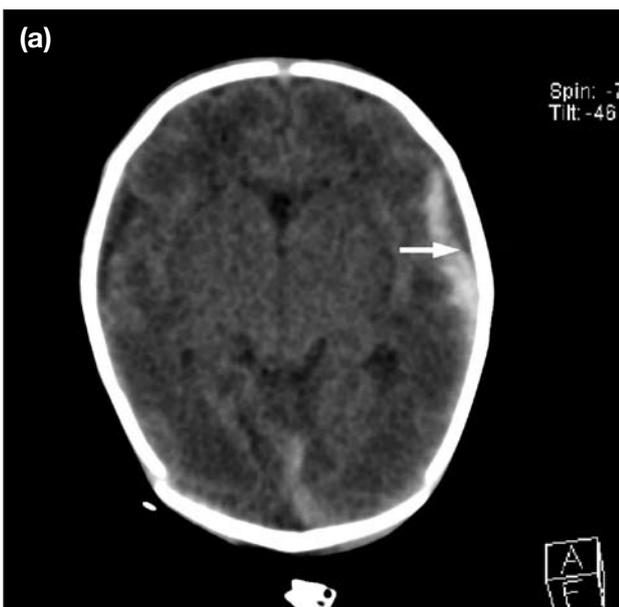


Figure 2. Non-contrast computed tomography of the foetal brain. (a) Axial view; and (b) coronal view. Hyperdense subdural haematoma is present over the left cerebral cortex (arrow). There is no significant midline shift or hydrocephalus.

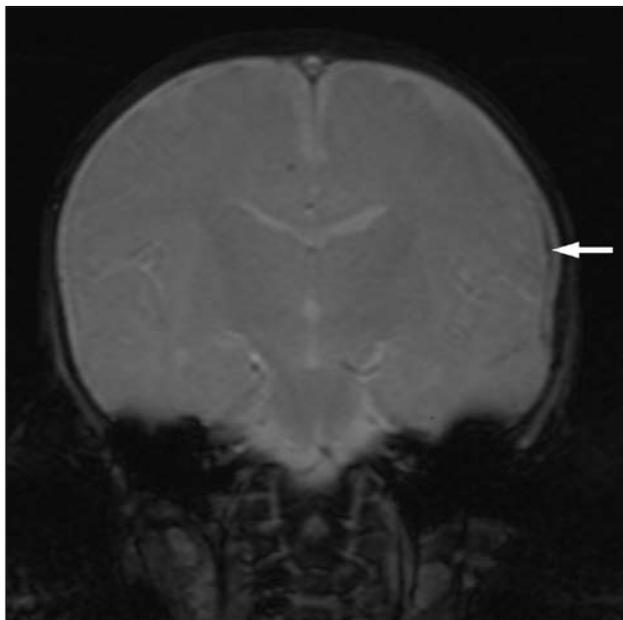


Figure 3. Coronal gradient magnetic resonance image of the baby's brain performed 6 months after birth. Hypointense haemosiderin signal (arrow) is noted over the left cerebral cortex, corresponding to the previous subdural haematoma.

the ACR practice guideline for imaging pregnant or potentially pregnant adolescents and women with ionizing radiation.⁹

When considering CT scan for a pregnant patient, it is critical to balance the risk and benefit for both the mother and the foetus. Alternative investigation should be considered if appropriate. If CT scan is unavoidable, informed consent should be obtained from the patient whenever possible. The radiation dose should be limited to as low as reasonably achievable without jeopardising the diagnostic value of the images.

In this patient, the car accident happened at midnight on a day with a high typhoon signal. The mechanism of injury was high impact and the patient was comatose. CT of the brain revealed significant maternal head injury that required emergency neurosurgical intervention. Although a screening ultrasound (FAST scan) had been performed, the surgeons were uncertain about the presence of severe internal injury. Indeed, it has

been suggested that the sensitivity of ultrasound for the detection of blunt intra-abdominal injury is only 61% for pregnant patients.¹⁰ As the on-call radiologist needed time to travel back to the hospital in the extreme weather conditions, it was decided to perform CT scan, with the aim of identifying severe maternal injury before transfer for operation. The diagnosis of foetal SDH was an incidental but important finding.

The outcome for a foetus with SDH is thought to be poor.^{3,5} However, this baby showed no significant neurological deficit or developmental delay, despite relatively serious maternal injury and the prematurity of the baby.

Intrauterine foetal SDH is a rare condition. It is possible, although unusual, to visualise this condition on CT scan. CT scan should only be performed for pregnant patients after careful consideration and balance of the risks and benefits. CT should not be used as a primary investigation for intrauterine foetal injury.

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