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Paediatric Neuro Trauma – Accidental or inflicted

To the radiologist, neuroradiologist in particular, physical abuse of infants and babies are of greatest interest since neuroradiology is often the only means by which the diagnosis of abuse can be suspected and subsequently proven. Small infants are most often shaken while larger infants are more often submitted to shaken/impact injury. The resulting brain damage is devastating. The infant presents with most non-specific symptoms, making the clinical diagnosis of abuse extremely difficult.

The repeated accelerations and decelerations and rotations associated with repeated shaking of a small baby will cause venous haemorrhage into the subdural space, a very important marker indicating that the baby has been shaken. Repeated instances of abuse will cause haemorrhages of different ages. Same treatment will also cause tearing injuries seen in the white/grey matter interface, often with small haemorrhages as well as retinal haemorrhages. Hypoxic/ischaemic brain injury added upon the tearing injuries aggravates brain oedema.

With the findings of subdural haemorrhages, brain oedema and retinal bleeds in combination, child abuse is the only clinically reasonable diagnosis.

The most important method used to diagnose abuse of infants is CT-scanning of the brain. It is an effective way of showing subdural haemorrhage and can give an indication of the age of the haemorrhage. MR imaging has a superior sensitivity in detecting collections of haemorrhage in the subdural space. It has a superior ability to demonstrate brain injury. The only, but most important weakness of MRI is its inability to accurately indicate the age of a subdural haemorrhage.

Accidental trauma to the head is rare in the infant below 1 year of age and the neuroradiological findings differ significantly from those of abusive head trauma. Knowledge about these differences is vital to the radiologist and allows the radiologist to express an opinion about the likely mechanism behind head trauma in the infant.

The purpose of this presentation is to stress the fact that physical abuse of infants and small children is a radiological diagnosis. The clinical diagnosis is always difficult and in most cases impossible. Objective imaging documentation of internal injuries, fractures, intracranial haemorrhages and brain injuries is in the domain of radiology and is often the only possibility to make the correct diagnosis and confirm the presence of child abuse!