Near-total splenic infarction associated with meningococcal septicaemia
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Section: Paediatric radiology
Area of Interest: Paediatric Spleen
Imaging Technique: Teleradiology
Special Focus: Ischaemia / Infarction Case Type: Clinical Cases
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Patient: 15 years, female

Clinical History:
A 14-year-old girl with a background of epilepsy presented with a 12-hour history of abdominal pain, fever, vomiting and diarrhoea complicated with septic shock. On examination, there was tenderness in the left-upper quadrant with no focal peritonism. Haematological investigations revealed isolated thrombocytopenia, leucocytosis and elevated CRP. Blood culture revealed growth of Neisseria meningitides serotype Y. Lumbar puncture was not performed due to haemodynamic compromise. A diagnosis of meningococcal septicaemia was made. Immediate fluid resuscitation was commenced as well as administration of IV ceftriaxone in accordance with local hospital guidelines. Immediate transfer to intensive care was conducted and ionotropic support was administered. Recovery occurred 12 days later.

Imaging Findings:
The splenic abnormalities were followed up with ultrasound which revealed that almost the entire spleen had infarcted and been replaced by fluid as well as a remaining portion of viable splenic tissue on the diaphragmatic aspect of the spleen (Fig. 2). Follow-up MRI showed that the volume of fluid within the spleen had significantly increased forming a large cyst within the left upper quadrant (Fig. 3). The patient was managed conservatively as she was asymptomatic from this, and follow-up ultrasound demonstrated that the cyst had significantly reduced in size after 3 months. The latest follow up ultrasound demonstrates a small volume of fluid within the spleen. (Fig. 4).

Discussion:
Meningococcal septicaemia is specifically associated with 5-15% mortality and morbidity complications such as neurodevelopmental impairments, sensorineural deafness and mono-arthritis. [1] Splenic infarction can occur in the context of thrombo-embolic events, haematological malignancies, vasculitis, aortic dissection and splenic torsion. [1] Additionally, genetic or acquired defects in Toll-like receptor polymorphisms can increase susceptibility to N. Meningitidis and unusual complications. [2] There are two reported cases (2001 and 2003) of splenic infarction secondary to meningococcaemia; both in the adult population. [2,3] Similarly, peripheral blood film showed no red cell structural abnormalities. However, literature research indicates that splenic infarction can occur without
concurrent changes on blood film. [4] Hence, CT remains the preferred diagnostic test, although, pathological examination of the spleen and peripheral blood film examination should be conducted as these are gold standard. [5] In this particular case, imaging studies revealed low-attenuated spleen with intact vascularity, likely infarction, (Figs. 1, 2 & 3). Additionally on CT, there was a unilateral hyper-attenuated left adrenal gland which is suggestive of left adrenal haemorrhage, (Fig. 1). The cause may be due to N. Meningitidis and/or adrenal vein thrombosis; and likely to have a good prognostic outcome in correlation with recovery from meningococcal septicaemia. [6,7] Nonetheless, peripheral blood film showed no red blood cell abnormality such as Howell-Jolly bodies. This may be due to a remaining portion of viable splenic tissue as shown on the ultrasound image, (Figure 2). Therefore a diagnosis of near-total splenic infarction associated with meningococcal septicaemia was made. The patient recovered well with no abdominal discomfort and was discharged with lifelong penicillin prophylaxis and appropriate annual vaccinations 12 days after admission Learning points: 1. Meningococcal septicaemia is a rare cause of a near-total splenic infarction in the paediatric and adult population. 2. The aetiology of N. Meningitidis-induced splenic infarction remains unclear. 3. The diagnostic criteria for splenic infarction involve findings from imaging studies (Ultrasound, CT, and MRI) and peripheral blood film investigations for a definitive diagnosis to be ascertained.

Written informed patient consent for publication has been obtained.

Differential Diagnosis List: Near-total splenic infarction associated with meningococcal septicaemia, Disseminated intravascular coagulation/vasculitis, Sickle cell anaemia, Infectious mononucleosis, Cytomegalovirus infection, Malariae

Final Diagnosis: Near-total splenic infarction associated with meningococcal septicaemia

References:

Description: Selected axial slice from a contrast-enhanced CT of the abdomen demonstrating diffuse splenic hypoattenuation (solid arrow) and adrenal hyper-enhancement (dashed arrow). Origin: Department of Radiology, Royal Berkshire NHS Foundation Trust, Reading 2019.
Figure 2

Description: Selected image from an ultrasound of the abdomen demonstrating near complete replacement of normal splenic tissue by fluid (solid arrow) and moveable debris (dashed arrow). There seems to remain splenic tissue on the diaphragmatic aspect of the organ. Origin: Department of Radiology, Royal Berkshire NHS Foundation Trust, Reading 2019.
Description: Selected coronal STIR sequence slice of the abdomen demonstrating an enlarging cyst (solid arrow) occupying the entirety of the spleen, with mass effect and displacement of the adjacent organs. Origin: Department of Radiology, Royal Berkshire NHS Foundation Trust, Reading 2019.
Description: Selected image from 3-month follow-up ultrasound of the abdomen demonstrating significant reduction in the size of the splenic cyst and replacement with organising septated tissue (solid arrow). Origin: Department of Radiology, Royal Berkshire NHS Foundation Trust, Reading 2019.