Short reports

Ultrasound diagnosis of gastro-oesophageal reflux

D R NAIK AND D J MOORE

Department of Radiology, Northern General Hospital, Sheffield

SUMMARY A method of diagnosing gastro-oesophageal reflux using ultrasound is described. This method was compared with barium swallow examination in 20 patients and found to be as accurate in infants and young children.

Gastro-oesophageal reflux is an important cause of failure to thrive in infants and children. It may also lead to blood loss and repeated chest infections and is implicated as one of the factors in 'cot death'.¹

Barium swallow examination is the established method of diagnosing reflux in infants and children. In our department 64 barium examinations were carried out in 1982 for suspected gastro-oesophageal reflux. We describe a method of diagnosing this important condition using real time ultrasound equipment.

Materials and method

Twenty infants and children from age 4 days to 16 years were studied by both barium and ultrasound techniques. The examinations were performed by two operators. The barium swallow was done first and was followed almost immediately by ultrasound, without the second operator knowing the result of the barium examination.

For the barium examination, a standard technique was used combined with fluoroscopy and spot films. Ultrasound examinations were carried out with the patient in the supine position. A commercially available real time sector scanner (ATL 500) was used with 3.5 MHz in-line transducer with a 90° sector. The transducer was placed in the epigastrium below the xiphisternum to obtain a midline sagittal section going through the skin and subcutaneous tissues, left lobe of the liver, aorta, left hemidiaphragm, and the spine. It is important that the section contains several centimetres length of the long axis of the aorta and certainly 1 to 2 cm above and 2 cm below the diaphragm. The transducer is then moved to the right of the midline (approximately 2 cm) and the beam is angled slightly

medially to ensure that the aorta remains in the section. In our experience, the cardia is outlined easily with this slight angulation of the beam. To ensure that the oesophagus empties completely the baby is held in the erect position or the child is made to sit up at least twice and is then scanned again in the supine position. The examination is observed on the screen and recorded intermittently on a video cassette recorder. Hard copy on photographic paper is obtained by a freeze frame facility but this leads to considerable degradation of the recorded detail of the dynamic nature of the reflux.

Results

Gastro-oesophageal reflux is easily seen as 'bright' linear echoes lying anterior to the aorta and behind the heart in the thorax (Figure). Often the whole of the oesophagus is outlined in this way. The 'bright' echoes represent microbubbles of air which are present in the fluid—either barium or the normal feed in an infant. Occasional reflux is recognised as a common phenomenon in normal children. The criterion we used for diagnosing positive reflux was filling of half the oesophagus on at least two

Figure A freeze frame from a video recording showing the presence of reflux in the oesophagus lying anterior to the aorta.

occasions and to and fro movement of the fluid in the lower oesophagus.

Twenty patients had both barium and ultrasound examinations as described above. There was agreement on 18 examinations; 7 patients showed reflux and 11 showed no abnormality on either examination. One patient had definite reflux on ultrasound examination but 'minimal' reflux was reported on the radiographic examination. On the 16 year old patient, reflux was seen on the barium swallow but it was not possible to outline the oesophagus on ultrasound because of interposition of lung between the heart and the aorta.

Discussion

We had observed that some infants and children had a line of 'bright' echoes behind the heart during two dimensional echocardiographic examinations. Closer scrutiny showed that these echoes represented fluid filled oesophagus caused by occasional reflux. This prompted us to undertake the present study to assess the possibility of diagnosing reflux using ultrasound.

It became obvious after the first few examinations that the method was as accurate and in some ways superior to the barium swallow. Ultrasound examination is likely to be more physiological as it is not necessary to use contrast media and infants are now examined after normal feeds. It is also more accurate than the barium examination in which one uses very short radiographic screening time to minimise the radiation dose. This leads to false negative examinations in 15% of cases.² With ultrasound it is possible to scan continuously for several seconds and the examination may be carried out over several minutes (usually 15 minutes) by intermittent scanning. Gastro-oesophageal reflux

may be reliably diagnosed by ultrasound but resolution of anatomical detail is generally insufficient to allow comment upon the presence or absence of an associated hiatus hernia. Only two of 20 patients in this study were over 3 years of age so the application in older children remains to be assessed.

Most radiology departments have real time ultrasound equipment for neonatal head and abdominal examinations. A sector scanner is probably the equipment of choice for this, as for all paediatric ultrasound examinations.

New diagnostic modalities are often criticised for providing some additional information but not replacing established techniques. In our department, ultrasound examination has replaced conventional barium examinations in all cases of suspected gastro-oesophageal reflux in children and is also used in follow up of children receiving antireflux treatment. In addition to avoiding unnecessary exposure to radiation, there are undoubted savings in the use of contrast media and x-ray films that have important implications if all infants presenting with near-miss sudden infant death syndrome are to be screened for reflux. Ultrasound is a safe, reliable, and rapid method of diagnosing reflux.

We thank our consultant paediatrician colleagues, particularly Dr A Boon.

References

- 1 MacFadyen UM, Hendry GMA, Simpson H. Gastro-oesophageal reflux in near-miss sudden infant death syndrome or suspected recurrent aspiration. *Arch Dis Child* 1983;58: 87-91.
- 2 Herbst JJ. Gastro-oesophageal reflux. *J Pediatr* 1981;98:859-70.

Correspondence to Dr D J Moore, Northern General Hospital, Sheffield S5 7AU.

Received 28 November 1983

Serum immunoglobulin concentrations in febrile convulsions

D ISAACS, A D B WEBSTER, AND H B VALMAN

Departments of Paediatrics and Immunology, Northwick Park Hospital and Clinical Research Centre, Harrow

SUMMARY The mean, age adjusted, serum IgA values of 47 children with febrile convulsions were almost identical to those of controls. Five children had serum IgA values less than 0.1 g/l by nephelometry, suggesting that in some cases at least there may be an association between a low serum IgA concentration and febrile convulsions.

A distinction is drawn between selective IgA deficiency and low serum IgA.¹ In selective IgA deficiency, serum IgG and IgM values are normal but serum IgA is undetectable by radial immunodiffusion (<0.02 g/l). In low serum IgA, serum IgA can be detected by radial immunodiffusion but is more than two standard deviations below the mean for age.