When and how to perform intravenous urography in children

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IVU has few specific indications in paediatrics, but is still the most useful tool for evaluating abnormalities of the calyces and ureters. It has, however, been superseded by other modalities (ultrasound and nuclear medicine) for the assessment of renal size, contour, anomaly and function at no or little radiation exposure.

Each request by a clinician should be carefully reviewed by a consultant radiologist and each procedure should be planned and customised according to the information desired for that patient.

Patients should receive a bowel preparation to facilitate visualisation. Any fluid given orally allows the stomach to distend with gas, creating a "window" to the calyces.

A full-length control film is valuable unless recent abdominal films have been performed. This helps to assess the degree of bowel clearance prior to embarking on the IVU.

There is NO place for tomography or a "STAT" nephrogram. (Renal contour, size and function should be assessed with ultrasound or nuclear medicine.)

If the calyces need to be assessed, a coned "renal" window film with the beam centred on the xiphisternum and angled 32-34 degrees to the feet is performed at 5-7 minutes.

If the ureters are the main consideration, then only a full-length film is performed at 5-7 minutes (Figure 1). If there is known obstructive uropathy, even in the upper moiety of a duplex system (Figure 2), then the first film should be at 12-15 minutes. Delayed films are rarely indicated, as obstructive uropathy is better assessed using MAG 3 isotope studies.

Figure 1

Figure 2

Polycystic kidney disease may require a delayed film after 24 hours have elapsed.

Indications to visualise the calyces include:

1. Assessment of medullary necrosis in ARF

to page 54

from page 53

2. A small kidney causing hypertension when there is no VUR
3. Calculi (also needs a full-length film)
4. Renal TB
5. Certain syndromes
6. Polycystic kidney disease

Ureteric visualisation using a full-length film is performed when anatomical information is needed, especially in duplex kidneys with ectopic ureters. (This is useful for girls with continuous enuresis and in bladder extrophy).

Trauma to the kidney is best imaged with spiral CT, as it not only adequately assesses renal injury, vascular pedicle injury and contrast leak, but also assesses the other intra-abdominal organs. A full-length film, however, performed after the initial post-contrast CT, precludes performing a delayed CT to assess contrast leaking from the collecting system.

Conclusion

This protocol aims to reduce radiation dose and elicit maximum information from the different modalities available. The radiologist should try to use each modality effectively according to the question at hand.

Acknowledgements

The basis of this paper is a protocol devised by Prof. Isky Gordon for Great Ormond Street Hospital (1998). Modifications have been made according to local experience.

Radiology at the Sydney Olympics

R de Villiers

I had the honour of being part of the Sydney 2000 Olympic Games medical imaging team. All the staff were unpaid volunteers and were rostered to work between 10 September and 3 October 2000. The team consisted of 40 radiologists, 60 radiographers, 10 nursing staff and 10 medical typists. Dr Jock Anderson, well-known to South Africa as the guest speaker at the SA Sports Imaging Congress in 1999, was the Director of Medical Imaging. Other well-known musculoskeletal radiologists on the team were Drs John Reid, Jenny Noakes, Steven Kiss, Neil Simmons, Bill Breidahl and Phil Lucas. The team was responsible for 10 500 athletes, seeing on average 80 patients per day. The clinic was open from 8 am to 11 pm. Kodak was a major sponsor, supplying film, a digital filmless computed radiography system and workstations. GE supplied a spiral CT and mobile 1.5 T MRI scanner. ATL supplied two of the latest ATL 5000 ultrasound machines. All of the equipment was state-of-the-art.

The work ratio was 35 plain films: 20 ultrasound: 5 CT: 20 MRI.

The majority of examinations were sports-related problems. Among the recent advances was the imaging of muscle injuries, which were often very subtle. Interventional procedures were performed under CT or US guidance.

Often local anaesthetic with or without steroid was injected into tendon sheath, facet joints, muscle tears or perineurally.

The procedures were mostly successful. Great importance was placed on quality radiography. Many additional views were performed, which Dr Anderson discusses in his new book *Radiography of Sports Injuries*. Ultrasound examination of groin injuries (adductor tears, sports hernia), sciatic nerve irritation (chronic hamstring tears, piriformis syndrome), tendinopathies (Achilles, infrapatellar, rotator cuff) and ligament tears (ankle, elbow) were commonly performed. CT was used mainly for subtle avulsion injuries and stress fractures. MR of the knee was the main MR request, followed by the ankle, shoulder, elbow and foot. MR imaging of Lisfranc fractures were performed in two cases. Plantar fascia ruptures were imaged in four cases. Common stress fractures imaged were anterior tibial, patellar, fibular, tarsal navicular, pars interarticularis and osteitis pubis. The great stresses placed on the musculoskeletal system caused a number of stress responses to joints. This was especially so in the feet of elite runners. Increased signal was noted on the fluid-sensitive MR studies.

The experience gained at the event for a radiologist interested in musculoskeletal sports imaging was phenomenal, as all the cases were discussed by a group of at least four radiologists in an academic setting.