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Management in Uroradiology

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Imaging has always been an important part of the diagnostic investigation of urinary tract disease. Historically, urological imaging relied on the excretion of iodinated contrast media into the urine to outline the collecting systems of the kidney, the ureter and the urinary bladder. Modern urological imaging involves other modalities – ultrasound, computed tomography and magnetic resonance imaging, as well as nuclear medicine.

Much uroradiology involves the investigation of the older male patient and improvements in life expectancy of men in the Western world in the last 30 years. The corresponding increase in the number of male patients aged over 70 years, has caused a significant workload increase for radiology departments, which often struggle to cope with this increased demand for urological imaging in this large elderly male population. It should be appreciated that cancer diagnosis and staging is a major part of the uroradiological workload: it is estimated that urological cancers will account for 25% of all new cancers diagnosed in the United States in 2005 (1) (Table 1).

The main issues that uroradiology managers face in this climate focus on increasing demand, new technologies, workforce competencies and skill mix, and the use of interventional radiology.

Demand

The increasing elderly male population has raised the number of patients presenting with urinary outflow tract obstruction. Different local and national working practices affect the practice of urological ultrasound within the United Kingdom and in mainland Europe. In many Northern European countries, urological ultrasound is undertaken by office urologists. By contrast, in the United Kingdom the vast majority of urological ultrasound examinations are undertaken in radiology departments, although some prostate biopsy is undertaken by urologists.

Guidelines such as those from the American Urological Association (AUA) (2) optimise the management of resources by clarifying the requirements for upper tract imaging in patients and offering guidance on a selective approach to kidney imaging in patients with outflow tract obstruction. Such patients should be assessed on the basis of symptoms. For example, using the AUA symptom index, urinary flow rate, and post void residual volume, imaging of the upper urinary tract is not recommended in the evaluation of the typical patient with benign prostatic hyperplasia (BPH) symptoms, unless the patient has haematuria, urinary tract infection, abnormal renal function or a history of urolithiasis. Such guidelines are a valuable decision-making tool but should always be used alongside guidance issued by professional radiological bodies such as the Royal College of Radiologists(3).

Prostate cancer is increasingly prevalent in older men and the investigation of suspected prostate cancer is now a major part of the work of all urology and radiology departments. Attempts have been made to rationalise such imaging but it has not been easy to produce consensus guidelines for selecting patients for prostate biopsy. For example, different prostate-specific antigen (PSA) thresholds are considered important by different workers. However, guidelines do exist for the use of computed tomography and magnetic resonance imaging in staging prostate cancer (4). Furthermore, a policy of selective use of isotope bone scans based on serum PSA levels and clinical symptoms should be encouraged by uroradiology departments, based on the PSA nomograms (5) that have been developed for predicting survival in patients with newly-diagnosed prostate cancer. The development of such protocols is aided by the establishment of effective multidisciplinary team meetings, considering patients with newly diagnosed urological cancers. Urologists and oncologists have variable approaches to the staging of prostate cancer, prior to treatment, and this can cause considerable local variation in the demand for staging investigations within radiology between different hospitals. Some guidelines have been produced for both the diagnosis and staging of prostate cancer, and their use is to be encouraged. Prostate cancer is the commonest male cancer and thus it is important to ensure a standardised cost-effective approach to the imaging of this tumour.

Scrotal assessment is another area, where demand for imaging has increased markedly in the last 10-15 years. The incidence of testicular cancer has been stable in recent years, yet scrotal ultrasound requests have risen exponentially in the last 15 years because of the ability of

ultrasound to clearly demonstrate scrotal anatomy and pathology, and to accurately diagnose scrotal abnormalities. Men are encouraged in the lay media to seek ultrasound assessment of scrotal symptoms, but resources must be available to reflect this media pressure, and radiology departments must be able to cope with ultrasound imaging requests in a timely fashion. Commissioners of health care in a managed healthcare environment need to appreciate that resources must match patient referral patterns to radiology, when new imaging uses are adopted in primary and secondary care.

Adoption of New Technologies

Ultrasound revolutionised the investigation of the upper urinary tract during the 1980's, and the introduction of higher frequency transducers enabled a marked improvement in testicular demonstration by ultrasound during the 1990's. Multi-slice computed tomography (CT) has been the major technological imaging change since 2000, offering a new approach to the investigation of urinary tract stone disease, improved visualisation of renal pathology and potential improvement to the investigation of haematuria of urinary tract cancer. The replacement of the simple excretory urogram by ultrasound and, now, by the more expensive CT causes workflow problems in the CT suite, financial consequences, and also worries about radiation dosage. Multi-slice computed tomography is a high radiation dose technique and there are legitimate concerns about the increase in population radiation dose from this wider use of CT, particularly in suspected stone disease. European radiology has traditionally been more cautious in considering radiation dosage than in the United States, but the widespread usage of multislice technology for frequent situations, such as suspected renal colic, may lead to the development of radiation induced tumours and predispose the referring clinician and radiologist to medico-legal claims.

Workforce Competencies and Skill Mix

To cope with these demand problems, skill mix provides an effective solution, delegating tasks traditionally undertaken by qualified medical practitioners to other (non-medical) health-care staff. Sonographers are able to undertake the majority of the routine ultrasonography for patients' upper tract imaging in outflow tract obstruction. Injections of contrast agents and radiopharmaceuticals by nurses and radiographers are an effective use of resources. The skill competencies required for nurses and sonographers to perform ultrasound guided prostatic biopsies should also be investigated: with the marked increase in demand for these tests, it is inevitable that this procedure will be undertaken by non-medically qualified staff in some hospitals in the near future. It is important that there should be proper frameworks underpinning this delegation of medical procedures to non-medical staff, based on guidance from regulatory bodies, such as the General Medical Council in the United Kingdom. Delegation of scrotal ultrasound to female sonographers is often problematic, because of the understandable unwillingness of female staff to undertake intimate examinations on male patients.

Increasingly many departments are struggling to recruit experienced radiologists able to undertake percutaneous nephrostomy drainage, particularly outside of standard working hours. The increasing sub-specialisation that has occurred within radiology in the last 15 years has meant that general radiologists are progressively less able to maintain the skills that enable them to competently undertake the procedure, whilst there are often insufficient interventional urologists to maintain a specific out-of-hours interventional rota for urology.

Interventional Radiology

Percutaneous stone surgery, nephrostomy drainage, fibroid embolisation, and radiofrequency tumour ablation are examples of interventional procedures that are potentially undertaken by urologists. New techniques of tumour treatment or accessing the urinary tract are always being developed. By their nature, interventional procedures are complex and require skilled operators, experience, and full support facilities. It is essential that management provides a safe environment for these procedures to be undertaken, but adoption of new technologies must be in line with regulatory guidance from bodies such as the National Institute for Clinical Excellence (NICE).

The Future

There is a long history of close co-operation between urology and radiology departments, because radiology has been central to the management of many urological conditions. It is predicted that the population of men over 65 will markedly increase by 2030, and this will intensify the logistical problems for the investigation of urological conditions in the older male. CT will progressively replace the excretory urogram for stone disease but the availability of PACS and image transfer to the home environment means that urologists will be able to arrange the management of these patients from home. Multi-disciplinary team working is improving cancer care, and survival improvement for urological cancers in the UK is anticipated. There are some indications that urologists predict a change in their role, as they progressively become 'specialists in men's health', covering a broader range of areas but the range of urology will be unchanged by this transition.

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