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The growing role of interventional oncology within multidisciplinary cancer care

Interventional radiology (IR) is already well established within the field of oncology and the contribution it makes to cancer care continues to grow. Minimally invasive image-guided interventions started out having an ancillary role in oncology; treating the complications of cancer (e.g. clearing occluded ducts and vessels) or managing the side-effects of disease and of treatment (e.g. haemorrhage). However, over the past decade modalities to treat the tumours themselves have been developed and made available.

Interventional oncology, increasingly recognised as the fourth arm of cancer treatment, describes the range of procedures offered by IR in the field of oncology. This range includes many palliative and adjunctive therapies such as ablation, embolisation, chemoembolisation and radioembolisation. Innovation and development are characteristic of IR in general and this is no less true for interventional oncology; a specialty which is expanding, not only thanks to advances in imaging and interventional techniques, but also due to keen efforts supporting multidisciplinary collaboration.

Quality Imaging Vital

One of the defining features of IR is good quality and detailed imaging, which is absolutely crucial at every stage of image-guided interventions. Initially in each case, the most appropriate imaging modality for the particular patient must be selected; the lesion is then located and evaluated with high precision. This in turn allows an informed choice of the most suitable therapeutic procedure and a thorough planning of the treatment strategy, including selection of the most suitable devices and calculating the optimal trajectory to reach the lesion. Pre-procedural imaging is nowadays assisted by a range of technologies, not least 3D reconstruction.

During the procedure itself, imaging confers the ability to visualise the lesion, guide the instruments and devices, and assess the progress of the intervention.

Finally, post-procedural follow-up is of the utmost importance to accurately evaluate the success of a treatment, assess complications, and to detect any recurrence of the disease as early as possible. A general shift away from isolated technical service provision towards comprehensive clinical care has meant that IR is increasingly involved at each stage of therapy, including follow-up. The importance of imaging to the work of IR makes a close working partnership with diagnostic radiology a prerequisite.

Multidisciplinary Synergy

Cancer is a huge area of medicine and radiologists are necessarily involved, at the very least having contact with oncological patients many times each day: they are therefore part of the multidisciplinary team.

Modern medicine is not a one-man show and no single specialty can be the sole provider of care or the only driving force of innovation. It is especially true of oncology that all the new ideas and treatment modalities are coming about at the crossroads of many specialities. It is through biochemists, geneticists, oncologists, radiologists and many others working together that development and improvement is assured.

The increasing importance of synergy between the various medical specialties has already begun to influence and will continue to influence the way in which radiologists are trained. Modern imaging techniques now allow us to see more than just morphology; for example, the metabolism of tissues can be seen. Radiology residents and students therefore must be taught not only the relevant anatomy to read images but also much more clinical knowledge and the relevant basic sciences that underpin understanding and competence with the new technologies.

IR Conference Supports Teamwork

At the European Conference on Interventional Oncology, one clearly sees that the scope of IR is widening at all clinical stages of cancer care. The conference acknowledges and fosters multidisciplinary collaboration through the recurring incentive programme whereby referring physician colleagues of IRs receive support to attend.

In this way, oncologists, surgeons, and physicians of other specialties can experience and contribute to the meeting. The mutual understanding and co-operation that arise out of such opportunities are crucial and ultimately lead to a better service provision for patients. IR can be present in a hospital and be ready to offer effective oncological interventions, but unless patients are referred nobody will benefit. All the specialties involved in oncology need to be familiar with what the others offer if they are to pool their expertise and achieve superior outcomes.

Co-Operation at the Medical University in Lublin

The awareness of other specialties does not stop when the conference ends, but rather the spirit of teamwork and drive for multidisciplinary co-operation continues back at the hospital.

At the Medical University in Lublin, Poland, interventional radiologists have successfully established close co-operation with many other groups. This began with neurologists, as well as with endocrinologists and diabetologists, due to IR having the facilities and expertise to provide carotid stenting and below-the-knee angioplasty respectively.

Likewise, there is close co-operation between the various hospital departments involved in cancer care, including IR. This is not a new phenomenon; even before the new minimally invasive treatment options became available - what are now collectively termed interventional oncology - IR had been providing palliative tumour embolisation and catheter drainage for many years. Many patients with advanced malignant tumours were frequently referred to IR from the oncology department. This has meant that the oncologists at the hospital have long had an awareness of the skill base of IR and how this can translate into services for cancer patients.

For historical reasons there is a Department of Diagnostic Radiology and a separate Department of Interventional Radiology at Lublin, which is not the typical situation in Poland. The two separate units co-operate very closely, understanding each other's roles and sharing resources. The Department of Interventional Radiology has two MRI machines and two ultrasound machines and has free access to CT machines within the Department of Diagnostic Radiology, allowing diagnosis and the necessary pre-procedural investigations.

For interventions, the IR Department has three operating theatres equipped with up-to-date angiography equipment and a room for ultrasound procedures. There is also a bi-plane angi suite which is dedicated completely to neurointerventions. This capacity allows the treatment of many patients from Lublin and beyond and due to having the necessary equipment and trained staff, the department has been the site of introduction for many of the newest procedures.

Interdepartmental Cancer Care

Every day, interdepartmental meetings are held to discuss clinical cases, so the most suitable therapeutic procedure can be chosen for each cancer patient, whether it is provided by IR, surgery, or another oncology department. The oncologist remains in charge of the patient clinically, and is still very much involved even when the patient is referred to IR, being alongside the patient in the Interventional Radiology Department when the procedure is carried out. This makes the situation much more comfortable for the patient, keeps two-way communication open between the oncologist and radiologist, and helps to streamline patient care.

There are no dedicated beds in the IR Department, but IR does have use of beds within the Vascular Surgery Department. The close co-operation with the various other departments enables patients undergoing IR neurointerventions, for example, to stay in the neurosurgery department, where there are beds reserved for neurointervention patients. This arrangement is duplicated in the various departments, including vascular surgery, gynaecology, and oncology.

The best clinical care is guaranteed as the patient is based in the relevant department with the required specialist support staff and equipment on hand. The interventional radiologists, however, do still attend to post-procedural monitoring and are integral to the ongoing team effort.

Developments in Interventional Oncology

IR as a specialty has been a major contributor to the recent revolution in the treatment of cancer. Its main advantage is the elegant and precise way in which lesions are targeted, thus minimising harm to surrounding areas.

This particular strength of interventional oncology is continually being refined, the next step being automated guidance, a technology already present in some kinds of surgery. At the moment, device trajectory during a procedure is corrected manually by the radiologist but soon the navigation will be automatic, with the highest possible accuracy and precision assured by robotisation. One of the main technical challenges to

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overcome is that the organs IR often treats are not stationary, but continuous imaging with ultrasound or Xray can be used to constantly adjust pre-procedural MR and CT images, thus making automated navigation possible.

Another area of development in terms of procedure guidance is virtual CT sonography and virtual MRI sonography. This fusion of two imaging modalities is very advantageous: if part of a lesion is not seen with one modality, but is seen with another, the images can be synchronised. Furthermore, being able to perform CT much earlier on, rather than during the procedure, reduces burden of radiation to the patient.

Similar to the growing tendency to merge imaging techniques, there is also a tendency to combine interventional procedures. When performing radiofrequency ablation of tumours, for example, systemic chemotherapy can be administered simultaneously. Particular cytostatic drugs are more effective at higher temperatures, so the heat generated by the ablation can boost the action of the chemotherapy.

Increasing sophistication in imaging allows us to not only localise the tumour, but also to see the structure in more detail than was previously possible. The use of ultrasound contrast media, for example, is already making a significant clinical impact. Contrast-enhanced ultrasound (CEUS) provides images showing intra-tumoural vascularity and blood flow, comparable to the information obtained by computer tomography and dynamic magnetic resonance imaging. An advantage of CEUS is no exposure to radiation, and the absence of nephrotoxic contrast agents.

Tumour metabolism is indeed an area upon which research is now focusing, with the therapeutic goal to inhibit angiogenesis, tumour growth and proliferation. The future promises much more specific ways to treat tumours involving the exertion of influence over cell division processes and controlled initiation of apoptosis in targeted cells. The action of some of the drugs in this area could be induced by a controlled impulse, light being just one example. IR is set to play a central role in delivering these therapies, as it will in other biotechnological approaches such as gene therapy.

Benefits to the Hospital

The availability of interventional oncology services in a hospital represents many advantages. As many of the procedures can be performed on an outpatient basis, hospitalisation time and the associated costs can be reduced. The lower level of discomfort reported by patients, compared to other procedures, is also noteworthy. Interventional oncology procedures are often effectively employed in connection with other therapies, such as surgery, improving the success of the latter, and may also provide options in cases where other treatment modalities are not possible.

Due to the complex nature of cancer care, hospitals that attract patients with interventional oncology services will increase the caseloads of other departments generally, due to the likely necessity of a range of follow-up investigations and procedures, which will be delivered by the appropriate specialists; all members of the multidisciplinary cancer team.

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