

Editorial

Should a Neuroradiologist Be a Clinician?

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Radiology is a well-established discipline defined on the basis of examinations performed largely for diagnostic purposes using X rays. This concept of radiology has changed radically, especially in recent years, bringing about a change in terminology, whereby the term "radiology" has evolved into that of "imaging".

The radiologist has thus become for some an "image-maker", a term that leaves much to be desired as it harks back to the more pejorative label of "photographer" attached to radiologists a decade or so ago.

On the other hand, it is a sign of the times that new Radiology journals have adopted this term, "Revue d'Imagerie Médicale" in France, or "Neuro-imaging".

Before answering the question directly, asking ourselves if we are truly clinicians at the present time would clearly solve part of the problem.

In France, Neuroradiology made great advances in the Seventies and many have wondered how this came about. The answer is relatively straightforward.

At that time, many clinicians, mainly neurologists, but also neuropathologists and neurosurgeons took an interest in neuroradiology.

In France, in particular, René Djindjian, one of the world-famous pioneers of interventional neuroradiology, was a neurologist, as were Georges Salamon, Auguste Wackenheim and other leading figures and interventional neuroradiologists in the French Neuroradiology school.

The dictionary definition of a clinician is a physician engaged in the clinical practice of medicine: a role embracing numerous tasks.

This raises a series of questions: What does "being a clinician" mean? Examining patients? Asking questions and listening to the patient? Recognizing the symptoms and diseases of the nervous system? Taking the place of a neurologist or neurosurgeon? Being constantly up-to-date with advances in diagnostic and therapeutic neurology and neurosurgery? Being recognized by virtue of such knowledge, as a fellow consultant and not a provider of services?

Clearly, a clinical neuroradiologist will have to choose from among this myriad of possibilities.

To be recognized as a competent fellow consultant, he/she must have a minimum grounding in neurology to perform investigations in a reasonable and selective manner.

The clinician is a doctor, i.e. a person qualified to practice medicine, medicine being the science and art of dealing with the maintenance of health and the prevention, alleviation or cure of disease.

All neuroradiologists have had an initial medical training to start off with. We can therefore trace our discussion back to the origins of neuroradiology.

It is important to remember that in most countries neuroradiologists were not originally radiologists, but in most cases, neurosurgeons specialized in performing certain technical manoeuvres which for the most part entail known

functional and vital risks: fractional gas encephalography, myelography, angiography, often performed by direct needle puncture (don't forget that before catheterization developed, vertebral angiography was performed by direct needle puncture of the vertebral artery in the canal!).

When a medical student decides to specialize in radiology, his/her decision is based on a number of reasons which are interesting to analyze in depth.

Is it a purely intellectual interest in a discipline which employs a number of techniques to reveal the true diagnosis and which is currently developing a therapeutic potential? Is it a particular interest in a specialty which applies state-of-the-art techniques which force the specialist to adapt unceasingly to new technological advances? (over the last few years, radiologists have had to learn in succession, first echography then computed tomography, adapt to digital angiography techniques then more recently learn about magnetic resonance imaging).

Is he/she attracted by financial gain given the fact that in many countries radiologists are among the most highly paid specialists? Last but not least, is it an attempt to escape the patient, since radiologists who feel threatened by their patients can take refuge behind the control panel protected by an array of screens, from the x-ray tube to the console desk, with the technician in between? For some, the radiologist is a "failed" clinician, interested in photographic techniques, but this is not the definition I share.

Another thing to consider is the neuroradiologist's specific training. For some, he is a hybrid who has lived most of his life searching for an individual identity between 1965 and 1990 owing to the difficulty of certain techniques which have now for the most part been abandoned.

The neuroradiologist is a sort of species on the road to extinction before having achieved official recognition of his existence.

Yet, the neuroradiologist's evolution can be likened to that of the anesthetist: to start with the latter was an operating theatre technician who worked to the surgeon's orders.

Slowly but surely, the anesthetist has become a fully-fledged specialist, a responsible independent member of the team in which his own indications and contraindications are set in relation to the parameters of his discipline.

The neuroradiologist's motivations include a specific interest in the nervous system, and in a more specialized concept of radiology. Clearly, though, the neuroradiologist must also be attracted by the idea of team-work without which this specialty could not exist.

After asking ourselves all these questions, we could address the conditions in which neuroradiology is practiced nowadays, which will help us to find an answer to the original question.

First and foremost, the diagnostic neuroradiologist still uses traditional imaging techniques based on the application of X-rays, but these are becoming increasingly obsolete, giving way to computed tomography, Doppler ultrasound and, above all, magnetic resonance imaging.

Diagnostic investigations once considered "aggressive" are increasingly disappearing in favour of the new imaging techniques.

It is noteworthy that in 1975, just before the introduction of the first CT scanner, the neuroradiology service in Nancy performed roughly 2500 myelographic examinations a year.

In the space of a few years, this figure was reduced by a factor of ten, especially since MR appeared on the scene. In the years to come, as MR evolves, myelographic examinations may well disappear altogether.

As far as angiography is concerned, in 1975 around 6000 angiograms were performed every year, allowing medical students to gain a great deal of experience. Today, since the service specializes in endovascular interventional neuroradiology, around 1500 angiograms are performed yearly.

However, angiography today has nothing in common with the angiograms of twenty years ago as most cases involve long and delicate treatments.

This raises problems of training the neuroradiologists of tomorrow in angiographic techniques which for the time being will only be interventional.

What is this diagnostic neuroradiology? Is it a question of supplying the examination or examinations requested, or instead, selecting the most appropriate technique which involves the least risk and is also the most cost-effective - no minor consideration in the current climate?

These examinations are aimed at establishing the origin of a set of clinical symptoms which constitute the sole reason for the request.

In actual fact, because of technological ad-

vances, it is really the neuroradiologist who ought to be the specialist best suited to choose the most appropriate examination, but this is not meant to encroach on the competence of our clinician colleagues in this field.

Very recently, during the European courses on diagnostic and therapeutic neuroradiology, Olof Flodmark referred to two different diagnostic protocols, the one pragmatic and the other defensive.

He used the umbrella term "defensive protocol" to cover all those protocols which lead the neuroradiologist to perform a panoply of examinations which serve to cover him in case of error, setting these multiple examinations against a reasoned choice based on the patient's specific clinical symptoms. The justification for these different types of behaviour lies with the doctor who refers the patient to the neuroradiologist, rather than with other reasons, not least the cost criterion.

Once the problem of indication is solved, the problem of interpretation arises. In diagnostic neuroradiology the technical side gives way to the essentially intellectual task of interpretation. Interpretation means "translation", a far more important task than providing one or more images.

This brings us to changes in legislation and litigation in the different countries in which we work.

I have no intention on of discussing the different laws in force, but I would recall that in France medical liability for radiological diagnosis is extremely far-reaching and includes the report which in principle must be in writing except in emergency cases.

The quality of the diagnosis may be questioned: a diagnostic error may be forgivable, but is condemned if it is a glaring mistake. In addition, it is up to the neuroradiologist to choose the least dangerous technique, a liability which has, and continues to pose problems when choosing between myelography and magnetic resonance.

In 1993, France was still under-equipped with MR systems which accounts for the fact that myelography is still performed even when MR imaging could have established the diagnosis at no risk to the patient,

Moreover, there are a whole series of socio-economic parameters which often having nothing to do with the team called into question.

Many will be surprised to learn that the radiologist is responsible for proposing other examinations when these are required for a diagnosis considered incomplete or insufficient. Some clinicians, shut in their ivory towers, accuse neuroradiologists of overstepping their function, often basing their accusations on the dangers of direct prescription, particularly in the field of private work.

This means ignoring the primary function of the neuroradiologist, based on the professional competence we have been defending for many years.

Lastly, neuroradiologists are liable for the information they give to the patient and his/her family, which should be communicated with tact, taking into account all the tenets of medical ethics.

These comments reveal the need for training in diagnostic neuroradiology. Training must, of course, include all the basic knowledge required for an understanding of the nervous system, i.e. anatomy, physiology and pathology both neurological and neurosurgical.

Anatomo-pathology should be added to the list, especially in view of the advances made in magnetic resonance.

Even at diagnostic level, the neuroradiologist should be aware of the various therapeutic possibilities which sometimes entail performing further examinations or complementary tests. Only after having acquired this ground knowledge should the neuroradiologist learn about radiology techniques which are but a necessary and essential means to achieve his goal.

The development of interventional neuroradiology has placed neuroradiologists at the centre of the clinical arena.

The interventional neuroradiologist is responsible for therapy from start to finish: selecting and performing the procedure, monitoring the follow-up and outcome, all of which imply the need for initial consultation.

During this examination, the interventional neuroradiologist must select or confirm the therapeutic procedure which may have been suggested by a colleague or requested by the patient.

On this occasion, he must inform the patient and his/her family of the purpose of treatment and whether it will be partial or definitive. He must give all the necessary explanations about the protocol, so that the patient can understand

the need for integrated treatments, sometimes performed at long intervals as well as the need for follow-up monitoring even if clinical symptoms disappear.

The neuroradiologist must point out the risks attached to therapy and the chances of cure, comparing them with those of other therapeutic techniques such as neurosurgery or radiotherapy when these are feasible.

It is only after having given all this information to the patient that he can ask the patient to sign an authorisation form stating that the patient and/or his family have received all necessary information.

I recently heard that in the United States some neuroradiology teams have recorded all this information on computer to check that at the end of the interview, the patient and/or his/her family has understood and/or absorbed all the explanations completely. At the end of the interview, the patient can run a computer programme to answer questions aimed at ascertaining that he/she has understood. We have not reached this stage yet, but it does offer food for thought.

Clearly, many of the decisions which some deem purely technical are basically clinical decisions requiring all the information outlined above.

Treating an intracerebral arteriovenous malformation or an arterial aneurysm is very often a problem of indication, and hence a clinical rather than technical problem. It is not a question of imaging or disease, but a patient who has or has had certain symptoms and whose disease carries certain evolutive risks.

Once the problem of indication has been solved, the interventional neuroradiologist is naturally responsible for carrying out the procedure.

Depending on his/her area of specialization, more often than not, as in surgery, there is a certain personalisation of the operator. It is he/she who is responsible for the quality of the equipment.

In 1993, a court case established that medical specialists are no longer entitled to use out-of-date or old equipment which usually entail many more risks for the patients than their modern counterparts.

This therefore raises the problem of investment and updating equipment, a problem made all the more delicate by the fact that these deci-

sions very often depend on hospital administrators rather than doctors.

The working quality of the equipment can also be the subject of litigation which is why the interventional neuroradiologist is responsible for the maintenance of all instruments.

Contrary to what some believe, the interventional neuroradiologist, like any other therapist, is responsible for patient follow-up after treatment.

Again, it is not a question of taking the place of the neurologist or the resuscitation anaesthetist, but after a difficult operation, the neuroradiologist must follow his patient even in an intensive care unit.

Together with the other members of the team, he must take all necessary decisions in case of complications and, of course, follow the patient in the long-term.

The problem of replacing the clinician crops up at every stage.

Yet, how can the interventional neuroradiologist assess the outcome of his therapy if he does not personally monitor his patients with follow-up examinations which will disclose whether the treatment was fully effective?

All these factors reveal the need for training in interventional neuroradiology. Here clinical training is even more essential than for the diagnostic neuroradiologist and must never be neglected.

In addition to the basic anatomy and physiology required in diagnostic neuroradiology, this clinical training must include a knowledge of different therapeutic techniques.

It is well known that intracerebral arteriovenous malformations can currently be treated by neurosurgery, endovascular procedures or by stereotaxic radiotherapy.

The choice of treatment will depend on the patient's radio-anatomic conditions, but also on a whole series of other parameters be they personal or cost-related. Training must also provide a basic knowledge of resuscitation as well as elements of neurosurgery, especially the indications and results of a certain number of treatments.

All this may seem self-evident to some, or give rise to sharp criticism in other quarters. Many will deem that what I have said will oblige the neuroradiologist to take the place of general physicians or an allied specialist and hence

overstep both his rights and his responsibilities. This means ignoring the fact that shared responsibility exists and is becoming unavoidable in our increasingly complex fields of specialization. Being a clinician is a state of mind which leads to a different form of clinical and human behaviour. The practice of medicine is based on competence, humanism and ethics.

This implies a new philosophy of medical training grounded on the definition of certain goals.

Teaching doctors who have addressed the issue of general medical training think that training should be based on a certain amount of basic knowledge, followed by an apprenticeship to learn some essential techniques and finally, the tools required to make the choices.

These tools are basically those mental attitudes which André Gouazé in a recent paper listed as the critical management of information, ongoing research, an apprenticeship to learn of a way of reasoning and decision-making which allows the management of decisions and finally, the techniques required to assess the experience.

In the same article, Gouazé recalled that "humanism is a philosophy which places the values of man over and above all other values, based on culture, psychology and communication".

According to Jean Bernard, ethics is based on a good use of advances in knowledge, a duty to foster its positive effects and, above all, a duty to curb its negative effects.

Like all other specialists, the neuroradiologist is faced with numerous ethical problems. The interventional neuroradiologist must know how not to treat, given the fact that it is sometimes far more dangerous to treat a patient than to refrain.

It is also important to know how to refuse a pointless heroic act which may result in keeping a human being alive in a vegetative state.

This is particularly true for certain aneurysms of Galen's ampulla with brain damage.

Last but not least, he must know how not to privilege the indication for one treatment technique simply because that is the one he knows how to perform himself.

The answer to our original question then will depend on our conceptions of Neuroradiology. It is obvious that there is no clear-cut demarcation line between diagnostic neuroradiology

and interventional neuroradiology. Future specialists must first train in diagnostic neuroradiology and then opt for further training in the therapeutic field if they so wish.

The clinical concept of the neuroradiological unity I aim to defend has major consequences which affect both neurological and neurosurgical training, as well as specialist practice in which the neuroradiologist is a fellow consultant among a team of colleagues.

Although this may be a surprise to some, this concept also has architectural consequences: a neuroradiological service can no longer be confined to examination rooms. Neuroradiology services of the future must include outpatients consultation facilities and above all intensive care units for the practice of interventional neuroradiology.

Finally, the neuroradiologist must have free access to hospital beds which is essential to the practice of interventional neuroradiology. Access to beds does not mean owning them; there are numerous ways and means offering access to ward beds in the sphere of pluridisciplinary shared responsibility among different specialists.

In conclusion, should a neuroradiologist be an advanced technician, a biophysicist, a biochemist, and a clinician familiar with the whole gamut of neurological problems - in other words a superspecialist?

Nothing of the sort.

The neuroradiologist must be a true specialist in the neurological sciences with the intellectual and human capacity to work as part of a multidisciplinary team.

The clinical neuroradiologist must practise as a consultant, a medical specialist able to take decisions which concern his specialty, to shoulder the responsibility for his actions and their consequences, to say yes, but also to say no.

To end, I must tackle the problem of élitism. Neuroradiologists have often been accused of considering themselves part of an intellectual élite: is this true or not?

The term élitism does carry pejorative overtones, but in the concept I uphold, training a competent specialist, acknowledged as such by his peers and by those around him, and who knows his place, being part of an élite remains an ideal which I heartily hope all our students will aspire to.