International Day of Radiology 2015
Interview on paediatric imaging
Portugal / Prof. Maria Luisa Lobo

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Paediatric imaging in Portugal

An interview with Maria Luisa Lobo, consultant paediatric radiologist at the Santa Maria University Hospital – North Lisbon Hospital.

European Society of Radiology: What is paediatric imaging? What age are the patients, and how is it different from regular imaging?
Maria Luisa Lobo: Paediatric imaging is a subspecialty of radiology dedicated to diagnostic imaging and image-guided therapeutic interventions in the paediatric population – in foetuses, neonates, infants, children and adolescents. In general, patients' ages range from birth (or before birth) until 18 years old; sometimes, it may be extended to early adulthood, particularly for those patients suffering from typical paediatric chronic conditions that nowadays have a longer survival rate and who require a transitional period of medical care with both paediatricians and adulthood clinicians.
Although adult clinical conditions can also occur in children, there are quite a number of specific diseases affecting mainly children. When imaging paediatric patients, one must take into account the dynamics of growth and development, as well as anatomic and physiological particularities in children that may impact not only their response to illness but also the specifics of the imaging examination, including adapted equipment and adjusted imaging protocols. Furthermore, children are more susceptible to radiation exposure. Imaging paediatric patients can be quite challenging – small children cannot understand what's happening and they tend to be afraid, shout and cry. A friendly environment with calm and pleasant professionals is extremely important, and small children may require deep sedation to undergo radiological exams such as computed tomography (CT) and magnetic resonance imaging (MRI).

ESR: Since when has paediatric imaging been a specialty in its own right?
MLL: Although not officially recognised as a specialty in most countries, including Portugal, paediatric imaging has long been considered an important field in radiology, and it is one of the oldest recognised subspecialties of radiology. In Portugal, radiology cabinets were included in public hospitals just a few years after the discovery of x-rays, including in the existing paediatric hospitals.

ESR: Which imaging modalities are usually used to examine paediatric patients? Does this change depending on the age of the patient?
MLL: All imaging modalities are used in children, but whenever possible, modalities that do not use ionising radiation are preferred. Besides plain radiographs, which remain the most commonly used imaging tool in all age groups, ultrasound and MRI are being increasingly promoted in paediatric patients because they do not use ionising radiation. When feasible, ultrasound is an extraordinary modality with a wide range of applications from head to toe for many clinical conditions in the paediatric population, with continuously increasing indications, particularly for neonates and infants. The well-known advantages of ultrasound – its lack of ionising radiation, rapidity, availability, portability and relatively low cost – are particularly important in children. Furthermore, young children are particularly well suited to paediatric ultrasound due to their small bodies and less ossified skeleton, which allow for adequate imaging evaluation of areas usually less accessible in older children and adults (such as the brain and spinal cord or the chest). On the other hand, the smaller size of organs and the smaller amount of inner fat – particularly intra-abdominal fat – in children compared to adults can negatively impact the accuracy of both CT and MRI examinations.

For paediatric imaging, non-ionising radiation imaging techniques should be preferred whenever possible and if applicable and accurate for a given clinical context.

ESR: Some imaging techniques, like x-ray and CT, use ionising radiation. What risk does this radiation pose to paediatric patients? What kind of safety measures are in place to protect children?

MLL: It is well known that ionising radiation can induce cellular damage, and at low levels of ionising radiation dose (those that are used for diagnostic imaging) its cumulative effect can induce the development of cancer later in life. Children are particularly vulnerable to ionising radiation, not only because they are more sensitive to radiation due to the rapid cellular turnover of growing and the still developing body – in general and particularly for specific organs – but also because they have a greater remaining lifespan, meaning more time in which to develop a radiation-induced cancer. Radiation protection includes several measures, including the clinical justification of a given examination, the choice of the examination (preferring non-ionising techniques whenever possible), optimisation of the procedure with adjusted low-dose protocols respecting reference levels for paediatrics, and external protection with adequate shielding of areas that do not need to be exposed. Furthermore, proper immobilisation is crucial for radiological examinations – repeated examinations due to inadequate positioning are unacceptable.

ESR: Do general radiologists always use lower radiation doses when imaging children; are there any guidelines to follow?

MLL: Awareness of the specific harmful effects of ionising radiation in children is rising among general radiologists, and they tend to reduce some amount of radiation dose when imaging children, although usually far less than desirable. Specific protocols for children are available in most radiological equipment, but proper calibration and adjustment must be carried out before using new equipment and unfortunately these practices are not always fully observed. Theoretically, guidelines are increasingly accepted as a useful tool in daily practice, but real adoption and adherence are more doubtful.

ESR: How aware are parents and relatives about the risks of radiation exposure? How do you address the issue with them?

MLL: Parents are increasingly aware about the risks of radiation exposure, and usually concerned, or even extremely afraid, when their children need to undergo a radiological examination. It is important to talk to the parents and explain to them in understandable terms that the information provided by the exam clearly exceeds the potential harm from radiation exposure, and that the exam is going to be performed with adapted and adjusted lower doses of radiation.

ESR: Undergoing an imaging examination, especially a long procedure like MRI, can be an uncomfortable and sometimes frightening experience for some children. How can it be made more bearable?

MLL: A friendly environment and a previous visit to the examination room to become familiar with what is going to happen will often help. Whenever possible, parents will be present with their child during the examination, and, depending on the type of examination, toys, books or games can be used. Of course, this must be adapted to the situation and the age of the patient; small children and non-collaborative patients usually need sedation for long examinations such as MRI.

ESR: How many imaging exams are performed on paediatric patients in Portugal each year?

MLL: I don't have enough information to answer this question, as I don't have access to those figures for Portugal. At my hospital, 390,311 radiological examinations were performed in 2014, among which 31,532 examinations were paediatric patients.

ESR: Access to modern imaging equipment is important for paediatric imaging. Are hospitals in Portugal equipped to provide the necessary exams?

MLL: In general, hospitals in major cities in Portugal are satisfactorily equipped. However, human resources are less satisfactory and, with the exception of paediatric hospitals or tertiary hospitals with paediatric units, imaging examinations in children are often performed by general radiologists.

ESR: What has changed in paediatric radiology during your lifetime?
MLL: During the 25 years since I graduated from medical school, there has been enormous technical development in radiology in general, and in paediatric radiology in particular. Consequently, the role of imaging and radiologists in daily clinical practice has increased. Awareness of specific paediatric patients' vulnerability to radiation exposure by both medical professionals and patient families has led to the development of several paediatric radiology campaigns and working groups aimed at protecting children and optimising imaging dose according to the As Low As Reasonably Achievable (ALARA) principle. Today, several imaging techniques are now widely available with specific applications for paediatric patients. The justification of examinations, the choice of technique, and what to do when and how, are all carefully considered in daily practice. Paediatric radiologists are fortunately increasingly involved in those decisions. However, in recent years, a decrease in paediatric radiologists or interest in paediatrics from radiologists has been observed, which may seriously compromise paediatric imaging in the near future.

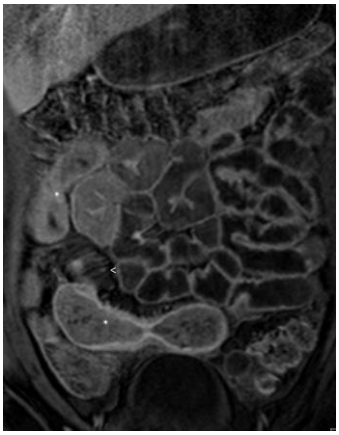
ESR: Where do you see the next developments in your field?
MLL: In an era of financial and economic problems with general policies of cost reduction, the demand for paediatric radiologists will probably continue to be low. Apart from the on-going developments in the field of radiology, such as the emerging fields of functional and molecular imaging for example, which will affect paediatric patients, future efforts should include continuous development of dedicated high level educational programmes in paediatric radiology, not only during radiology training but also as postgraduate programmes for all radiologists (and other professionals) who deal with paediatric imaging in daily practice. Efforts should be made to promote paediatric radiology, in order to improve paediatric patients' care to the best of our knowledge.

Maria Luisa Lobo *is a consultant paediatric radiologist at the Santa Maria University Hospital – North Lisbon Hospital and is also an invited professor at the Medical School of the University of Lisbon. She trained in radiology at the radiology department of the Santa Maria University Hospital with a special focus on paediatric radiology. She then completed a fellowship in paediatric radiology at the Children's Hospital – Harvard Medical School in Boston, USA, in 2000.*

Dr. Lobo is an active member of the Portuguese Society of Radiology (SPRMN), the European Society of Radiology (ESR), the European Society of Paediatric Radiology (ESPR) and the European Society of Urogenital Radiology (ESUR). She is also a member of the ESPR taskforce on uroradiology and the ESUR working group on paediatric radiology. She has participated in numerous national and international meetings, and has authored and co-authored scientific presentations and publications in the field of paediatric radiology.

Foetal MRI (T2W coronal image). Right cervical lymphatic malformation (*) extending into the mediastinum. Cephalic presentation of the foetus.

Chest US (longitudinal section of the lower left hemithorax) in a six-year-old boy with recurrent respiratory infection. Heterogeneous left lower lobe (*) abnormal consolidation due to infected intralobar sequestration (confirmed by CT not shown and after surgery).



MR-enterography (T1W fat saturation post gadolinium, coronal image). Active Crohn's disease in a 14-year-old boy. Enhanced thickened bowel loops of the distal ileum (*) with proliferation of mesenteric vessels (combs sign).