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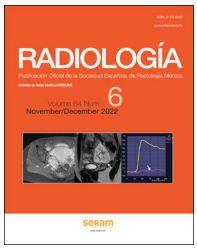

EDITORIAL

Developments in thoracic imaging

Avances en Radiología Torácica

Enormous progress has been made in artificial intelligence (AI) in recent years. AI is driving changes thanks to the image pattern recognition capabilities it acquires from the information fed into the system. AI will become a hugely useful tool for radiologists, making their job easier and allowing them to expand into areas that they were not previously able to cover due to workload.

Thoracic radiology has benefitted more than most from the development of AI and deep learning, with the majority of AI software targeting this area.[1] Many AI-based tools have been developed, with a particular emphasis on lung segmentation and the detection and characterisation of nodules, but also the quantification, characterisation and monitoring of interstitial involvement, bronchial diseases and COVID-19. Many tools have been proposed for the detection, characterisation and stratification of lung carcinoma, some of which are commercially available. Mass screening for lung cancer is an enormous challenge both because of the volume of patients and the medical resources it requires. It is likely that AI-based tools will play an important role in minimising costs and the workload involved, thus enabling a larger proportion of the at-risk population to benefit from efficient screening (with a small number of false negatives and positives). The majority of programmes available on the market today are designed to detect lung nodules.[1,2]

Chest radiography is the most common procedure in a radiology department. Recently, AI has been applied extensively in image interpretation. Various algorithms have been shown to perform well in specific tasks, such as detecting pulmonary nodules/masses, pneumothorax, pleural effusion, consolidation and atelectasis and changes secondary to pulmonary tuberculosis. These algorithms may improve a radiologist's performance by prioritising the detection of the most relevant findings, increasing their diagnostic capacity.[3]

Digital tomosynthesis (DTS) of the chest is a technique that provides multiple anatomic images in a single sweep. It has a number of advantages over chest radiography: it improves the detection of lesions by reducing artefacts caused by the superimposition of anatomical structures, facilitates lesion location and provides greater contrast resolution and sensitivity.[4] DTS of the chest has been shown to be useful in detecting lung nodules and in breast cancer screening. It has also been used in patients with suspected COVID-19 pneumonia, detecting subtle, multiple and peripheral pulmonary opacities, which are more difficult to identify with conventional chest radiography.

Thoracic ultrasound is very useful in guiding diagnostic and therapeutic interventional procedures in the pleura, the chest wall, the mediastinum and peripheral lung parenchyma as it saves money, time and reduces patient exposure to radiation. More recently, it has started to be used to characterise different pulmonary entities, thanks to more extensive clinical experience and improvements in ultrasound equipment, particularly in accident and emergency and intensive care departments. Pleural effusion, pneumothorax, pulmonary atelectasis, interstitial oedema, interstitial lung disease, pneumonia and pulmonary embolism can be identified through specific ultrasound signs, artefacts or a combination of the two.[5,6] This technique is also extremely useful in the context of bedridden patients with acute respiratory failure because it enables both a differential diagnosis between various entities and interstitial fluid management in cases of volume therapy. In outpatient care, it supports the diagnosis of pneumonia and the assessment of pleural effusion.

As García Mullor et al. describe in this supplement, early diagnosis of fibrosing interstitial lung disease can be difficult, and is often delayed. Computer tomography (CT) has a crucial role to play in studying these diseases and is generally the first non-invasive test to suggest this diagnosis. CT findings compatible with diffuse interstitial lung diseases are increasingly common in patients with no relevant clinical symptoms. The Fleschner Society recently published a document on the radiological detection of interstitial lung abnormalities (ILAs) in asymptomatic patients.[7] The report highlights that, in some cases, these patients must undergo clinical evaluation as abnormalities can evolve to become a progressive fibrosing disease which increases the risk of mortality.

This *Radiología* supplement contains a series of original pieces of research and reviews on diverse matters relating to thoracic radiology. These articles demonstrate the utility of applying previously described techniques and technology, the use of CT in monitoring well-known diseases such as COVID-19 pneumonia or in the early detection of lesser-known subtle ILAs.

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