Artificial intelligence
DRAWS THE FUTURE OF BLOCKS

Innovation

(Photo. doc ED)

A control room for operating blocks to secure patient pathways, surgical gestures and facilitate the training of surgeons: AI will profoundly change practices in the years to come.

The Lindbergh operation in 2001, which saw a surgeon operating from New York on a patient lying in a surgical block in Strasbourg, marked the beginning of a new technological era with telemedicine. Since then, the arrival of artificial intelligence has continued to expand the scope of possibilities offered to medicine, offering changes in terms of organization and technical means. Two examples, in the field of diagnosis and in that of surgery, with Dr Pierre-Thierry Piechaud, urologist and head of teaching at Ircad in Strasbourg (1) and the Dr Delphine Raoux, anatomopathologist within the Médipath network. Both recently spoke on this subject at the Onco UroVar congress in Toulon.

"Artificial intelligence is based on the recording of numerous data, what is called Big Data recall the Dr Piechaud in the preamble. *In the field of diagnosis, in particular in terms of radiology or anatomopathology, its superiority can make it possible to go to a faster and/or more reliable result, because it is able to compare a result or an image with thousands other content in its database. »*(Read in sidebar).

From enhanced surgeon...

In the field of surgery, it has a completely different vocation. *" The presence of artificial intelligence in an operating theater has first of all to do with the concept of augmented surgeon,* explains the doctor. *It is useful for increasing* the capacities of the three fundamental organs for the surgeon: his brain, his eyes and his hands. »*Artificial intelligence thus makes it possible to go from a usual two-dimensional vision on the screens to an augmented three-dimensional vision, thanks to a virtual reconstruction in volume of the patient's anatomy. *" This facilitates the definition of the limits of the pathology and it is key for the way of approaching the intervention and the treatment",* emphasizes the urologist. Artificial intelligence also makes it possible to use virtuality to optimize the planning of the surgical gesture, by offering the surgeon the possibility of training before operation, on a virtual patient, exact copy of his real patient. It will also find in the coming years an application in terms of augmented reality. *" Research and development in the field of virtual image explores, for example, the possibility of superimposing a more readable virtual image of the patient (generated by AI) on the real image available to the surgeon on the endoscopic scanner. »,* comment the Dr Piechaud.

. . . to recorded interventions

Artificial intelligence finally makes it possible to record an intervention in the smallest details. *" It can be scary at first,* says the Dr Piechaud, *but it is a reassurance for the patient as for the surgeon, and not only because there will be no more ulterior motives on what could have been hidden. It's also a great way to learn about surgery. »* According to the specialist, all operating theaters will in future have a control room, much like airports have their control tower. *" It will make it possible to optimize and simplify the patient's journey on the technical platform and also to record everything: the surgeon's vision, the patient's constants, the atmosphere of the room,* he details. *A bit like there is a black box on board an airplane, we will have a black box of the patient's surgical course. Any incident can be explained. It is a benefit for the understanding of the practitioner, to advance the techniques and it will have educational virtues: we will be able to standardize the recordings to teach future surgeons to know the different stages of a given operation. At the end of the process, we can also imagine a system capable of setting alerts if it spots a problematic gesture. »*

" the introduction of artificial intelligence in all these applications represents the near future of operating blocks." according to the Dr Piechaud, we can however think that certain doctors will give a less enthusiastic reception for fear of the procedures. Or because they refuse to be filmed during their exercise.

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> "A control room will allow to optimize and to simplify the patient journey »

1. The Digestive System Cancer Research Institute is also a research and development laboratory recognized as a world leader in the fields of computing, robotics and medical imaging applied to mini invasive surgery.

Galen Prostate: an example of help to the diagnosis

Routinely used for just over a year by pathologists in the Médipath network, Galen Prostate is an artificial intelligence tool for the diagnosis of prostate cancer.

"Trained to recognize all types of tissues and cells, he can detect cancer and its histoprognostic grade on a biopsy slide. (1),explains the Dr Delphine Raoux.**Its precision is such that it recognizes all the tissues of the prostate, it can even recognize the nerve threads. It's not as easy for the pathologist to detect. The help of artificial intelligence, which offers a very powerful second reading, improves the efficiency of the diagnosis. »**

Returns over one year show that 3% of diagnoses are redirected by artificial intelligence. **" These are on the one hand cancers diagnosed as benign at first and which are not, on the other hand cancers whose Gleason score (2) is reoriented, often with a higher grade. In both cases, this very clearly modifies the clinical management"** details the Dr Raoux.

"Without artificial intelligence, continues the pathologist, **there is a non-negligible error rate. This tool aims to approach a 100% diagnostic truth on this cancer. »** An algorithm of the same type, developed by the Medipath laboratory with the Curie institute for the diagnosis of breast cancer, has been validated and should arrive on the market.

1- Our Health pages of June 14, 2020.

2- The Gleason score is a prognostic factor for prostate cancer which attempts to quantify the degree of aggressiveness of the tumour. It establishes a score according to the degree of anomalies detected in the tissues.

Many pathologists like Dr Delphine Raoux already uses the Galen Prostate diagnostic aid tool routinely.
(Photo Ph.A.)