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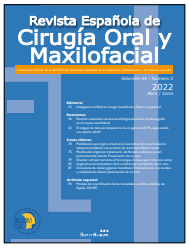

Editorial

Artificial intelligence in maxillofacial surgery. Future or present?

Artificial intelligence (AI) is today among the main driving forces in the field of medicine, with clear utility in the field of clinical diagnosis and with a role in improving the results obtained with the treatment of patients. Machine learning technology ("Machine learning" [ML]) arises from human capacities to feel, learn and reason[1] and is based on the training of logical algorithms by virtue of which machines make decisions in specific cases if we give them a series of general rules. AI applications are already very varied today, having been used to improve diagnostic processes, identify rare pathologies, as well as control results after treatments. In addition, the creation of databases with multiple records, thanks to the high data processing capacity of ML technology, can help us to detect the main prognostic indicators in a given entity. Without a doubt, the inclusion of elements derived from AI in healthcare is becoming more and more frequent. The main ones include: programs to improve communication with the patient, healthcare monitoring systems, drug development and, above all, in surgery, robotic systems to facilitate surgical intervention[2]. Although these new technologies still have certain limitations in their application to the field of maxillofacial surgery, today's surgeon needs a correct understanding of their possibilities, limitations and future challenges.

At the Mobile World Congress held in Barcelona last year, the first AI platform capable of remotely directing surgeries through connectivity with 5G technology (Advances in Surgery- TeleSurgeon platform) was presented. The system reliably reduces errors in the operating room, counting on the advice of the machine in the most critical phases of the process. These advances augur a very promising future, although it is not easy to predict when these systems will reach human capacity in the field of surgery; most predictions point to this happening in the early 2050s.

One of the great applications of AI is based on its precision for the identification of radiographic alterations. These tools have already shown their usefulness in aspects of predicting results in dental implants with peri-implantitis problems[3]. The operation of the ML is based on the interpretation of external data to achieve learning, achieving specific objectives and with the ability to adapt. The ability of machines to quickly analyze the data corresponding to tens of thousands of cases easily exceeds human possibilities, resulting in the detection of small changes in a radiographic study with the result of early detection of inflammatory pathologies in implantology. Other applications in the analysis of radiographic studies are related to the pathology of the temporomandibular joint. The automatic detection of cases with osteoarthritis based on cone beam computed tomography studies can provide important support to the clinician in the diagnosis and decision making for the management of patients in advanced stages of joint dysfunction (Figure 1)[4].

Of special importance are ML systems in their application to the field of head and neck oncology. Aspects as important as the differentiation between ameloblastoma and other odontogenic lesions by virtue of panoramic radiology studies[5] or, as regards malignant lesions, the potential in terms of early diagnosis and prognostic prediction thanks to the sum and analysis of multiple variables. Additionally, computerized vision systems are used as surgical tools in the field of robotics and, with application at the present time, for guided resection by means of navigation systems pre-surgical analysis of the resection area, increasing safety in patient management and reducing human error (Figure 2).

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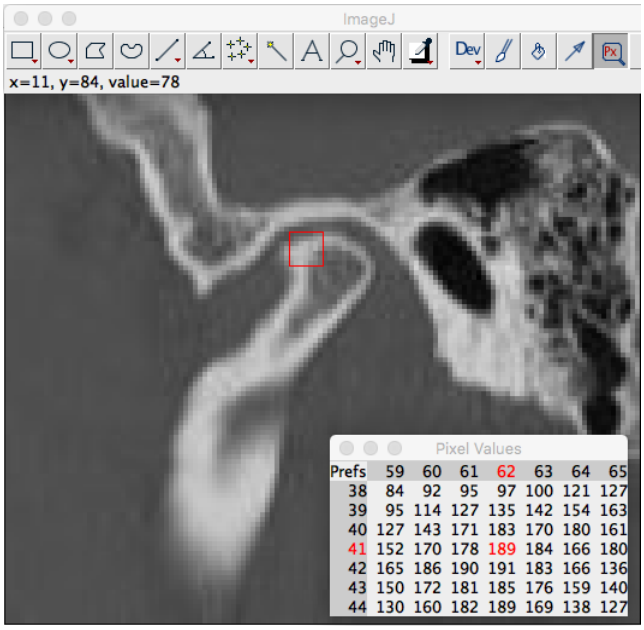

Figure 1. Localization of areas of sclerosis in the context of temporo-mandibular joint osteoarthrosis through J application based on systems of artificial intelligente.

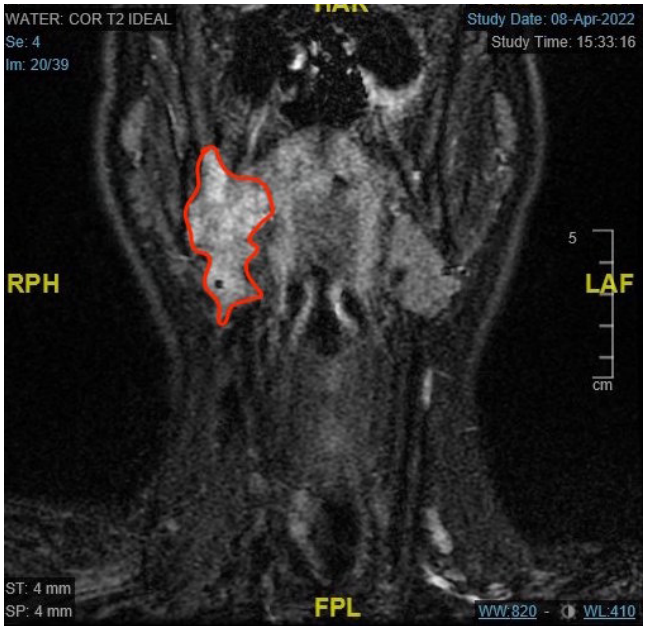

Figure 2. In the surgical treatment of head and neck tumors, the correct delimitation of the lession is essential, based on the radiographic examination of the lesion as a support for navigation techniques. Location of the tumor area in a care of submandibular adenoid cystic gland carcinoma with wide involvement of the chewing space.

Although AI exceeds human capacity in certain aspects, the responsibility for decision-making, especially in critical situations such as those that occur in surgery, must remain in the realm of the human being. Even so, there is no doubt that innovation in the field of surgery follows a geometric progression, limiting the ancestral practice of evidence-based surgery. The future will involve diagnostic decision making and process management likely without the need for support from a health center, sometimes thanks to virtual consultations, irremediably changing our daily practice. The role of the surgeon is not threatened in the short term, but we must make an effort to interpret the recommendations that arise from AI. Our experience will continue to be fundamental but, ideally, it should be coordinated with the data obtained thanks to the new technological systems.

The maxillofacial surgeon must be prepared through courses and training programs for the applications of AI in our specialty, understanding what its clinical application will be like and progressively adopting new functions. These aspects are especially important within the group of young residents and specialists, thus promoting improvement in diagnostic and treatment techniques. We are not talking about science fiction, the implementation of AI and ML systems will soon become something of daily use. Its correct operation will not be possible unless the specialist is properly prepared for its arrival in daily practice.

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