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Artificial intelligence in the diagnosis of Oral Cancer

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Abstract: *Artificial intelligence (AI) can be helpful in the diagnosis of diseases, in making prognosis, or in creating patient-specific treatment plans. AI can help the clinicians and pathologists especially when they need to make important judgements quickly. It can eliminate human mistake from the judgement process, resulting in improved and standardised health care. Pathologists can use AI to find specific imaging indicators connected to disease processes in order to improve early diagnosis, assuming prognosis, and select the treatments that are most likely to be successful. AI and pathologists working together can produce outcomes that are superior to what humans are capable of in terms of accuracy, consistency, timeliness, and utility.*

Keywords: *Artificial intelligence, Pathology, Oral Cancer, Clinicians*

I. Introduction

As now, there is an era of artificial intelligence (AI), where machines act as human minds to take inputs, process them and produce outputs from given data. Artificial intelligence has a wide range of applications in health services. Its use can counteract with human factors such as increase in workload, complexity of work and potential fatigue of doctors that can compromise diagnostic ability.AI applications in imaging machines would reduce this workload and help in more efficient and accurate diagnosis. Mc Carthy et al. first adopted the phrase "artificial intelligence" (A.I.) in the 1950s to refer to computer science.

ML Unit can further be divided into two categories: Supervised learning and Unsupervised learning. In supervised learning, the data that is provided to the machine are matched to the intended output using a labeled training data set. Unsupervised learning techniques don't give out labeled results after completing the learning. It is on the training model to identify the groups or features in the outcome data. Semi-supervised learning combines supervised and unsupervised learning. Another component of AI is Deep learning unit, which is the most recent invention of machine learning. All the major and complicated functions of machine learning applications require deep understanding, so as to have more sophisticated capabilities, decision-making abilities, and the ability to compile larger datasets. Convolutional and fully linked layers together make up CNN compositions with main function of recognizing patterns, lines, and other features schematic and pictorial figures. The cores provide numerous feature images and enable success in various vision tasks, including differentiation, classification, segmentation, complilation, etc. These networks are very similar to human brain that receive and do the analysis of data signals. The amalgamation of artificial intelligence (AI) in healthcare has been the biggest revolution in medical sciences and the earliest change in this field includes the large reliance on digital pathology.

Prevalence of Oral Cancer

Cancer may involve various sites the body but 80-90% of the head and neck cancer comprises of Oral squamous cell carcinoma (OSCC).

In the Indian subcontinent, the prevalence of oral cancer is the highest among all cancers in men even though it is only the sixth most common cancer worldwide. (Neville BW et al) Olshan FA 2010, in their review on epidemiology, pathogenesis and prevention of head and neck cancers suggested that more than one million new cases of cancers are being detected annually in the Indian population among which 92-95% of all oral malignancies are oral squamous cell carcinomas (OSCC). OSCC usually involves elderly population mainly affecting the age group of 50-70 yrs. Squamous epithelium is the main surface structure of the tongue, lips,

palate, floor of the mouth and remaining mucous membranes of the oral cavity. 86% to 95% of head and neck malignancies arise from the oral surface epithelium. Oral squamous cell carcinoma is an invasive neoplasm arising from surface epithelium with varying degrees of squamous differentiation.

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Also, this problem is enhanced by the reduced the size and quality of samples received. The introduction of various tumor markers and improved technology for diagnosing the lesions adds more confusion due to the lack of uniform reporting ways or guidelines. Therefore, A.I.-based techniques can be more robust and reproducible, and help the pathologists to face the diagnostic challenges by the pathologists. It also improves the workflow by enhancing the quality control and quality assurance, pathology workstream, guiding for additional investigations. AI data can be generated with clinical, radiographic and demographic and genetic data,that can efficiently diagnose the lesion with almost no confusion among the pathologists. Therefore, it is imperative to adopt a more encompassing approach with input from A.I. researchers, pathologists, and other participants like oncologists and surgeons

Convolutional neural network-operated automatic computer-aided hyperspectral image detection method can be used to classify OSCC as first suggested by Jeyaraj and Nadar. Through their experiment it was found that OSCC vs. benign lesions image classification accuracy for this system was about 91 percent.

Also, Das et al. presented a two-stage method for computing oral histology images using a 12-layered deep convolution neural network (CNN). From these isolated keratin areas, developed random forests of the Gabor filter are employed to locate the keratin pearls.

A computer-assisted histomorphometry classifier based on nuclear morphology was developed by Lu et al. (2017) which is a very essential diagnostic criterion in the diagnosis of oral cancer. By using a digitized tissue microarray to analyze 2mm sections of OSCC, an ML classifier was able to identify cases at high and moderate risk for diseasespecific survival with an AUC. In this way, many studies have been conducted about prognostic systems for anticipating the survival of patients and local recurrence in OSCC patients in order to improve the prognostication of oral cancer.

Shabana et al. (2019) created a special Deep-learning method to measure cancer infiltrating lymphocytes utilizing whole slide images of oral Squamous cell carcinoma and in this method, efficiency of 96 percent was found

II. Conclusion

Artificial intelligence will also enable more sophisticated diagnostics, allowing the healthcare professionals to exchange expertise and employ automated systems to evaluate and offer insightful contributions that could eventually result in a more accurate pathological diagnosis. The future of oncology will benefit from this combination, which will be very helpful in providing personalized treatment plans.

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