ENT-S01

AI in Ultrasound

Ruey-Feng Chang[1,2]
[1]*Department of Computer Science and Information Engineering*
[2]*Graduate Institute of Biomedical Electronics and Bioinformatics, National Taiwan University, Taiwan, R.O.C.*

Breast cancer is the most common malignancy of the total cancer cases in United States females. However, early diagnosis leads to early treatment and reduces mortality rates. In the clinical usage, breast ultrasound and computer-aided diagnosis (CAD) is usually used to diagnosis tumors into benignancy or malignancy. Also, CAD has been used to decrease the diagnosis variation of different physicians and assist in classifying or detecting the tumors. With the growth of computing power, particularly GPU computing, deep learning has been applied in many different domains and especially in image recognition. The convolution neural network (CNN) has been used in medical imaging for lesion detection, segmentation, and classification. In our study, we use the CNN for automatic feature extraction and the ensemble method to combine multi CNN models for better diagnostic performance. The automated breast ultrasound (ABUS) has been widely used as the popular screening examination in breast. However, reviewing hundreds of ABUS slices and classifying tumor is a time-consuming process for the physician. Hence, fast and effective computer-aided detection (CADe) and diagnosis (CADx) systems can help to accelerate the process for the physician. Therefore, in this talk, the CADe and CADx systems based on 3-D CNN are proposed for breast tumor detection and classification in ABUS image. The proposed systems locate the tumor position and distinguish the tumor as malignant or benign. In the CADe system, the whole ABUS image is scanned and the tumor candidates are detected by using the sliding window, 3-D CNN, and prioritized candidate aggregation. After tumor detection, the tumor region is fed as the input of following CADx system for tumor classification.

Acknowledgments

The authors thank the National Science and Technology Council (110-2221-E-002-122-MY3, 110-2221-E-002-123-MY3, 111-2634-F-002-021) for financial support.

ENT-S02

Ultrasound in Salivary Gland Disease

Yi-Fang Ding[1,2]
[1]*Department of Otolaryngology, Taipei Medical University -Wan Fang Hospital;*
[2]*Department of Otolaryngology, School of Medicine, Taipei Medical University*

Ultrasound imaging has emerged as a valuable diagnostic tool in the assessment of salivary gland diseases due to its non-invasive nature, real-time visualization capabilities, and absence of ionizing radiation. Salivary gland diseases encompass a diverse range of pathologies, including inflammatory, infectious, neoplastic, and obstructive conditions. Ultrasound serves as an essential modality for both initial assessment and follow-up of these disorders. In cases of inflammatory conditions like sialadenitis, ultrasound aids in detecting glandular enlargement, focal hypoechoic regions indicating abscesses, and increased vascularity suggestive of active inflammation. Neoplastic lesions, including both benign and malignant tumors, can be well-differentiated through ultrasound imaging. Benign tumors exhibit smooth margins, a well-defined capsule, and homogenous internal echotexture. Malignant tumors, on the other hand, often display irregular borders, infiltrative growth patterns, and increased vascularity. Obstructive disorders like salivary stones or strictures are accurately visualized using ultrasound. Echogenic foci within the salivary ducts indicate the presence of calculi, while dilated ducts proximal to the obstruction are observable. Moreover, ultrasound-guided fine-needle aspiration (FNA) has become a crucial technique for obtaining tissue samples from suspicious lesions. In conclusion, ultrasound imaging holds paramount significance in

the assessment of salivary gland diseases due to its non-invasive nature, ability to characterize various pathologies, and guide interventions like FNA. The method's real-time imaging and increasing accuracy make it an indispensable tool for clinicians and radiologists in the comprehensive evaluation of patients with salivary gland disorders.

ENT-S03
Ultrasound in Adult Obstructive Sleep Apnea

Chun-Hsiang Chang[1,2]
[1]Department of Head and Neck Surgery, Cardinal Tien Hospital (An Kang Branch)
[2]Cancer Center, Cardinal Tien Hospital

Obstructive sleep apnea (OSA) is a prevalent sleep disorder associated with significant morbidity and mortality. While polysomnography (PSG) is the gold standard for OSA diagnosis, it is costly. In addition, the PSG does not depict the dynamic motion of the upper airway in the settings, particularly the movement of the tongue during natural sleep. Ultrasound has emerged as a potential tool to evaluate the dynamic changes of the tongue in patients with OSA. Algorithm-driving automatic tracing and measuring the characteristics of the tongue during natural sleep may aid in OSA diagnosis and guide surgical interventions. Moreover, the symposium will explore future directions for ultrasound in OSA, such as using ultrasound neuromodulation to manage OSA and machine learning for real-time ultrasound analysis. Overall, this symposium session aims to review the current state of ultrasound in OSA and discuss future directions for its use to promote its adoption as a valuable tool for OSA diagnosis and management.

ENT-S04
Intraoperative Ultrasound in Otolaryngology

Hsin-Lin Chen[1,2], Che-Yi Lin[2], Tsung-Lin Yang[2]
[1]Department of Surgical Oncology, National Taiwan University Hospital Cancer Center, Taipei, Taiwan
[2]Department of Otolaryngology, National Taiwan University Hospital, Taipei, Taiwan

Intraoperative ultrasound (IOUS) has been widely used for decades. It has emerged as a revolutionary imaging tool within the field of otolaryngology, facilitating real-time, high-resolution visualization of anatomical structures during surgical interventions. IOUS has become an indispensable adjunct to conventional surgical navigation techniques in otolaryngology. It provides immediate feedback make it a valuable aid for surgeons in accurately delineating anatomical structures, identifying pathological lesions, and guiding precise surgical resections. This abstract also highlights the multiple domains of otolaryngology where IOUS finds its utility. This technology is particularly beneficial in complex procedures involving the head and neck, skull base, paranasal sinuses, and thyroid, where the proximity of vital structures demands surgical precision and minimization of iatrogenic injuries. Here we present the application in clinical practice. There's growing significance of IOUS in otolaryngology, encompassing its various applications, advantages, and potential limitations.

ENT-S05
Ultrasonography in Rhinology

Yun-Ting Chao
Department of Otorhinolaryngology- Head and Neck Surgery, Taipei Veterans General Hospital National Yang Ming Chiao Tung University

Ultrasonography can be applied in several aspects in the field of rhinology: (1) evaluation of paranasal sinus lesions; (2) diagnosis of nasal bone fracture; and (3) assessment of the skin-soft tissue envelope and cartilage for septorhinoplasty procedures. An 'A mode' sinus ultrasound provides quick, noninvasive and accurate diagnosis of acute /

subacute maxillary sinusitis. Maxillary sinusitis with fungal ball can be diagnosed by a positive plain sinus film combined with a false negative sinus ultrasound. B-mode ultrasound can also be a potential diagnostic tool for sinusitis and sinonasal tumors. The nasal bone fracture can be diagnosed by ultrasound with high accuracy and positive predictive value. The ultrasonography can also serve as a helpful tool for septorhinoplasty in preoperative planning and postoperative follow-up.

ENT-S06

Ultrasound in Oral and Maxillofacial Surgery

Hsin-Hu Peng i
Department of Oral and Maxillofacial Surgery, National Taiwan University Hospital Hsin-Chu Branch

Ultrasound is one of the most commonly used imaging tools in the head and neck area. Head and neck ultrasound can be used as a diagnostic and biopsy tool, including: cervical lymph node examination, salivary gland tumor and stone diagnosis, unknown head and neck mass diagnosis, fine needle aspiration and core needle biopsy. In addition to the above functions, ultrasound can also be used for the treatment of head and neck infections, temporomandibular joint diseases (TMD), etc. The temporomandibular joint has dynamic and static changes, and it is difficult to use ultrasound in the diagnosis or treatment of the TMD. Traditionally, TMD is intervened using arthrocentesis or arthroscopy, ultrasound provides a new way for temporomandibular joint approach. I will share my experience of using head and neck ultrasound as an oral and maxillofacial surgeon.

ENT-S07

Ultrasound in Head & Neck Oncology

Chi-Maw Lin
Department of Otolaryngology, National Taiwan University Hospital, Yun-Lin Branch, Yun-Lin, Taiwan

The major advantage of ultrasound in Head & Neck Oncology is incorporating and facilitating real time fine needle aspiration (FNA) or core needle biopsy (CNB) to get cytological or pathological samples for diagnosis. Ultrasound provides clinicians robust information in pre-treatment assessment, surgical assistance, and post-treatment surveillance. Regarding cervical lymph nodes, ultrasound is profitable in the differentiation of benign and malignant lesion and in the evaluation of extra-nodal extension (ENE) by identifying the well-known malignant features, such as irregular (interrupted) margin, increased S (short)/L (long) ratio, aberrant vascular pattern, and elevated strain ratio/shear wave speed in elastography. Besides cervical lymph nodes, thyroid glands, and salivary glands, ultrasound was recently adopted in the evaluation of oral and pharyngal tumor, post-radiation carotid artery stenosis, and post-treatment dysphagia. Though FNA and CNB have great sensitivity and specificity in the diagnosis of Head & Neck tumors, the unsatisfactory rate in FNA and the untargeted rate of CNB seem to be deteriorated after surgical and radiational treatments. It indicates that mutual collaboration of FNA and CNB according to divergent situation will elevate the diagnostic accuracy of ultrasound. In brief, ultrasound has become an essential tool with continuously expending applications in Head & Neck Oncology.