Round up

ARTIFICIAL INTELLIGENCE-ASSISTED GLEASON GRADING IN PROSTATE BIOPSIES

Pathomics, the fusion of digitalized pathology and artificial intelligence (AI), is currently changing the landscape of medical pathology. Gleason grading (GG) in prostate cancer is important for management decisions and prognosticating survival outcomes. However, the high interobserver variability between pathologists causes frequent diagnostic dilemmas, leading to both under and overtreatment, thus impacting patient outcomes and health-care costs. AI systems have demonstrated the potential to assist pathologists in performing GG while overcoming the variability. Mun et al. developed a deep learning algorithm-based GG system called Yet Another Automated GG System (YAAGGS).[1]

The system accepted whole-slide image (WSI) maps constructed using a convolutional neural network-based model trained by slide-level annotations using the multiple-instance learning method, thus predicting the GG groups. A total of 7600 WSIs from 788 cases from two institutions were included in the study, with 6664 WSIs (689 cases) used for system discovery and 936 WSIs (99 cases) used for internal validation of the system. The system accuracy for the prediction of GG group was 77.5% (95% confidence interval [CI]: 72.3%–82.7%), with the Cohen’s kappa score (κ) being 0.650 (95% CI: 0.570–0.730), and the quadratic-weighted kappa score (κ quad) being 0.897 (95% CI: 0.815–0.979). In the inter-institutional validation, YAAGGS trained on 621 cases from one institution was validated on 167 cases from the other institution, and the system’s accuracy was 67.4% (95% CI: 63.2–71.6%), the κ 0.553 (95% CI: 0.495–0.610), and the κ quad 0.880 (95% CI: 0.822–0.938).

The author concluded that their AI-based GG system trained only from slide-level annotations performed on par with pathologists and could assist them to achieve better agreement with consensus grading. In the future, AI would integrate complex datasets from the patients’ diagnostic evaluation to improve diagnostic and prognostic ability and assist in planning the most desirable treatment plan. The histopathological imaging data would be integrated with the magnetic resonance imaging data, with initial risk stratification data utilizing modern prediction models and possibly with tumor genomic profiling data.

MOSES™ TECHNOLOGY FOR HOLMIUM LASER ENUCLEATION OF THE PROSTATE

Holmium laser enucleation of the prostate (HoLEP) is a safe and effective treatment modality for benign enlargement of the prostate. New laser technologies strive to improve energy delivery and thus decrease the operative time, the MOSES™ pulsed-laser system being one such system. Much like the biblical character MOSES™, who parted the Red sea to clear the path for his disciples, the pulsed-laser system divides the laser energy into two peaks – initial energy causes water displacement and creates a vapor bubble, followed by the targeted energy with lesser dissipation.

Kavoussi et al. compared HoLEP with or without the MOSES™ in a prospective, double-blind, randomized controlled trial.[2] The study randomized 65 individuals with a prostate size of ≥80 cc with moderate to severe LUTS. One arm used HoLEP, while the other used MOSES™ technology. Lumenis 120H dual pedal laser unit with a MOSES™ 550 μm laser fiber was used. Prostate enucleation was performed using a two-lobe, bottom-up technique by a single surgeon. Hematocrit was determined on the 1st postoperative day, and patients followed up after 6 weeks for functional outcome and complications. The total operative time was significantly shorter with MOSES™ (mean 101 min vs. 126 min; P < 0.01) due to a significant shortening of the enucleation time (mean 68 min vs. 80 min; P = 0.03). It took significantly lesser time to achieve hemostasis (mean 18 min vs. 29 min; P < 0.01) with lesser blood loss (mean 6.3% vs. 9.0%; P = 0.03). At the 6-week follow-up, the functional and safety outcomes were similar between the two groups. The drawbacks were that it was a single-institution study with a short follow-up period. The effect of anticoagulation/antiplatelet therapy and financial impact was not studied.

PROSTATIC ARTERY EMBOLIZATION - AN ALTERNATIVE TO TRANSURETHRAL RESECTION

Prostatic artery embolization (PAE) is a minimally invasive alternative to transurethral resection of the prostate (TURP), with the advantages of being able to be performed under local anesthesia, lack of requirement to discontinue anticoagulants, and a quicker recovery time. Abt et al. addressed the lack of reliable long-term data on PAE with a randomized, noninferiority trial.[3]

The trial randomized 103 men with benign prostatic hyperplasia, who failed medical therapy and had prostate volumes of 25–80 ml to receive PAE (n = 51) or TURP (52), Embozene™ microspheres (250–400 mm; Boston Scientific)
were used for PAE and it was considered successful on complete cessation of flow in both the prostate arteries on angiography after embolization. At 2-year follow-up, the mean decrease in the International Prostate Symptom Score was 9.2 and 12.1 in the PAE and TURP group, respectively, with a difference of 2.9 (95% CI 0.04–5.72). Prostatic volume reduction was better with TURP (10.66 ml vs. 30.20 ml; 19.54 [7.70–31.38]). TURP was more efficient in improving maximum urinary flow rate (3.9 ml/s vs. 10.23 ml/s, difference of −6.33 (−10.12−2.54); P < 0.001), and PVRU volume reduction (62.1 ml vs. 204.0 ml; 141.91 [43.31–240.51]). The authors concluded that patients who underwent TURP had a better subjective and objective outcome when compared with patients who underwent PAE. However, PAE was associated with fewer adverse events and can be considered an option in patients needing minimal invasive treatment and who are willing to have inferior outcomes than resection procedures.

DELAYED PHASE IMAGING IN HIGH-GRADE RENAL TRAUMA

The American Urological Association Urotrauma guidelines recommend contrast-enhanced computed tomography and delayed phase imaging (DPI) at presentation for all renal injuries. However, there is a scarcity of data to support the universal acceptance of this protocol. Koch et al designed a retrospective study to analyze the impact of DPI at admission on urinary extravasation (UE) complications.[4]

Patients were assigned an estimated American Association for the Surgery of Trauma (eAAST) renal injury grade based on arteriovenous-phase admission imaging, as the receipt of DPI was variable. Patients were included if they had an eAAST renal injury Grade of III-V and a perinephric fluid collection. The primary outcome was developing a complication (flank pain, fever, or leukocytosis) perinephric fluid collection. The primary outcome was developing a complication (flank pain, fever, or leukocytosis) secondary to UE requiring intervention. Ninety (28.6%) of 315 patients had DPI on presentation. Patients without DPI had higher injury severity scores (29 vs. 23, P = 0.002), fewer isolated renal injuries (27.6% vs. 38.9%, P = 0.05), and lower grade renal injuries (56.9% vs. 41.1% Grade 3, P = 0.03). Patients with DPI were more likely to undergo immediate interventions (OR: 11.75, 95% CI: 2.99–78.10) and interval stent placement for UE (OR: 6.86, 95% CI: 1.56–47.64), without a difference in urologic complications (OR: 5.07, 95% CI: 0.25–766.16).

The authors concluded that DPI at admission was associated with an increased odds of undergoing immediate and asymptomatic interval urologic interventions without a difference in the odds of a complication after high-grade renal trauma. Further studies are required to determine the criteria for acquiring DPI at admission in renal trauma patients.

STAGING MUSCLE-INVASIVE BLADDER CANCER – MULTIPARAMETRIC MAGNETIC RESONANCE IMAGING VERSUS TRANSURETHRAL RESECTION OF BLADDER TUMOR

Transurethral resection of bladder tumor (TURBT), the current gold standard to diagnose muscle-invasive bladder cancer (MIBC), is commonly associated with staging inaccuracies, potentially delaying radical treatment for MIBC. Multiparametric magnetic resonance imaging (mpMRI) is a noninvasive alternative that may offer rapid and accurate diagnosis of MIBC. The preliminary evaluation of BladderPath randomized controlled trial compared risk-stratified mpMRI-directed treatment pathway (pathway-2, n = 52) with TURBT (pathway-1, n = 48) in patients with newly diagnosed bladder cancer.[5]

Cystoscopic risk-stratification was done according to a 5-point Likert scale for appearance, with scores 1–2 considered “probable NMIBC” and scores 3–5 considered as “possible MIBC.” In pathway-2, for possible MIBC, patients underwent flexible cystoscopy-guided tissue biopsy under local anesthesia and mpMRI using the Vesical Imaging – Reporting and Data System protocol and for probable NMIBC, underwent TURBT. Of 11 participants diagnosed as non-MIBC on mpMRI, 10 (91%) were pathologically confirmed to be non-MIBC on TURBT. Of 15 patients diagnosed as MIBC on mpMRI, 10 (67%) were treated as MIBC (cystectomy = 5, radiotherapy = 2, chemoradiation = 1, palliative care = 2) and 5 underwent TURBT that demonstrated non-MIBC (pT1 = 2 and pTa = 3), highlighting the limited specificity of mpMRI for diagnosing MIBC. For patients who underwent chemoradiotherapy (n = 1), radiotherapy (n = 2), or palliation (n = 2) for mpMRI-diagnosed MIBC, it was impossible to know whether these were correct treatments as they were not biopsy proven, and this is again a limitation of the study design. The authors concluded that a risk-stratified mpMRI-directed treatment pathway could diagnose MIBC with good accuracy, thus potentially avoiding treatment delays, especially in the COVID era. TURBT in some patients can be avoided and replaced by office-based flexible cystoscopy-guided tissue biopsy under local anesthesia, based on cystoscopic visual score, which can accurately identify patients with low risk of MIBC. This is the first RCT on mpMRI using VI-RADS.

COVID BREAKTHROUGH INFECTION

Vaccination is the key to changing the course of the current COVID-19 pandemic. Very little is known about the postvaccination real-world scenario. Evolution of viruses with increased transmissibility lead to an increase in postvaccination cases. Hence, developing insights on “at risk” patient and devising methods to protect them has gained significance.
A prospective, community-based, case–control study on adults >18 years in the United Kingdom for assessing post vaccination infection using a mobile app ZOE. Around 4.5 million people enrolled and self-reported baseline demographic, geographical, and health-related risk factors, along with disease symptoms, vaccination status. Adults who received the first or second dose and had positive report at least 14 days from the first dose (before the second dose) along with who had positive report at least 7 days after the second dose were grouped into Case 1 and Case 2 groups. Individuals reporting negative tests at the same timelines were taken in control group. Case 3 and Case 4 groups were made for disease-profile analysis from Case 1 and 2 groups who had used the app for 14 days consecutively. Unvaccinated individuals who used the app continuously for 14 days were taken as control 3 and control 4 groups and matched with cases based on date of the positive status, body mass index (BMI), gender, age, and health-care worker status. Univariate logistic regression models were used to compare both groups.

The analysis showed frailty in older people (>60 years) (OR: 1.93, 95% CI: 1.50–2.48, \( P < 0.0001 \)), and individuals living in deprived areas (OR: 1.11, 95% CI: 1.01–1.23; \( P = 0.039 \)) were the main risk factors for the development of infection. Individuals with low BMI (<30 kg/m\(^2\)) had lower risk for infection (OR: 0.84, 95% CI: 0.75–0.94; \( P = 0.0030 \)). Reduced hospitalization and duration of symptoms were noted with vaccination. There was a significant reduction in the symptoms in vaccinated individuals, and the older individuals (>60 years) essentially were asymptomatic following complete vaccination.

Efforts should be made to give booster doses to “at-risk” individuals for effective infection control. Relaxation of COVID protocols should be taken with caution around frail and underprivileged people even if they are vaccinated.

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