

Commentary

As technology progresses new and additional diagnostic tests become available for various conditions. In imaging the newer tests are evaluated and validated by comparing their performance against an “established” test or a reference standard. Obuchowski et al argue that this alone may be insufficient to establish their interchangeability. They suggest formal evaluation of this before replacing one test with another. This is an important concept as we as radiologists often pay little attention to this aspect of technological evaluation. The key point to remember is that just because a test has similar diagnostic performance may not necessarily make it directly interchangeable. Contrast extravasation causes significant morbidity with mild extravasation leading to pain and swelling whereas severe cases may lead to tissue necrosis if not treated appropriately. The incidence of contrast medium extravasation as an absolute number of events has been increasing over the years. Two important factors in this is the increasing number of contrast enhanced CT and MR examinations and the wide spread implementation of power injectors to deliver the contrast agent. In the study by Shaqdan et al from Massachusetts General Hospital the incidence is 0.13%. They review the factors associated with the event and not surprisingly find that the use of automated power injectors, inpatient settings, females and CT examinations are statistically significant risk factors. It is prudent that operators take special precautions in these circumstances.

Advanced hepatocellular carcinoma is a common condition with few treatment options that have any impact either on quality of life or survival. Trans catheter chemoembolisation (TACE) offers some hope but is relatively contraindicated in patients with portal vein thrombosis. Pan et al describe their experience with a combination of TACE and Sorafenib in patients with portal vein tumour thrombus. In this group they found that they were able to extend overall survival without serious complications. This may be of benefit to our patients who often present with this scenario.

Good data regarding the diagnostic performance of various new tests is sparse. It is therefore good to see a meta-analysis of shear wave elastography (SWE) in the assessment of thyroid nodules. Ultrasound of the neck is now the first test that is done for thyroid and other neck swellings. Although the characterization of swelling is very good on high resolution neck sonography the meta-analysis indicates that it is further improved by the addition of SWE. SWE on its own has a sensitivity of 84.3% and a specificity of 88.4% respectively. This is creditable performance indeed. SWE takes the variability out of the equation when it comes to ultrasound based elastographic evaluations that had dogged the conventional strain based tests.

Prof. Zafar Sajjad

Professor of Radiology

Aga Khan University Hospital, Karachi, Pakistan.

Academic Radiology 2014; 21(11): 1483-9

Nancy A. Obuchowski PhD, Naveen Subhas MD and Paul Schoenhagen MD

Testing for Interchangeability of Imaging Tests

RATIONALE AND OBJECTIVES: New tests are typically assessed by estimating their technical and

diagnostic performance through comparisons with a reference standard. A valid reference standard, how-

ever, is not always available and is not required for assessing the interchangeability of a new test with an existing one.

MATERIALS AND METHODS: To show interchangeability of a new test with an existing test, one compares the differences in diagnoses between the new and existing tests to differences between diagnoses made with the existing test on several occasions. We illustrate the test for interchangeability with two studies. In a transcatheter aortic valve replacement study, we test whether semiautomated analysis can be used interchangeably with manual reconstructions from three-dimensional computed tomography (CT) images. In patients with femoroacetabular impingement, we test whether magnetic resonance imaging (MRI) can replace CT to measure acetabular version.

RESULTS: Although the semiautomated method agreed often with the manual measurement of aortic valve size (87.6%), interchanging the semiautomated method with manual measurements by an expert would lead to a 1.7%–12.2% increase in the frequency of disagreement. Interchanging MRI for CT to measure acetabular version would lead to differences in angle measurements of 2.0° to 3.1° in excess of the differences we would expect to see with CT alone.

CONCLUSIONS: Testing for agreement or correlation between a new and an existing test is not sufficient evidence of the performance of a new test. A formal evaluation of interchangeability can be conducted in the absence of a reference standard.

Clinical Radiology 2014; 69(12): 1264-72

K. Shaqdan, S. Aran, J. Thrall and H. Abujudeh

Incidence of contrast medium extravasation for CT and MRI in a large academic medical centre: A report on 502,391 injections

AIM: To present the author's experience of contrast medium extravasation (CME) during both CT and MRI examinations in a large academic medical centre.

MATERIALS AND METHODS: The present retrospective investigation was conducted between June 2008 and June 2013. The radiology data and medical records of patients in whom CME had occurred were reviewed.

RESULTS: The extravasation rate for CT and MRI was 0.11% (541/502 391); the % was 0.13% during CT and 0.06% during MRI. There was a statistically significant difference between females and males in the overall % ($p = 0.0062$), and the number of extravasations between CT and MRI ($p < 0.0001$). At MRI, the incidence of CME in patients >60 years was statistically significant when compared to the 18–60 year age group ($p = 0.0072$). Of 90 MRI patients with extravasation, CME occurred in 51 (0.048%, 51/105,

578) patients from manual injections, and 39 (0.087%, 39/44,688) patients from automated injection with statistical significance ($p = 0.0048$). A statistical significance was found between females receiving automatic injections and males receiving manual injections ($p = 0.0161$). The majority of CME during CT and MRI occurred in the outpatient department [64.5% (291/451) and 64.4% (58/90), respectively], but the overall incidence of CME was highest in inpatients [0.29%, (160/54,664) in CT and 0.16% (32/20,048) in MRI].

CONCLUSION: Patients undergoing CT are at higher risk of developing CME than MRI patients. Females and inpatients were also more likely to develop CME at both CT and MRI. At MRI CME is more likely in patients above the age of 60 years and for those receiving automated power injections.

Clinical Radiology 2014; 69(12): 553-61

T. Pan, X.-S. Li, Q.-K. Xie, J.-P. Wang, W. Li, P.-H. Wu and M. Zhao

Safety and efficacy of transarterial chemoembolization plus sorafenib for hepatocellular carcinoma with portal venous tumour thrombus

AIM: To evaluate the safety and efficacy of combined therapy with transarterial chemoembolization (TACE) and sorafenib for hepatocellular carcinoma (HCC) with portal venous tumour thrombus (PVTT).

MATERIALS AND METHODS: This study was approved by the institutional review board. From May 2009 to May 2012, 170 consecutive patients were newly diagnosed with advanced-stage HCC and treated with TACE plus sorafenib. Among them, 41 patients with PVTT were retrospectively enrolled in the study. The adverse events (AEs), overall survival (OS), time to progression (TTP), and prognostic factors were analysed. Statistical analysis was performed with the Kaplan–Meier method using the log-rank test and Cox regression models.

RESULTS: The most common AEs were hand–foot skin reaction related to sorafenib and fever related to

TACE. Procedure-related mortality and grade 4 AEs were not observed. Grade 3 AEs were observed in five patients. During the median follow-up period of 13.5 months (range 1.4–45 months), the 6-month and 1-year survival rates were 87.7% and 53.6%, respectively. The median OS was 13 months (range 1.4–44.8 months), and the median TTP was 7 months (range 1–18.6 months). The Child–Pugh class ($p = 0.022$), extrahepatic metastasis ($p = 0.009$), and gross morphological type (nodular type versus diffuse type; $p = 0.008$) were prognostic factors related to OS in the multivariate analysis.

CONCLUSION: TACE plus sorafenib in an interrupted therapeutic scheme was well tolerated and might improve OS for HCC patients with PVTT, especially in those with Child–Pugh class A, no extrahepatic metastasis, or nodular-type HCC.

European Radiology 2014; 24(11): 2729-38

Peiliang Lin, Minqi Chen, Baoxian Liu, Siwen Wang, Xiaoxi Li

Diagnostic performance of shear wave elastography in the identification of malignant thyroid nodules: a meta-analysis

OBJECTIVE: This meta-analysis aimed to assess the performance of shear wave elastography (SWE) in the identification of malignant thyroid nodules.

METHODS: Web of Science, Scopus, PubMed, and the references of narrative reviews were searched for relevant studies with a publication date through October 2013. The methodological quality was assessed using QUADAS tools. Data synthesis was calculated using the bivariate mixed-effects regression model.

RESULTS: Of the 131 studies identified, 15 (11.5 %) were included, in which SWE, point-SWE or 2D SWE, was used to evaluate 1,867 thyroid nodules in 1,525 patients. Methodological assessment revealed study quality was moderate to high. The pooled sensitivity,

specificity, and area under the summary receiver operating characteristic curve of SWE for detecting malignant thyroid nodules were 84.3 % (95 % confidence interval [CI], 76.9–89.7 %), 88.4 % (95 % CI, 84.0–91.7 %), and 93 % (95 % CI, 90–95 %), respectively. As a screening tool, positive and negative predictive values were 27.7–44.7 % and 98.1–99.1 %, respectively, calculated with a malignance prevalence of 5–10 % in thyroid nodules. A publication bias regression test revealed no significant small-study bias.

CONCLUSIONS: SWE is a highly accurate diagnostic modality for the identification of malignant thyroid nodules, with promise for integration into routine imaging protocols for thyroid nodules.