ULTRASOUND NEWS

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2D shear wave elastography (SWE) performance versus vibration-controlled transient elastography (VCTE/fibroscan) in the assessment of liver stiffness in chronic hepatitis

Ahmed M. Osman, Ahmed El Shimy, and Mohamed M. Abd El Aziz

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Insights into Imaging

ORIGINAL ARTICLE Open Access

2D shear wave elastography (SWE) performance versus vibration-controlled transient elastography (VCTE/fibroscan) in the assessment of liver stiffness in chronic hepatitis

Ahmed M. Osman*, Ahmed El Shimy and Mohamed M. Abd El Aziz

Abstract

Background: The assessment of liver stiffness and the degree of fibrosis are important factors affecting the management strategy. Multiple non-invasive tools are now available to offer an adequate alternative to biopsy. In this study, we tried to compare the performance of 2D shear wave elastography (SWE) to the transient elastography/fibroscan as a non-invasive tool in the prediction of liver stiffness. This is a prospective study of 215 patients confirmed by serology to have positive virus C or B infection. 2D SWE was done followed by vibration-controlled transient elastography (VCTE) known as fibroscan at the same session. Biopsy results were collected.

Results: The mean age was 51.07 years ± 6.07 SD. Five cases were excluded due to insufficient data. Fibroscan failed in 30 cases out of 210 cases (failure rate of 14.3%) compared with only 12 patients (6.7% failure rate) while using SWE. Only 180 patients completed the study to the result analysis. SWE results showed significant agreement to the fibroscan results with 86.7% agreement with a tendency for overestimation of the degree of fibrosis (11.7%). The efficacy of SWE was the highest during the assessment of patients with F0 (98.9%), F1 (97.8%), and F4 (93.3%) respectively and relatively low in F2 (92.8%) and F3 (90.6%).

Conclusion: 2D SWE is a relatively recent non-invasive tool in the assessment of liver fibrosis grading which can be used as an alternative to the fibroscan with almost similar diagnostic performance especially when fibroscan is not capable to obtain adequate results such as in obesity and ascites.

Keywords: Chronic liver disease, Liver stiffness, Shear wave elastography, Fibroscan, Transient elastography

Key points

-Chronic liver disease is one of the commonest chronic diseases worldwide.
-The degree of fibrosis is important to determine the treatment strategy.
-SWE and fibroscan are non-invasive tools for liver fibrosis grading.
-SWE offers almost similar diagnostic accuracy as fibroscan with overestimation tendency

Conclusion

SWE shows almost similar diagnostic performance compared to fibroscan which considered recently as a main non-invasive tool in liver fibrosis staging with minimal tendency to overestimate the degree of fibrosis. SWE can be used with high performance as an alternative to fibroscan especially when fibroscan is not able to obtain adequate results as in obesity and massive free ascites. Also, SWE gives the operator a real-time visualization of the selected area with a large surface area compared to fibroscan.

Table 4 The diagnostic validity of fibroscan (TE) and SWE compared to tissue biopsy at different fibrosis scores

	F0		F1		F2		F3		F4	
	TE	SWE	TE	SWE	TE	SWE	TE	SWE	TE	SWE
Sensitivity (%)	94.3	91.4	83.9	77.4	87.5	84.3	88.9	77.8	95.7	100
Specificity (%)	97.9	98.6	97.3	97.3	98.6	98.6	97.2	97.9	97	91
NPV (%)	98.6	97.9	96.7	95.4	97.3	96.7	97.2	94.6	98.5	100
PPV (%)	91.6	94.1	86.7	85.7	93.3	93.1	88.9	90.3	91.7	97.3
Efficacy (%)	97.2	97.2	95	93.9	96.7	96.1	95.6	93.9	96.7	93.3

Table 5 The results of fibrosis score between the selected population using both fibroscan and SWE technique with the fibroscan results used as the reference

			Fibroscan (VCTE) fibrosis score					Total
			F0	F1	F2	F3	F4	
SWE fibrosis score	F0	Count	34	0	0	0	0	34 (18.9%)
	F1	Count	1	27	0	0	0	28 (15.6%)
	F2	Count	1	3	23	2	0	29 (16.1%)
	F3	Count	0	0	5	25	1	31 (17.2%)
	F4	Count	0	0	2	9	47	58 (32.2%)
Total		Count	36	30	30	36	48	180
		%	20%	16.7%	16.7%	20%	26.7%	100.0%
Chi-square tests								
			Value	*P*				
Pearson chi-square			514.551	0.000				

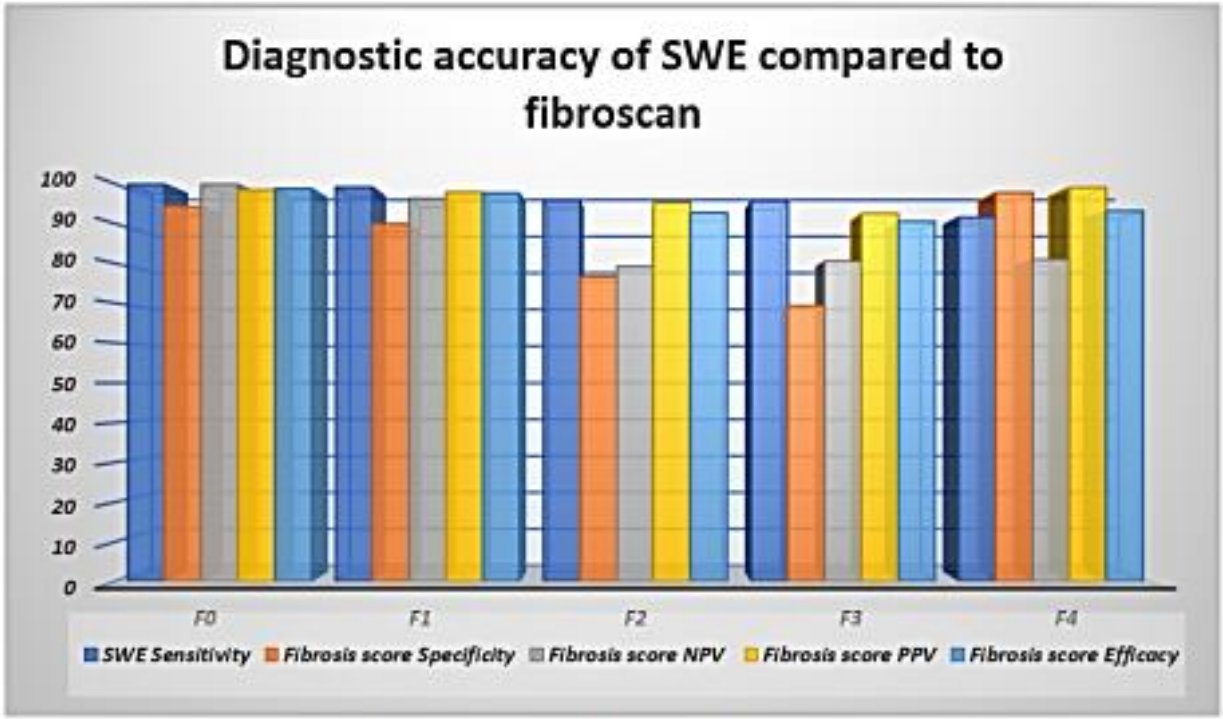

Fig. 3 The diagnostic accuracy of SWE compared to the TE fibroscan when using the TE fibroscan results as a reference

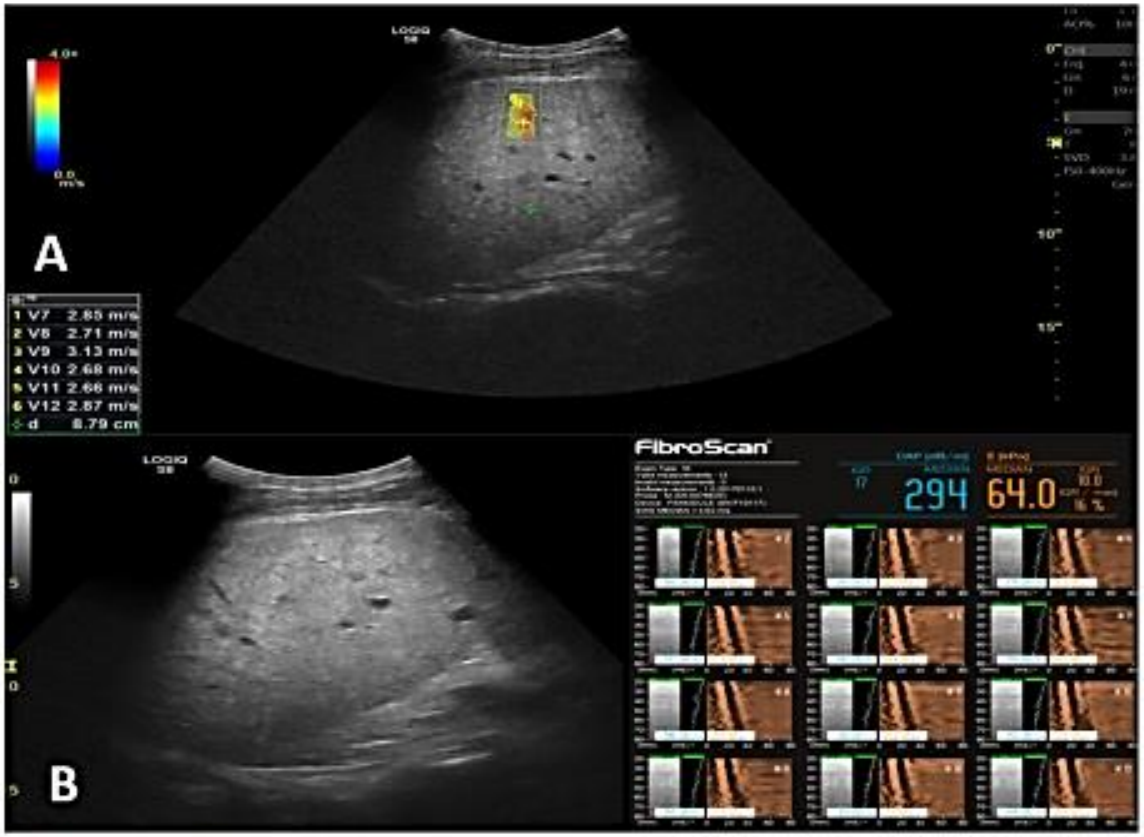

Fig. 4 A male patient 52 years old with chronic hepatitis C infection on follow-up. **a** SWE revealed median velocity = 2.62 m/s and *V* median/IQR = 14.6% consistent with F4 according to Metavir score. **b** Fibroscan was done for the same patient and revealed kPa = 64 and IQR/median = 16% consistent with F4

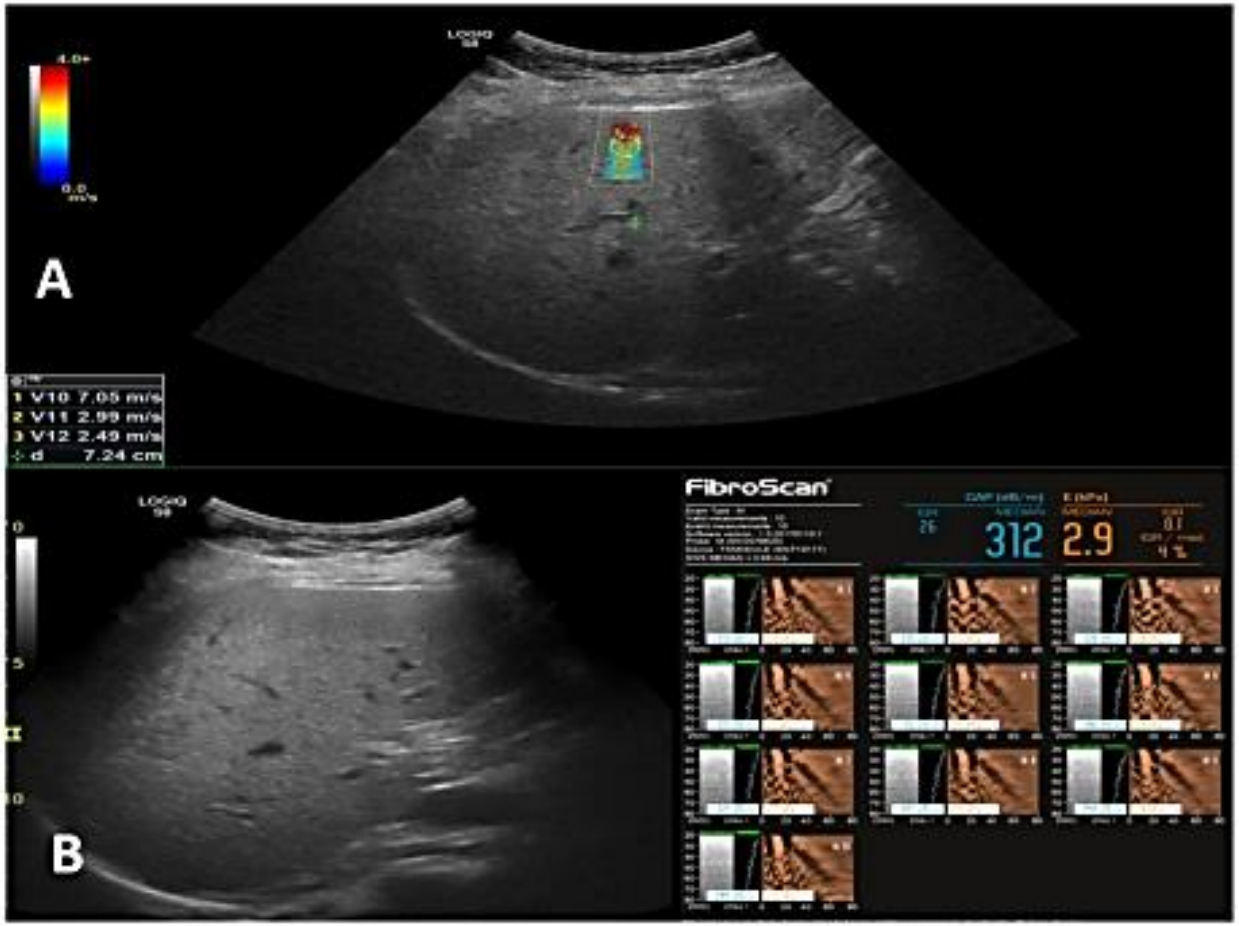

Fig. 5 A female patient 48 years old with chronic hepatitis B infection on follow-up. **a** SWE revealed median velocity = 1.54 m/s and *V* median/IQR = 23% consistent with F2 according to Metavir score. **b** Fibroscan was done for the same patient and revealed kPa = 2.9 and IQR/median = 4% consistent with F0

MEDICAL ULTRASONOGRAPHY
An international journal of clinical imaging

Usefulness of lung ultrasound in the early identification of severe COVID-19: results from a prospective study

Alba Hernández-Píriz, Yale Tung-Chen, David Jiménez-Virumbrales, Ibone Ayala-Larrañaga, Raquel Barba-Martín, Jesús Canora-Lebrato, Antonio Zapatero-Gaviria, Gonzalo García De Casasola-Sánchez

Abstract

Aim: There is growing evidence regarding the imaging findings of coronavirus disease 2019 (COVID-19) in lung ultrasound (LUS); however, its role in predicting the prognosis has yet to be explored. The aim of the study was to assess the relationship between lung ultrasound findings with the degree of respiratory failure measured by the PaO2/FiO2 ratio (PaFi) and
the prognosis of these patients: need for non-invasive mechanical ventilation (NIMV), admission to the Intensive Care Unit (ICU) and mortality.

Material and method: Prospective, longitudinal and observational study performed in patients with confirmed COVID-19 underwent a LUS examination and laboratory tests.

Results: A total of 107 patients were enrolled: 93.4% with bilateral involvement and 73.83% presented at least one consolidation. A good inverse correlation (Rho Spearman coefficient -0.897) between the ultrasound score and PaFi was obtained. The AUC for identification of patients with more severe respiratory failure, a moderate and severe ARDS, was 0.97 (CI 95%: 0.95-1) and a cut-off score of 34.5 showed a sensitivity of 0.94 and a specificity of 0.91. The Kappa index showed a high concordance (0.83) of the classification by ultrasound lung
involvement and ARDS.

Conclusions: The combination of the ultrasound score and the presence of respiratory failure can easily identify patients with a higher risk to present complications.

Ahead of print

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DOI: 10.11152/mu-3263

Usefulness of lung ultrasound in the early identification of severe COVID-19: results from a prospective study

Alba Hernández-Píriz[1], Yale Tung Chen[2,3], David Jiménez-Virumbrales[4], Ibone Ayala-Larrañaga[1], Raquel Barba-Martín[5], Jesús Canora-Lebrato[1,6], Antonio Zapatero-Gaviria[1,6], Gonzalo García De Casasola-Sánchez[7]

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Abstract

Aim: There is growing evidence regarding the imaging findings of coronavirus disease 2019 (COVID-19) in lung ultrasound (LUS); however, its role in predicting the prognosis has yet to be explored. The aim of the study was to assess the relationship between lung ultrasound findings with the degree of respiratory failure measured by the PaO2/FiO2 ratio (PaFi) and the prognosis of these patients: need for non-invasive mechanical ventilation (NIMV), admission to the Intensive Care Unit (ICU) and mortality. **Material and method**: Prospective, longitudinal and observational study performed in patients with confirmed COVID-19 underwent a LUS examination and laboratory tests. **Results:** A total of 107 patients were enrolled: 93.4% with bilateral involvement and 73.83% presented at least one consolidation. A good inverse correlation (Rho Spearman coefficient -0.897) between the ultrasound score and PaFi was obtained. The AUC for identification of patients with more severe respiratory failure, a moderate and severe ARDS, was 0.97 (CI 95%: 0.95-1) and a cut-off score of 34.5 showed a sensitivity of 0.94 and a specificity of 0.91. The Kappa index showed a high concordance (0.83) of the classification by ultrasound lung involvement and ARDS. **Conclusions:** The combination of the ultrasound score and the presence of respiratory failure can easily identify patients with a higher risk to present complications.

Keywords: Coronavirus disease 2019 (COVID-19); Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2); lung ultrasound (LUS); lung score

Review

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DOI: 10.11152/mu-3342

How to perform shear wave elastography. Part II

Giovanna Ferraioli[1], Richard G Barr[2], André Farrokh[3], Maija Radzina[4], Xin Wu Cui[5], Yi Dong[6], Laurence Rocher[7], Vito Cantisani[8], Eleonora Polito[8], Mirko D'Onofrio[9], Davide Roccarina[10,11], Yasunobu Yamashita[12], Manjiri K. Dighe[13], Daniela Fodor[14], Christoph F Dietrich[15]

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Abstract

Recently a series of papers was introduced describing on "how to do" certain techniques. More specifically we published on how to perform strain imaging using the transcutaneous and endoscopic ultrasound approach and shear wave elastography (SWE). In the first part we describe how to optimize the examination technique, discussing normal values, pitfalls, artefacts and specific tips for applying SWE to specific organs (liver, breast, thyroid, salivary glands) as part of a diagnostic US examination. In part II, the use of SWE in the pancreas, spleen, kidney, prostate, scrotum, musculoskeletal system, lymph nodes and future developments are discussed.

Keywords: ultrasound; shear wave elastography; elastometry; guideline

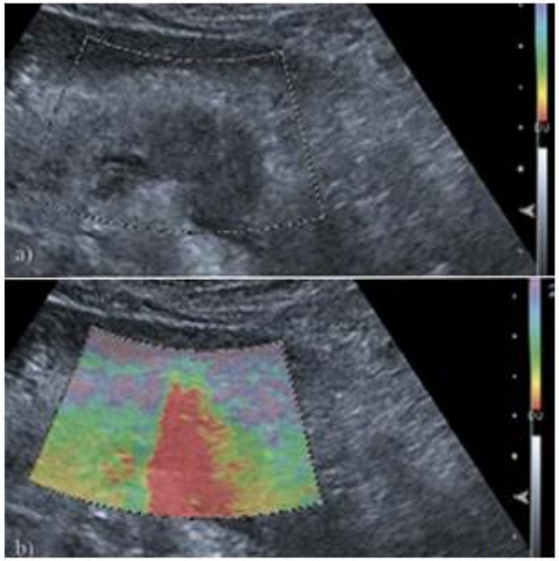

Fig 1. Adenocarcinoma of the pancreas body: (a) 2D-SWE box includes both the hypoechoic mass and the surrounding tissue for comparison of relative stiffness: (b) The hypoechoic mass is stiffer (red).

Med Ultrason 2022; 24(1): 196-210

Fig 2. Spleen stiffness measurement with the region of interest placed at the inferior pole of the spleen.

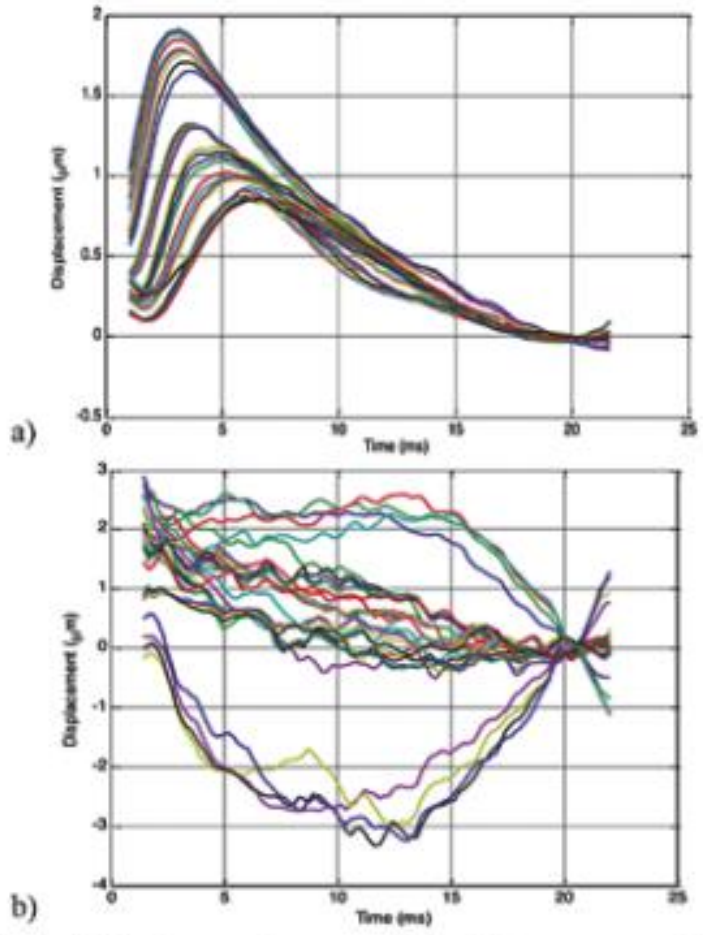

Fig 3. a) Displacement curves obtained from a normal liver. Note the nice family of curves from which the time to peak and distance from the ARFI pulse can be obtained to generate the slope of the line to accurately estimate the shear wave speed; b) One example from one vendor of the displacement curves from a normal renal cortex. Note that the time to peak is not clearly evident and estimates of SWS could not be estimated accurately from these curves. Copied with permission from reference 51.

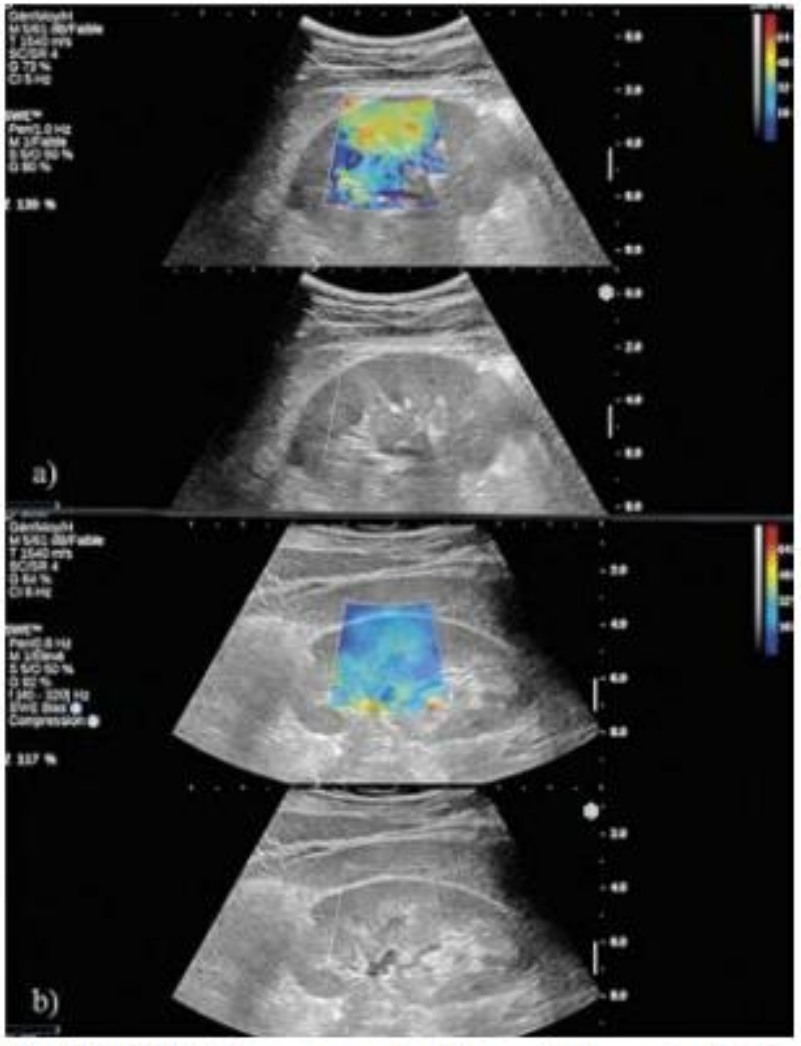

Fig 4. 2D-SWE from one vendor demonstrating using (a) the old algorithm (that used for liver) and the new algorithm (b) used exclusively for kidney imaging. Note the marked difference in the SWS estimates, the heterogeneous speeds using the old algorithm and the more uniform values using the new renal specific algorithm. Copied with permission from reference 51.

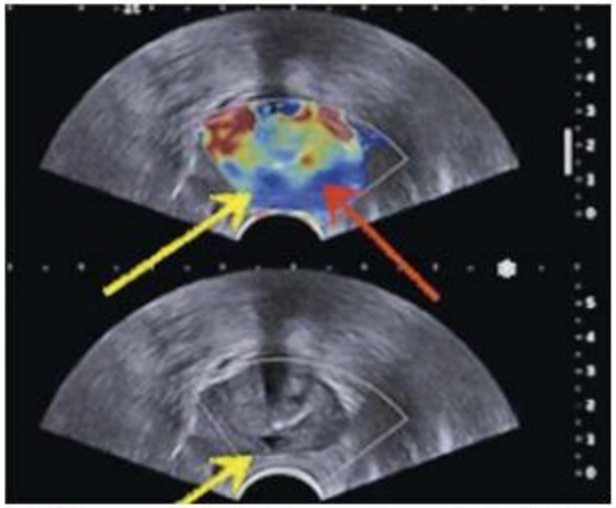

Fig 5. Transrectal 2D-SWE demonstrates a patient with a hypoechoic nodule on B-mode (yellow arrow), which has a low stiffness on SWE (20 kPa) and was biopsy proven benign. Another lesion is identified (red arrow) that has a high stiffness (75 kPa) with no B-mode correlate. The lesion was a Gleason 7 lesion on biopsy.

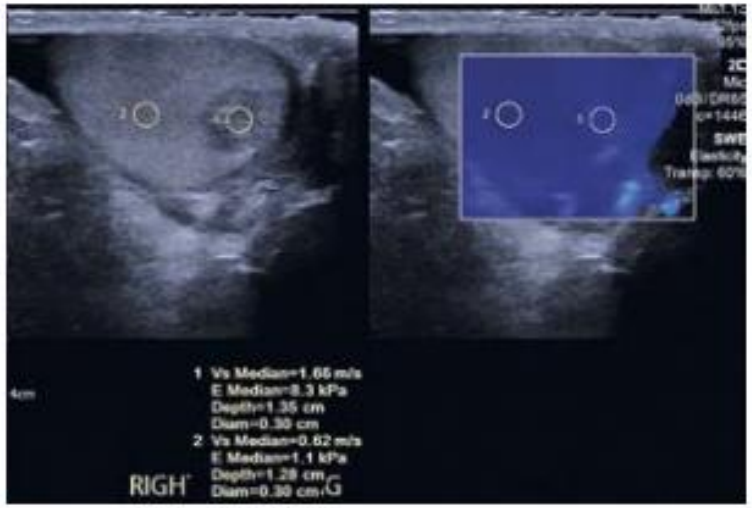

Fig 6. 2D- SWE of a testis with a small tumor. Note the uniform stiffness of the normal testes with a stiffness of 1.1 kPa (0.62 m/s). The mass has a higher stiffness of 8.3 kPa (1.66 m/s).

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Original Article

Interobserver Variability in Ultrasound-Based Liver Fat Quantification

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First published: 02 July 2022 | https://doi.org/10.1002/jum.16048

The authors declare that they have no conflict of interests. This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

This prospective study was approved by the institutional review board and written informed consent was provided by the all patients.

ORIGINAL ARTICLE

Year : 2022 | Volume : 30 | Issue : 2 | Page : 94-100

Diagnostic accuracy of bedside lung ultrasound in emergency protocol for the diagnosis of acute respiratory failure

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Source of Support: None, **Conflict of Interest:** None

DOI: 10.4103/JMU.JMU_25_21

Background: The multifactorial etiology of acute respiratory failure (ARF) often complicates diagnosis at an early stage of clinical presentation. Despite being a common life-threatening disorder, accurate and timely diagnosis is hindered by bad quality of bedside radiographs and nonavailability of immediate computed tomography imaging. This study was an attempt to evaluate the diagnostic accuracy of ultrasound in diagnosing ARF. **Methods:** This hospital-based cross-sectional study investigated the underlying etiological factor in 130 patients presenting with ARF and admitted to the intensive care unit. Lung ultrasound was performed according to the Bedside Lung Ultrasound in Emergency (BLUE) protocol. The diagnostic accuracy of lung ultrasound by emergency protocol was measured against each final diagnosis. **Results:** The mean age observed was 49.28 ± 14.9 years among the cohort. Of the 130 patients, pneumonia was the most common cause of ARF, seen in 42 patients. Breathlessness (56.15%) and fever accompanied by cough (25.38%) were the chief complaints. Diagnostic accuracy of ultrasound lung emergency protocol was 95.38% in the diagnosis of pulmonary edema, 100% for pneumothorax, 93.85% for pneumonia, 96.92% for chronic obstructive pulmonary disease, 99.23% for pulmonary thromboembolism, and 95.38% for acute respiratory distress syndrome. **Conclusion:** Lung ultrasound is a reliable modality that provided accurate and timely diagnosis of ARF in this study. Therefore, BLUE protocol is feasible, easily implementable in the intensive care unit, and must be scaled up in respiratory health-care settings.

JUM Journal of Ultrasound in Medicine

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Original Article

Does Cystocele Type Vary Between Vaginally Parous and Nulliparous Women?

Sascha Vereeck MD, Stefaan Pacquée MD, Yves Jacquemyn MD, PhD, Hedwig Neels PhD, De Stefan Wachter MD, PhD, Natalie Weeg MD, Hans Peter Dietz MD, PhD

First published: 29 June 2022 | https://doi.org/10.1002/jum.16046

Abstract

Objectives

To evaluate whether cystocele type varies with vaginal parity.

Methods

Retrospective analysis of 464 vaginally nulliparous women seen at 2 urogynecology units between November 2006 and November 2019. A control group consisted of 871 vaginally parous women seen between July 2017 and November 2019. Patients underwent a standardized interview, POPQ, urodynamic testing, and translabial ultrasound. On imaging, significant cystocele was defined as bladder descent to ≥10 mm below symphysis pubis. Volume datasets were analyzed offline and blinded against clinical data.

Results

Of 5266 women seen during the inclusion period, 464 were vaginally nulliparous. Three were excluded due to missing data, leaving 461. A control group of 871 parous women was generated from patients seen during the last 2.5 years of the inclusion period. Vaginally nulliparous women were presented at a younger age compared to vaginally parous women ($P < .001$). Symptoms of prolapse were reported in 104 (22%) nulliparae and 489 (56%) parous women ($P < .0001$). Vaginally parous women demonstrated more bladder descent ($P < .0001$) and more cystocele (418/871 versus 43/461, $P < .0001$), with a higher proportion of type III cystocele (cystocele with intact retrovesical angle) (20/43 versus 273/ 418, $P < .0001$). Cystourethrocele (Green type II) was more common in nulliparae and cystocele type III in parous women ($P = .015$). On multivariate analysis, these differences in proportions remained significant ($P = .049$).

Conclusions

Nulliparity was associated with a higher proportion of Green type II cystoceles. Green type III cystocele was more common in vaginally parous women, suggesting that the latter may be more likely to be due to childbirth-related pelvic floor trauma.

Lecture, Online, Flipped, and Blended: A Mixed-Methods Study on Ultrasound Student Outcomes and Perceptions

Tanya Custer, MS, R.T.(R)(T), Kathryn Wampler, MA, RT(R), RDMS, RVT, Lea Lambing, BS, RT(R), RDMS, RVT, more...

Show all authors

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https://doi.org/10.1177/87564793221106781

Article information

Altmetric 0

Abstract

Objective:

The purpose of this study was to examine the effects of course delivery methods on examination grades and student perceptions in a sonography course.

Materials and Methods:

The participant included all sonography students (n = 103), enrolled at a Midwestern university, during the academic years (AY) of 2010–2021. A retrospective, convergent mixed-methods design was used to collect and analyze data, related to the course delivery method.

Results:

The highest overall mean examination score and course satisfaction rating resulted from the blended learning format and the lowest mean examination scores and course satisfaction resulted from the flipped learning format.

Conclusion:

Health professions students are a diverse group of learners. Pedagogical practices should include course design and delivery methods which educate all learners. Courses that balance both face-to-face learning with opportunities for self-directed learning improve student satisfaction which could lead to improved student outcomes and provide the foundation for students to become competent health care professionals.

Journal of Diagnostic Medical Sonography

Early Sonographic Detection of Gallbladder Carcinoma Can Improve Patient Outcomes: A Case Report

Lori A. Kimbrow, M.Ed, RDCS, RDMS, RVT, Lela Smith, DMS Student

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Abstract

Gallbladder carcinoma (GBC) is a lethal and rare disease despite it being the most common malignancy of the biliary tract. Most cases of GBC are also associated with cholelithiasis and inflammation. The poor prognosis of GBC is mainly due to a lack of symptoms in the early stages of the disease. Early detection and cholecystectomy can lead to a higher survival rate when the cancer is confined to the gallbladder mucosa. This case study describes a man in his late 50s who presented with elevated liver function tests and was diagnosed incidentally with GBC with sonography.

ORIGINAL ARTICLE

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Evaluation of acoustic radiation force impulse imaging in differentiating benign and malignant cervical lymphadenopathy

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Source of Support: None, **Conflict of Interest:** None

DOI: 10.4103/JMU.JMU_10_21

Background: The aim of this study was to assess the diagnostic role of acoustic radiation force impulse imaging (ARFI) in differentiating benign and malignant cervical nodes. **Methods:** This was a diagnostic accuracy cross-sectional study. All patients who underwent ultrasound-guided fine-needle aspiration cytology (FNAC) of cervical nodes were included. Patients without FNAC/biopsy and patients in whom cervical nodes were cystic or completely necrotic were excluded. FNAC was used as reference investigation to predict the diagnostic accuracy. In all cases, FNAC was carried out after the B-mode, color Doppler and the ARFI imaging. In patients with multiple cervical lymph nodes, the most suspicious node based on grayscale findings was chosen for ARFI. ARFI included Virtual Touch imaging (VTI), area ratio (AR), and shear wave velocity (SWV) for each node, and the results were compared with FNAC/biopsy. **Results:** The final analysis included 166 patients. Dark VTI elastograms had sensitivity and specificity of 86.2% and 72.1%, respectively, in identifying malignant nodes. Sensitivity and specificity of AR were 71.3% and 82.3%, respectively, for a cutoff of 1.155. Median SWV of benign and malignant nodes was 1.9 [95% confidence interval (CI), 1.56–2.55] m/s and 6.7 (95% CI, 2.87–9.10) m/s, respectively. SWV >2.68 m/s helped in identifying malignant nodes with 81% specificity, 81.6% sensitivity, and 81.3% accuracy. ARFI was found to be inaccurate in tuberculous and lymphomatous nodes. **Conclusion:** Malignant nodes had significantly darker elastograms, higher AR and SWV compared to benign nodes, and SWV was the most accurate parameter. ARFI accurately identifies malignant nodes, hence could potentially avoid unwarranted biopsy.

Journal of Diagnostic Medical Sonography

Sonography of Lateral Plantar Artery Pseudoaneurysm Caused by Knife Cut Injury

Tony Y. Li, RDMS, RVT, RMSK, CRGS, CRVS

First Published June 21, 2022 | Research Article | Check for updates
https://doi.org/10.1177/87564793221106203

Article information

Altmetric 0

Abstract

Pseudoaneurysms of the lateral plantar artery (LPA) are rare. In this case study, a very rare case of a pseudoaneurysm of the LPA, caused by a knife cut, is reported. A female adult patient presented with a growing lump in the arch of the left foot for 4 weeks. She had an accidental steak knife stab her on the arch of the left foot and had the cut sutured 5 weeks prior. The physical examination revealed a warm, pulsatile, and tender lump without a clear border deep to the scar in the lateral arch. Duplex ultrasonography (DUS) detected a cavity with the wall uneven in thickness and the outer wall undistinguished. Doppler demonstrated a typical Yin-yang sign inside the cavity and a neck-like structure connecting the cavity to an artery along the path of the LPA, suggesting that this was a LPA pseudoaneurysm, caused by penetration trauma. Later, the patient received priority surgery to have the pseudoaneurysm repaired.

JUM Journal of Ultrasound in Medicine

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Original Research

The Current Status of Ultrasound Education in United States Medical Schools

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All of the authors of this article have reported no disclosures.

Abstract

Objectives

Ultrasound is used by nearly every medical specialty. Medical schools are integrating ultrasound education into their curriculum but studies show this to be inconsistent. The purpose of this study was to provide an updated description of ultrasound in the curricula of United States Accredited Medical Schools (USAMS).

Methods

In 2019, USAMS curricular offices were contacted. Institutions were asked about the presence of ultrasound curriculum and for contact information for faculty involved with education. Schools reporting ultrasound curriculum were surveyed regarding details of their curriculum.

Results

Two hundred USAMS were contacted with a response rate of 84%. Of 168 schools, 72.6% indicated they have an ultrasound curriculum. For schools with a curriculum, 79 (64.8%) completed our survey. The majority of survey respondents, 66 (83.5%), indicated having mandatory ultrasound. Ultrasound is primarily integrated into courses (73.8% in basic science courses, 66.2% in clinical skills courses, and 35.4% in clinical rotations). Emergency medicine physicians accounted for 54.7% of course directors. Ten or fewer faculty participate in education in 68.4% of schools and mostly as volunteers. Dedicated machines for education were reported by 78.5% of schools.

Conclusions

Compared to prior studies, this study had a higher response rate at 84%, and more schools reported ultrasound in their curricula. Emergency medicine represents the majority of leadership in ultrasound education. Despite increased integration of ultrasound into American medical school curricula, its instruction is still inconsistent.