

Application of color doppler ultrasound and US shear wave elastography with connective tissue growth factor in the risk assessment of papillary thyroid carcinoma

Xiaoling Leng^{1*}, Jinhui Liu¹, Qiao Zou², Changchun Wang² and Sen Yang²



Abstract

Background This study aims to investigate the role of shear wave elastography (SWE) and connective tissue growth factor (CTGF) in the assessment of papillary thyroid carcinoma (PTC) prognosis.

Methods CTGF expression was detected with immunohistochemistry. Clinical and pathological data were collected. Parameters of conventional ultrasound combined with SWE were also collected. The relationship among CTGF expression, ultrasound indicators, the elastic modulus and the clinicopathological parameters were analyzed.

Results Univariate analysis showed that patients with high risk of PTC were characterized with male, Uygur ethnicity, increased expression of CTGF, convex lesions, calcified, incomplete capsule, intranodular blood flow, rear echo attenuation, cervical lymph node metastasis, lesions larger than 1 cm, psammoma bodies, advanced clinical stage, increased TSH and high value in the shear modulus ($P < 0.05$). Multivariate analysis demonstrated that the risk factors of high expression of CTGF according to contribution size order were irregular shape, aspect ratio ≥ 1 , and increased TSH. The logistic regression model equation was $\text{Logit}(P) = 1.153 + 1.055 \times 1 + 0.926 \times 2 + 1.190 \times 3$ and the Area Under Curve value of the logistic regression was calculated to be 0.850, with a 95% confidence interval of 0.817 to 0.883.

Conclusion SWE and CTGF are of great value in the risk assessment of PTC. The degree of fibrosis of PTC is closely related to the prognosis. The hardness of PTC lesions and the expression level of CTGF are correlated with the main indexes of conventional ultrasound differentiating benign or malignant nodules. Irregular shape, aspect ratio ≥ 1 , and increased TSH are independent factors of CTGF.

Keywords Papillary thyroid carcinoma; Shear wave elastography; Connective tissue growth factor

risk		Risk stratification			χ^2	<i>P</i>
Characteristics		Low risk	Medium risk	High risk		
Gender	Male	16	47	15	23.695	0.001
	Female	86	100	41		
Ethnicity	Han	69	112	43	309.801	<0.001
	Uighur	19	19	10		
	Others	14	16	5		
CTGF	-	23	15	5	37.065	<0.001
	+	25	18	2		
	++	35	45	19		
	+++	19	69	31		
BRAF V600E	-	20	26	2	8.022	0.018
	+	82	121	55		
Nodule convex	Yes	1	4	11	31.964	<0.001
	No	102	142	46		
Calcification	Yes	84	114	54	6.247	0.044
	No	18	32	4		
Capsule	Intact capsule	102	144	36	86.42	<0.001
	Incomplete capsule	1	2	21		
Blood flow	Perinodular blood flow	65	73	23	9.004	0.011
	Intranodular blood flow	37	74	34		
Rear echo attenuation	Yes	78	122	55	8.777	0.012
	No	24	24	3		
Thyroid nodule status	Hot	27	50	15	2.098	0.350
	Cold	75	97	42		
Cervical lymph nodes metastasis	Yes	5	11	9	7.147	0.028
	No	98	135	48		
Lesion size	<1 cm	87	95	15	55.472	<0.001
	≥1 cm	15	52	42		
Psammoma bodies	Yes	33	63	34	12.454	0.006
	No	69	84	23		
Clinical stage	Stage 1	94	100	32	184.684	<0.001
	> Stage 1 (advanced stage)	7	47	25		

of PTC lesions. The E-SD value is an index to evaluate the internal homogeneity of lesions [17]. The larger the E-SD was, the more heterogeneous the lesions were. Our results showed that the larger lesions, calcification, and cervical lymph node metastasis were related with heterogeneous structure of thyroid cancer lesions (Table 3). The heatmap illustrating the correlation between clinical

sis level and ultrasonographic and clinicopathological parameters in PTC, we analyzed the expression of CTGF in tissue sections. In this study, increased expression of CTGF in PTC lesions was significantly associated with elevated TSH, convex and irregular shape, clear margin, aspect ratio larger than 1 and incomplete thyroid capsule ($P < 0.05$) (Table 5). The CTGF expression level had no

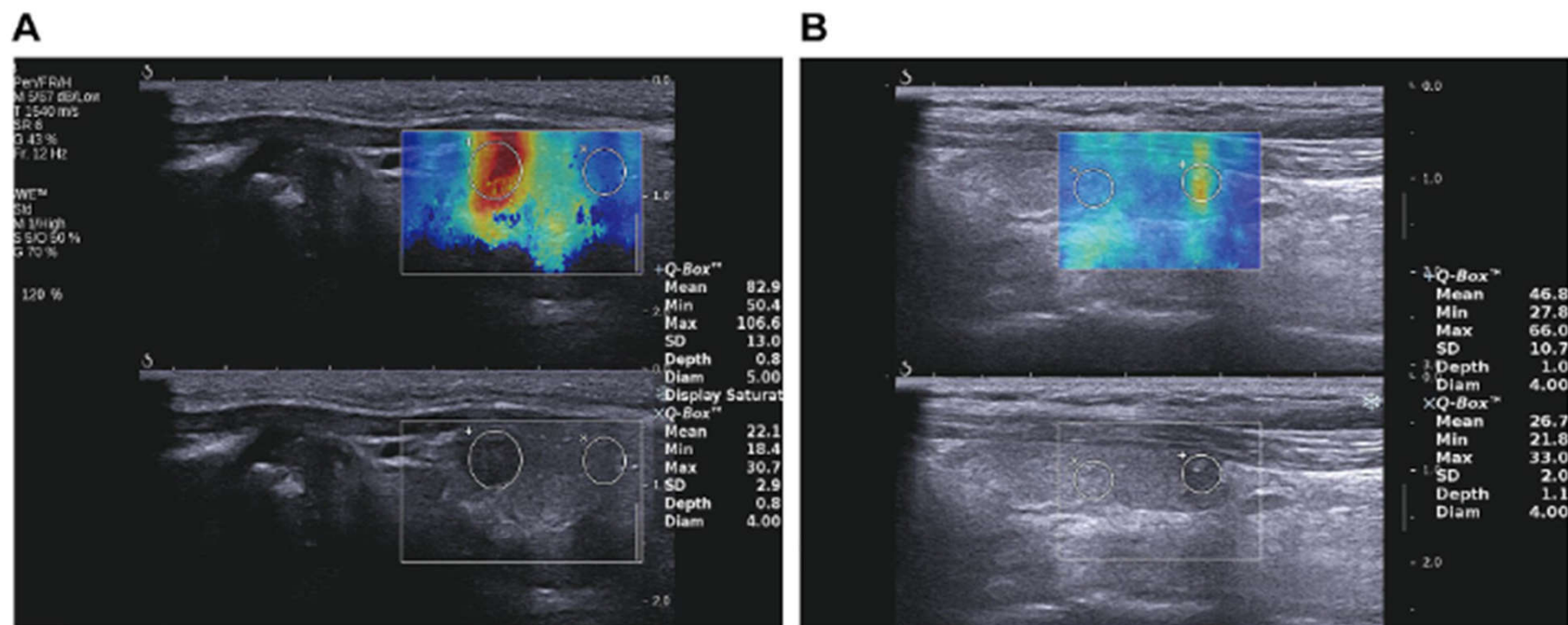


Fig. 2 The representative SWE images. The SWE measurement was performed on the lesion. The Q-box was placed in the lesion and normal tissue next to the lesion. **(A)** PTC lesion with high elastic modulus. It was in the lower right lobe of the thyroid gland, with 6 * 4 mm in size. It had convex and irregular shapes, with unclear borders, an aspect ratio greater than 1, and an incomplete thyroid capsule. The diameter of the Q-box in the lesion was 4 mm. The elastic modulus were: E-mean: 56.6 kPa, E-min: 35.5 kPa, E-max: 73.6 kPa, and E-SD: 9.9 kPa. The diameter of the Q-box in the normal tissue was 4.5 mm, with E-mean: 28.3 kPa, E-min: 20.8 kPa, E-max: 36.5 kPa, and E-SD: 4.5 kPa. **(B)** PTC lesion with low elastic modulus. It was middle right lobe of the thyroid, with size of 6 * 4 mm. The lesion was not convex with regular shape. The border was less clear. The aspect ratio was less than 1, and the thyroid capsule was intact. The diameter of the Q-box in the lesion was 4.0 mm. The elasticity values were: E-mean: 40.7 kPa, E-min: 31.9 kPa, E-max: 48.6 kPa, and E-SD: 3.5 kPa. The diameter of the Q-box in normal tissue was 4.0 mm, with E-mean: 14.33 kPa, E-min: 10.8 kPa, E-max: 31.93 kPa, and E-SD: 1.9 kPa. The SWE imaging of

Conclusions

In conclusion, SWE and CTGF were of great value in the assessment of PTC risk. The degree of fibrosis in PTC was closely related to the prognosis. The hardness of PTC lesions and the expression level of CTGF were all correlated with the main indexes of differentiating benign or malignant thyroid lesions in conventional ultrasound, indicating that ultrasound signs could predict the prognosis. PTC lesion hardness had many influencing factors. Irregular shape, aspect ratio ≥ 1 and increased TSH level were independent factors of CTGF. The degree of fibrosis of the lesion was related to the pathological structure of the lesion itself, but not to the individual characteristics. High expression of CTGF was not only a poor prognosis of PTC but also be associated with hypothyroidism.

Assessment of Alvarado criteria, ultrasound, CRP, and their combination in patients with suspected acute appendicitis: a single centre study

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Abstract

Background Acute appendicitis (AA) is one of the most common reasons for visiting the emergency room. The lack of proper diagnosis and rapid treatment of AA may lead to severe complications such as intestinal perforation and increased mortality. This study aimed to evaluate the diagnostic accuracy of the Alvarado criteria, ultrasound, and CRP criteria in comparison with their combined use in patients with suspected AA who presented to the emergency room.

Methods In this diagnostic accuracy study, 1411 patients with suspected AA who presented to the emergency department of Firoozabadi Hospital affiliated with Iran University of Medical Sciences and underwent appendectomy from October 2019 to October 2021 were examined. Nine hundred eighty-eight patients were enrolled. All patients were assessed using Alvarado, CRP, and ultrasound. The definitive diagnosis of AA was based on pathological findings and was considered the gold standard. Statistical analyses were performed with STATA VER 11.5. The diagnostic accuracy for each group was compared using the Pearson chi-square test. A value of $p < 0.05$ was considered statistically significant.

Results The mean age was 29.57 ± 13.66 years. The sensitivity and specificity of Alvarado in the diagnostic accuracy of appendicectomy were 75.2% and 61.3% (CI = 95%), respectively. The sensitivity of ultrasound and CRP for predicting appendicitis was significantly higher than the Alvarado criteria. The diagnostic accuracy for CRP was significantly higher than ultrasound (64.9% vs. 60.7%, $P: 0.003$). The diagnostic accuracy of the simultaneous use of Alvarado + CRP and CRP + Ultrasound was significantly higher than that of Alvarado + ultrasound. The sensitivity, specificity, and diagnostic accuracy of the simultaneous use of all three criteria together (Alvarado + Ultrasound + CRP) were estimated to be 94.9%, 25.8%, and 81.5% (CI = 95%), respectively, which were significantly higher than the use of other criteria.

Conclusion

Our study showed that the Alvarado criteria did not have adequate diagnostic sensitivity and accuracy for the diagnosis of acute appendicitis. The addition of ultrasound or CRP to the Alvarado criteria greatly improves the sensitivity and diagnostic accuracy of these criteria. The sensitivity of acute appendicitis increases significantly (above 90%) by simultaneously using the three Alvarado+ultrasound+CRP criteria. The use of this index can help and be used in the accurate detection of acute appendicitis, and it reduces the burden of surgeries by preventing unnecessary appendectomies.

Acknowledgements

Conclusion

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Acknowledgements

Meta-Analysis

Role of hepatitis B core-related antigen in predicting the occurrence and recurrence of hepatocellular carcinoma in patients with chronic hepatitis B: A systemic review and meta-analysis

Qi-Hang Cao, Hui Liu, Lun-Jie Yan, Han-Chao Wang, Zi-Niu Ding, Xin-Cheng Mao, Rui-Zhe Li, Guo-Qiang Pan, Xiao Zhang, Bao-Wen Tian, Cheng-Long Han, Zhao-Ru Dong ... See all authors

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Declaration of conflict of interest: The authors declare no conflicts of interest.

Author contribution: Q-H. C., H. L., and T. L. designed the study. Q-H. C. and H. L. performed the systematic search. Q-H. C., H. L., L-J. Y., H-C. W., Z-N. D., X-C. M., G-Q. P., Y-C. Y., and D-X. W. selected the eligible articles and conducted the quality assessment. Q-H. C., H. L., L-J. Y., H-C. W., X-Z. B., W. T. C.

Methods

We searched PubMed, Embase, Scopus, and Web of Science from database inception to April 6, 2023. Pooled hazard ratio (HR) or odds ratio (OR) with 95% confidence interval (CI) was calculated for the occurrence and recurrence of HCC.

Results

Of the 464 articles considered, 18 articles recruiting 10 320 patients were included. The pooled results showed that high serum HBcrAg level was an independent risk factor for the occurrence of HCC in CHB patients (adjusted HR = 3.12, 95% CI: 2.40–4.06, $P < 0.001$, $I^2 = 43.2%$, $P = 0.043$; OR = 5.65, 95% CI: 3.44–5.82, $P < 0.001$, $I^2 = 0.00%$, $P = 0.42$). Further subgroup analysis demonstrated that the predictive ability of HBcrAg for the occurrence of HCC is not influenced by the hepatitis B e antigen (HBeAg) status or the use of nucleoside/nucleotide analogs (NAs). In addition, our meta-analysis also suggests that HBcrAg is a predictor of HCC recurrence (adjusted HR = 1.71, 95% CI: 1.26–2.32, $P < 0.001$, $I^2 = 7.89%$, $P = 0.031$).

Conclusions

For patients with CHB, serum HBcrAg may be a potential predictive factor for the occurrence of HCC, regardless of HBeAg status or NA treatment. It may also serve as a novel prognostic biomarker for the recurrence of HCC. More studies are needed to confirm our conclusions.

Understanding Your Cholesterol Ratio

The numbers on your cholesterol test reveal key details about your health. Do you know how to interpret them?

Updated Mar 25, 2024 | By: Stephanie Watson

After having your blood drawn for a cholesterol test at your annual exam, you've been anxiously awaiting your results. When your doctor shares your labs, it's filled with acronyms like LDL and HDL, and a whole lot of numbers. What do those numbers mean? What is a normal range for your cholesterol ratio—and what can it tell you about your health?

We asked top cardiologists to help us make sense of [cholesterol numbers](#), what different cholesterol ratios can reveal about your potential risk for heart disease, and how to bring these numbers to healthy levels if they're not there already.

Types of Cholesterol

Different Types of Cholesterol: LDL, HDL, and Total Cholesterol

Your lab report will include [values for different types of cholesterol](#), as well as the total

Original Investigation

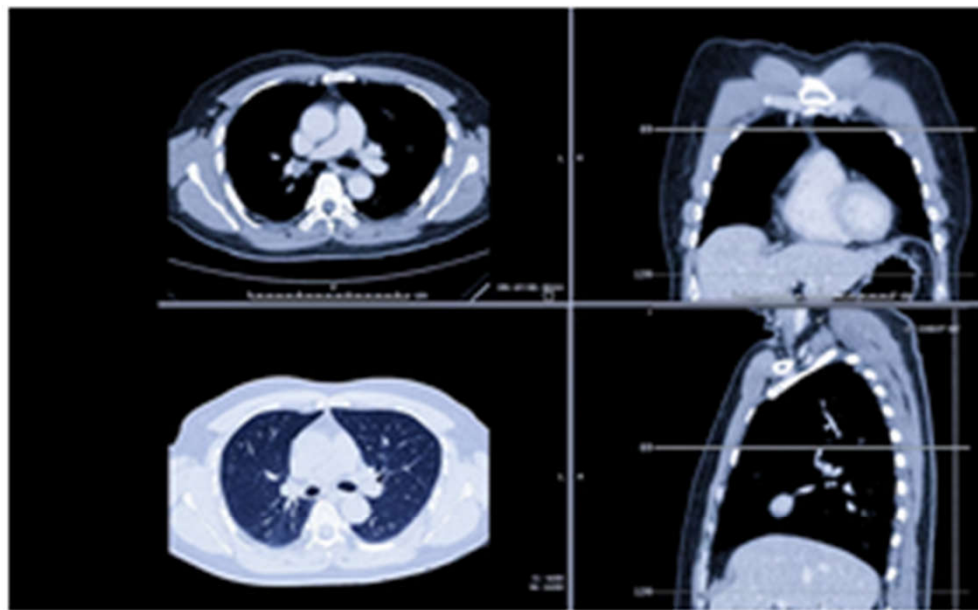
December 10/24, 2001

**Total Cholesterol/HDL Cholesterol
Ratio vs LDL Cholesterol/HDL
Cholesterol Ratio as Indices of
Ischemic Heart Disease Risk in Men
The Quebec Cardiovascular Study**

Isabelle Lemieux, MSc; Benoît Lamarche, PhD; Charles Couillard, PhD; [et al](#)

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CLINICAL NEWS | CT

Study finds lung nodules in more than a fifth of nonsmokers

Lung nodules are present in more than a fifth of Northern European nonsmokers — a percentage similar to their prevalence in high-risk populations of smokers.

By — Kate Madden Yee

Aug 12th, 2024

Lung nodules are present in more than a fifth of Northern European nonsmokers — a percentage similar to their prevalence in high-risk populations of smokers, researchers have found.

The study results suggest that, as the volume of chest CT scans for various clinical indications continues to climb, the presence of incidental nodules could increase the number of follow-up scans and workups among low-risk individuals.

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Distribution of Solid Lung Nodules Presence and Size by Age and Sex in a Northern European Nonsmoking Population

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