

# Practical application of elastography in the diagnosis of thyroid nodules in children.

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## Introduction:

Elastography is a new, non-invasive ultrasound method of imaging, conducted during ultrasonography, based on estimation of mechanical properties (elasticity) of the tissue. Recent data has shown its ability to differentiate benign from malignant tumors. Decreased flexibility in comparison to around tissue is characteristic for malignant tissues, like most thyroid carcinoma (except follicular thyroid carcinoma). Stiffness of the tissue is presented as a colour map called elastograms with red colour indicating soft tissue, through green colour indicating middle tough tissue, till blue for tough tissues, that is typical for malignancy. Analysis of the image gives the result presented as a strain ratio [1,2,3].

## Aim of the study:

The purpose of our study was to assess the deformation of the thyroid nodules during elastography in comparison to the results of fine needle aspiration cytology of the nodule.

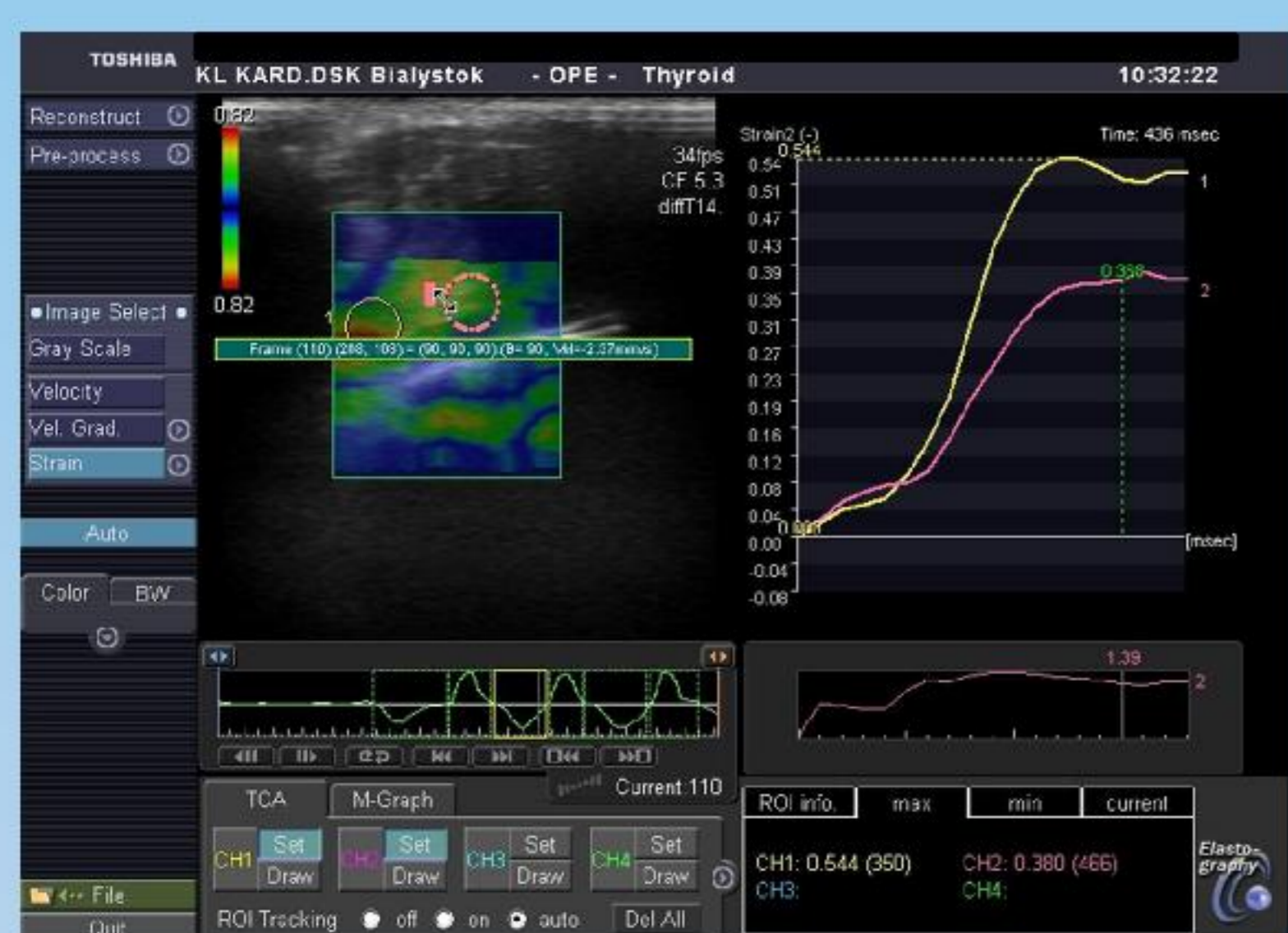
## Materials and methods:

We examined 47 children between February 2013 and February 2015 with nodular goiter. All patients underwent elastography and fine needle aspiration cytology (FNAC). Both data were compared in order to determine any correlations. Elastography parameters were acquired with Toshiba Aplio MX SSA-780A system and analyzed while comparing of the stiffness of the nodule and the healthy tissue.

## Results:

In the study 39 girls (83%) and 8 boys (17%) were involved. Strain ratio below 2 was observed in 9 patients (19,2% of the study group). In 27 patients (57,4% of the study group) strain ratio was between 2 and 4,9. Strain ratio above 5 was observed in 11 patients (23,4% of the study group). In 3 patients (6,4% of patients) cytological examination confirmed thyroid carcinoma. In all of cases it was papillary thyroid carcinoma. Strain ratio: 5 and above was present in 2 patients with thyroid cancer, while one of the patients had strain ratio 2.

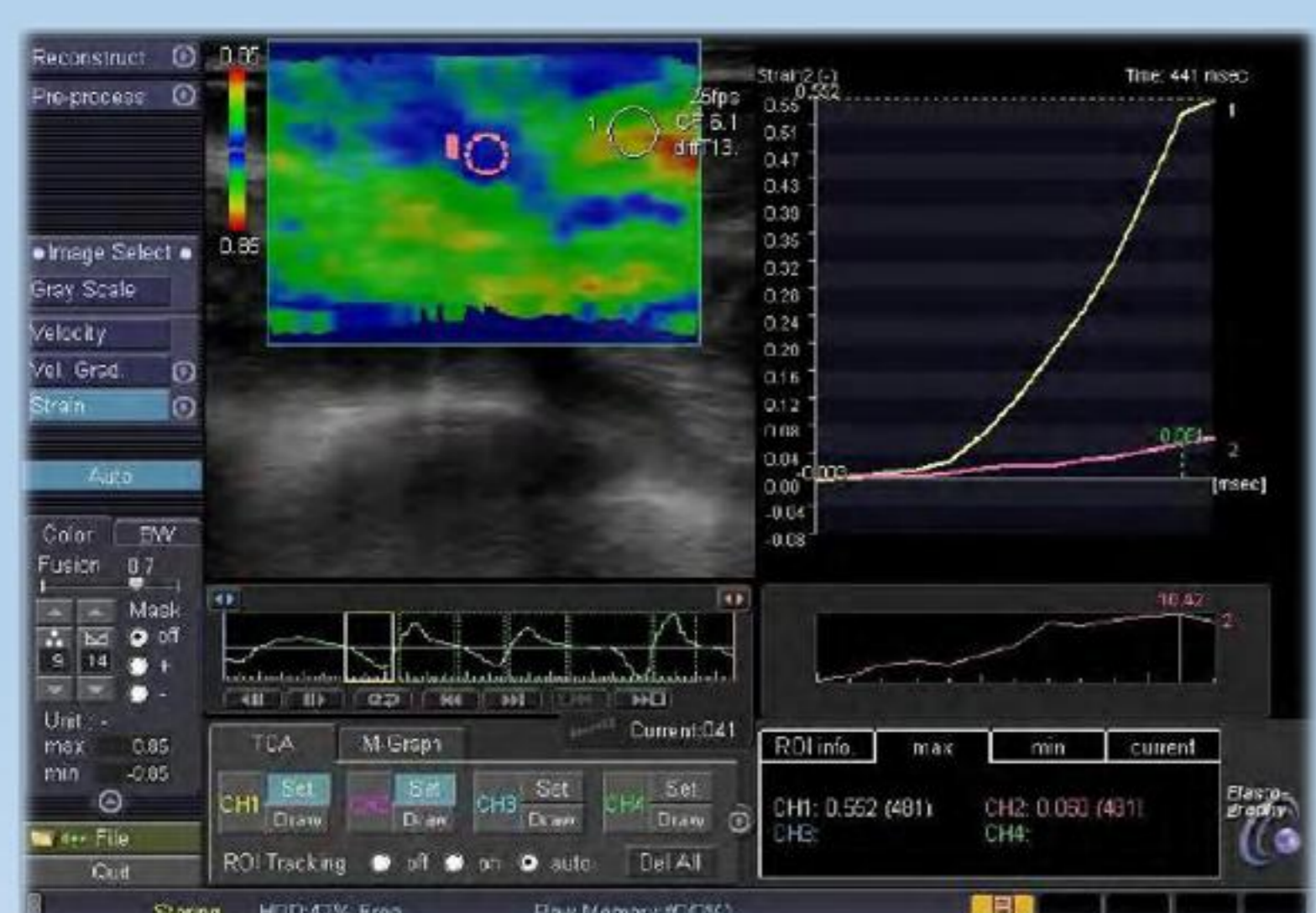
	Strain ratio < 2	Strain ratio = 2-4,9	Strain ratio > 5
number of patients 47 (100%)	9 (19,2%)	27 (57,4%)	11 (23,4%)
papillary carcinoma	-	1 (4%)	2 (18%)
nodular goitre	3 (33%)	9 (33%)	2 (18%)
nodular, colloid goitre	1 (11%)	2 (7%)	3 (27%)
nodular goitre partly cystic	-	3 (11%)	2 (18%)
nodular goitre with proliferative nodule	1 (11%)	3 (11%)	-
nodular goitre and lymphocytic inflammation	-	4 (15%)	2 (18%)
lymphocytic inflammation	3 (33%)	4 (15%)	-
hemorrhagic cyst	-	1 (4%)	-
lymph tissue with singular Hodkin like cells	1 (11%)	-	-



Soft thyroid nodule in elastography, strain ratio 1,39



Hard thyroid nodule in elastography, strain ratio 6,92



Hard thyroid nodule in elastography, strain ratio 10,42

Diagrams of the deformation:

CH1 – ROI for healthy tissue

CH2 – ROI for the nodule

Fine needle aspiration cytology results in correlation to strain ratio

## Conclusions:

Our results suggest, that elastography can be complementary to classic ultrasonography and useful while taking decision about fine needle aspiration cytology. At the same time it should not replace cytological assessment of the nodule in the thyroid.

### REFERENCES:

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- [3] Bojunga J, Herrmann E, Meyer G et al. Real-time elastography for the differentiation of benign and malignant thyroid nodules: a meta-analysis. Thyroid 2010;20(10):1145-50.