COMPARISON BETWEEN SURGEON-PERFORMED VERSUS IMAGING SPECIALIST-PERFORMED ULTRASONOGRAPHY FOR HEAD AND NECK PATHOLOGY

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Abstract: *Ultrasonography is a proven diagnostic tool for head and neck pathology. However previous data come from examinations performed in imaging departments and there are few studies about the accuracy of surgeon-performed ultrasonography. Our objective was to compare surgeon-performed ultrasound exams in the ENT department with ultrasound exams performed on the same patients by an imaging specialist. We compared the 2 ultrasound exams performed for 30 patients using variables such as: location, number, dimensions, echostructure, margins, hilum, vascular pattern, necrosis, calcifications, surrounding structures invasion, diagnosis and etiology. Statistical analysis of the data revealed an overall inter-observer variability of 16.66%, with a 10% inter-observer variability concerning the Doppler examination and a 6.66% variability concerning the margins of the tumor. Our pilot study shows that surgeon-performed ultrasonography has the same accuracy as imaging specialist performed ultrasonography in head and neck pathology.*

INTRODUCTION

In the last decade, medicine has been under the influence of specialization and extension of one's activity in connected fields thus, nowadays, we cannot speak about a cardiologist or a gastroenterologist not knowing to perform an ultrasound exam.(1) Therefore, other specialists including the otorhinolaryngologist should conquer the secrets of first hand performed ultrasonography and ultrasound guided procedures.(2) The path towards this competence in specialized ultrasonography should begin from the time of medical school training.(3) Evidently, this opened the discussion regarding the accuracy of ultrasound examinations performed by nonimaging specialists.(4) However, when comparing the accuracy of exams performed by imaging and nonimaging specialists one should bear in mind the reality of inter-observer and inter-equipment variability.(5) In the area of head and neck surgery, there has been a great interest in analyzing the efficacy of surgeon performed ultrasonography for thyroid (6,7) and parathyroid pathology.(8-10) There are very few data tackling the subject of surgeon performed ultrasound guided procedures for head and neck pathology.(11,12) Future techniques are nowadays developed to be surgeon performed, such as dye marking for tumour localization (13) or elastography (14) and their development take into consideration observer variability from the beginning.(15)

PURPOSE

The present research is a pilot study trying to establish the inter-observer variability between imaging specialist and non-imaging specialist performing ultrasonography of head and neck pathology. Ultrasonography is a proven diagnostic tool for head and neck pathology in the hands of imaging specialists but there are very few studies relating to its use directly by ear, nose and throat (ENT) specialists. In theory, the ENT undertaking standard ultrasonography training for passing the competency board should have similar if not superior accuracy than the imaging specialists in performing ultrasonography of head and neck. This could be due to complex anatomy knowledge characteristic for head and neck surgeons. Possible advantages for ENT performed ultrasonography are better time and cost management and workflow in imaging departments and a higher compliance of the patient to treatment in ENT departments, as ultrasonography could be performed at the initial consultation without delay.

MATERIALS AND METHODS

The study design is based on the comparison of the results of ultrasound exams performed on the same patient by the imaging specialist and the ENT surgeon in a double blind manner: first, neither of the specialists knows the results offered by the other specialist, and the results are coded and compared by a third specialist. The imaging specialist, AC, is actually one of the national licensed trainers in the field of ultrasonography with more than 30 years' experience. The ENT surgeon performing ultrasonography of head and neck pathology is IA – professor with more than 30 years clinical experience and one of the first ENT surgeons with competence in ultrasonography in Romania.

This pilot study is an actual extension of the training period after the competency exam of IA and comprises the first procedures performed without direct supervision of the trainer. All patients were treated in the ENT Department of "Colțea" Clinical Hospital and signed an Informed Consent in compliance with the Declaration of Helsinki and the current Good Clinical Practice.

All patients were examined on a portable Sonoscape S2 machine with linear probe mounted using a standardised imaging protocol comprising the following five steps:

1. Horizontal movement of the transducer along the mandible from posterior to anterior;

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2. Vertical movement of the transducer in the anterior region of the neck from the chin to the suprasternal notch;
3. Horizontal movement of the transducer along the clavicle from anterior to posterior;
4. Vertical movement of the transducer in the posterior triangle of the neck from the clavicle to the styloid process;
5. Oblique movement of the transducer along the sternocleidomastoid muscle from superior to inferior insertion.

The variables analysed for every patient are listed in table no. 1. Table no. 2 lists the variables recorded from the ultrasonography exam, 2 sets of variables per patient, one set derived from the exam performed by the imaging specialist (AC) and one derived from the exam performed by the ENT specialist (IA). Note the fact that we used the standard topography of the cervical triangles: level IA (submental); level IB (submandibular); level II (jugular superior); level III (middle jugular); level IV (jugular inferior); level V (posterior cervical); level VI (cervical anterior).

Table no. 1. Variables recorded for every patient

Variables recorded for every patient.										
Name	Age	Sex	Prior pathology	Associated pathology	Clinical signs	Ultrasonography performed by AC (see table no. 2)	Ultrasonography performed by IA (see table no. 2)	Diagnosis	Treatment	Pathology results

Table no. 2. Ultrasound variables recorded per patient for each ultrasound exam received

Ultrasound variables recorded per patient for each ultrasound exam received.	
Location	Cervical levels I-VI
Number	Single/Multiple
Dimensions	In mm
Echogenicity	Hypo/Hyper/Iso/Transonic
Hilum	Present/Absent
Margins	Sharp/Not so well delineated
Vascular pattern	Central/Marginal pattern
Necrosis	Present/Absent
Calcifications	Present/Absent
Invasion of surrounding structures	Which structures
Diagnosis	Benign/Malignant
Etiology	Describe

The statistical analysis was performed with Statistical Package for the Social Sciences (SPSS) and compared the results between the 2 ultrasound exams received by the patient.

RESULTS

Our study included the first 30 cases referred to "Colţea" Clinical Hospital after IA passed the board for competence in general ultrasonography and we considered them still part of the learning curve.

The study group comprises 8 cases with reactive nodules, 9 cases with metastatic adenopathy, 5 cases with submandibular gland pathology, 2 cases with parotid gland pathology, 2 cases with thyroglossal duct cyst, 1 case with brachial cyst and 3 cases with thyroid cancer.

An overall total of 5 cases recorded differences between the two ultrasound exams resulting in an overall correlation of 83.33%. However, the differences concerned various details but did not influence the diagnosis of benign/malignant or the possible aetiology. In three cases, there were differences regarding the vascular pattern at Doppler examination resulting in a 90% correlation between the examiners and all three cases were in the first 10 cases analysed suggesting the fact that they were influenced by the learning curve and the process of getting accustomed with the portable device.

DISCUSSIONS

Another difference was at the level of invasion in adjacent structures such as the great vessels of the neck. The imaging specialist considered in one case the vessels to be invaded as the tumour surrounded the vascular structures but the ENT specialist ruled it out from experience as invasion occurs very late in the evolution of the pathology. Therefore, concerning the invasion of adjacent structures we recorded an inter-observer variability of 3.33%. Moreover in this pilot study, we discovered a 6.66% inter-observer variability concerning the margins of the cervical mass. In second part of the study group, 15 cases, there were virtually no discrepancies between the two examiners.

Special attention needs to be paid to the discrepancies between the two examiners regarding the dimensions of the masses.

In the final statistical analysis we decided not taking into account this parameter as there it was a great inter-observer variability due to millimetre differences but not interfering with the cut off of 10 mm which is generally considered to differentiate between clinically significant malignant/benign masses. This proved us that measuring the dimensions of cervical masses is operator dependent and made us aware of the fact that during the conservative treatment, serial examinations of the patient should be performed by the same specialist every time, thus hoping to reduce the error only to intra-observer variability.

CONCLUSIONS

There are some limitations to our study residing in the small number of patients and the fact that these cases are part of the learning curve.

An overall inter-observer variability of 16.66% without the influence of the final diagnosis confirms the fact that with proper training and continuing increasing experience surgeon-performed ultrasonography has the same accuracy as imaging specialist performed ultrasound for head and neck pathology.

We hope to grow the awareness of fellow ENT specialists towards surgeon-performed ultrasonography and we will continue this pilot study on a greater study group. Needless to mention the fact that surgeon-performed ultrasonography is cost efficient and permits a better time and personnel management in the already crowded imaging departments. Moreover, this is the very step towards resident training in ultrasonography and the use of ultrasound guided procedures or novel techniques such as elastography and contrast enhanced ultrasonography.

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