AUTOMATED BREAST VOLUME ULTRASOUND
HOW WE DO IT?

Indications, diagnostic criteria and pitfalls

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Automated Breast Volume Ultrasound INTRODUCTION

- The technique of ABVS
- Indications
- Diagnostic criteria
- Pitfalls
- Clinical cases
Questions to answer

- How does the ABVS work?
- How do we analyse the datasets?
- Is the c-plane superior to the conventional planes?
- What could be the benefits in a screening setting?
- What are the risks of the ABVS?
- What do we achieve by using 14MHz?
- Can we use the additional information from the c-plane for planning the surgical procedure?
- Are we allowed to use the c-plane for analysis instead of sagittal and tranverse slices?
- ABVS generally an alternative for freehand US?
- For which patient can ABVS be an alternative to freehand US even today?
Target of Automated Breast Ultrasound system

- Reduce dependence on individual operators
- Boost the efficiency of image interpretation
- Obtain reproducible images which are necessary to perform follow-up exams accurately
- Acquire automatically, quickly and comfortably full-field sonographic volumes of the breast
The technique: how we acquire the images

- **Automated scan**
  - User-independent imaging
  - Reproducible

- **Fast full-field volume imaging**
  - 14L5BV Transducer
  - Hanafy Lens
  - Wide frequency bandwidth transducer
  - High center frequency transducer
  - 15.4 cm x 16.8 cm x 6 cm

- **Stabilizing membrane**
  - Minimizes breast movement
ABVS 2000s Siemens system
Positioning: 3 Views per breast

Lateral

AP

Medial
5 Views for Full Coverage

Superior

Lateral

AP

Inferior

Medial
General considerations

- Indications
  - Distinct indications with patients need ABVS instead Hand Held US

- Workflow
  - Standardized workflow for image interpretation

- Criteria
  - New diagnostic criteria how to interpret the coronal (c-plane)
Indications?

- All patients
  - Screening Setting/ACR 3-4
  - Breast cancer follow-up
- Distinct patients
  - Mutation carriers /BRCA1-2
  - Preoperative assessment
  - Invasive lobular carcinomas
  - Early ductal changes
Workflow

Complete c-plane analysis

Lesion Evaluation in conventional planes

BI-RADS CLASSIFICATION

Complete c-plane analysis

Additional analysis of both conventional planes

Lesion evaluation

BI-RADS CLASSIFICATION

2-4 MIN PER CASE

4-10 MIN PER CASE
Hanging protocol

- Transverse
- Sagittal
- Coronal
Diagnostic criteria c-plane

- Margins
- Small lesions
- Lesions
- Nipple area
- Artifacts
Clinical Cases
False positive Artifact
Invasive ductal carcinoma

Screening case
Fibroadenoma

Screening case

C-plane

trans

sag
Invasive ductal carcinoma

Screening case

C-plane
Invasive ductal carcinoma

Screening case
6h inframammary zone/12.59cm from nipple
Cyst in fibrocystic changes

Screening case
Post-op changes

Screening case
fibroadenoma

Screening case
Second look Ultrasound in ABVS finding

- B-mode
- Color mode
- Strain/shear wave elastography
Pitfalls

- Positioning errors
- Pressure in deep areas
- Imaging in the periphery of FOV
- Ignoring imaging of other conventional planes
Freehand-US

**Advantages**

- Gold standard
- Real-time examination
  - Optimal Compression
  - Doppler, Elastography, ...
  - Less artifacts
  - Optimal adaption to the breast tissue
- High Sensitivity & Specificity
- Direct patient contact
- No reconsultations
- Access to the axillary region

**Disadvantages**

- Time consuming
- No objective documentation
- No second reading
- Examiner-dependend
- Showing only small slices of the breast
Automated Breast Ultrasound

Advantages

- High sensitivity [79-100%]*
- Objective documentation
- Second reading
- New Information
  - Whole breast c-plane
  - Planning surgical procedures
  - Intraductal proliferations
  - Lobular carcinomas
- High research potential

Disadvantages

- Low specificity [53-69%]*
- High assessment rate [31-47%]*
- No real-time examination – Artifacts
  - Second-look ultrasounds
  - Loss of Informations
- Axilla is unavailable
Today’s indications for ABVS

- All patients
  - Screening Setting / ACR III-IV
  - Breast cancer follow-up care

- Distinct patients
  - Mutation carriers BRCA1-2
  - Preoperative assessment
  - Multicentric lesions
  - Invasive lobular carcinomas
  - Research
Cases presentation in Workstation

Thanks!
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