FINE NEEDLE ASPIRATION CYTOLOGY SIMULATION USING PHANTOMS

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Authors have no conflict of interests to disclose

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AGENDA

- Purpose
- Product
- Process
Same old thing?
Boring lectures?
WHAT IS FNA ABOUT?

Fine Needle Aspiration Cytology
WHAT IS A FNA?

- Fine needle aspiration Cytology (FNA/FNAC/FNAB) is an extremely useful, cost-effective and minimally invasive diagnostic procedure to characterize palpable and deeper non-palpable lesions (in the latter case, guided by imaging techniques).
PROCEDURE

- Using an sterile technique, a small needle is introduced into the lesion and quickly moved back and forth to remove cells, placing the material on glass slides and preparing the smears.
SLIDES STAINING

- After that, the smears are stained by a technician (or histotechnician). This step takes around 2-3 minutes.
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RAPID ON SITE EVALUATION

- In the end, slides are examined under the microscope in order to provide an assessment of the quality of the sample, even a preliminary diagnosis*.

*in case of ROSE (Rapid On-Site Evaluation for US/EUS/CT-guided FNA).
RAPID ON SITE EVALUATION
DIAGNOSIS

Lymphoma

Breast carcinoma

Metastatic skin carcinoma

Tuberculosis (lymph node)

Metastatic lung carcinoma

Lipoma

Benign thyroid nodule
DIAGNOSIS

CANCER IS DIAGNOSED BY PATHOLOGISTS
DIAGNOSIS

- Etiology (causes).
- Cancer staging.
- Molecular test (personalized treatments)

The role of cytology in the era of HPV-related head and neck carcinoma.
Roy-Chowdhury S¹, Krishnamurthy S².

Use of fine needle aspirate from peripheral nerves of pure-neural leprosy for cytology and PCR to confirm the diagnosis: a pilot study.
Indian J Dermatol Venereol Leprol 2013 Nov-Dec;79(6):789-94.

Sonography and Sonographically Guided Needle Biopsy of Internal Mammary Nodes in Staging of Patients With Breast Cancer.
Dogan BE¹, Dryden MJ¹, Wei W², Fornage BD¹, Buchholz TA³, Smith B³, Hunt K⁴, Krishnamurthy S⁵, Yang WT¹.

Seize the Opportunity
Underutilization of Fine-Needle Aspiration Biopsy to Inform Targeted Cancer Therapy Decisions
Douglas P. Clark, MD

Using "residual" FNA rinse and body fluid specimens for next-generation sequencing: An institutional experience.
Wei S¹, Lieberman D¹, Morrissette JJ¹, Baloch ZW¹, Roth DB¹, McGrath C¹.
How does it work?
PROCEDURE

- The syringe and the needle are usually connected to a vacuum system (i.e. Cameco pistol).
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PROCEDURE

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  Otherwise, it becomes a bloody and an inadequate sample.
PROCEDURE

Again?  Why?
NEEDLES

- The size of the needles varies depending on the lesion (glandular or not, e.g. thyroid) or operator preferences, between 25-20G.
ANESTHESIA

- Most physicians do not use local anesthesia to perform a superficial FNA, but some do employ a topical cream or lidocaine injection.
COMPLICATIONS

- Despite being a minimally invasive procedure, some complications have been documented, apart from self-limited hematomas and local infections (due to inadequate aseptic methodologies).
COMPLICATIONS

Litigation for *pneumothorax* as a complication of *fine-needle aspiration* of the *breast*.

Bates T, Davidson T, Mansel RE.
**Intrathyroid hemorrhage and acute upper airway obstruction after fine needle aspiration of the thyroid gland.**


**Bilateral thyroid hematomas after fine-needle aspiration causing acute airway obstruction.**

COMPLICATIONS

Anaplastic thyroid carcinoma implantation after fine needle aspiration cytology.
Abelardo E, Jaramillo M, Sheffield E, Tierney P.

Role of FNAC in Hepatic lesions: Risk of track metastases.
Reddy CV, Goud YG, Poornima R, Deshmane V, Madhusudhana BA, Gayathridevi M.
SITUATION

- To err is human
PROCEDURE

- This technique can be performed by any physician (pathologists, radiologists, surgeons, endocrinologists, and others).
SITUATION

- What is the current situation?

Are you kidding me?
What is the current situation?

- Resource limitations and lack of standardization in teaching programs at medical school make teaching this technique difficult.

- Results: Deficient training of students.

- Consequences: Patient safety risk.
SITUATION

• Where do we go from here?
MANNEQUINS

- They allow the whole FNAC process to be performed (palpation, puncture, aspiration, placement of material on slides and smear preparation) and, furthermore, are reusable.
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MANNEQUINS

- We can change the content of the loads, depending on the clinical scenario, being more creamy, thicker or watery.
Let's start the simulation!
FNA SIMULATION PROGRAM - PIONEER EXPERIENCE

- This technique has been in practice for four academic years (2013-2017) in the third year of the degree at medical school with small groups of students.
A simulated waiting room is presented to the students with several clinical scenarios.
FNA SIMULATION PROGRAM

- Clinical cases are presented with a picture and a background history is reported by the facilitator.
Each student, individually, is presented a simulated case and performs the fine needle aspiration procedure.
CHECKLIST

- Anamnesis: clinical correlation, procedure explanation, Inform Consent Form.
- Palpate the lesion.
- Clean the area (alcohol/clorhexidin).
- Assemble the system (Vacuum pistol + syringe + needle).
- Obtain material through back & forth movements.
- Expel the material on glass slides.
- Prepare the smears.
At all times, the students are supervised by an instructor.
FNA SIMULATION PROGRAM

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FNA SIMULATION PROGRAM
DIAGNOSIS – CYTOLOGY & HISTOLOGY CORRELATION
DIGITAL IMAGES
CONVENTIONAL MICROSCOPE VS DIGITAL SLIDES
DIGITIZATION
SET OF CLINICAL CASES
DEBRIEFING

• After every case a discussion is held on what has taken place.
• The instructor encourage the trainee to think about experiences, perceptions, decision making, and clinical competences.
• The students are invited to share their feelings, and the problems they found, as well as their opinion about the procedure.
FNA SIMULATION PROGRAM

How far we’ve come?
FNA SIMULATION PROGRAM
FNA SIMULATION PROGRAM

- 220 medical students, in their third year, from the University of Murcia, Spain, took part in the FNAC simulation (44 groups): 135 women, 85 men.

- The success rate performing the FNA was 97.2%.
FOREIGN STUDENTS

- In addition, 18 IFMSA students from 14 different universities (national/international) performed this simulation. None of them had the opportunity to do this practice in their places of origin.

- According to an anonymous survey, the simulation was considered valuable, with 4.2/5.
- There is no proper standardization of the practical aspects among different universities.
We assessed our debriefing methodologies, using the Debriefing Assessment for Simulation in Healthcare questionnaire (DASH©, Harvard).

Debriefing Assessment for Simulation in Healthcare (DASH) Student Version

Directions: Please summarize your impression of the introduction and debriefing in this simulation-based exercise. Use the following scale to rate the “Behaviors” and the six “Elements.” If a listed behavior is impossible to assess (e.g., how the instructor handled upset people if no one got upset), leave it blank and don’t let that influence your evaluation. The instructor may do some things well and some things not as well within each Element. Do your best to rate the overall effectiveness for the whole Element guided by your observation of the Behaviors that define it. The overall Element rating is not an average of the Behavior Scores; it’s your overall impression of how well the Element was executed by the instructor.

Rating Scale

<table>
<thead>
<tr>
<th>Rating</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Descriptor</td>
<td>Extremely Ineffective / Detrimental</td>
<td>Consistently Ineffective / Very Poor</td>
<td>Mostly Ineffective / Poor</td>
<td>Somewhat Effective / Average</td>
<td>Mostly Effective / Good</td>
<td>Consistently Effective / Very Good</td>
<td>Extremely Effective / Outstanding</td>
</tr>
</tbody>
</table>

Element 1 assesses the introduction at the beginning of a simulation-based exercise.

If there was no introduction and you felt one was needed to orient you, your rating should reflect this.

The instructor set the stage for an engaging learning experience.

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Behavior Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. The instructor introduced him/herself, described the simulation environment, what would be expected during the activity, and introduced the learning objectives.</td>
<td></td>
</tr>
<tr>
<td>B. The instructor explained the strengths and weaknesses of the simulation and what I could do to get the most out of simulated clinical experiences.</td>
<td></td>
</tr>
<tr>
<td>C. The instructor attended to logistical details as necessary such as toilet location, food availability, and schedule.</td>
<td></td>
</tr>
<tr>
<td>D. The instructor made me feel stimulated to share my thoughts and questions about the upcoming simulation and debriefing and reassured me that I wouldn’t be shamed or humiliated in the process.</td>
<td></td>
</tr>
</tbody>
</table>

Elements 2 through 6 assess a debriefing.
DEBRIEFING ASSESSMENT

- We assessed our debriefing methodologies, using the Debriefing Assessment for Simulation in Healthcare questionnaire (DASH©, Harvard).
DEBRIEFING ASSESSMENT

- The long form was performed, with a total of 23 Behaviours grouped in the following 6 Elements (range 1-7):
  - For setting an engaging learning experience (6.05).
  - For maintaining an engaging context for learning (6.33).
  - For the debriefing organization (5.95).
  - For provoking deep discussions (6.43).
  - For assessing students performances (6).
  - For helping to improve or sustain good performance (6.07).

- The mean total score was 37 (out of 42).
Eduardo Alcaraz Mateos

Eduardo’s name is well-known on Twitter for his educational contributions, but he’s equally active offline. One nominator recognized him for his “leadership within the Spanish Society of Pathology-IAP on pathology communication and social networks,” and another cited his participation as the USCAP Ambassador for Spain.

A pathologist with interests in cytology and dermatopathology, Eduardo can be found at the Hospital General Universitario. He’s an active proponent of better medical education—including the use of new technologies like digital pathology and simulations.

of his motivation to teach. “You can never stop studying and learning, because this is the only way to teach and provide accurate diagnostics.”
OSCE PERSPECTIVE

- FNAC simulations could be potentially included in the Objective Structured Clinical Examination (OSCE) evaluative formats.
OSCE PERSPECTIVE

Student

OSCE

Patient / Simulator

Examiner

THE DEFINITIVE GUIDE TO THE OSCE
The Objective Structured Clinical Examination as a performance assessment

HPSN World 2017
Florida, February 28 – March 2, 2017
Alcaraz & Caballero - FNA Cytology Simulation Using Phantoms
OSCE PERSPECTIVE

Fine Needle Aspiration Skills

1. Anamnesis
   (anticoagulant therapy)
2. Palpation
3. Asepsis/Antisepsis
4. FNA procedure
5. Ask for compression
6. Material expelled
7. Smeared preparations
OSCE PERSPECTIVE
FNA SIMULATION IMPLEMENTATION

Simulators
TAKE HOME MESSAGES

• We want a safer health care system.
• We need simulators to practice on, avoiding procedures on the patient for the first time.
• Fine needle aspiration is a daily procedure to diagnose patients, guiding us to provide proper treatment for the patient.
• We want trained physicians.
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