ANAPHYLAXIS, ASTHMA AND PREGNANCY

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More than 300 million people have asthma

Females are 10% more likely than males to be diagnosed as having asthma in their lifetime

Asthma is the most prevalent chronic disorder to complicate pregnancy

Asthma affects 3.7 to 12 percent of pregnant women

Pawankar R, Cannon G, Holgate ST, Lockey RF. WAO White Book on Allergy. 2011
WOMEN WITH ASTHMA

INFLUENCING FACTORS:
- Sex Hormones
- Menstrual cycle
- Pregnancy
- Obesity
- Smoking

PHYSIOLOGICAL CHANGES DURING PREGNANCY

- The diaphragm is raised 4 cm
- The diameter of the rib cage increases 2 cm
- The circumference is increased 6 cm

Uterine enlargement restricts diaphragmatic excursion, reducing residual volume and functional residual capacity


PULMONARY PHYSIOLOGICAL CHANGES IN PREGNANCY AND POSTPARTUM

<table>
<thead>
<tr>
<th>Pulmonary Function</th>
<th>Pulmonary Function in Pregnancy and Postpartum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Inspiratory Level</td>
<td>Respiratory Rate (Breaths/Min)</td>
</tr>
<tr>
<td>10 weeks</td>
<td>16/15/min</td>
</tr>
<tr>
<td>24 weeks</td>
<td>16/15/min</td>
</tr>
<tr>
<td>36 weeks</td>
<td>16/15/min</td>
</tr>
<tr>
<td>Post-partum</td>
<td>16/15/min</td>
</tr>
<tr>
<td>TLC, Total Lung Capacity</td>
<td>200-450 ml</td>
</tr>
<tr>
<td>VC, Vital Capacity</td>
<td>680 ml</td>
</tr>
<tr>
<td>RV, Residual Volume</td>
<td>780 ml</td>
</tr>
<tr>
<td>FRC, Functional Residual Capacity</td>
<td>100 ml</td>
</tr>
<tr>
<td>IC, Inspiratory Capacity</td>
<td>1.2 L</td>
</tr>
<tr>
<td>ERV, Expiratory Reserve Volume</td>
<td>1.1 L</td>
</tr>
<tr>
<td>TV, Tidal Volume</td>
<td>1.0 L</td>
</tr>
<tr>
<td>ERV, Expiratory Reserve Volume</td>
<td>1.2 L</td>
</tr>
</tbody>
</table>


Gender difference, sex hormones, and immediate type hypersensitivity reactions

- The course of allergic diseases varies unpredictably during pregnancy
- Estrogens effects on mast cell activation and allergic sensitization
- Progesterone is shown to suppress histamine release but potentiate IgE induction


ASTHMA

It is the most common medical issue that can complicate pregnancy

- Increased risk
- Perinatal mortality
- Pre eclampsia
- Premature delivery
- Low birth weight

Exacerbations are most likely to occur between weeks 24 and 36, with exacerbations unlikely beyond week 37, including during delivery.

Asthma exacerbation

Maternal-fetal risk in asthma exacerbation

KEY POINT OF ASTHMA DURING PREGNANCY

- Asthma is considered the most common serious medical problem that could complicate pregnancy.
- During pregnancy the severity of asthma often changes.
- The focus of asthma treatment in pregnant women is to achieve the control of symptoms and maintenance of normal lung function.
- Poorly controlled asthma resulting in increased perinatal mortality, increased prematurity and low birth weight.
- Acute exacerbations should be treated aggressively in order to avoid fetal hypoxia. Treatment should include supplemental oxygen, β-2 agonist and systemic corticosteroids.
- The evidence suggests that the risks of uncontrolled asthma are greater than any known risks from medication.

Pharmacologic therapy using stepwise approach to achieve full control of symptoms and maintenance of pulmonary function.
ANAPHYLAXIS DURING PREGNANCY

* The true incidence of anaphylaxis during pregnancy is unknown

* Anaphylaxis during pregnancy, labor, and delivery can be catastrophic for the mother and, especially, the infant

ANAPHYLAXIS, ASTHMA AND PREGNANCY

Admission to emergency department

* She was cleaning the home and feels multiple ant bites on her arms and legs.
  * Immediately presented:
    - Generalized itching
    - Cough and sore throat
    - Difficulty breathing
    - Dizziness
    - Nausea

ANAPHYLAXIS, ASTHMA AND PREGNACNY

Patient

* Case: Anaphylactic shock in a pregnant women with untreated asthma

  * K.A.C.
  * Female
  * 29 years old
  * Pregnancy of 18 weeks gestation
  * Emergency Department
  * University Hospital
  * Monterrey, Mexico.

ANAPHYLAXIS, ASTHMA AND PREGNACNY

Admission Patient conditions

* Blood Pressure 80/40 mmHg
* Heart rate 117 x min
* Breath Rate 24 x min
* Temperature 36.5 °C
* O2 Saturation: 90%

Skin: Approximately 12-15 erythematous papules with central pustule in arms and legs, with edema, pain and generalized itching.

Respiratory: bilateral diffuse wheezing

Gastrointestinal: nausea

Cardiovascular system: hypotension, tachycardia.

Central Nervous System: Anxious, dizziness and confusion.
Anaphylaxis during pregnancy


Potential symptoms and signs of anaphylaxis during pregnancy


Potential global range expansion of the invasive fire ant


Factors associated with severity and fatality

**Basic management of anaphylaxis**

<table>
<thead>
<tr>
<th>First dose</th>
<th>Oxygen</th>
<th>Salbutamol Neb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epinephrine 1:1000</td>
<td>Up 100%</td>
<td></td>
</tr>
<tr>
<td>0.5mg IM</td>
<td>6-8 L/m</td>
<td></td>
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<tr>
<td>S-15</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Second dose</th>
<th>Monitorization</th>
<th>H1-Antihistamines IV</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vital signs, diuresis</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S-15</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Third dose</th>
<th>Intravenous fluids</th>
<th>Glucocorticoid IV</th>
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</table>

Place the woman in her left side and elevate her lower extremities.

**G & O Evaluation**

- Obstetric ultrasound
- Continuous Electronic Fetal Monitoring

**Report:**
- Fetal viability
- Heart rate and fetal movement
- No uterine contractions
- Placenta integrates

**Evolution and discharge**

- Good response to treatment
- Normal vital signs and fetal monitoring
- Remained under observation at least 24 hours
- Written Emergency Plan
- EPIPEN prescribing
- Tracking allergist's office

**Anaphylaxis during pregnancy:**

Risk assessment and risk reduction

- Confirm anaphylaxis triggers
- Measure allergen-specific IgE
- Avoidance and immunomodulation
- Avoid allergens
- Avoid high-risk food intake
- Avoid drugs that could cause flare-up

Emergency preparations:

- Auto-injector
- Antihistamines
- Steroids
- Medical identification
Conclusions

- Asthma is considered the most common serious medical problem that could complicate pregnancy.
- Anaphylaxis during pregnancy, labor, and delivery can be catastrophic for the mother and, especially, the infant.
- Allergy/immunology specialists should play an important role in the prevention of anaphylaxis and asthma in pregnancy.
- Prospective interdisciplinary studies of anaphylaxis and asthma during pregnancy are needed.