European Society of
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XXVIII CONGRESSO NAZIONALE

European Society of Regional Anaesthesia & Pain Therapy
ESRA ITALIA

Airway Management in Pregnant Patients

Palermo 07 Ottobre 2023

Ospedale Buccheri La Ferla F.B.F. - Palermo

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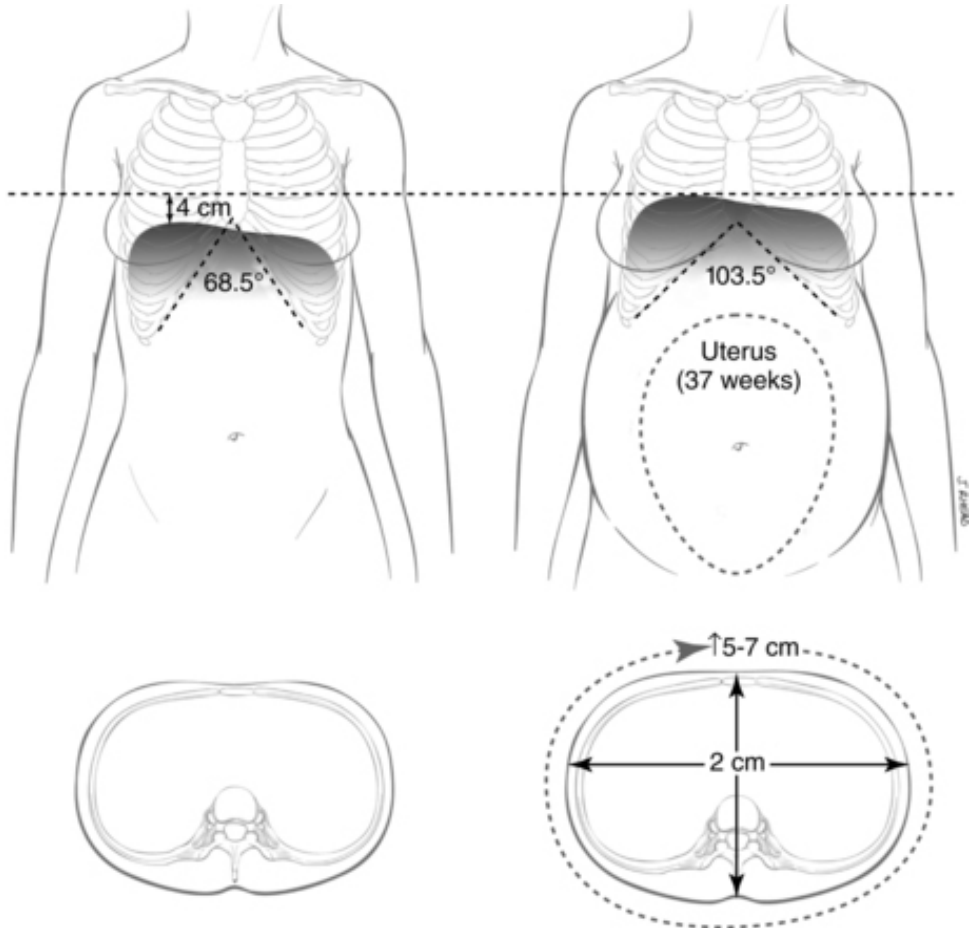
The airway management in pregnant patients is a key point because the prolonged hypoxemia risks compromising two lives at the same times.

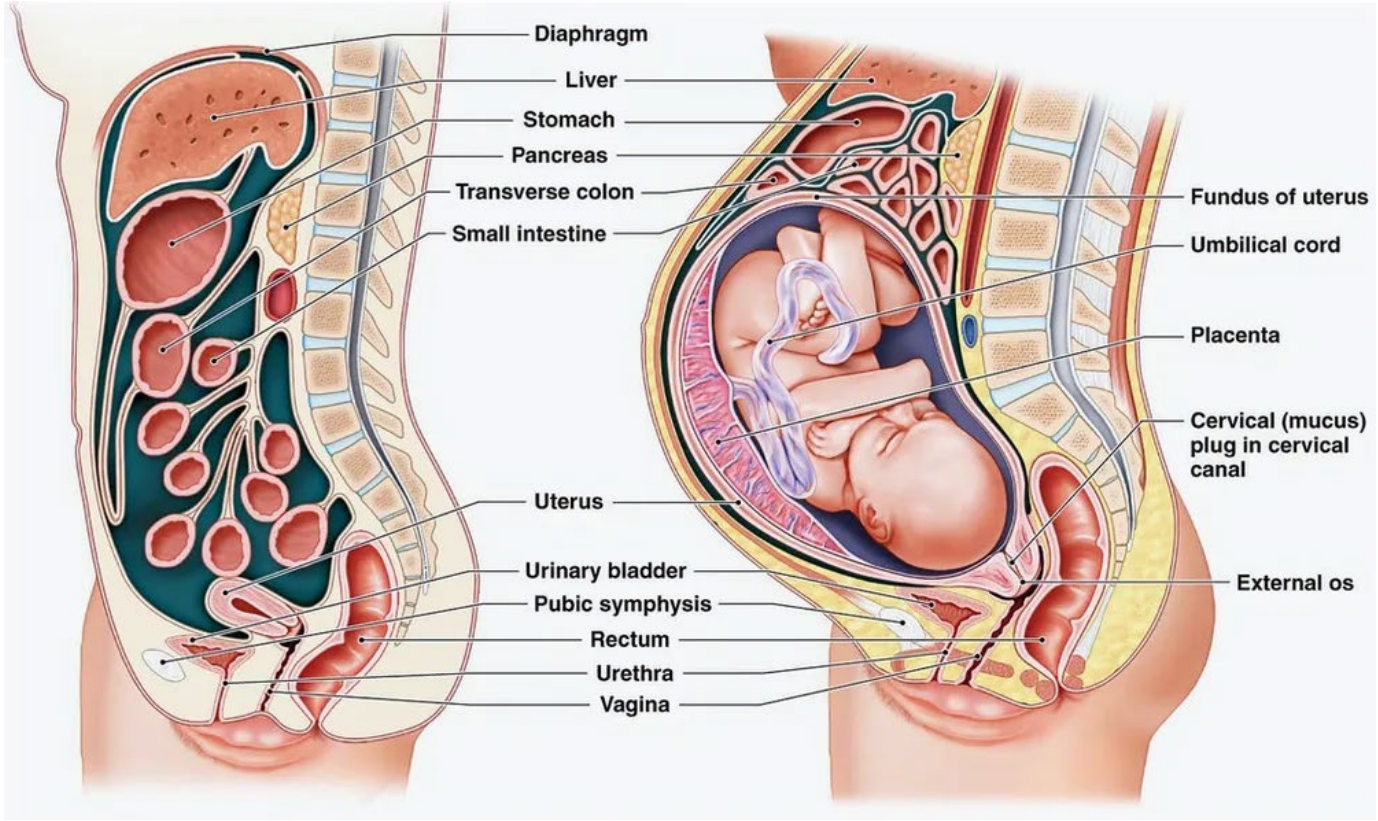
Pregnancy is a physiological process which involves a series of alterations in all maternal organs and systems, most of which will reverse after birth. From the first trimester, the maternal organism undergoes various anatomical and functional changes to meet the new fetal and placental needs.

Physiological changes of the maternal organism during pregnancy

Genital system
Cardiovascular system
Blood coagulation system
Uropoietic system
Gastrointestinal system
Endocrine system
Skin and musculoskeletal system
Respiratory system

The diaphragm, following the increase in the size of the uterus, rises by 4 cm, leading to a reduction in thoracic volume and early closure of the small airways...

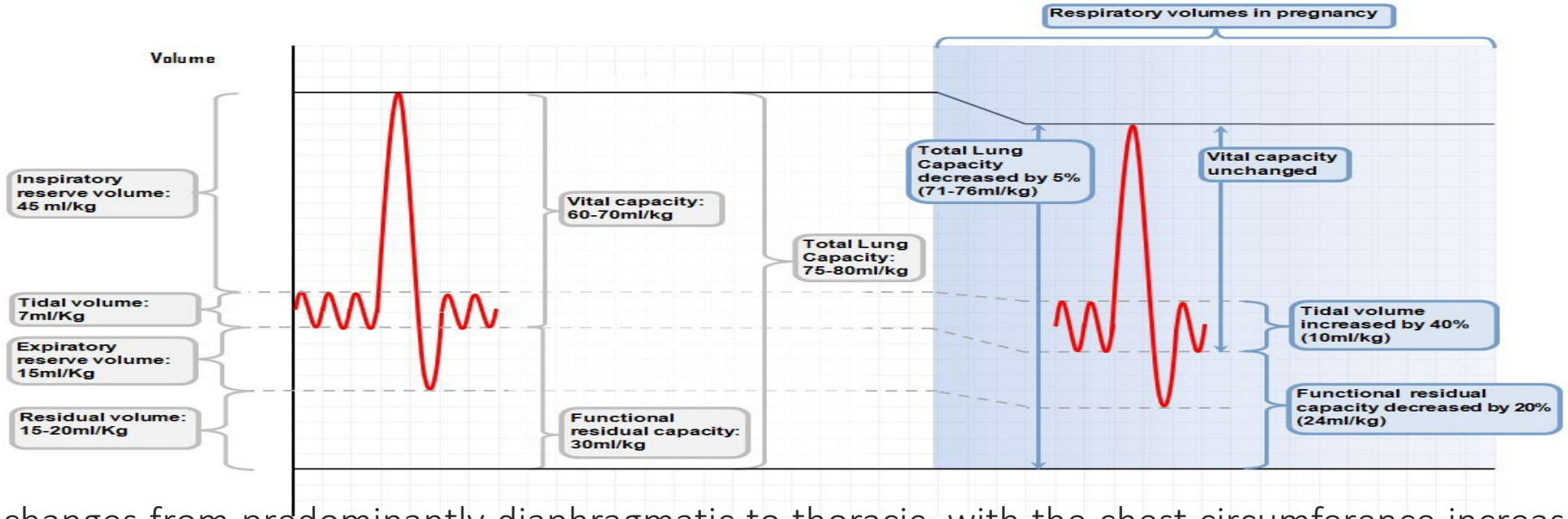




Body modification during pregnancy

Respiratory System

- RR is unchanged, but tidal volume and resting minute ventilation increase



Breathing changes from predominantly diaphragmatic to thoracic, with the chest circumference increasing by approximately 10 cm.

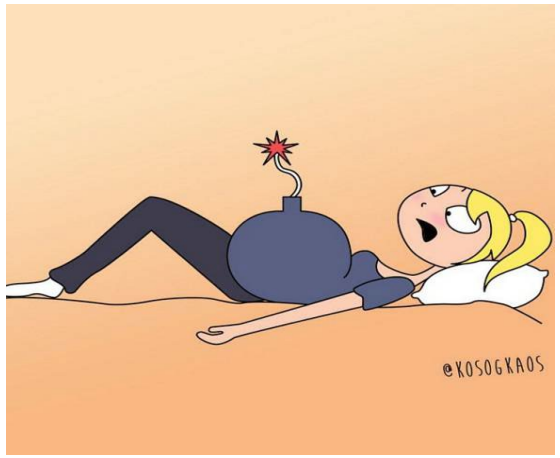
The modifications in thoracic volume are influenced by:

The hormone relaxin, which causes relaxation of the ligaments of the lower ribs

The volume of the uterus, which increases upward and causes the diaphragm to rise. This, in turn, expands the rib cage, increasing the subcostal angle and the anteroposterior diameter.

Also…..

Reduced functional residual capacity leads to a consequent reduction in maternal oxygen reserve.This, along with increased oxygen demand accelerate the onset of desaturation during apnea.



moreover....

Increased Blood Volume and Interstitial Fluids
Accumulation of Fatty Tissue
Increased Connective Tissue in the Airways
Increased Fragility, Bleeding, and Congestion of the Mucous Membranes in the Upper Airways
Increased Intragastric Pressure
Reduced Tone of the Lower Esophageal Sphincter
Less Acute Angle of His
Gastric Hyperacidity, Resulting from the Increase in Placental-Origin Gastrin
Reduced Gastric Emptying During Labor, Leading to an Increased Risk of Regurgitation and Aspiration

Bucklin BA, Fuller AJ. Physiologic Changes of pregnancy. In Suresh M, ed. Shnider and Levinson's anesthesia for obstetrics. 5th ed. Philadelphia, PA: Lippincot Williams & Wilkins; 2013:363

All these physiological alterations make the approach to airway management difficult in pregnant women. It's important to note that the rate of failed intubation in the obstetric population using standard laryngoscopic techniques is approximately 0.4%, which is 7-10 times higher than in the general surgical population. In obese parturients, the rate of failed intubation exceeds 6%.

Vasdev GM, J Anesth (2008) 22:38–48; Jenkins JG, Anaesthesia 2006;61:193–4 McDonnell NJ, Int J Obstet Anesth 2008;17:292–7; Djabatey EA, Anaesthesia 2009;64:1168–71
Ezri T, Obstet and Gynecol Survey 2001;56:631-641; *Hood DD, Anesthesiology 1993;79:7210–7218; Barnardo PD, Anaesthesia 2000; 55:685-94

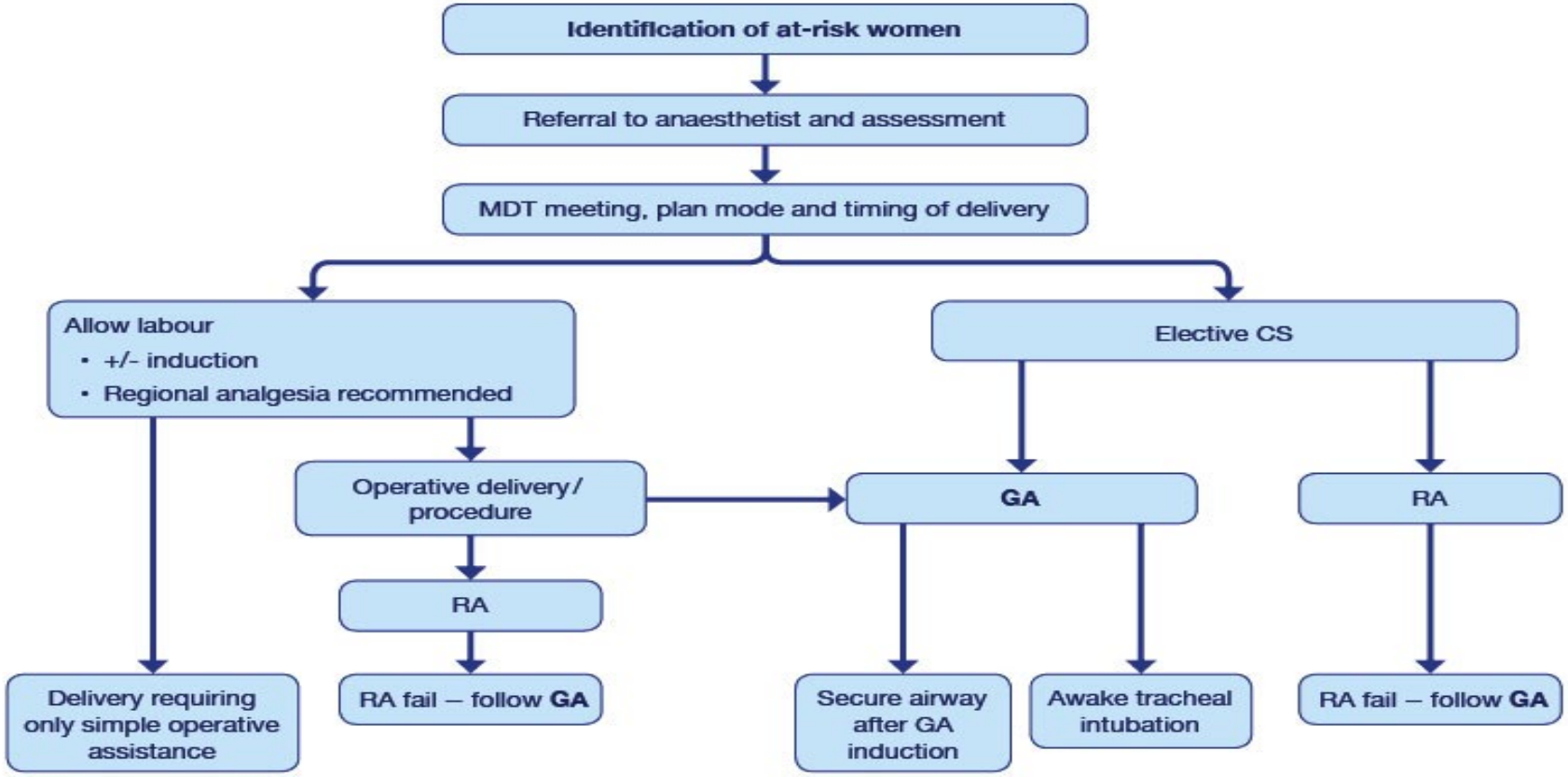
From all this we can deduce the importance, where possible, of a careful and scrupulous evaluation of the airways in order to foresee possible difficulties...

- Orotracheal intubation
- Mask ventilation
- Use of supraglottic devices
- Anterior access to the neck

Variabile	Valutazione	Score
Apertura della bocca (cm)	≥ 4	0
	< 4	1
Distanza tiromentoniera (cm)	> 6.5	0
	6.0 - 6.5	1
	< 6.0	2
Mallampati	I	0
	II	1
	III-IV	2
Movimento del collo	> 90°	0
	80-90°	1
	<80°	2
Prognatismo	si	0
	no	1
Peso corporeo (kg)	< 90	0
	90-110	1
	>110	2
Anamnesi di intubazione difficile	nessuna	0
	dubbia	1
	certa	2

Score ≥ 4: intubazione difficile probabile
Score < 4: intubazione difficile improbabile

Decision aid overview: management of pregnant women with anticipated difficult airway

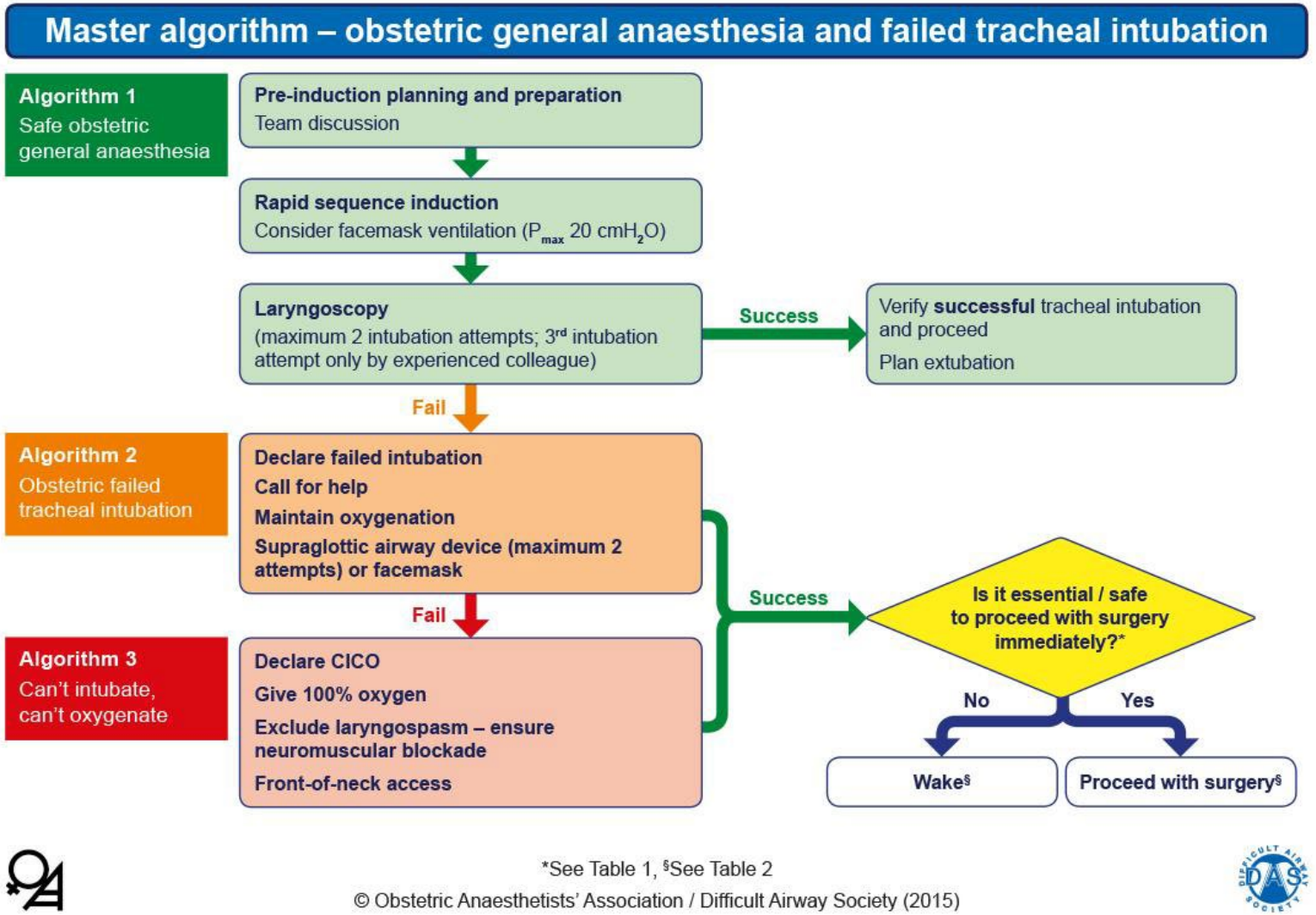


When administering general anesthesia to a pregnant patient

Indications:

- Emergency Cesarean Section
- ALR failure
- Massive bleeding

Guidelines for the management of difficult and failed tracheal intubation in obstetrics were published jointly by the Obstetric Anaesthetists' Association (OAA) and the Difficult Airway Society (DAS) in 2015.



Algorithm 1– safe obstetric general anaesthesia

Pre-theatre preparation
Airway assessment
Fasting status
Antacid prophylaxis
Intrauterine fetal resuscitation if appropriate

Plan with team
WHO safety checklist / general anaesthetic checklist
Identify senior help, alert if appropriate
Plan equipment for difficult / failed intubation
Plan for / discuss: wake up or proceed with surgery (Table 1)

↓

Rapid sequence induction
Check airway equipment, suction, intravenous access
Optimise position – head up / ramping + left uterine displacement
Pre-oxygenate to $F_{ET}O_2 \geq 0.9$ / consider nasal oxygenation
Cricoid pressure (10 N increasing to 30 N maximum)
Deliver appropriate induction / neuromuscular blocker doses
Consider facemask ventilation (P_{max} 20 cmH_2O)

↓

1st intubation attempt
If poor view of larynx optimise attempt by:
- reducing / removing cricoid pressure
- external laryngeal manipulation
- repositioning head / neck
- using bougie / stylet

Fail → **Ventilate with facemask**
Communicate with assistant

Success → **Verify successful tracheal intubation**
Proceed with anaesthesia and surgery
Plan extubation

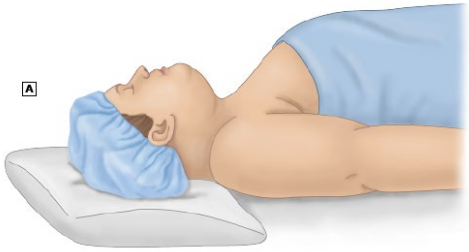
Fail ↓

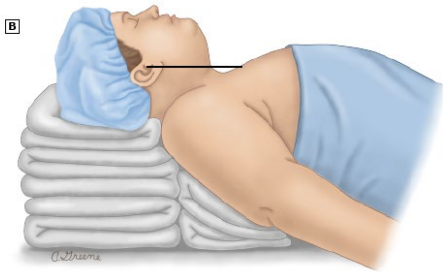
2nd intubation attempt
Consider:
- alternative laryngoscope
- removing cricoid pressure

3rd Intubation attempt only by experienced colleague

Fail ↓

Follow Algorithm 2 – obstetric failed tracheal intubation





Administration drugs

Administer adequate doses of hypnoinducer/curare

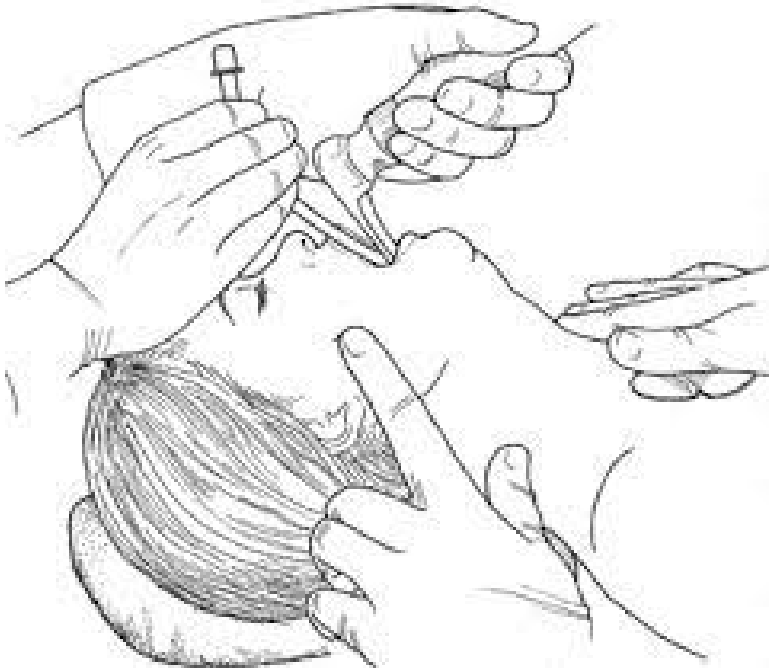
Hypnotics
Propofol: 1.5 -3 mg/kg
Ketamine: 2 mg/kg IV
Midazolam: 0.2 -0.3 mg/kg

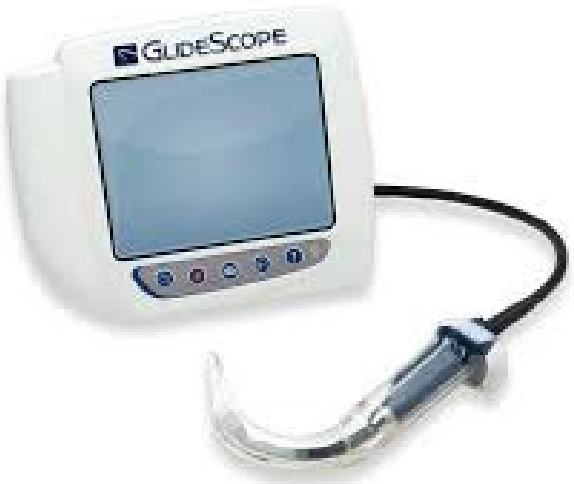
Opioids
Fentanyl: 2 mcg/kg

Curarization
Succinylcholine: 2 mg/kg IV
Rocuronium: (0.9 –1.2 mg.kg-1)-
>> selective antagonist:
Sugammadex16mg/kg ev.

MAX 2 INTUBATION ATTEMPTS

3rd ATTEMPT BY EXPERT ONLY





Algorithm 2 – obstetric failed tracheal intubation

Declare failed intubation
Theatre team to call for help
Priority is to maintain oxygenation

Supraglottic airway device
(2nd generation preferable)
Remove cricoid pressure during insertion (maximum 2 attempts)

Facemask +/- oropharyngeal airway
Consider:
- 2-person facemask technique
- Reducing / removing cricoid pressure

Is adequate oxygenation possible?

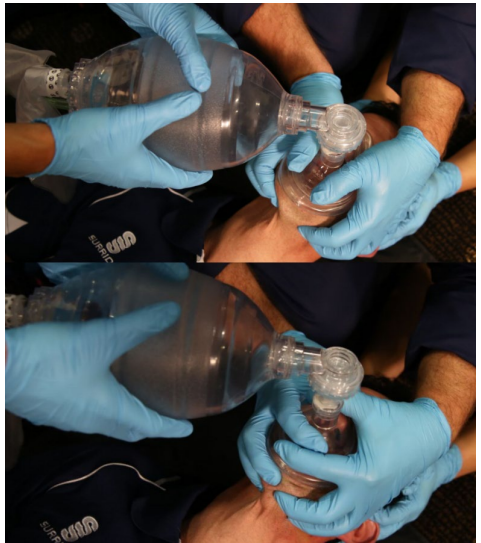
No → **Follow Algorithm 3**
Can't intubate, can't oxygenate

Yes → **Is it essential / safe to proceed with surgery immediately?***

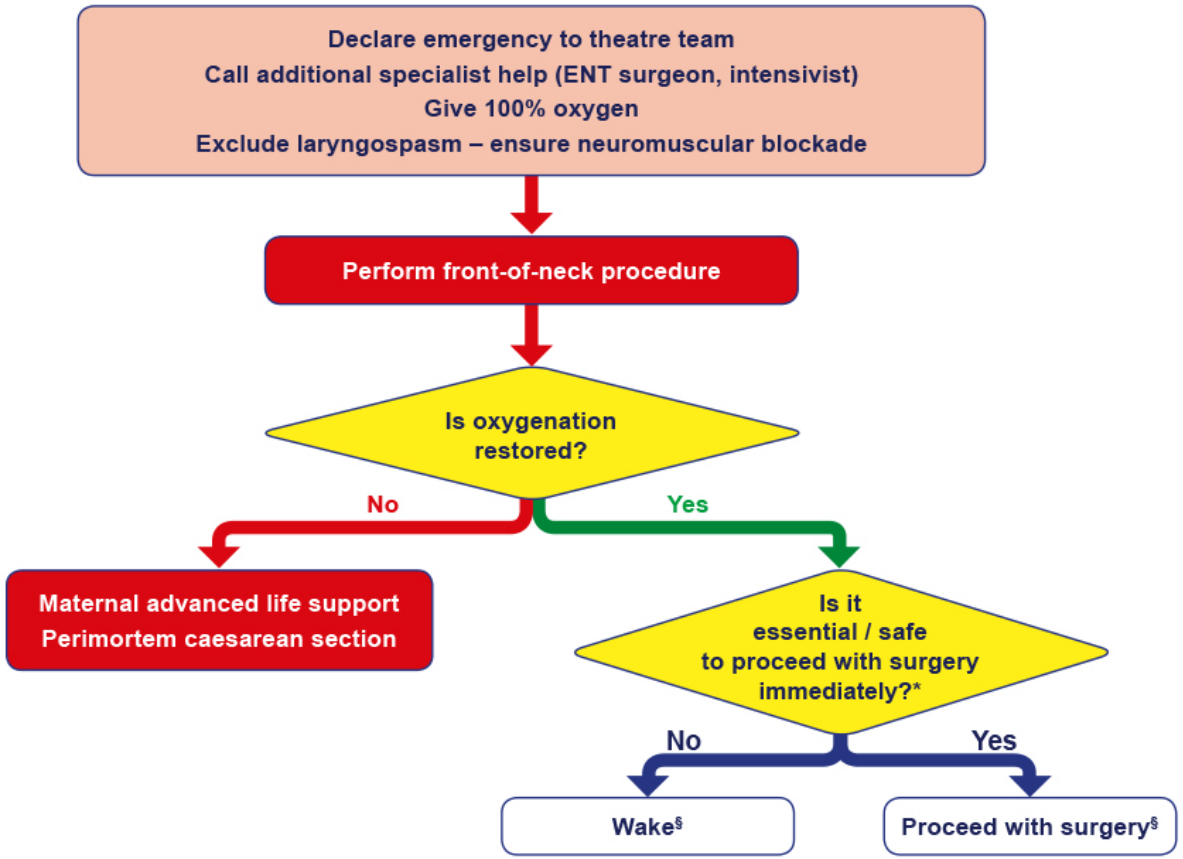
No → **Wake§**

Yes → **Proceed with surgery§**

*See Table 1, §See Table 2



Algorithm 3 – can't intubate, can't oxygenate



*See Table 1, §See Table 2

We conclude by emphasizing that effective multidisciplinary teamwork (Gynecologist, Obstetrician, Anesthetist) is essential for safety in the delivery room. An accurate evaluation of pregnant women can, in most cases, prevent potential complications and facilitate their management.

Thanks for your attention

Il Parto deve essere il tuo più grande successo,non la tua più grande paura (Jane Weideman)