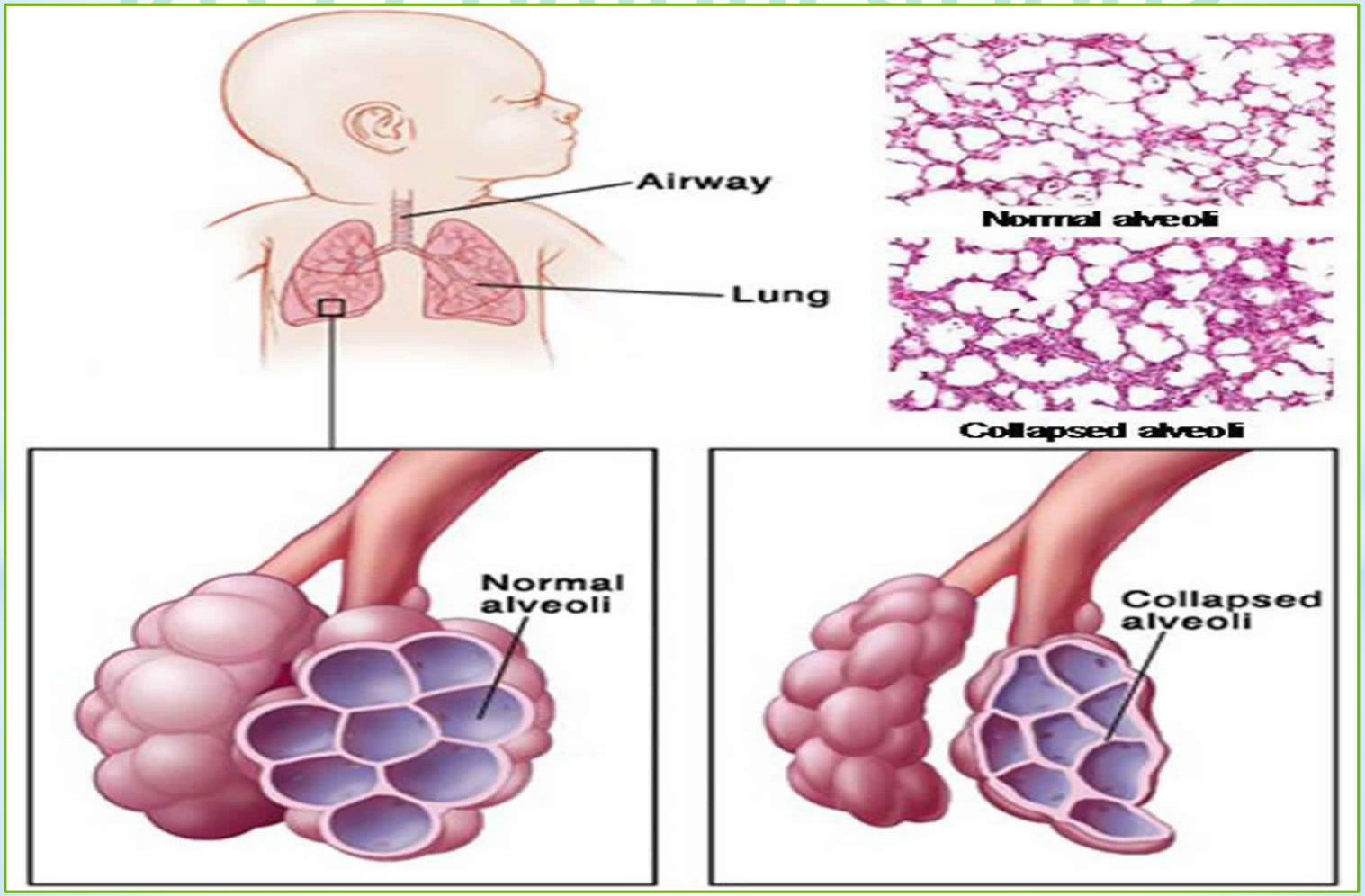
RDS Complications



DR.YEGANE TBZ.UMS

2021.06.10

Refferences

Clinical course of symptomatic spontaneous pneumothorax in term and late preterm newborns: Report from a large cohort. *Am J Perinatol* 28(2):163–168, 2011. doi: 10.1055/s-0030-1263300.

Queensland Clinical Guidelines. Respiratory distress and CPAP Guideline No. MN20.3-V8-R25.

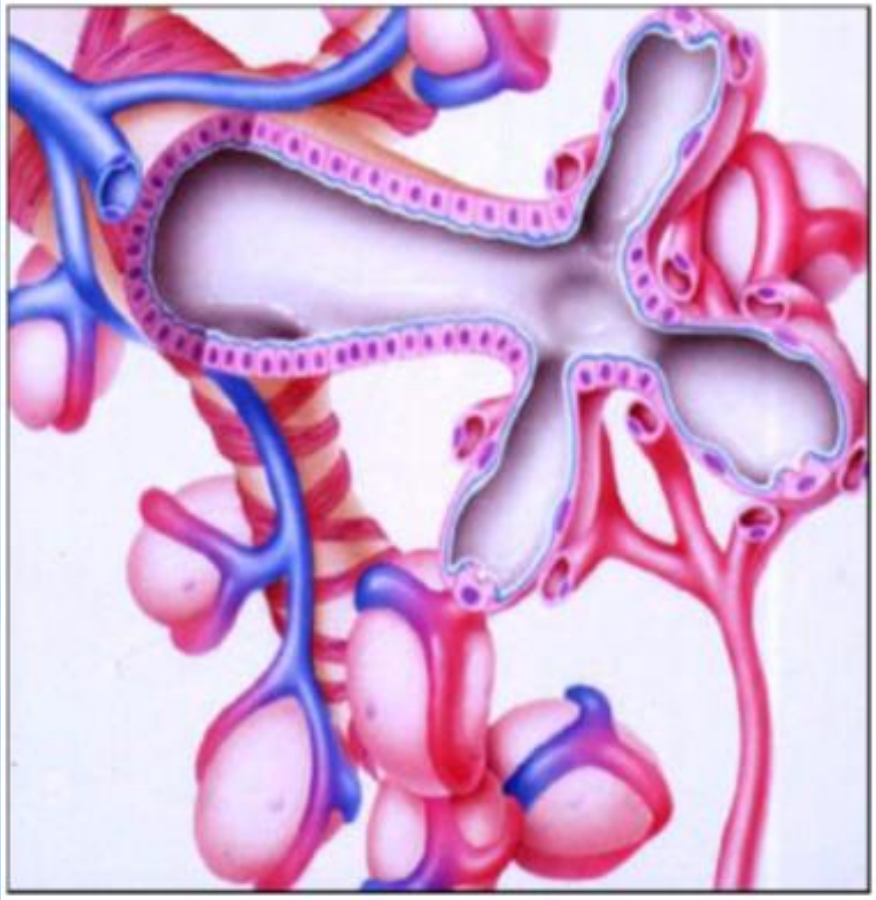
Skin injuries in newborns in neonatal intensive care , http://dx.doi.org/10.6018/eglobal.17.1.273671

Developing an Australian skin risk assessment and management tool for neonates, https://www.researchgate.net/publication/316846838March 2017

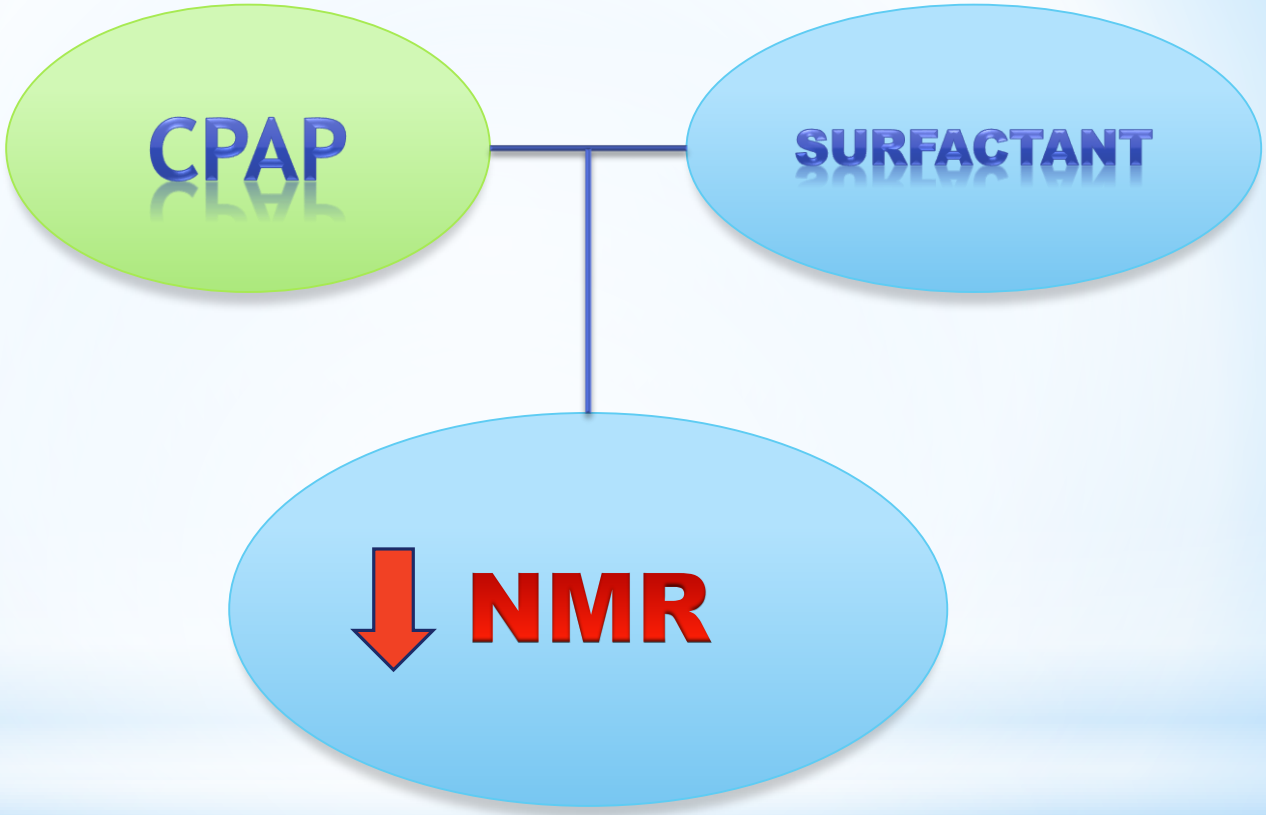
Fanaroff and Martin's Neonatal-Perinatal Medicine 2020

Assisted Ventilation of the neonate 2017

Normal Expiration With Surfactant



Abnormal Respiration Without Surfactant


CPAP
SURFACTANT
NMR

Common complications

- ✓ Skin Injuries
- ✓ Air leaks
- ✓ PDA
- ✓ Endothracheal Tube complications
- ✓ IVH
- ✓ Pulmonary hemorrhage
- ✓ Ventilator Induced Lung Injury (VILI)

Risk factors for skin breakdown

- Nasal CPAP device
- Length of therapy
- Age, Gestation and Size of baby
- Poor perfusion
- Environmental humidity and temperature

SKIN INJURIES

Approximately 80% of the morbidity and mortality of newborns is related to trauma or normal skin function changes .

Constant pressure on the *nares*, *nasal septum* and *forehead* can lead to reduced skin integrity and injury, causing pressure injury (ulcers) .

Nasal trauma :

- ✓ Pressure caused by poorly fitting nasal prongs or carrying crossbar exerting pressure on septum.
- ✓ Most common nasal injuries–necrosis : excoriation of the septum, nasal hyperaemia and disfigurement of the size and shape, nasal erosion, functional airway obstruction
- ✓ May progress to facial scarring and/or permanent deformity

Martins CP, Tapia CEV. A pele do recém-nascido prematuro sob a avaliação do enfermeiro: cuidado norteando a manutenção da integridade cutânea. Rev Bras Enferm., 2009, set/out, 62(5): 778-83. Available from: http://www.scielo.br/pdf/reben/v62n5/23.pdf.

Prevention

- Position binasal prongs 2 mm from the nares
- Avoid contact with the septal columella
- Fit firmly without blanching the skin to decrease movement
- Avoid pressure on the nasolabial sulcus and philtrum
- Resizing may be required as the nares increase in size
- Consider use of septum skin protector
- Assess regularly for moisture, and change at least every 12 hours

SRAMT (Skin Risk Assessment and Management Tool)

نام نوزاد
سن:

تاریخ:
ساعت:

ردیف	معیار ارزیابی	توصیف کننده ها	نمره
1	سن حاملگی	نوزاد بالای 38 هفته	1
		نوزاد 38-33 هفته	2
		نوزاد 33-28 هفته	3
		نوزاد کمتر از 2 هفته	4
2	درک حسی	پاسخهای مناسب نسبت به تحریک مناسب سن دارد، هوشیار است، رفتارهای خودآرامی خوبی دارد.	1
		به راحتی آشفته و بیقرار می‌شود، اما با اقدامات ساده و رفتارهای خود تنظیمی، آرام می‌شود	2
		بسیار حساس به نور، صدا و لمس، بطویکه که براحتی بیقرار و خیلی سخت آرام می‌شود	3
		کاهش سطح هوشیاری دارد، عضلات بسیار شل و بشدت SEDATE هست	4
3	تحرک	مکرر وضعیت بدن و اندامها را کاملا و اساسی تغییر می‌دهد، چرش سر دارد	1
		مکرر وضعیت بدن و اندامها را تغییر می‌دهد(مثل چرش سر)	2
		گاهی اوقات حرکات جزیی در تغیر وضعیت بدن دارد.	3
		کمترین حرکت و تغییر وضعیت را دارد و کاملا به کمک نیاز دارد	4
4	رطوبت	پوست معمولا خشک است و ملافه ها به ورت روتین هر24 ساعت یکبار تعویض می‌شوند	1
		پوست گاهی اوقات مرطوب است و ملافه ها باید هر12 ساعت تعویض شوند	2
		پوست اغلب مرطوب است و ملافه ها باید هر 8 ساعت تعویض شوند	3
		به دلیل دریافت رطوبت، ادرار کردن، وجود زخم و استوما، پوست مرتبا مرطوب است	4

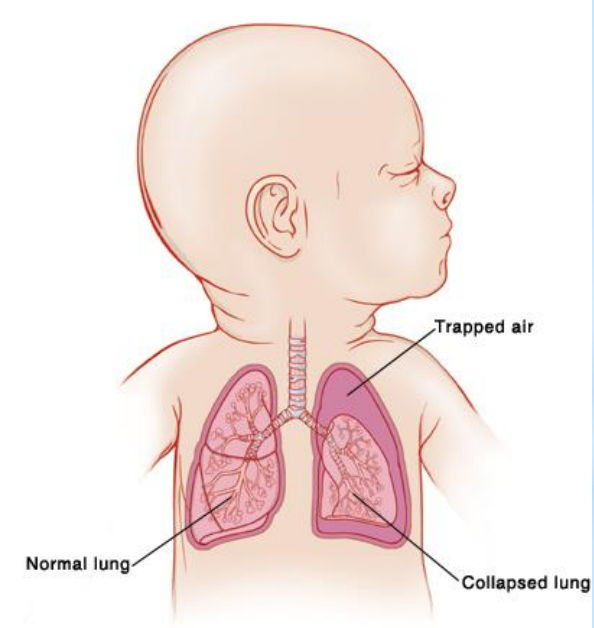
5	حمایت تنفسی	عدم نیاز به حمایت تنفسی	1
		HFNC	2
		CPAP بالای 5	3
		اینتوبه و تحت تهویه مکانیکی یا CPAP بالای 7	4
6	تمامیت پوست	پوست سالم و یکپارچه	1
		حساسیت و قرمزی جزیی پوست	2
		از بین رفتن موضعی تمامیت پوست و وجود ادم و شکاف	3
		از بین رفتن وسیع تمامیت پوست، وجود زخم فشاری	4
7	خونگیری	خونگیری هفتگی	1
		خونگیری از پاشنه بیشتر از 3 بار در 24 ساعت	2
			3
		تلاش مکرر ججهت تعبیه لاین وریدی، PICC، لاین شریانی	4
8	تغذیه	تغذیه کامل گوارشی	1
		TPN +Lipid + تغذیه از طریق سوند معده در حال افزایش و تحمل دارد	2
		TPN +Lipid با مایعات وریدی+ تغذیه تروفیک	3
		TPN +Lipid با مایعات وریدی و عدم تحمل تغذیه NPO	4

تفسیر نمره بدست آمده و راهکارهای لازم

نمره	میزان خطر	راهنمای بررسی و مستندسازی
کمتر از 8	ریسک کم	تداوم بررسی و مستندسازی تمامیت پوست
بین 16-9	ریسک متوسط	تغییر پوزیشن نوزاد هر 8-6 ساعت یکبار
		بررسی مجدد و مستندسازی تمامیت پوست هر 8-6 ساعت یکبار
بین 24-17	ریسک بالا	تغییر پوزیشن نوزاد و ججابجایی تجهیزات متل حداقل هر 6-4 ساعت یکبار بررسی مجدد و مستندسازی تمامیت پوست هر 6-4 ساعت یکبار
بین 32-25	ریسک خیلی بالا	بازرسی پوست هر 4-2 ساعت یکبار ، اطمینان از عدم فشار تجهیزات روی پوست بررسی مجدد و مستندسازی تمامیت پوست هر 6-4 ساعت یکبار

Air leaks

- Air escapes the lungs into extra-alveolar spaces- resulting disorder depends on the location of air.
- Pulmonary air leak occurs more frequently in the newborn period than at any other time of life. The incidence increases with decreasing gestational age.



Spontaneous pneumothorax and pneumomediastinum occur in 1 to 2% of normal neonates, probably because large negative intrathoracic forces created when the neonate starts breathing occasionally disrupt alveolar epithelium, which allows air to move from the alveoli into extra-alveolar soft tissues or spaces.

Risk Factors:

- ✓ MV
- ✓ Surfactant therapy without decreasing pressure support in ventilated infants
- ✓ Vigorous resuscitation
- ✓ Prematurity
- ✓ Pneumonia
- ✓ MAS
- ✓ …

Air leak syndromes

PIE

Pneumomediastinum

PTX

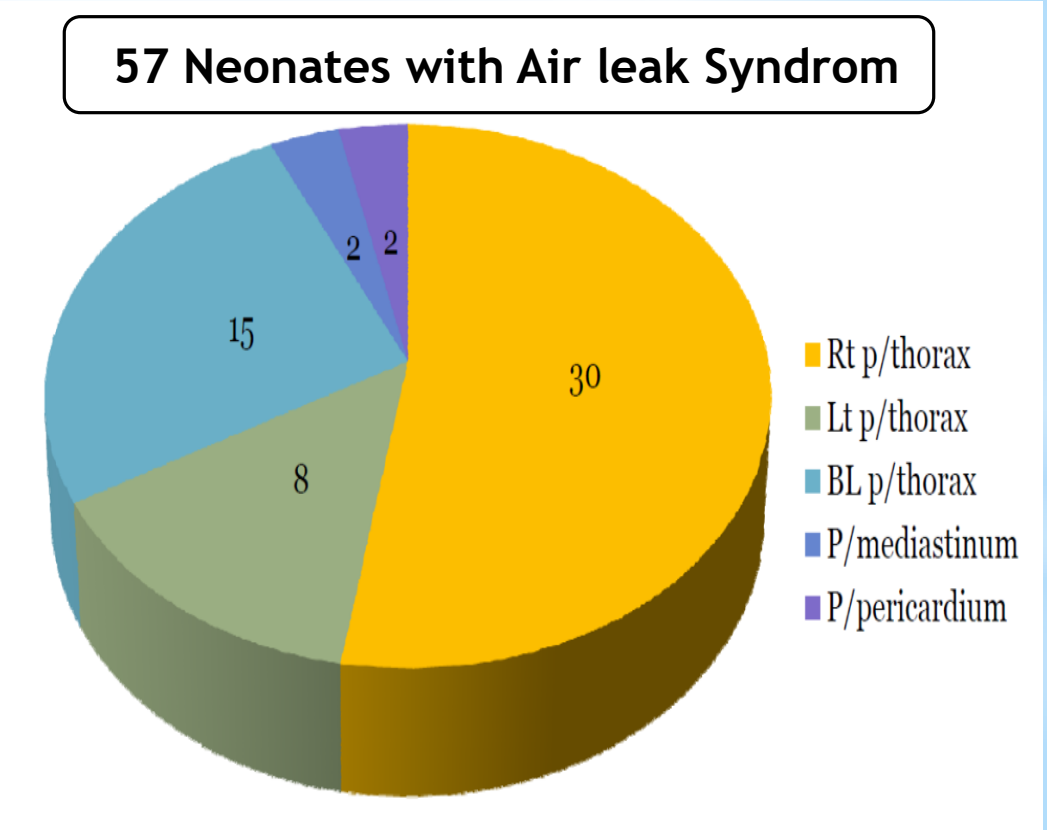
Pneumopericardium

Pneumoperitoneum

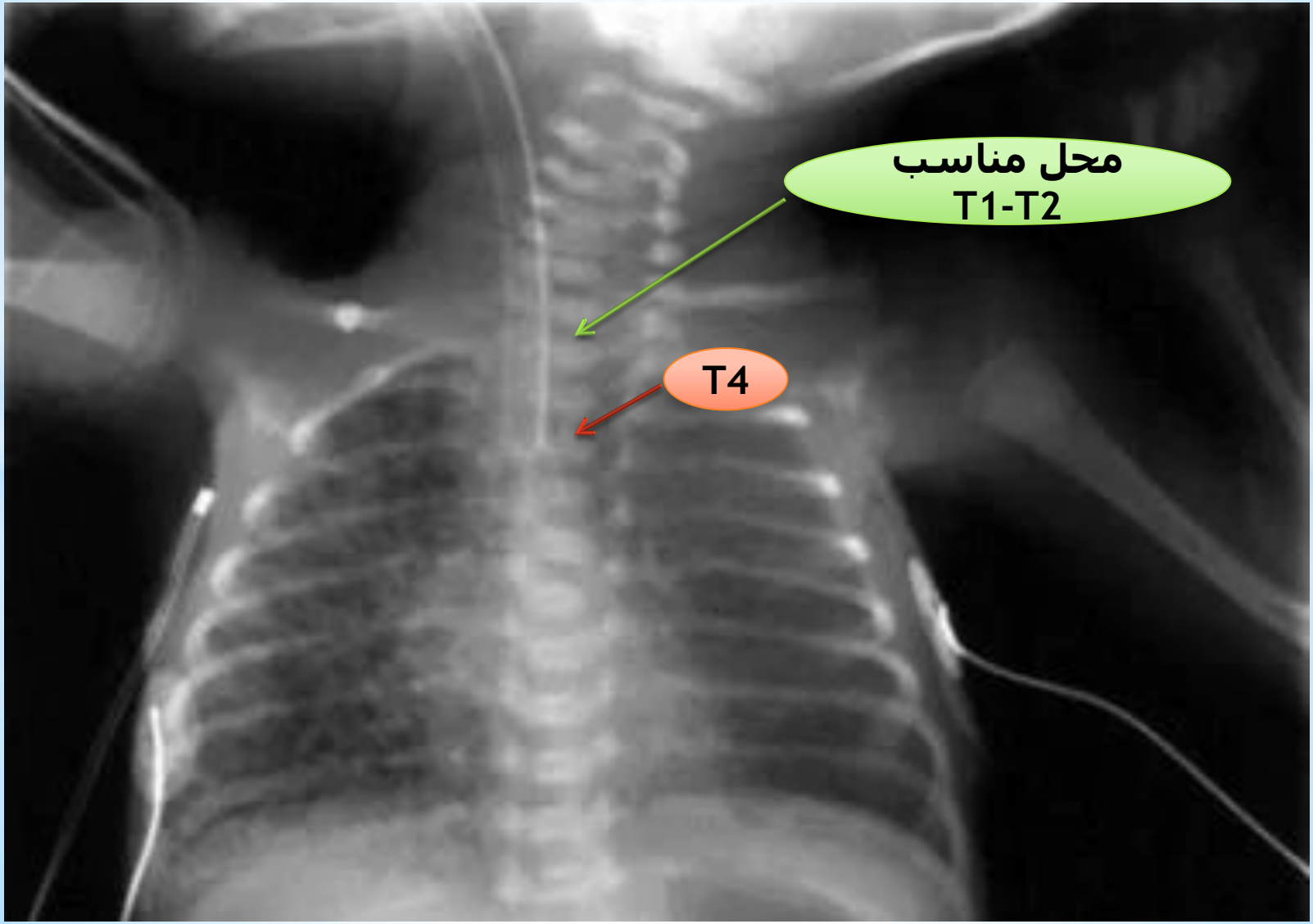
Subcutaneous emphysema

Systemic air embolism

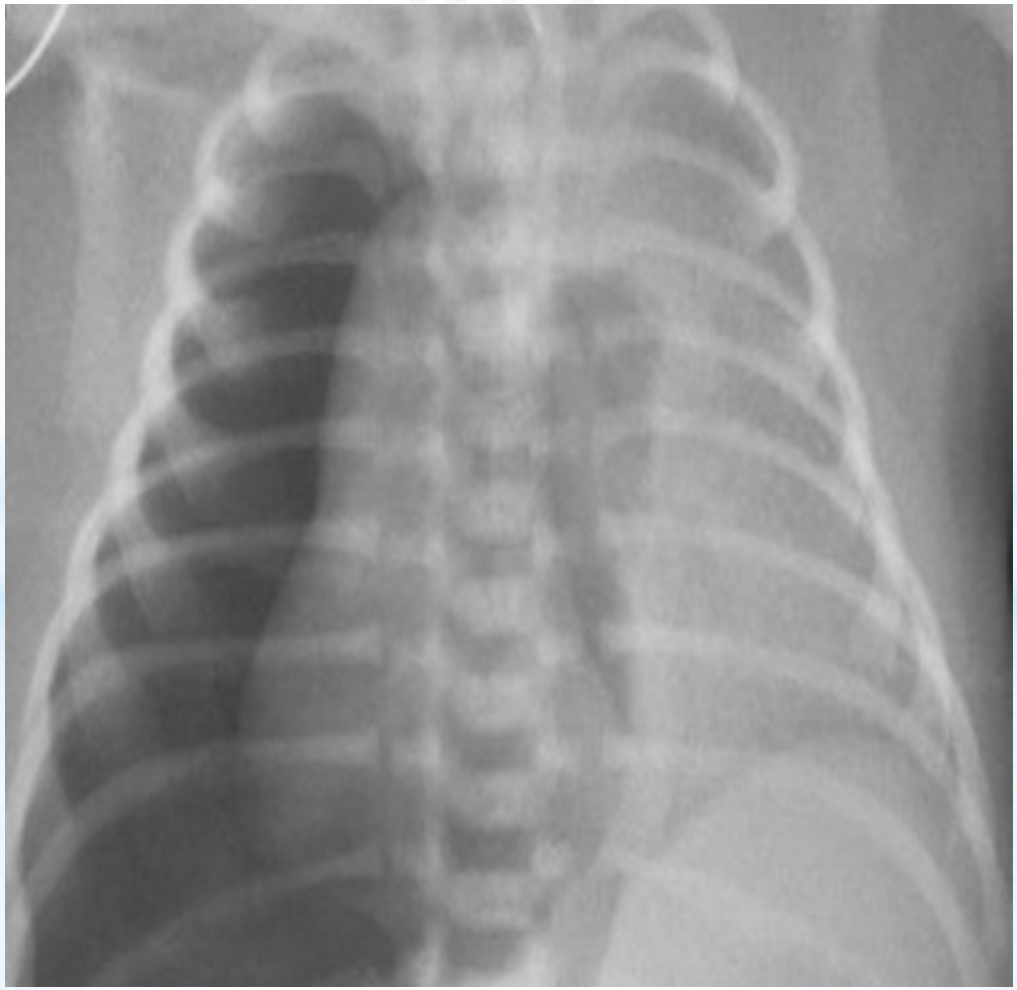
And Pneumoperitoneum



PIE



PTX



Clinical Manifestations

- Air-leak syndromes is suspected clinically or because of sudden deterioration (cyanosis, hypoxemia, hypercarbia & respiratory acidosis associated with decreased breath sounds and shifted heart sounds).and is confirmed by X-ray.

Dx

- CXR – AP, Lateral decubitus
- Transillumination
- Direct needle aspiration – diagnostic & therapeutic

Prevention

- NIV. Support

  Infant driven/Bobble CPAP

- Surfactant instilation

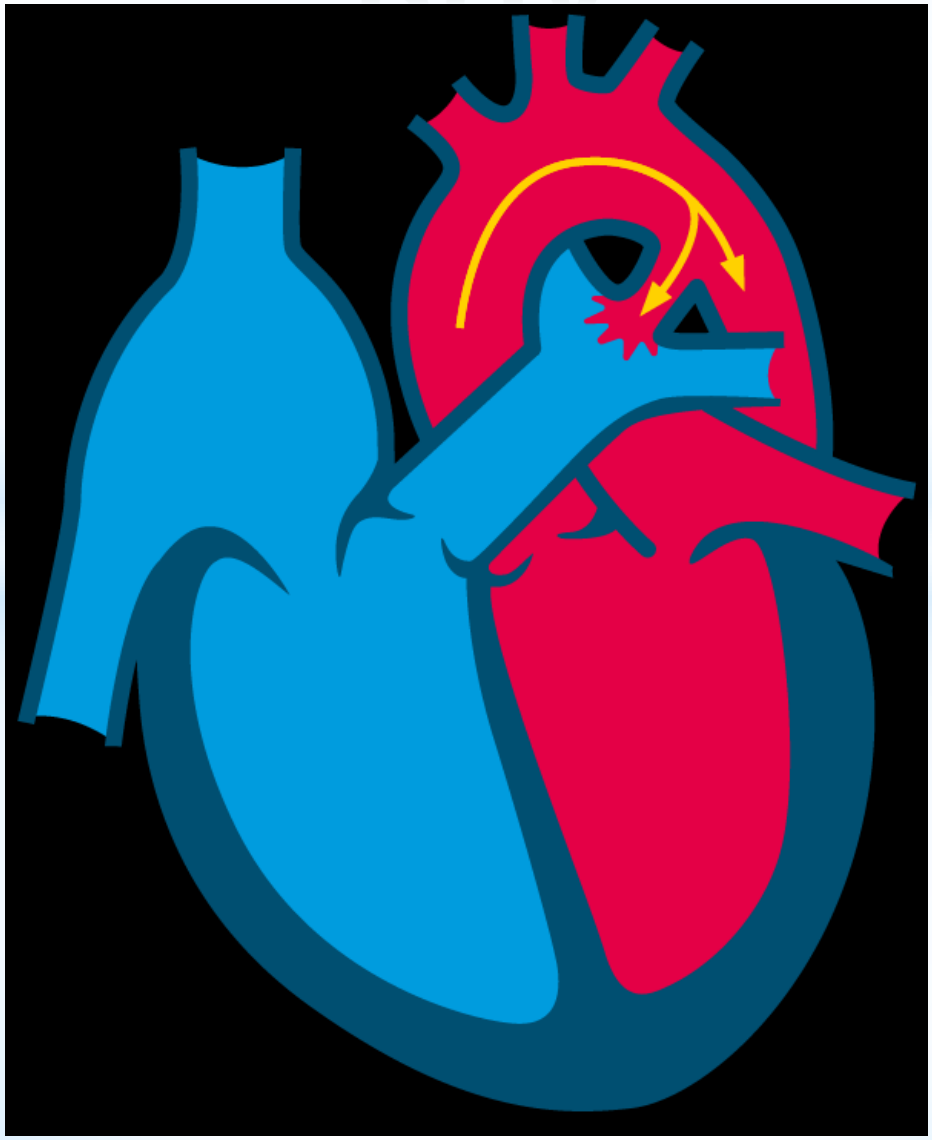
  LISA/INSURE…

- Ventilation Strategies

  Volume modes/Pressure modes …

- Sedation

PDA



- The Placenta is the primary source of fetal PGE2, leading to a precipitous fall in circulating levels upon umbilical cord clamping . Maximal effects of PGE2 withdrawal seem to require antenatal priming of the ductal muscle by the rising levels of PGE2 normally seen late in gestation.
- Dynamic functional closure initiates at the pulmonary end of the ductus and usually is complete within the first 4 days after birth, but anatomic obliteration is not achieved until after 1 week of age.

- In preterm infants, surfactant deficiency, low serum oncotic pressures, and compromised capillary integrity , lower the threshold for development of pulmonary edema.
- Plasma levels of B-type natriuretic peptide (BNP) or NT-pro-BNP, are elevated in infants with significant PDA, correlate with echocardiographic should be limited to screening to identify candidates for echocardiography.

Prevention

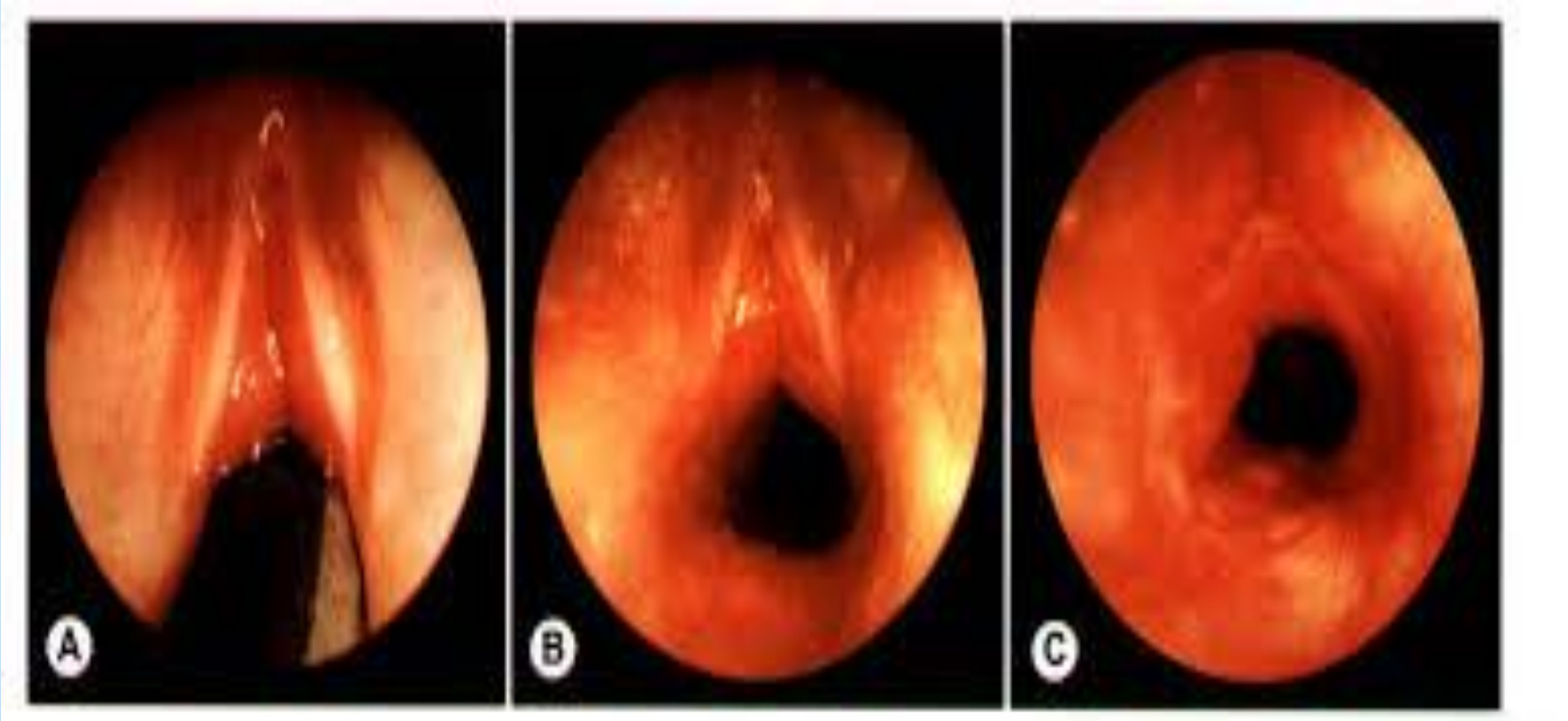
Factors that may delay ductal closure :

- ✓ Late-onset bacterial Infection
- ✓ Excessive fluid administration (>150 mL/kg /d)

should be avoided.

- ✓ Furosemide apparently does not compromise ductal closure in response to indomethacin but may prolong ductal patency in untreated infants.

ETT Comlications

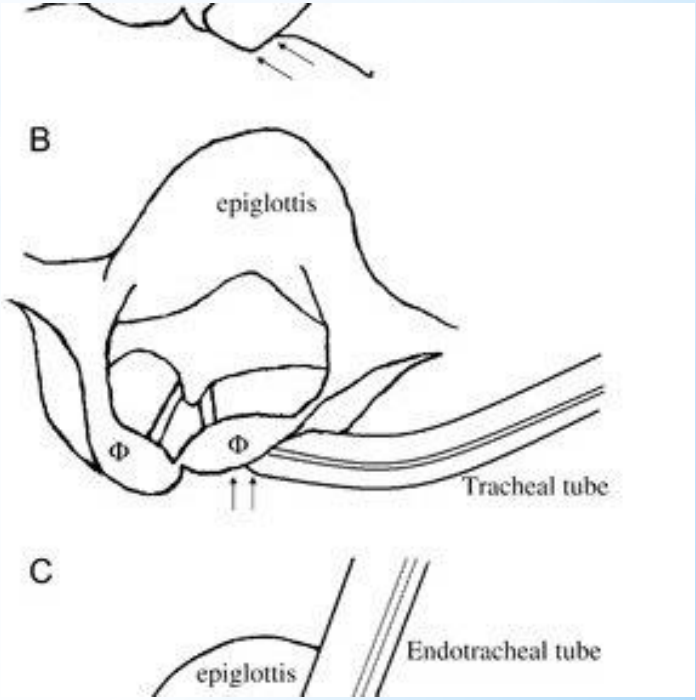


Granuloma formation

The infant is often hoarse following extubation, with progression rather than improvement of the symptoms with time.

Evaluation reveals a yellow-red pedunculated mass arising from the vocal process of the arytenoid

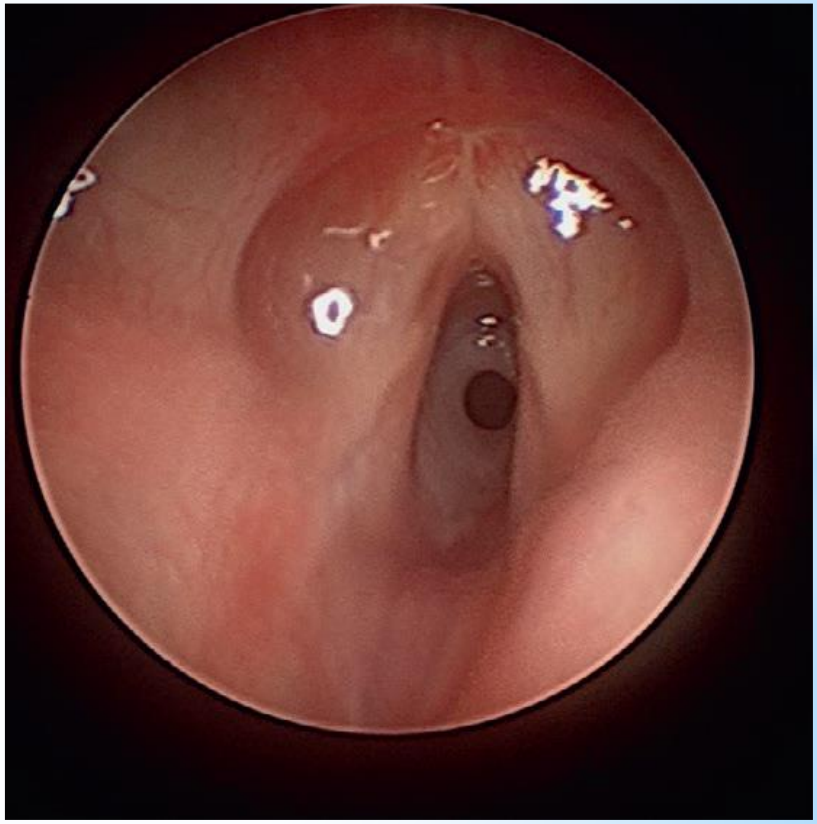
arytenoid dislocation:



Subglottic stenosis

Risk Factors :

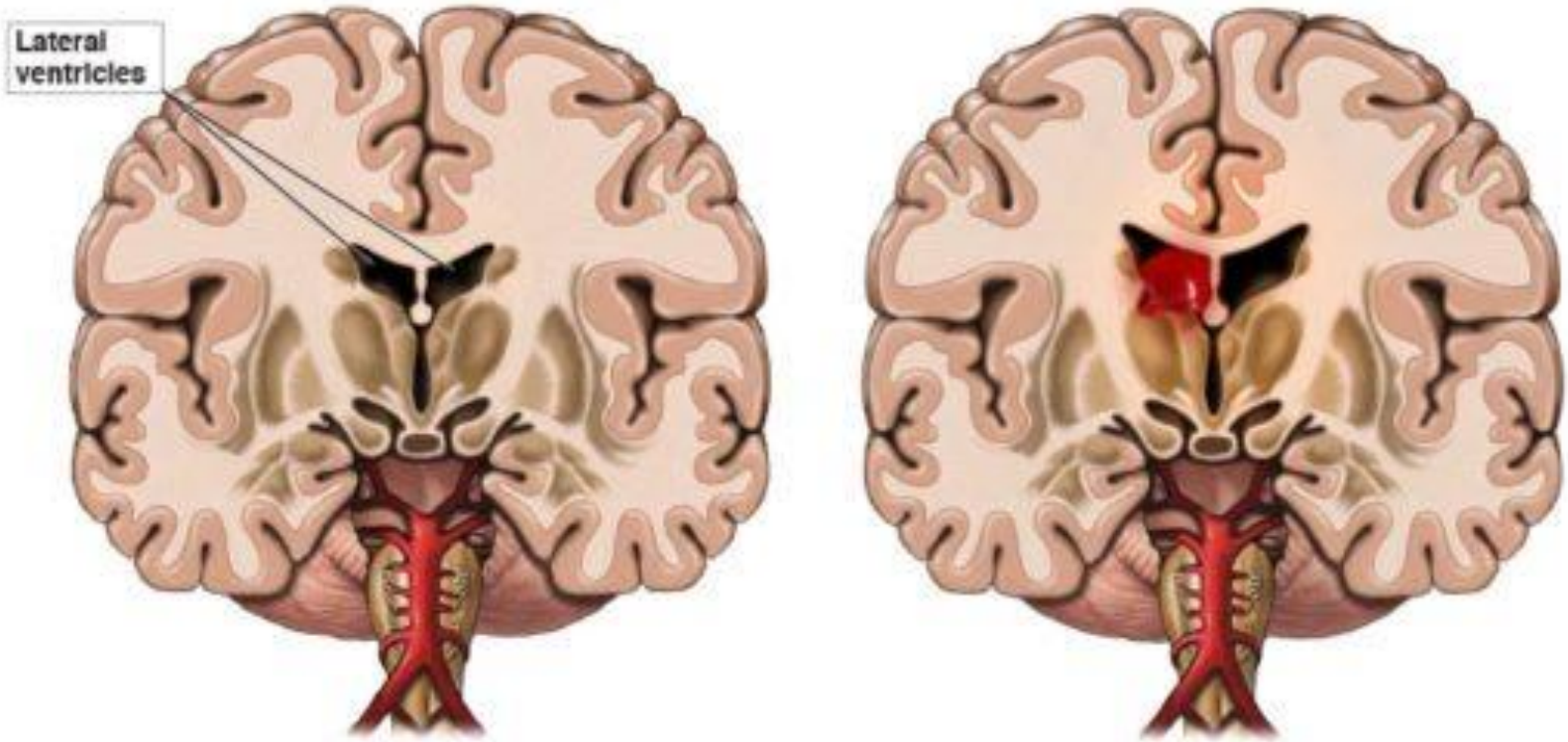
- The subglottic lumen is the narrowest aspect of the pediatric larynx.
- Down syndrome
- Gastroesophageal reflux
- infection at the time of intubation
- Extreme immaturity
- Difficulty in stabilizing the endotracheal tube
- Duration of MV



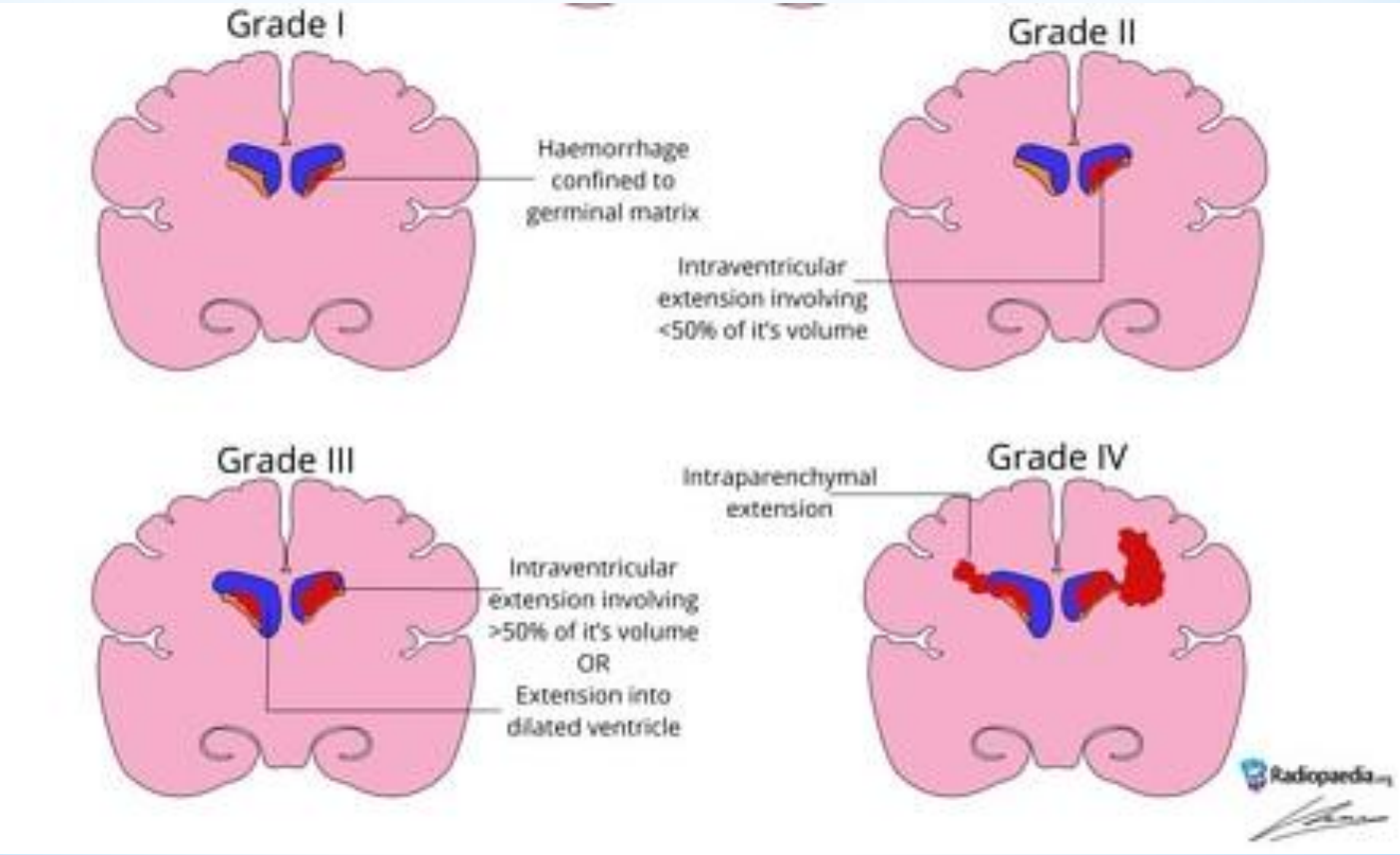
Prevention

- Use smaller endotracheal tubes.
- Avoid cuffed endotracheal tubes in the infant and young child.
- Aggressively treat systemic infection.
- Minimize patient movement to prevent abrasions of the subglottic mucosa and resultant exposed cartilage as well as to prevent accidental extubation requiring further manipulation (sedate as necessary).
- Consider tracheostomy if prolonged intubation is anticipated. Neonates tolerate intubation for much longer periods than the child or young adult.
- Extubate under ideal conditions. In the difficult airway, high-dose systemic steroids for 24-48 hours before and after extubation may aid extubation. Use of inhaled epinephrine immediately following extubation can help reduce airway edema.

IVH



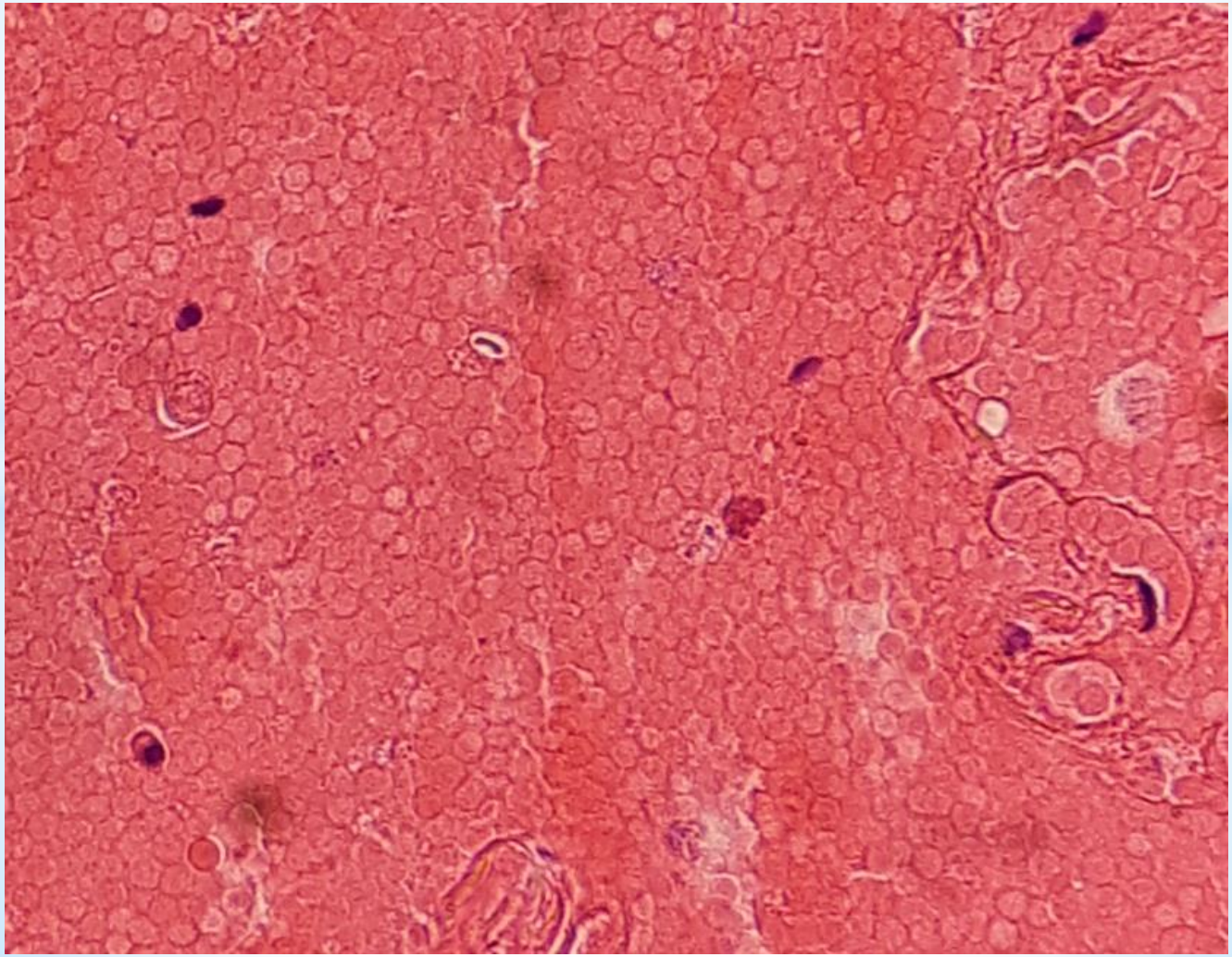
almost all hemorrhages develop within the first week after birth, and many of them within the first 48 hours after birth.



factors

- ✓ Histologic signs of amniotic infection
- ✓ Maternal preeclampsia has been associated with a reduced risk of GMH-IVH.
- ✓ Administration of antenatal corticosteroids is protective
- ✓ Delayed cord clamping was initially reported to be associated with a reduction in GMH-IVH
- ✓ RDS, in particular, have been recognized as important risk factors in the development of GMH-IVH

Pulmonary Hemorrhage



Incidence : **severe** hemorrhage is about **5%** in very low birth weight infants and **10.2%** in extremely low birth weight infants.

Risk factors :

Extreme prematurity
Surfactant administration
PDA with left-to-right shunting
Multiple birth
Male gender
Severe systemic illness
Coagulopathy
Asphyxia

Treatment

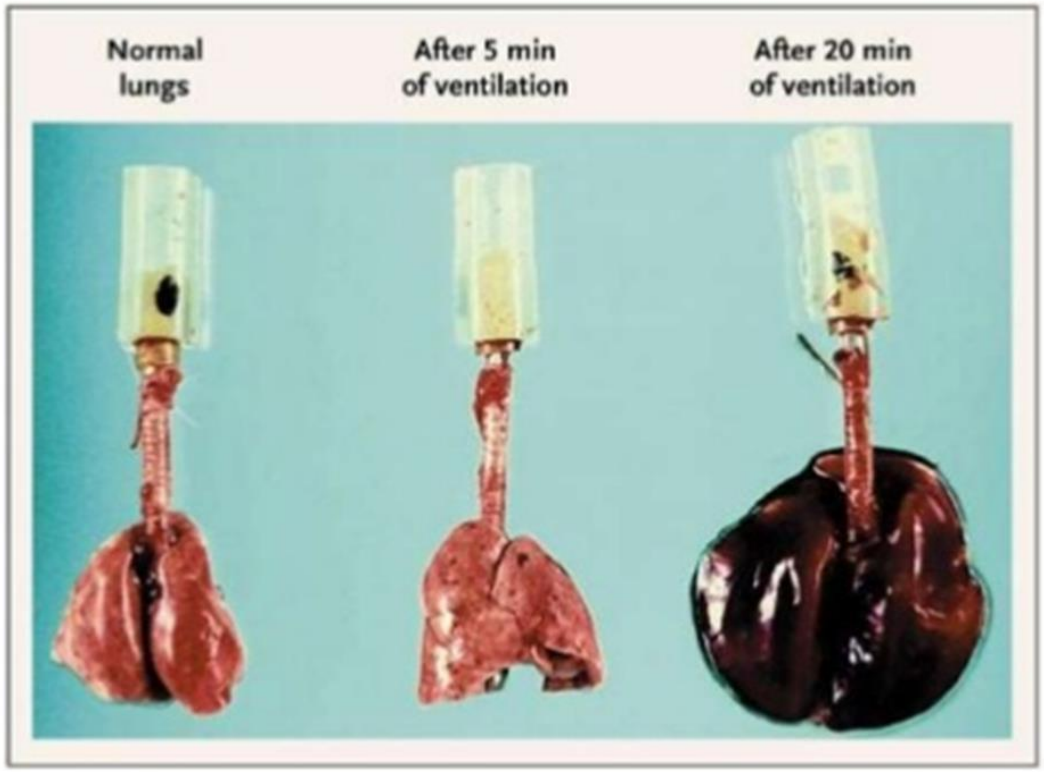
Ventilatory support especially PEEP

Surfactant

Coagolopathy correction

Epinephrine

VILI



Normal Rat Lungs and Rat Lungs after Receiving High-Pressure Mechanical Ventilation at a Peak Airway Pressure of 45 cm of Water.

Dreyfuss D, Saumon G. Ventilator-induced lung injury: lessons from experimental studies. Am J Respir Crit Care Med 1998;157:294-323.

VILI remains an important determinant in BPDs pathophysiology.

Risk Factors :

- Volutrauma
- Barotrauma
- Atelectrauma
- Biotrauma
- Rheotrauma
- Oxygen Toxicity
- Surfactant status of the lungs

Studies in preterm animal models also suggest that just a few injurious inflations administered immediately after birth are sufficient to trigger the cascade of VILI.

Thank You