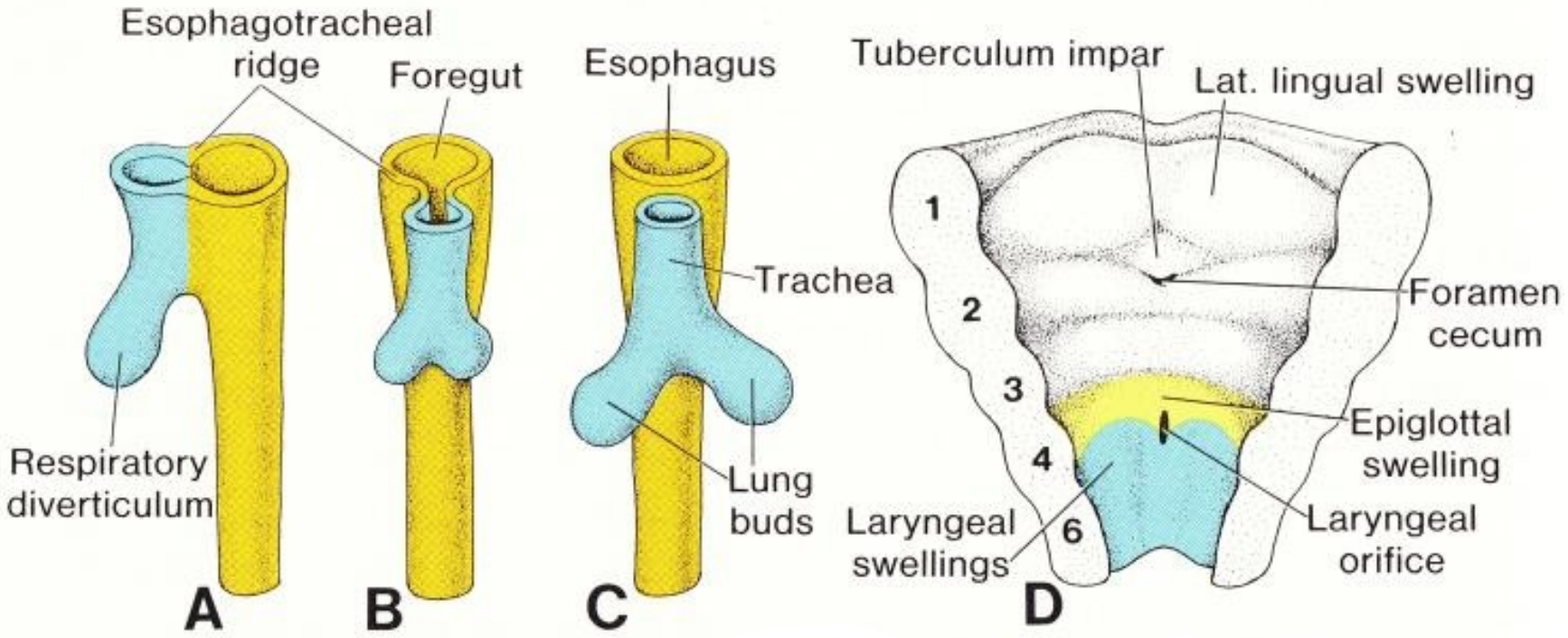
Congenital malformations of the larynx and trachea

Michaela Máchalová

KDORL LF MU a FN Brno

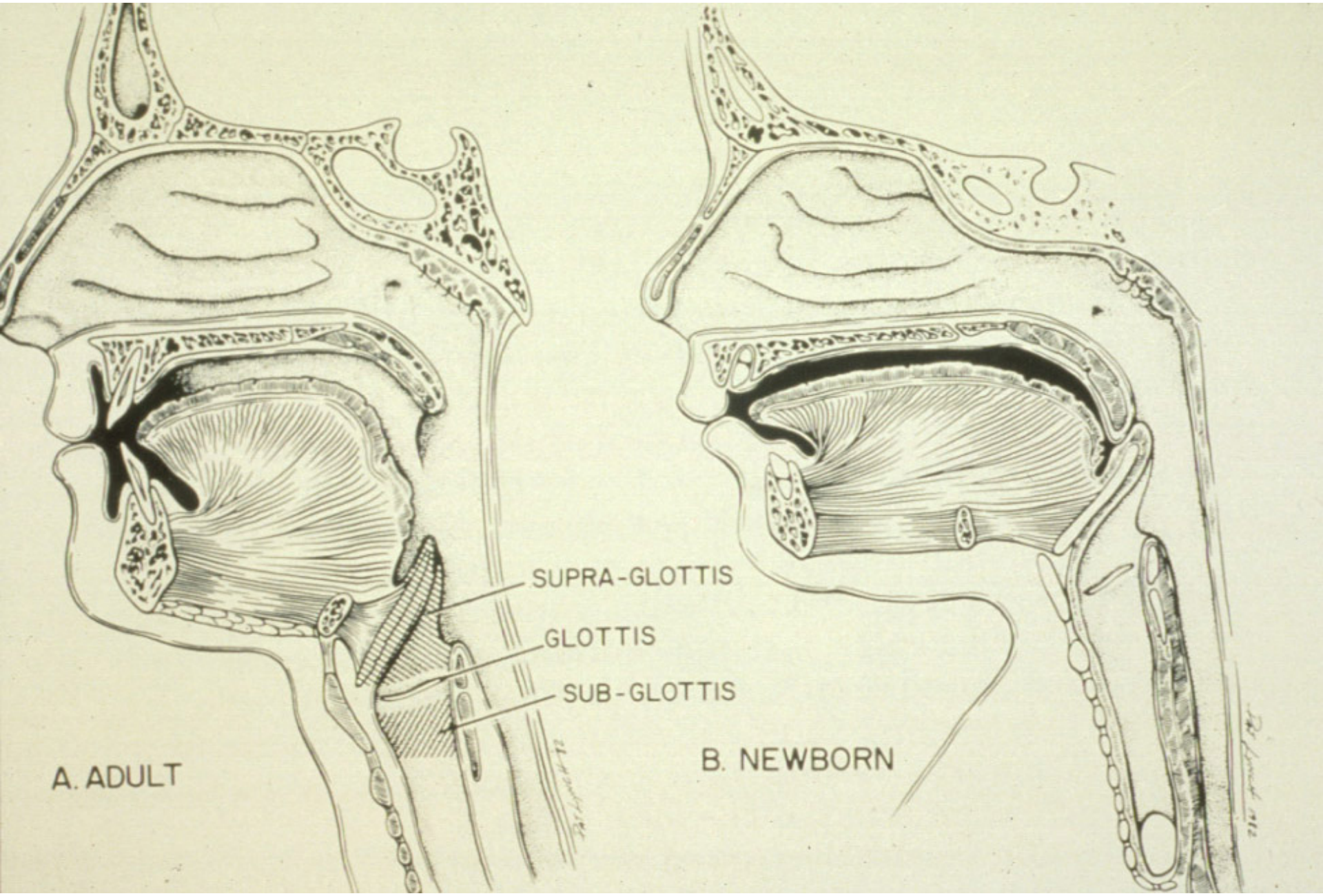
Embryological introduction

- Primitive gut – at the end of 1st month – laryngotracheal diverticulum + lung bud
- Tracheoesophageal septum separates them from primitive gut between 4th and 5th week
- Superior end of respiratory diverticulum forms larynx, luminisation in 10th week
- Inferior end forms trachea and 2 lung buds
- Oesophagus originates from foregut, grows longer
- temporary obturation followed by recanalization in 2nd month


Esophagotracheal ridge
Foregut
Esophagus
Tuberculum impar
Lat. lingual swelling
Respiratory diverticulum
Trachea
Lung buds
Foramen cecum
Epiglottal swelling
Laryngeal swellings
Laryngeal orifice
1
2
3
4
6
A
B
C
D

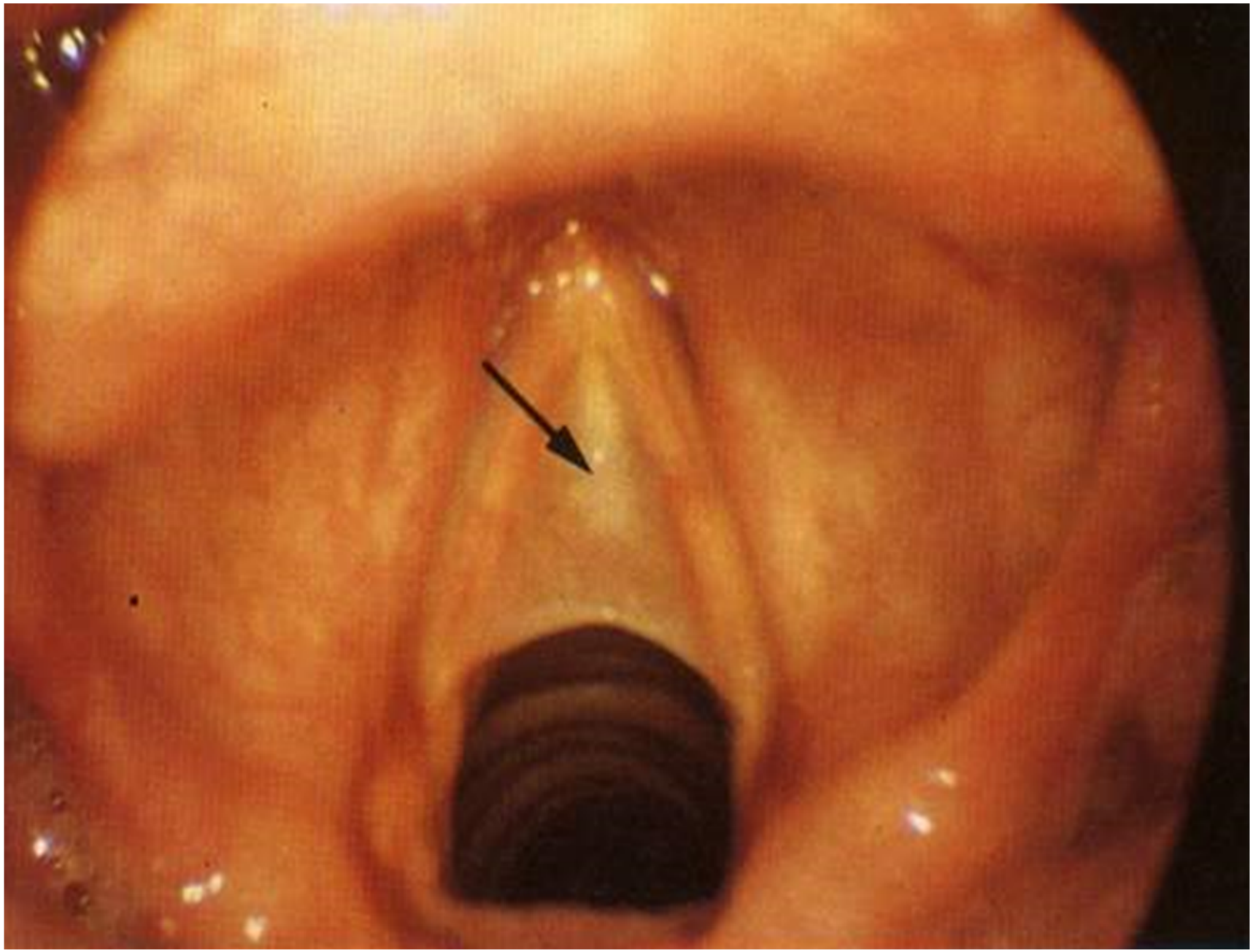
Anathomy

- larynx: in newborns at the level of C1-C4, glottis is 7 mm long, 4 mm wide, subglottic region 4-5 mm
- Then it moves downward, becomes larger and wider
- trachea:
- newborn: C4-Th3,
- 5 years: C5-Th4, 5,5 cm long, 7 mm wide
- adult: trachea - 10-12 cm long, 15-22 mm wide
- bifurcation: right main bronchus 25°, left 45°
- Right bronchus: divides to three lobar bronchi (superior, medium, inferior)
- left bronchus: divides to two lobar bronchi (superior, inferior)
- Size of the main bronchi expands with age


SUPRA-GLOTTIS
GLOTTIS
SUB-GLOTTIS
A. ADULT
B. NEWBORN

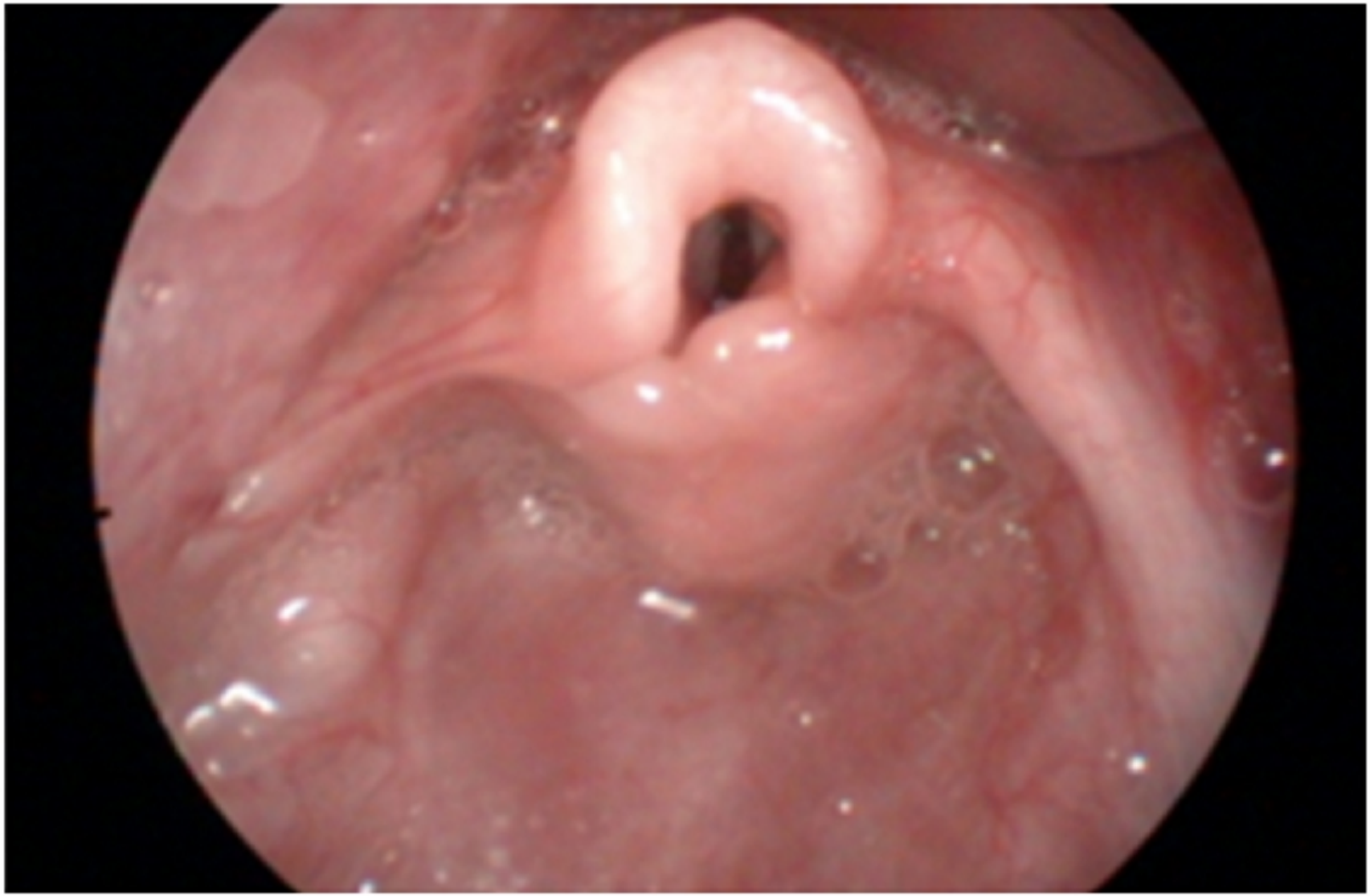
Congenital malformations of the larynx

- Laryngeal atresia - lethal
- diaphragma laryngis – membrane between vocal cord, usually not complete, can be also above or below vocal cord (symptoms vary by size and localization: dyspnoea, voice disorders)
- dg.: direct laryngoscopy
- treatment: tracheostomy, dilatation, discision (scar!) per laryngoscopiam, ev. Externa surgical approach



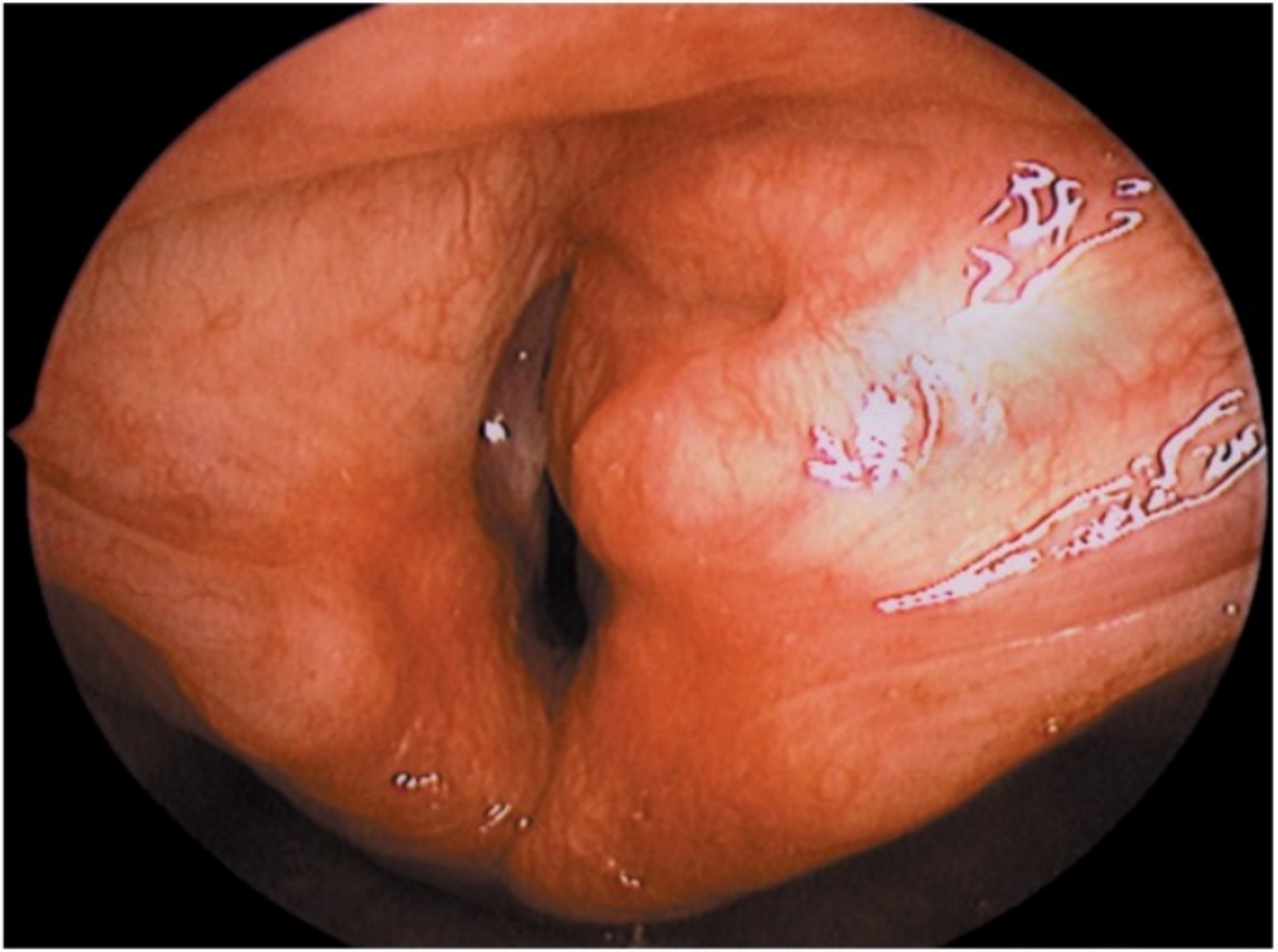
Congenital malformations of the larynx

- laryngomalacia – temporary disorder causing stridor in infants, caused by immaturity of laryngeal tissue, resolves spontaneously (2 years)
- dg.: laryngoscopy – drawing of epiglottis and other soft tissues into the larynx – narrowing of air ways – inspiratory stridor
- treatment: conservative, rarely tracheostomy



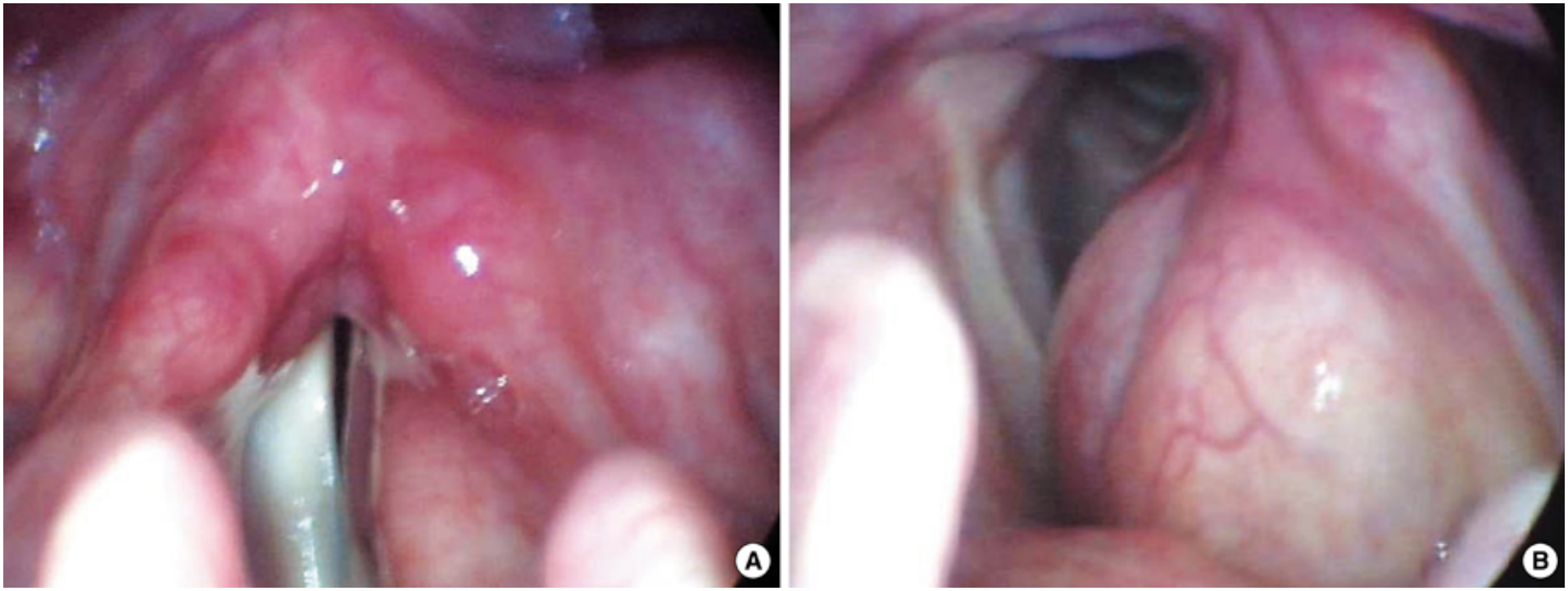
Congenital malformations of the larynx

- Congenital cyst of the larynx: endolaryngeal paralaryngeal, contains mesenchyme and ectoderm, acquierd: post-inflammatory or retention
- symptoms: depend on localization (breathing or swallowing difficulties)
- dg: direct laryngoscopy
- treatment: excision, marsupialization



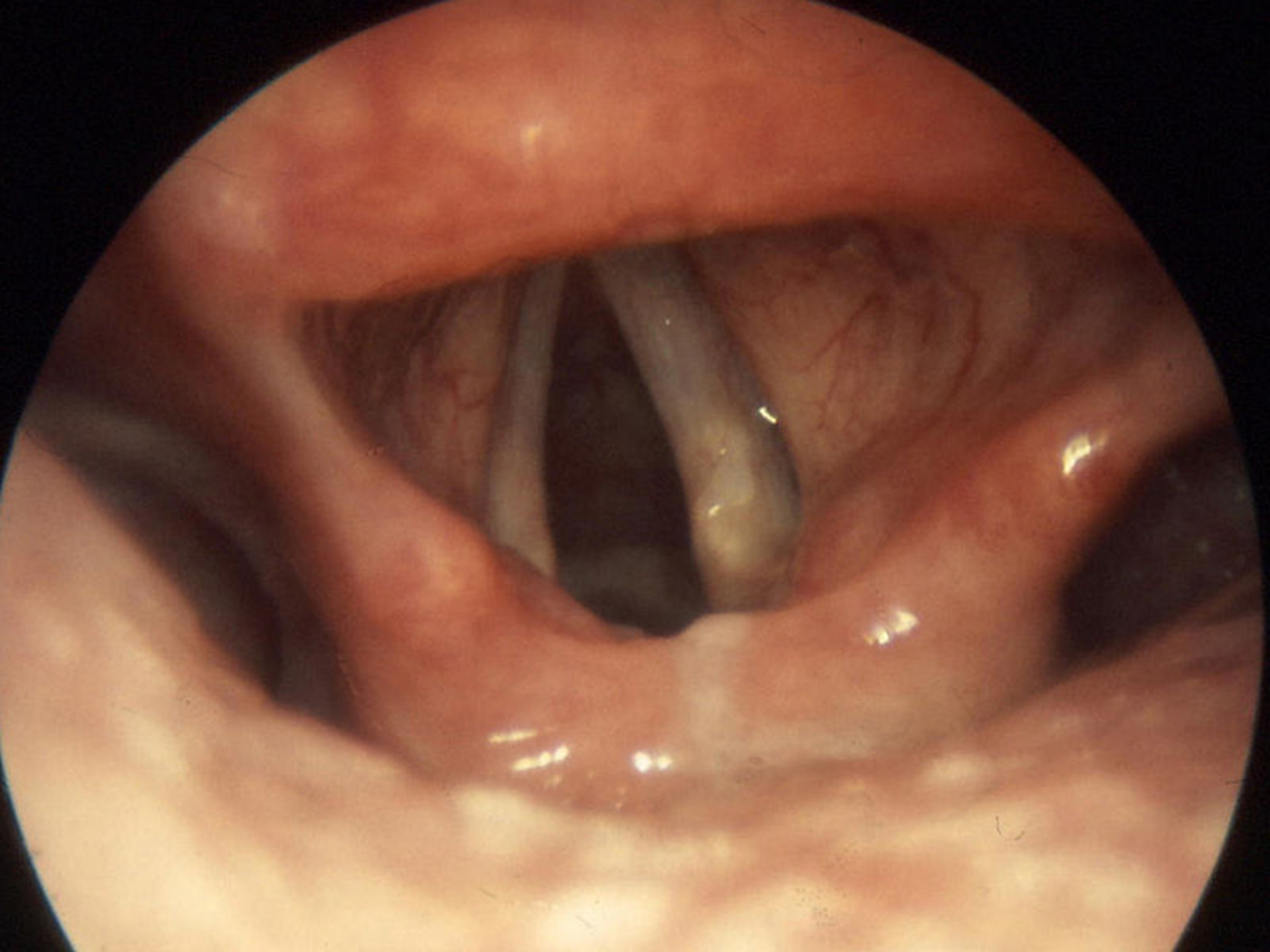
Congenital malformations of the larynx

- Internal laryngocele: herniation of laryngeal ventricle (various contents - mucus, air), protrudes, when the intralaryngeal pressure is increased, symtpoms: breathing, speaking difficulties
- dg.: direct laryngoscopy, (X-ray)
- treatment: incision, cauterization
- External laryngocele: protrudes over thyrohyoid membrane to the neck
- treatment: surgery


A
B

Congenital malformations of the larynx

- Neurogenic laryngeal lesions: uni- or bilateral paresis of vocal cords – often related to congenital malformations of heart, big vessels, CNS, oesophagus or intrathoracal organs
- dg: direct laryngoscopy – change of vocal cords posititon in breathing and phonation, unilateral lesions – phonation difficulties, bilateral – phonation and breathing difficulties
- treatment: bilateral lesion - tracheostomy



Congenital malformations of the larynx

- Congenital subglottic stenosis: rare (usually acquired), breathing problems exacerbated by respiratory diseases and physical exercise treatment: tracheostomy, endoscopic dilatation, external approach surgeries
- Laryngeal, laryngotracheoesophagal cleft: rare, defect of tracheoesophagal septum, respiratory and swallowing difficulties, asphyxiation by food, treatment: surgery, external approach

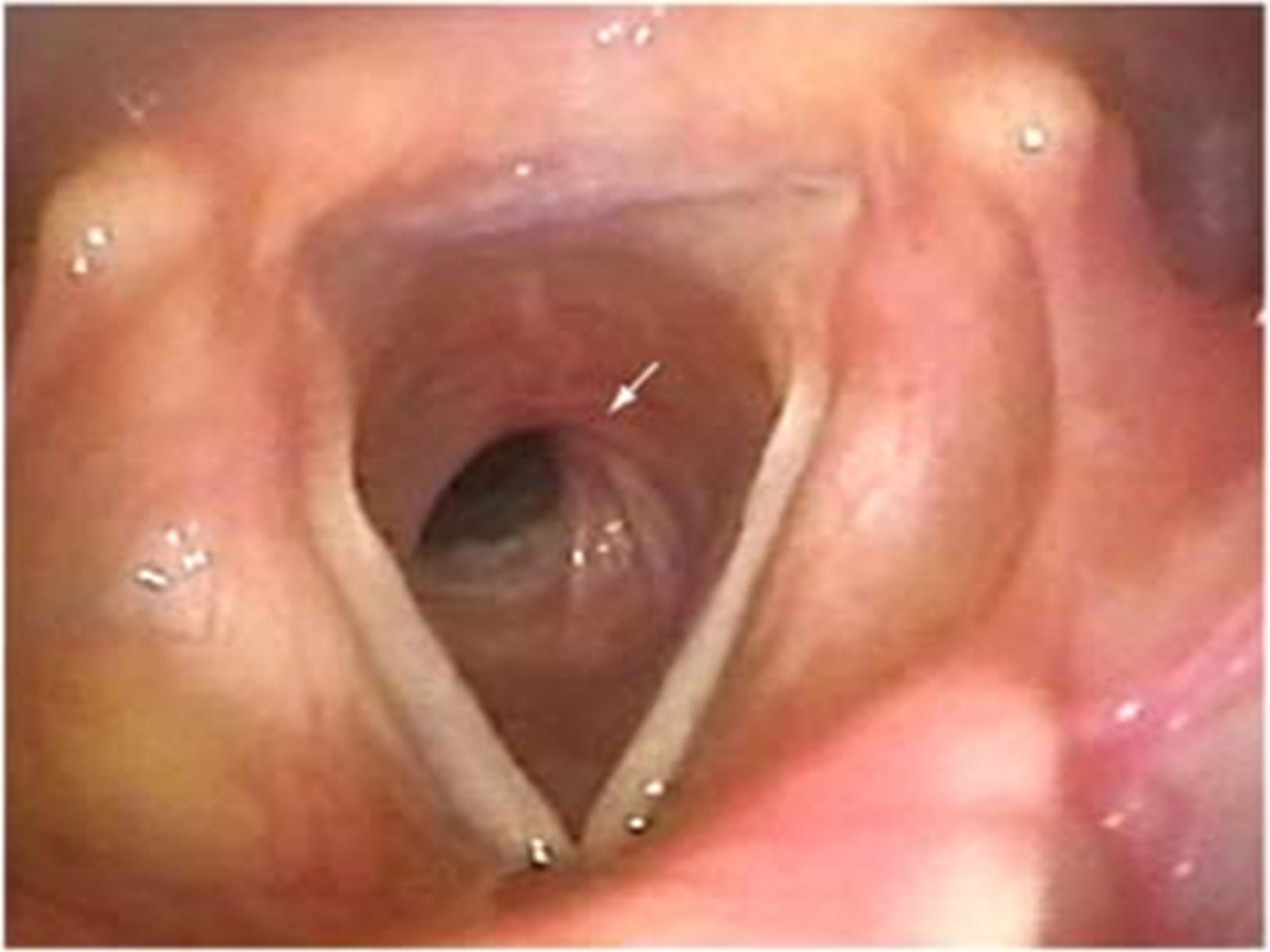
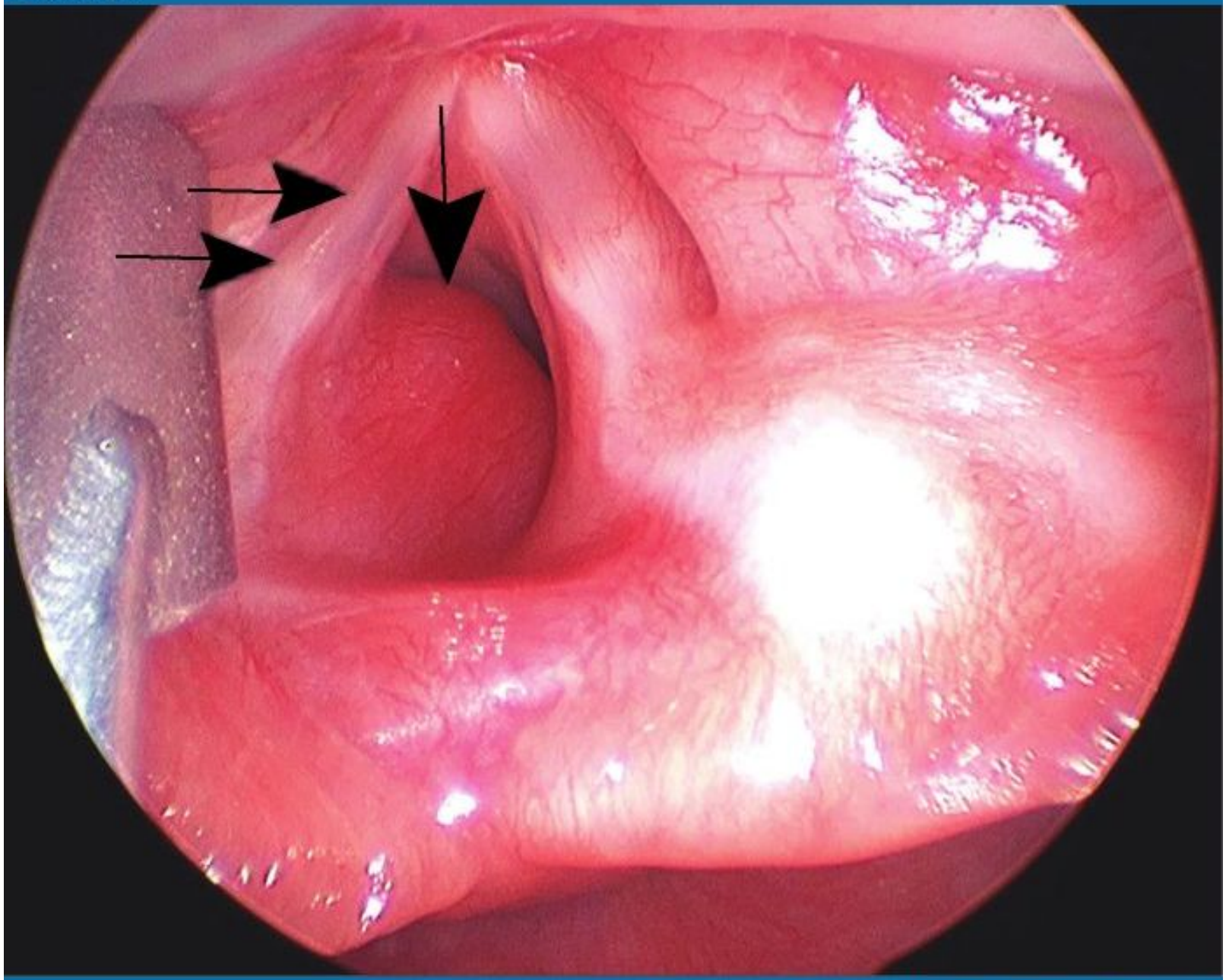


Figure 3 - Bronchoscopy: laryngotracheal stenosis.

Congenital malformations of the larynx

- hemangioma, lymfangioma of the larynx: congenital benign tumor formed by ectatic blood or lymphatic vessels, more common in subglottic region, often also in other localizations
- symptoms: dyspnoea, stridor of various severity
- dg: direct laryngoscopy, (X-ray)
- treatment: tracheostomy, conservative – administration of propranolol (infantile hemangioma)

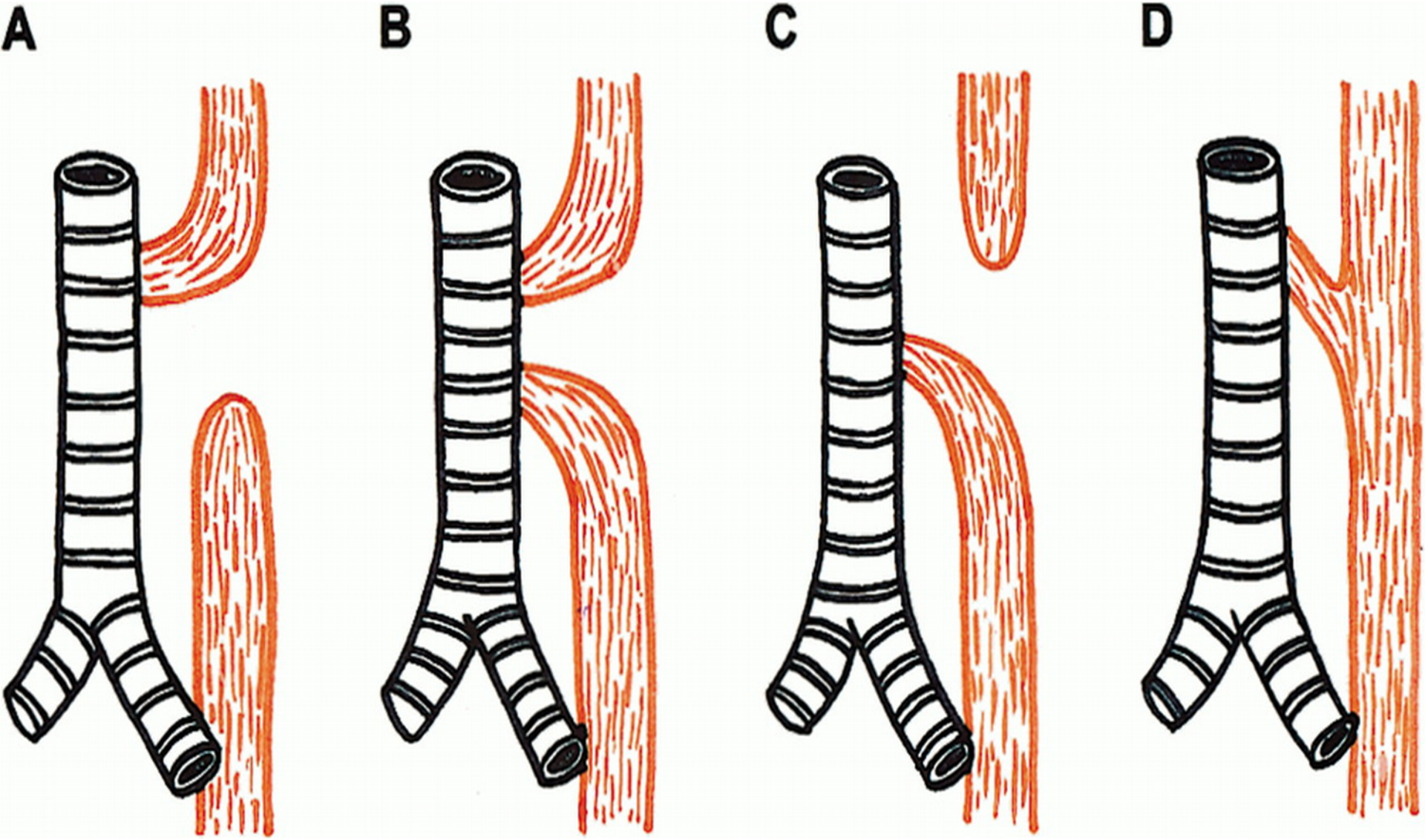


Congenital malformations of the trachea

- Tracheal agenesis/atresia: rare, lethal
- Congenital stenoses: membranous, fibrous strictures, cartilaginous deformities (t: dilatation, ev. end to end anastomosis, tracheostomy – special tubes)
- tracheomalacia: most common, inmature cartilages cause collapse of trachea in inspiration, stridor of various severity, dg.: tracheoscopy, t.: conservative, ev. tracheostomy

Congenital malformations of the trachea

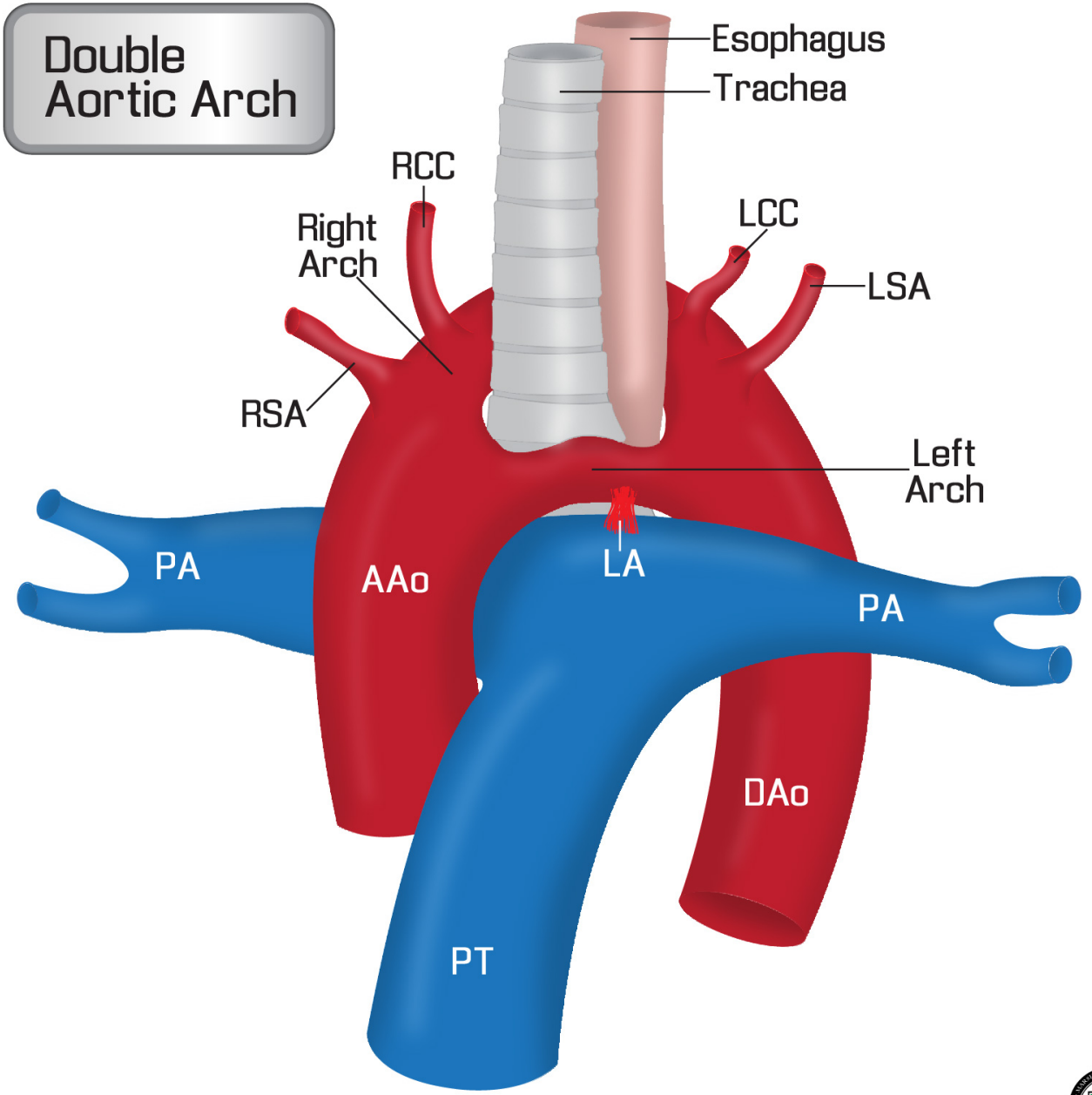
- Tracheal ectasia: rare
- Tracheal diverticula: cysts, various content
- tracheoesophageal fistulas: often connected with esophageal atresia, 3 kinds
- Symptoms of esophageal atresia: accumulation of pharyngeal secretion – aspiration, no gas in the intestine, TEF: cyanosis, dyspnoea of food aspiration
- dg.: isolated fistula is difficult to diagnose – endoscopy, esophagography
- treatment: surgical

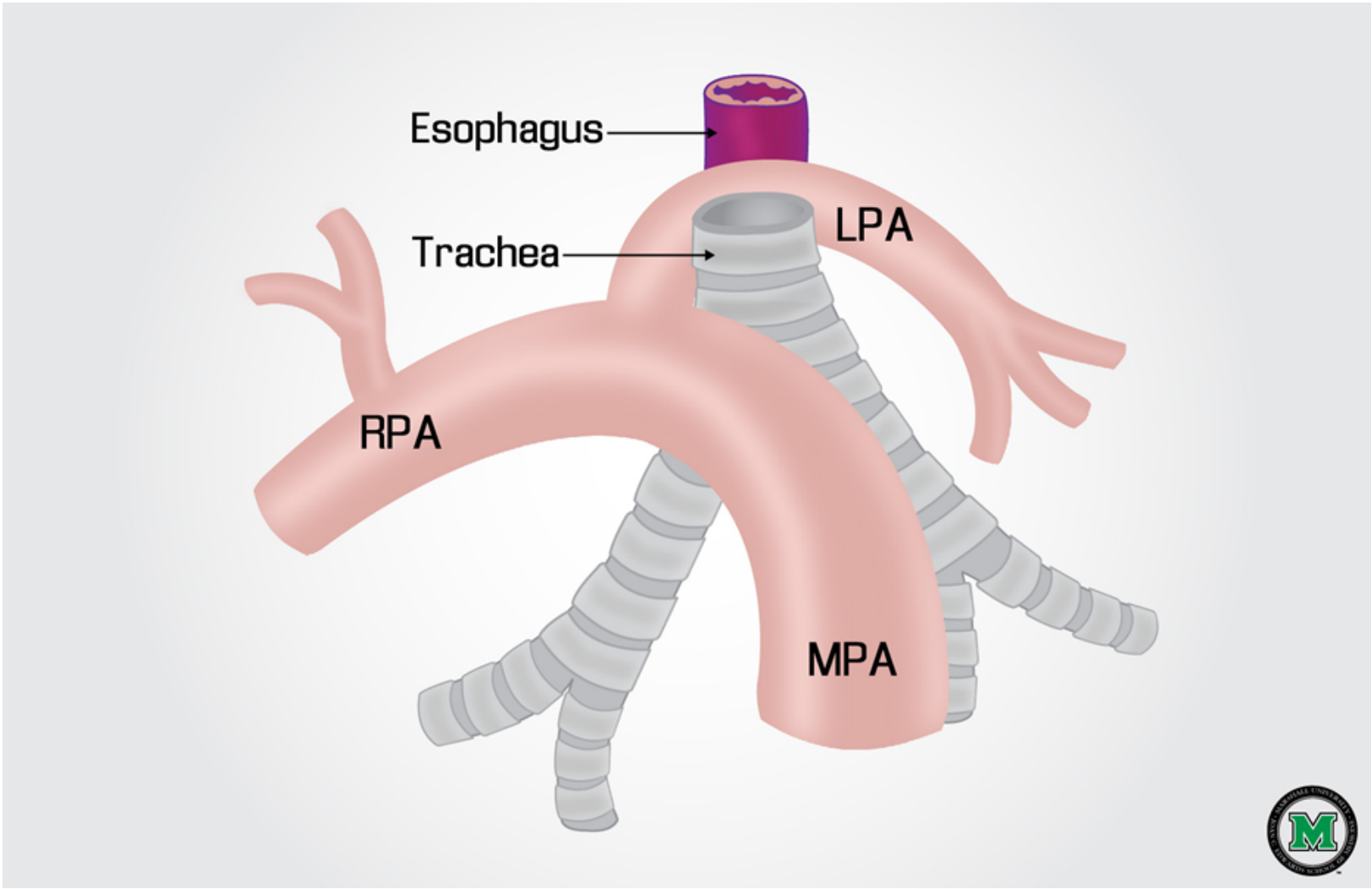

A
B
C
D

Breathing and swallowing difficulties caused by outer pressure – large vessels anomalies

- Compression of trachea and esophagus: arcus aortae duplex – complete vascular ring – dyspnoea, dysphagia
- Arcus aortae dexter – incomplete vascular ring , compression of esophagus
- aberant a. subclavia dx. – aortic arch branch, „dysphagia lusoria“, pulsations at the espohagus
- arteria innominata – distal branch, compression of trachea
- a. carotis communis sin. anomaly – compression of trachea
- arteria pulmonalis anomaly – compression of trachea and right main bronchus

Double Aortic Arch



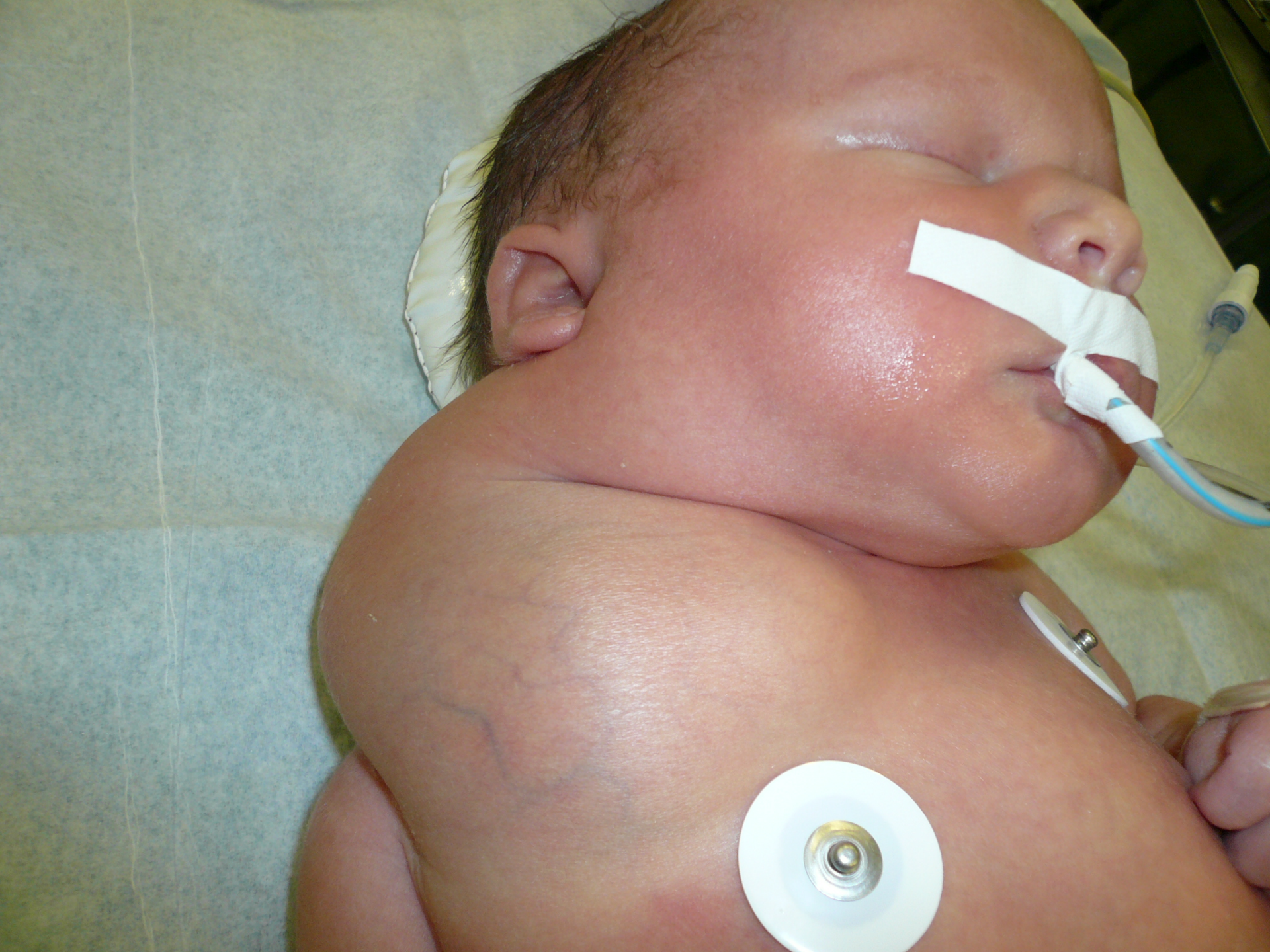

Esophagus
Trachea
LPA
RPA
MPA

Breathing and swallowing difficulties caused by outer pressure – large vessels anomalies

- symptoms: stridor, dyspnoea, swallowing difficulties
- diagnosis: endoscopy, X-ray, esophagography, cardiology – heart ultrasound, angiography
- treatment: depends on severity, cardiosurgery – in cases of severe tracheal compression (irreversible deformities of tracheal cartilages)

Outer compression of the airways

- Large congenital lymphangiomas of head and neck – hygroma colli cysticum
- stridor, dyspnoea of various degree depending on size and localization of the tumor
- dg.: clinical examination, ultrasound, MRI – typical multicystic formations
- treatment: small tumors - observation, large tumors – surgery, ev. punction



Thank you for your attention