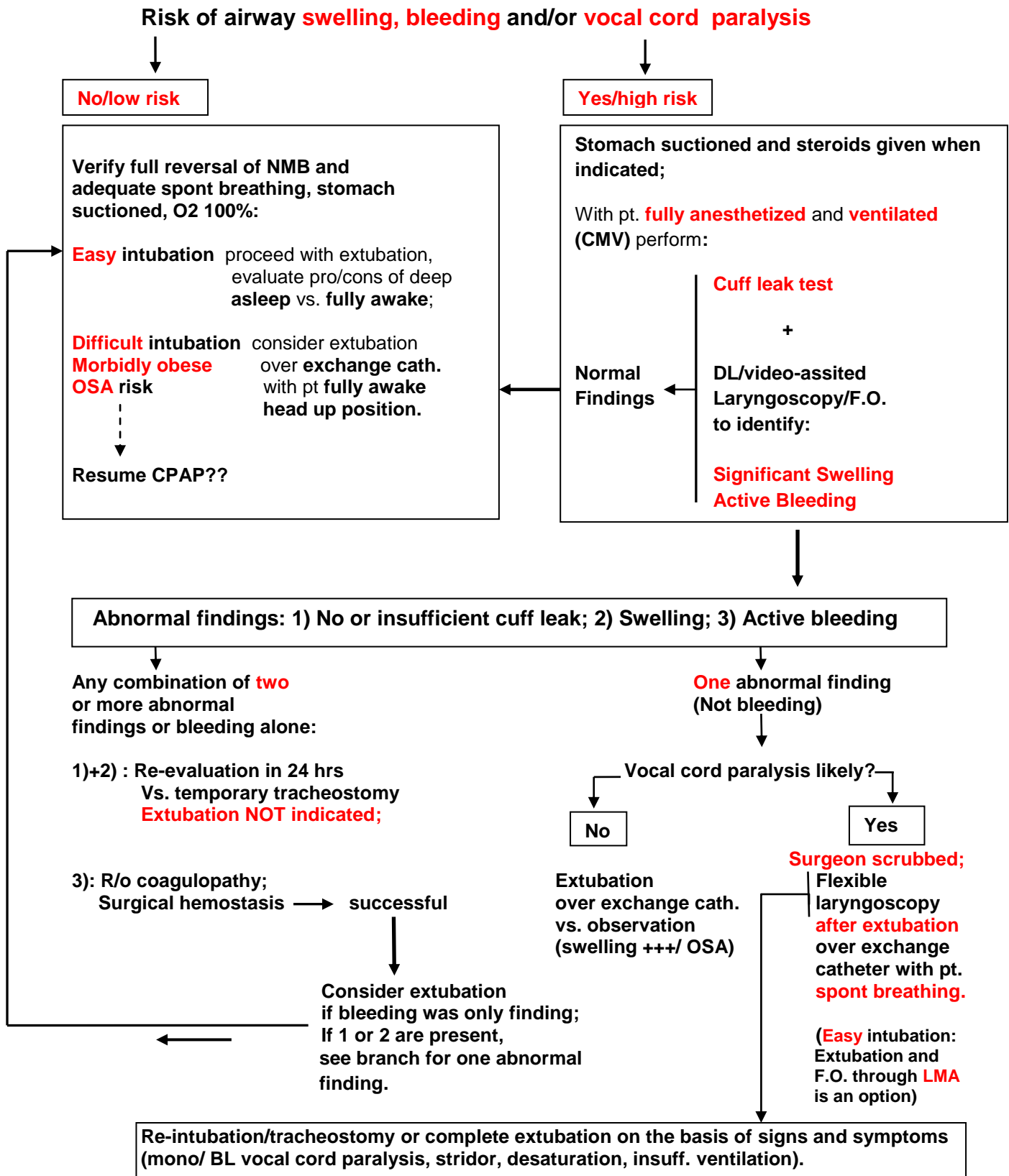


Extubation algorithm for major neck and upper airway surgery



Abnormal findings: 1) No or insufficient cuff leak; 2) Swelling; 3) Active bleeding

Any combination of **two** or more abnormal findings or bleeding alone:

1)+2) : Re-evaluation in 24 hrs Vs. temporary tracheostomy
Extubation NOT indicated;

3): R/o coagulopathy; Surgical hemostasis → **successful**

↓

Consider extubation if bleeding was only finding; If 1 or 2 are present, see branch for one abnormal finding.

One abnormal finding (Not bleeding)

Vocal cord paralysis likely? →

No

Extubation over exchange cath. vs. observation (swelling +++/ OSA)

Yes

Surgeon scrubbed;

Flexible laryngoscopy **after extubation** over exchange catheter with pt. **spont breathing.**

(**Easy intubation:** Extubation and F.O. through **LMA** is an option)

Re-intubation/tracheostomy or complete extubation on the basis of signs and symptoms (mono/ BL vocal cord paralysis, stridor, desaturation, insuff. ventilation).

Notes

1. Easy versus difficult intubation: the rationale for a differentiated strategy at extubation

- When the airway is considered difficult [at intubation] there should be consideration for a staged extubation (1)
- The literature does not provide a sufficient basis for evaluating the benefits of an extubation strategy for the difficult airway.
- The [Difficult Airway] Task Force regards the concept of an extubation strategy as a logical extension of the intubation strategy (2)

2. Use of steroids in major neck upper airway surgery

- Controversial and scarce data from specific literature;
- Data from studies in ICU setting suggest that steroids administration prior to extubation decreases the odds ratio for laryngeal edema and subsequent need for reintubation (3,4);
- Dexamethasone 8 mg pre-operatively improves post-op nausea, vomiting, pain, subjective vocal function after thyroidectomy (5)

3. Deep asleep versus fully awake extubation (1,6, AO)

Asleep (regular and effective spont. breathing must be present)

- **Pros** = pt still anesthetized avoids coughing and fighting ventilator which would lead to increased risk of re-bleeding at the site of surgery (due to increased venous pressure and straining on sutures.)
- **Cons** = lack/decrease of protective airway reflexes may lead to increased risk for aspiration and airway obstruction;
- **Caveats**=easy intubation and mask ventilation are important prerequisites; increased risk of laryngospasm if performed during transition between deep anesthetized state and awake state.

Fully awake

- **Pros** = complete recovery of airway protective reflexes and effective spont. breathing are present and may increase safety in the presence of possible difficult re-intubation.
- **Cons** = active protective airway reflexes may lead to increased risk of re-bleeding at the site of surgery (increased venous pressure and straining on wound).
- **Caveats**= if pt. awake but NOT calm and cooperative, safe extubation procedures (e.g. flexible laryngoscopy, positioning of tube exchanger) may be extremely difficult.

4. Morbidly obese/OSA patients management and associated risks at extubation (7,8)

- Strong association obesity-OSA (60-90% of OSA pts. are obese)
- Higher risk of post-extubation obstruction and stridor (6, 9)
- Higher risk of oxygen desaturation

- Higher risk of developing negative pressure pulmonary edema
- Increased risk of difficult mask ventilation
- “Head up” position recommended to prevent soft tissue/base of tongue collapse
(1,7,8)

5. Use of airway exchange catheter for protected extubation

- In the presence of a “difficult airway”, use of an Airway Exchange Catheter should be considered (1, 2, 10, 11)

6. Use of CPAP after upper airway surgery (6, AO)

Not always best choice/feasible:

- Impaired access for suction
- Impaired possibility to monitor site of surgery
- Fit of mask may be changed after surgery (edema)
- Increased risks of post-op upper airway aspiration

7. Cuff leak test: validated methods (12, 13, 14, 15)

- measurements of expiratory tidal volumes after 4 complete respiratory cycles with the ETT cuff deflated;
- measurements of expiratory tidal volumes with cuff deflated ONLY at the end of the end-inspiratory pause.

Proposed cut-off values:

- 10-12% of the TV that was measured before cuff deflation (average-adult population);
- 110-130 ml (average – adult population)

8. Direct laryngoscopy/video-assisted laryngoscopy/fibreoptic for pre-extubation airway exam (AO)

- Scarce data from literature; considered marginally useful in ICU setting to predict post extubation laryngeal edema (3,4)
- In the context of upper airway and neck surgery, where factors modifying airway anatomy and physiology and affecting post-extubation airway patency may have intervened intraoperatively, a thorough airway exam prior to extubation is advised.

9. Alternatives to early extubation (re-evaluation at 24-48 hrs versus temporary tracheostomy)

In selected groups of patients, early extubation after upper airway and neck surgery should be avoided and prolonged intubation or temporary tracheostomy should be considered as alternatives (16, 17, 18).

10. Risk of active airway bleeding at the end of surgery

Post operative bleeding is a frequent complication after trans-oral surgery.

Possible causes: ineffective hemostasis, coagulopathy due to underlying disease or drugs (also consider drug interactions), sudden increase of CVP during emergence causing increase in previously unnoticed minor venous bleeding;

- Airway exam pre-extubation to detect/quantify bleeding is indicated after trans-oral surgery (AO)
- Surgical re-exploration always necessary when bleeding detected (AO)

11. Risk of vocal cord paralysis after major neck and upper airway surgery

- A significant number of patients experience temporary or permanent vocal cord paralysis after thyroidectomy caused by RLN injury.
- Reported rates of RLN injury vary greatly in literature; rate reported also depends on the method of examining the larynx (e.g. temporary palsy: 1.4% to 38%) (19, 20, 21)
- Uncertain role of nerve monitoring during thyroid, PPV 40% and NPV 100% (22)
- Thyroid surgery remains the most common cause of **bilateral** vocal fold immobility; non-thyroid surgeries (other neck, intracranial and intra-thoracic procedures) are the main cause of iatrogenic **monolateral** vocal cord paralysis (19, 23)
- Monolateral paralysis more than 50% of times is asymptomatic (19); bilateral presents with stridor/airway obstruction (23)

12. Flexible laryngoscopy for post-extubation airway exam

Recommend as “the gold standard method to examine the larynx after thyroidectomy” (19,20)

Sources of Evidence

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SR = Systematic Review

G = National or International Society Practice Guidelines

MA = Meta-analysis

RCT = Randomized Controlled Trial

R = Review by expert

POS = Prospective Observational Study

RCS = Retrospective Cohort Study

AO = Authors' Opinion

