SWESEMs utbildningsutskott

Rubrik

Larynxmask

2013-09-30

Introduktion

Larynxmask har en viktig roll i akutsjukvård[1]. Larynxmask används framförallt i situationer där ventilation med mask och blåsa är inadekvat och/eller där endotrakeal intubation inte är möjlig, eller för riskabel, både på grund av patientfaktorer och vårdteamets erfarenhet och arbetssituation. Larynxmasken säkrar inte luftvägen på samma sätt som endotrakeal intubation men kan tillgodose luftväg för adekvat ventilation tills en definitiv luftväg kan etableras[2]. Specialister i akutsjukvård skall kunna sätta larynxmask, inklusive ILMA (Intubating Laryngeal Mask Airway, larynxmask som endotrakeal intubation kan göras genom).

I specialisttentamen

I specialisttentamen ingår att sätta larynxmask enligt proceduren nedan, på patienter i alla åldersgrupper, och att utföra blind endotrakeal intubation via ILMA. Borttagning av ILMA efter intubation granskas inte. Punkter i fetstil är obligatoriska för godkänt moment.

Indikationer

- ”Cannot ventilate” - otillräcklig ventilation med mask och blåsa (och basala luftvägsåtgärder)[3].
- ”Cannot intubate” - alternativ till intubation via direkt laryngoskopi[4] och videolaryngoskopi
- ”Cannot intubate / cannot ventilate” – nödläge i krissituation[5]
- LMA kan också bidra till stabilisering av halsryggen vid coniotomi[6]

Kontraindikationer[7]

- Vaken/ytlig patient
- Gapförmåga mindre än 2 cm

I situationer där högt luftvägstryck behövs, t ex hos patienter med bronkobstruktivitet, laryngospasm eller pågående HLR, kan stort läckage kring masken uppstå med risk för otillräcklig ventilation. Detta är dock ingen kontraindikation. Lösa tänder är en relativ kontraindikation eller ett potentiellt A-problem att hantera.

1-Förbereder patienten

- ☐ Optimerar, britsens höjd, patientens plats på britsen och huvudets position[8]
- ☐ Monitorerar patientens vitala funktioner (pulsoximeter, blodtryck, 3-avl EKG)
- ☐ Etablerar/kontrollerar intravenös/-osseös infart och kopplar infusion Ringer
- ☐ Bedömer svårighetsgrad enligt minneshjälpen RODS©[10]

2-Förbereder utrustning och team

- ☐ Tar sig skyddsutrustning (handskar, plastförkläde; vb munskydd, ögonskydd)
- ☐ Kontrollerar och har sug inom räckhåll
- ☐ Väljer larynxmask av rätt storlek[9]
- ☐ Förbereder larynxmasken (öppnar till/tömmer kuffen[11], glidmedel på dorsalsidan[12], kuffspruta)
- ☐ Blåsa av rätt storlek, kopplad till syrgas
- ☐ Avsiktligt inställt/kunskap om blåsans/ventilernas/ventilatorns ventilationstryck och PEEP
- ☐ Informerar teamet att larynxmask sätts och "plan B": vad som är nästa steg om åtgärden inte lyckas (ex behov av assistent, laryngoskop, läkemedel, larynxmask av annan modell/storlek, eller annan luftvägsåtgärd) eller om komplikation uppstår (ex sug vid kräkning)

3-Handgrepp
- ☐ Öppnar patientens mun och protruerar mandibula
- ☐ Inför larynxmasken på korrekt sätt[13]
- ☐ Fyller kuffen tills läckage upphör/rimlig volym[14]
- ☐ Kopplar och ventilerar med blåsa[15]

4-Kontroller
- ☐ Lyssnar efter kuffläckage[16]
- ☐ Justerar kuffvolym/larynxmaskens läge/huvudläge[17] eller går till plan B vid behov
- ☐ Inspekterar/palperar bröstkorgsrörelser[16] och auskulterar lungorna[16]
- ☐ Kontrollerar resultat på vitalparametrar, eventuellt blodgasanalys (pCO2) eller kapnometri[16]
- ☐ Kontrollerar/justerar kufftrycket (< 70 cm H2O)
- ☐ Fixerar larynxmasken

Fortsatt handläggning:
- ☐ Plan för fortsatt ventilation, monitorering, behov av säker luftväg, sedativa, väckas?

5-Teknik/Helhetsbedömning
- ☐ **Genomför färdigheten på ett ofarligt sätt (ex avseende apnétid, halsrygg, luftväg, ventilation - assisterad spontanandning/minutvolym, cirkulatoriska effekter av övertrycksventilation)**
- ☐ **Uppvisar förtrogenhet med utrustningen och handgreppen**

Endotrakeal intubation via ILMA[18]

- ☐ Redovisar indikation för intubation genom larynxmask (risk-nyttavärdering)
- ☐ Förbereder tuben (kontrollerar kuff, glidmedel på tuben[19])
- ☐ Informerar teamet att endotrakealtub sätts och "plan B": vad som är nästa steg om åtgärden inte lyckas (ex behov av assistent, läkemedel, eller annan luftvägsåtgärd) eller om komplikation uppstår (ex sug vid kräkning)

- ☐ Preoxygenerar via larynxmasken med 100 % syrgas i 3 min eller 8 djupa andetag
- ☐ För in endotrakealtuben i ILMA till dess öppning[20] i larynx
- ☐ Lyfter ILMA i anterior riktning och för ned tuben i trakea[21]
- ☐ Fyller endotrakealtubens kuff[22]
- ☐ Ansluter Rubens blåsa till tuben och ventilerar

- ☐ Kontrollerar tubläge med auskultation över ventrikeln och lungorna midaxillärt[23]
- ☐ Kontrollerar tubläge med kapnometri/kapnografi under ≥ 6 andetag[24]
- ☐ Kuffar ur larynxmaskens kuff och kontrollerar endotrakealtubens kufftryck (15-30 cm H2O)

- ☐ **Genomför färdigheten på ett ofarligt sätt (ex avseende apnétid, halsrygg, luftväg, ventilation - assisterad spontanandning/minutvolym, cirkulatoriska effekter av övertrycksventilation)**
- ☐ **Uppvisar förtrogenhet med utrustningen och handgreppen**

ANTECKNINGAR

1-Viktig roll för larynxmask i akutsjukvård
"Over the last few decades, several important changes have occurred in emergency airway management. Bag-mask ventilation has been supplemented by intermediate, or backup, ventilation devices like the laryngeal mask airway (LMA), the Combitube, and the laryngeal tube. These have become important devices for the initial resuscitation of apneic patients and for rescue ventilation when intubation fails." (Reardon 2009)

2-Ingen säker luftväg
"The LMA does not represent a definitive airway, as it does not prevent aspiration, but it is an excellent means of ventilation and oxygenation when laryngoscopic attempts have failed." (Tintinalli 2011 Chapter 29)

LMA: "The most important complications associated with using the LMA are aspiration of gastric contents and hypoxia. Remember that the LMA does not protect against aspiration and may actually cause vomiting if the patient gags when the device is placed. In fasted anesthetized patients, the incidence of aspiration is very low, about 2 per 10,000 cases.[127] There are many descriptive studies and case reports of LMA use for difficult airways with no mention of significant aspiration.[127] Although the risk of aspiration is surely higher than 2 per 10,000 when using the LMA in the ED, there is evidence that it provides some protection from passive regurgitation and produces less gastric inflation than bag-mask ventilation.[1]." (McGill 2009)

ILMA: "The risk of aspiration when using the ILMA in the ED is difficult to assess. There are no reports of significant aspiration in descriptive studies of the ILMA. However, most studies have been performed in the controlled environment of the operating room. The risk of aspiration is likely to be much higher in the ED. The ILMA does provide some protection against gastric inflation and passive regurgitation. However, active vomiting while the ILMA is in place would probably lead to aspiration." (Reardon 2009)

3-Indikation: alternativ till ventilation med mask och blåsa
"The LMA and the ILMA can be used as rescue devices in cases of failed bag-mask ventilation. Both devices can be inserted in less than 30 seconds and provide effective ventilation in 98% to 99% of patients.[127] The ILMA is more useful in the ED, because it is easier for inexperienced personnel to place and facilitates tracheal intubation. [130] [131] [132] [133] [134] Also, when the head is in the neutral position, during in-line stabilization of the cervical spine, the ILMA is more likely to allow successful ventilation and intubation." (Reardon 2009)

"The laryngeal mask airway (LMA; Figure 28-7) is placed blindly yet can provide a positive pressure airway." (Tintinalli 2011 Chapter 28)

"In the absence of personnel skilled in tracheal intubation, a supraglottic airway device (e.g., laryngeal mask airway) is an acceptable alternative (Section 4e). Once a supraglottic airway device has been inserted, attempt to deliver continuous chest compressions, uninterrupted during ventilation. If excessive gas leakage causes inadequate ventilation of the patient's lungs, chest compressions will have to be interrupted to enable ventilation (using a CV ratio of 30:2)." (Nolan 2010)

4-Indikation: alternativ till endotrakeal intubation via direkt laryngoskopi
"Patients who are difficult to intubate by direct laryngoscopy are often easy to intubate with the ILMA because many anatomic factors that cause difficult direct laryngoscopy do not affect placement or function of the LMA devices. [138] [139] The ILMA is more successful for ventilation and intubation of difficult airways than the LMA, and the failure rate of ILMA intubation of difficult airways is very low (see Chapter 4 for intubation through LMA devices)" (Reardon 2009)

"The LMA is an effective alternative when the ETT fails because the vocal cords cannot be visualized in situations of a difficult intubation, airway masses, or cervical pathology." (Tintinalli 2011 Chapter 28)

"The LMA is similar to other esophageal airways in that it can be inserted without manipulation of the patient's head." (Tintinalli 2011 Chapter 28)

5-Indikation: "cannot intubate / cannot ventilate"
"The cannot-intubate/cannot-ventilate scenarios are the most common reasons for using the LMA in the ED. In this situation, failure to adequately ventilate and oxygenate with the LMA occurs in about 6% of cases. Another 6% of patients with difficult airways suffer episodes of hypoxia during attempts to intubate through the LMA.[127] There is evidence that the ILMA performs better in the cannot-intubate/cannot-ventilate situation.[127] Failure to ventilate with the ILMA occurs in only about 2% of cases and hypoxia after ILMA placement is very rare. Also, there are more technical difficulties when using the LMA, compared with the ILMA, for difficult airways. This is probably due to the fact that the LMA requires more skill for proper insertion and was not specifically designed to facilitate tracheal intubation." (Reardon 2009)

"The LMA has been described as a successful rescue device in the pediatric difficult airway." (Tintinalli 2011 Chapter 29)

"The ILMA is an essential rescue ventilation device for the "cannot-intubate/cannot-ventilate" situation. It is also an excellent primary ventilation and intubation device for patients with known difficult airways, especially in cases of severe facial trauma." (Reardon 2009)

"In emergency airway management, LMA devices are used as temporizing airways to allow rescue ventilation and provide a conduit for tracheal intubation." (Reardon 2009)

"LMA devices have been used more than 200 million times worldwide and researched extensively.[127] LMA devices are primary rescue adjuncts in the difficult airway guidelines put forth by the American Society of Anesthesiologists[125] and the Difficult Airway Society.[126] Advanced Cardiac Life Support guidelines suggest that the LMA provides a more secure and reliable means of ventilation than face-mask ventilation.[1] Pediatric Advanced Life Support guidelines acknowledge the LMA as a potential backup device for difficult pediatric airways." (Reardon 2009)

"The ILMA is indicated as an alternative to bag-mask ventilation or as a conduit for intubation of difficult airways. Its primary use in emergency airway management has been as a rescue device in the cannot-intubate/cannot-ventilate situation. In this situation, adequate ventilation with the ILMA is possible in almost all cases. Ventilation with the ILMA is probably superior to face mask ventilation with inexperienced providers. The ILMA can also be used as a primary ventilation and intubation device for patients with difficult airways. Tracheal intubation through the ILMA can be

accomplished using a blind technique, or with light-wand or fiberoptic guidance. Studies of difficult airway management with the ILMA show that almost all patients can be adequately ventilated with the ILMA and 94% to 99% can be intubated through the device. The ILMA is especially useful in patients with difficult face mask ventilation owing to a beard, severe facial trauma, or obesity because none of these factors inhibits ILMA placement. When brisk bleeding above the glottis makes ventilation and intubation difficult, the ILMA can prevent aspiration of blood and facilitate blind or fiberoptic intubation." (Reardon 2009)

"The LMA is particularly useful as a rescue device in difficult pediatric airways.[127] Two descriptive studies and 86 case reports describe the use of the LMA for difficult pediatric airways.[127] [155] [156] [157] [158] [159] [160] [161] In these reports, ventilation was adequate with the LMA in nearly all pediatric patients.[127] [159] [161] [162] Intubation of pediatric patients through the LMA is usually possible with a small fiberoptic scope.[159] [161] Case series and case reports also suggest that the LMA can provide an effective rescue airway in neonatal resuscitation if bag-mask ventilation and endotracheal intubation fail." (Reardon 2009)

"Regardless of the care taken by the intubator and the detailed assessment of the patient before intubation, some intubations are simply unsuccessful or impossible. In most circumstances when intubation is not possible, BMV or ventilation using an EGD provides adequate ventilation and oxygenation until a rescue airway can be established." (Walls 2009)

"Placement of an EGD, such as a laryngeal mask airway, a Combitube, or a similar upper airway device often can facilitate ventilation, and convert a "can't intubate, can't oxygenate" situation to a "can't intubate, can oxygenate" situation, which allows time for more careful planning of the rescue of a failed airway." (Walls 2009)

"In the emergency setting, studies to date have focused on use during resuscitation from cardiopulmonary arrest, although data are beginning to emerge for use of the LMA as a rescue device in the event of failed intubation and as an alternative to direct laryngoscopy for intubation or a bag-valve-mask for ventilation.[107] Evaluations of LMA insertion by experienced and inexperienced personnel consistently have shown ease of insertion, high insertion success rates, and successful ventilation.[108] Novice users appear to be able to both ventilate and intubate more easily and successfully with the intubating LMA (ILMA) than by bag-mask ventilation and direct laryngoscopy.[108] The LMA may be a viable alternative to endotracheal intubation for in-hospital or out-of-hospital treatment of cardiac arrest, particularly when responders are inexperienced airway managers. At a minimum, the device may serve a temporizing role equal or superior to BMV until definitive airway management can be achieved." (Walls 2009)

"In the ED, the primary use of the LMA or ILMA is as a rescue technique to provide a temporary airway when intubation has failed, bag ventilation is satisfactory, and the patient has been paralyzed or is otherwise in need of immediate airway management. In such cases, the LMA is one of numerous acceptable devices. In the "**can't** intubate, **can't** ventilate" situation, cricothyrotomy is indicated, but an ILMA may be placed rapidly in an attempt to achieve ventilation (converting the situation to "**can't** intubate, **can** ventilate") as long as this is done in parallel with preparations for cricothyrotomy and does not delay the initiation of a surgical airway.[107] Availability of the LMA and adequate prior training of the clinician offer a legitimate option for the management of the failed airway, and the ILMA compares well with fiberoptic intubation in terms of successful intubation of difficult airways.[112] The standard LMA may also offer advantages for providing ventilation in unconventional positions, such as when the patient is lying on his or her side.[117] In

the out-of-hospital setting, where concerns about esophageal placement of ETTs have focused interest on methods used for airway management, the LMA and Combitube offer excellent placement and ventilation characteristics and may be preferable to endotracheal intubation in this setting, especially when intubation is relatively infrequently performed.[118] If the patient is in a difficult position in terms of intubation access, the LMA may facilitate more rapid ventilation." (Walls 2009)

"The ILMA is designed to facilitate intubation through the mask after correct placement (Fig. 1-11). It differs from the LMA in two main ways: The mask is attached to a rigid, stainless steel ventilation tube that is bent almost to a right angle, and the mask incorporates an epiglottic elevator at its distal end. Placement of the ILMA results in successful ventilation in almost 100% of cases and successful subsequent intubation in 95%.[97,110-112] The ILMA can also be used for both ventilation and intubation in obese patients with similarly high success rates.[113] The ILMA has a special ETT and a stabilizer rod to remove the mask over the ETT after intubation is accomplished, but intubation can be comparably successful with a conventional polyvinylchloride (PVC) endotracheal tube." (Walls 2009)

"The ILMA is a better device than the standard LMA for use in the ED because it facilitates both rescue ventilation and intubation. Intubation through the ILMA has compared favorably in terms of success with direct laryngoscopy and is superior in the hands of relatively novice intubators. When the ILMA is placed, intubation can be performed blindly or guided by a lighted stylet or a fiberoptic scope. The ILMA comes only in sizes 3, 4, and 5 and so is not suitable for use in patients weighing less than about 30 kg. For smaller patients, the standard LMA, which has sizes down to size 1 (infant), should be used. Intubation can be achieved through the standard LMA, but the success rate is significantly less than with the ILMA. As experience with both the LMA and ILMA grows, it is likely that there will be increasing adoption of the LMA as a primary airway management technique by nonhospital first-responders, and the ILMA is gaining attention as a primary rescue device in the ED." (Walls 2009)

6-Indikation: vid koniotomi

"In patients requiring an urgent cricothyrotomy or percutaneous needle insertion into the trachea, the ILMA can be used to counteract anterior neck pressure. In this capacity, the ILMA provides temporary ventilation and stabilizes the cervical spine during the surgical airway procedure." (Reardon 2009)

7-Kontraindikationer

"The LMA is relatively contraindicated in awake patients, especially those with a full stomach. Insertion of the LMA in an awake patient will cause coughing, gagging, or vomiting. If the LMA is inserted when the patient is awake and the stomach is full, vomiting and aspiration may occur. In the ED, the LMA should be used only if the patient is unconscious or after paralytic agents are given. Once the LMA is inserted and ventilation is established, the patient should not be allowed to wake up or gag. Consider using a long-acting paralytic agent or multiple doses of succinylcholine once adequate ventilation is established. Decreased mouth opening may make insertion of the LMA difficult or impossible. Insertion of the LMA may also be difficult or impossible in patients with severely distorted upper airway anatomy, especially those with scarring secondary to cervical radiation therapy." (Reardon 2009)

"The ILMA is contraindicated in patients with less than 2 cm of mouth opening. The ILMA requires 2 cm of space between the upper and the lower incisors in order to be inserted. The ILMA

is relatively contraindicated in awake patients, especially those with a full stomach. Insertion of the ILMA in an awake patient will cause coughing, gagging, or vomiting. If the ILMA is inserted when the patient is awake and the stomach is full, there is a high likelihood of vomiting and aspiration. In the ED, the ILMA should be used only if the patient is unconscious or after a paralytic agent has been given. Once the ILMA is inserted and ventilation is established, the patient should not be allowed to wake up or gag. Consider giving a long-acting paralytic agent or multiple doses of succinylcholine after the ILMA is placed and ventilation is adequate. Although several studies show that the ILMA is safe and effective for ventilation and intubation during in-line cervical spine stabilization, some evidence shows that the ILMA causes posterior pressure on the midportion of the cervical spine. The clinical importance of cervical spine pressure caused by the ILMA is unknown and the device is generally considered safe in patients with an unstable cervical spine injury. Nevertheless, providers should be aware of this concern and make every effort to stabilize the ILMA in these situations. Ventilation with the ILMA may be difficult or impossible in patients with severely distorted upper airway anatomy, especially those with scarring secondary to cervical radiation therapy." (Reardon 2009)

"Complications of the LMA include partial or complete respiratory obstruction (approximately 3%) and general failure to protect against aspiration of gastric contents. If possible, do not use the LMA in situations in which high inspiratory pressures are required, such as in patients with chronic obstructive pulmonary disease (COPD)." (Tintinalli 2011 Chapter 28)

8-Huvudet i sniffing position
"The best patient position for LMA insertion is the sniffing position, with the neck flexed and the head extended." (Reardon 2009)

"The ILMA works best in the neutral or sniffing position; cervical extension may interfere with proper placement." (Reardon 2009)

9-Larynxmask - rätt storlek
"The first step is to select the appropriate-sized LMA. The LMA is available in a wide range of sizes, from size 1 for neonates weighing less than 5 kg to size 6 for adults weighing more than 100 kg. The disposable version is available in sizes 1 through 5, but not size 6." (Reardon 2009)

Lämplig storleken av LMA hos barn baseras på vikt. Se Table 29-4 (Tintinalli 2011 Chapter 29)

"The first step is to select the appropriate-sized ILMA. The ILMA is available in three sizes: size 3 for children weighing 30 to 50 kg, size 4 for small adults weighing 50 to 70 kg, and size 5 for adults weighing 70 to 100 kg. When there is doubt about which size is appropriate, it is probably better to use the larger size." (Reardon 2009)

"The ILMA is available only in sizes suitable for adults and children heavier than 30 kg, so the LMA should be used for smaller children and infants." (Reardon 2009)

10-Bedömning av förväntad svårighet
Rosen's (Walls 2009) rekommenderar användningen av minneshjälpen RODS© där:

- R står för Restricted mouth opening (förmågan att patienten be able to place 3 of his or her own fingers between the open incisors)

- O står för Obstruction or obesity: “obstruction (particularly supraglottic obstruction, but can be present anywhere in the airway) or obesity (because of redundant upper airway tissues, chest wall weight, and resistance of abdominal mass)” (Walls 2009)
- D står för Distorted anatomy
- S står för Stiffness (resistance to ventilation)

11-Töm kuffen
“After selecting the proper size, completely deflate the LMA cuff while pushing it posteriorly, so that it forms a smooth wedge shape without any wrinkles.” (Reardon 2009)

“After choosing the correct ILMA, completely deflate the cuff while pushing it posteriorly so that it assumes a smooth wedge shape without any wrinkles.” (Reardon 2009)

12-Glidmedel
“Place a small amount of water-based lubricant onto the posterior surface of the LMA mask just before insertion.” (Reardon 2009)

“Place a small amount of water-based lubricant onto the posterior surface of the ILMA mask just before insertion.” (Reardon 2009)

13-Teknik att sätta larynxmask
Att sätta larynxmask lärs bäst genom övning under överinseende och tips från mer erfaren kollega, inte genom läsning. Svårast brukar vara att 1) komma in i munhålan, 2) få masken att glida nedåt när den ställer sig mot bakre svalgväggen. 1) kan lösas med att öppna underkäken med pekfinger-tumgrepp om mandibula med ena fingret inne i patientens munhåla. 2) kan lösas med att med pekfingret peta larynxmaskens spets inferiort om den vill vika sig superiort mot bakre svalgväggen. Problem 2 kan också minskas genom att införa larynxmasken till höger om tungan ungefär som laryngoskopet vid intubation och sedan rotera den rätt. Att använda laryngoskopet som tungdepressor kan också avhjälpa både problem 1) och 2), särskilt vid patienter du inte vill bli biten av.

LMA: “The most common method is the index finger insertion technique. This is accomplished by holding the LMA like a pen, with the index finger at the junction of the airway tube and the cuff (Fig. 3–13). Have an assistant open the patient's mouth and insert the LMA with the posterior tip pressed against the hard palate just behind the upper incisors. Under direct vision, use the index finger to slide the LMA along the hard palate and into the oropharynx (Fig. 3–14). As the LMA is inserted farther, extend the index finger and push the posterior cuff along the soft palate and the posterior pharynx. Exert counterpressure on the back of the patient's head during insertion. Continue to push the LMA into the hypopharynx until resistance is felt (Fig. 3–15). Use the other hand to hold the proximal end of the LMA airway tube while removing your index finger from the patient's mouth.” (Reardon 2009)

ILMA: “Open the patient's mouth and position the posterior mask tip so that it is flat against the hard palate immediately posterior to the upper incisors (Fig. 3–8). Advance the airway straight into the mouth along the hard palate without rotation until the curved part of the airway tube is in contact with the patient's chin. Then rotate the ILMA completely into the hypopharynx by advancing it along its curved axis, keeping the posterior mask firmly applied to the soft palate and posterior pharynx, until firm resistance is felt.” (Reardon 2009)

14-Fyller kuffen
LMA: "After the LMA is fully inserted, let go of the proximal end of the airway tube and inflate the cuff enough to achieve a good seal with the glottis (Fig. 3–17). This may require only half of the maximum cuff volume. Be careful not to overinflate the LMA cuff (see the product packaging for maximal cuff volumes)." (Reardon 2009)

ILMA: "Without holding the tube or handle, inflate the mask cuff (Fig. 3–10). The entire device will normally slide backward a bit when the cuff is inflated. Frequently, only half of the maximum cuff volume is sufficient to obtain a good mask seal. Do not overinflate the cuff; this may make the seal worse." (Reardon 2009)

15-Kopplar blåsa och ventilerar
LMA: "Attach a bag and ventilate the patient" (Reardon 2009)

ILMA: "Attach a bag and ventilate the patient" (Reardon 2009)

16-Kontroller
LMA: "Attach a bag and ventilate the patient, using chest rise, breath sounds, and capnography to confirm adequate gas exchange. If bagging is easy and ventilation is good, the aperture of the LMA is probably aligned correctly over the glottic opening. Proper positioning of the LMA aperture with the glottic opening allows optimal ventilation." (Reardon 2009)

ILMA: "Attach a bag and ventilate the patient, using chest rise, breath sounds, and capnography to confirm adequate gas exchange. If bagging is easy and ventilation is good, the aperture of the ILMA is probably aligned correctly over the vocal cords." (Reardon 2009)

"Listen for an audible cuff leak to make sure there is a good mask seal." (Reardon 2009)

17-Justerar kuffvolym /maskläget/huvudläge vid behov
<u>LMA</u>
"Several tips or techniques should be considered if LMA ventilation is inadequate. The best way to ensure proper ventilation is to optimize the insertion technique by carefully following the previously discussed directions. Position the patient's head and neck properly and ensure that the patient is deeply anesthetized or paralyzed. Listen for an audible cuff leak to make sure there is a good mask seal. Adjust the cuff volume if necessary to improve the mask seal and ensure optimal ventilation. Simply adding more air to the cuff will not necessarily improve the mask seal with the glottis. Cuff overinflation may cause a leak, whereas deflation and repositioning may improve the seal." (Reardon 2009)

"Sometimes adjusting the patient's head and neck position is easier than trying to change the position of the LMA. Move the patient into a better sniffing position or into the chin-to-chest position so see if this improves the LMA cuff seal. If these positions do not help, or are not possible, then try a jaw-thrust or a chin-lift maneuver. Also, apply anterior neck pressure to help push the glottis down into contact with the LMA mask. This technique can be used in combination with any of the maneuvers just discussed." (Reardon 2009)

"If mask seal and ventilation are still not optimal after simple repositioning maneuvers, withdraw, advance, or rotate the LMA cuff. Another alternative is to completely remove and reinsert the LMA, with careful attention to the details described earlier. If unsuccessful, change the LMA size.

A larger size LMA will usually improve ventilation even if it is more difficult to insert. It is much more common to need to increase LMA size rather than to decrease LMA size. Finally, consider using the ILMA or the Combitube or performing a surgical airway when ventilation with the LMA is not adequate." (Reardon 2009)

ILMA

"Approximately 5% to 10% of insertions are associated with an initial failure to ventilate. Occasionally this is caused when the tip of the LMA pushes the epiglottis over the glottic opening, a complication that is more common in children due to the larger epiglottis.[21] If ventilation is difficult, manifest by poor chest rise or high peak pressures, the clinician should attempt to reposition the LMA by deflating the cuff and partially or completely removing and reinserting." (Tintinalli 2011 Chapter 29)

"If optimal ILMA placement is not initially accomplished, adjusting maneuvers can be attempted. The purpose of adjusting maneuvers is to align the aperture of the ILMA with the glottic opening. Proper positioning of the ILMA aperture with the glottic opening allows optimal ventilation and facilitates tracheal intubation. Before adjusting the ILMA, consider the patient's position and degree of relaxation; both may affect ILMA function. The ILMA works best in the neutral or sniffing position; cervical extension may interfere with proper placement. The patient should not react to ILMA placement with coughing or gagging because this may interfere with proper placement. Have a single operator perform the adjustment maneuvers by gripping the ILMA handle with one hand, in a "frying pan" grip, and providing bag ventilation with the other hand (Fig. 3–11). After each adjustment maneuver, assess the quality of bag ventilation and mask seal. Easy bag ventilation, good chest rise, and the absence of an audible mask leak are indications of good ILMA alignment with the glottis." (Reardon 2009)

"To adjust the position of the ILMA, first gently pull the handle toward you without rotation along the ILMA's curvature. Next, gently push the handle toward the patient's feet without rotating it. Finally, try the "Chandy maneuver," gently rotating the ILMA farther into the hypopharynx and then lifting the handle toward the ceiling above the patient's feet. If these simple maneuvers do not result in adequate ventilation, then consider the "up-down maneuver" (Fig. 3–12). This technique is used to correct down-folding of the epiglottis, which is common with insertion of the ILMA and may interfere with ventilation or intubation. The up-down maneuver is accomplished by rotating the ILMA out of the hypopharynx along its curvature about 5 to 6 cm, while the cuff remains inflated, then sliding it back into position while pressing it against the posterior pharynx. Do not use excessive force when placing or adjusting the ILMA." (Reardon 2009)

"If adjusting maneuvers do not result in adequate ventilation, it is likely that the wrong size of ILMA has been used. Incorrect ILMA size is more likely to be a problem if the device is too small, so try a larger ILMA as a reasonable first approach. If another ILMA size is not available, external anterior neck manipulation/pressure may bring the glottis and ILMA cuff into proper alignment. If the size of the ILMA is not in question, consider completely removing and carefully reinserting the device." (Reardon 2009)

18-Endotrakeal intubation via ILMA

"The ILMA has a special ETT and a stabilizer rod to remove the mask over the ETT after intubation is accomplished, but intubation can be comparably successful with a conventional polyvinylchloride (PVC) endotracheal tube." (Walls 2009)

Intubation är möjligt via en LMA men lättare via en ILMA, varför detta dokument beskriver enbart intubation via ILMA: "In the emergency setting, the LMA and the intubating laryngeal mask airway (ILMA) are excellent rescue devices for the "cannot-intubate/cannot-ventilate" situation. Both devices are valuable for rescue ventilation, but the ILMA is superior to the LMA as a conduit for intubation.[76] Thus, if there is an option between the two, the ILMA should be chosen as the rescue ventilatory device for emergency airways. The ILMA is very successful when intubating patients with known difficult airways. [77] [78] In the operating room, blind intubation through the ILMA has an overall success rate of 90% and, when aided by fiberoscopy, approaches 100%." (McGill 2009)

19-Glidmedel
"Prior to inserting the ET tube into the ILMA, lubricate it generously." (McGill 2009)

"The majority of intubations through the ILMA are performed blind, using either the designated LMA ET Tube or a standard ET tube." (McGill 2009)

20-För ned tuben till ILMAs öppning i larynx
"Next, advance the tube into the ILMA airway tube with the longitudinal black line on the LMA ET Tube facing the handle of the ILMA. When the tube has advanced 15 cm, to the transverse line marked on the tube, it is an indicator that the tip is about to emerge from the ILMA mask." (McGill 2009)

21-Lyfter ILMA i anterior riktning och för in tuben i trakea
"Just prior to advancing the tube, use the frying-pan grip and apply a slight anterior lift (not a tilt) to further align the aperture of the ILMA with the glottis (see step 2 of the "Chandy maneuver," Fig. 4–19*B*). Do not use a levering action. While holding the handle in this position, gently pass the tracheal tube to about 16.5 cm, or 1.5 cm beyond the transverse line. In this position, the ET tube will push the epiglottic elevating bar up and may now come in contact with the larynx or esophagus. If cricoid pressure is being applied, decrease it because it can make intubating through the ILMA more difficult. If there is no resistance, advance the tube into the trachea until the tracheal tube adapter comes in contact with the proximal end of the ILMA airway tube. Do not use force when advancing the tube." (McGill 2009)

22-Fyller tubens kuff
"Once the LMA ET tube has passed into the trachea, inflate the tube cuff and attempt to ventilate the patient." (McGill 2009)

23-Auskultation
"After tracheal tube placement, auscultate both lungs under positive-pressure ventilation. Take care to auscultate posterolaterally because auscultation anteriorly can reveal sounds that mimic breath sounds but arise from the stomach." (McGill 2009)

24-Kapnometri eller kapnografi
"ET_{CO2} detection, with aspiration as backup, should be considered the primary means of ETT placement confirmation." (Walls 2009)

"Immediately after intubation, the intubator should apply an end-tidal carbon dioxide (ET_{CO2}) detection device to the ETT and assess it through six manual ventilations. Disposable, colorimetric ET_{CO2} detectors are highly reliable, convenient, and easy to interpret, indicating adequate CO_2

detection by color change (Figs. 1-3 and 1-4) (see Chapter 3). ET_{CO2} detection is highly reliable in determining tracheal and esophageal intubation in patients with spontaneous circulation.[33] These devices indicate the carbon dioxide content in exhaled air either qualitatively or quantitatively. The persistence of detected CO_2 after six manual breaths indicates that the tube is within the airway, although not necessarily within the trachea. Gas exchange is detected with the tube in the mainstem bronchus, the trachea, or the supraglottic space. Correlation of ET_{CO2} detection with the depth markings on the endotracheal tube (particularly important in pediatric patients) confirms tracheal placement. Rarely, BMV before intubation or ingestion of carbonated beverages may lead to release of CO_2 from the stomach after esophageal intubation, causing a transient false indication of tracheal intubation. Washout of this phenomenon occurs within six breaths, however, so persistence of CO_2 detection after six breaths indicates tracheal intubation." (Walls 2009)

Barn: "Immediately after intubation, confirm endotracheal tube placement using a capnograph or a colorimetric end-tidal CO2 detector. A small-sized colorimetric end-tidal CO2 detector should be used for children weighing <15 kg. For larger children, weighing >15 kg, use the adult sized CO2 detector, as there can be a resistance to flow when using the smaller device with larger tidal volumes." (Tintinalli 2011 Chapter 29)

"A multicenter study of a colorimetric device demonstrated an overall sensitivity of 80% and a specificity of 96%.[50] In patients with spontaneous circulation and the tracheal tube cuff inflated, the sensitivity and specificity were 100%. The poor sensitivity (69%) seen in cardiac arrest was due to the fact that low exhaled CO_2 levels were seen in both very-low-flow states and esophageal intubation. The device must, therefore, be used with caution in the cardiac arrest victim. Levels of CO_2 returned to normal after return of spontaneous circulation. Further, colorimetric changes may be difficult to discern in reduced lighting situations, and secretions can interfere with the color change. Regardless of the monitoring device, patients in cardiac arrest should be ventilated for a minimum of six breaths before taking a reading. Otherwise, recent ingestion of carbonated beverages can result in spuriously high CO_2 levels with esophageal intubation.[51] Colorimetric changes do not rule out glottic positioning of the ET tube tip. Adequate ventilation and oxygenation may be achieved in the glottic position, but the risk remains for aspiration in the absence of a protected airway and the potential for further tube dislodgment." (McGill 2009)

25-Kuffar ur maskens kuff

"If the tube is in the trachea, deflate the cuff of the ILMA. There is no rush to remove the ILMA; it can remain in place for an hour or longer if more pressing patient care issues need to be addressed first." (McGill 2009)

"To remove the ILMA, deflate the cuff (Fig. 4–21*A*). Be careful not to deflate the ET tube cuff. Start by removing the ET tube adapter. Then hold the proximal end of the ET tube in place while rotating the ILMA out of the hypopharynx. As the ILMA passes over the ET tube and out of the mouth, hold the ET tube in place using the stabilizer rod provided with the ILMA (see Fig. 4–21*C*). When the ET tube pilot balloon comes in contact with the stabilizer rod, remove the stabilizer rod to allow the pilot balloon to travel through the ILMA airway tube. Then reattach the ET adapter and resume ventilation. Adjust the ET tube depth as needed." (McGill 2009)

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