THE AIRWAY IN AEROMEDICAL EVACUATION

PBLD (Problem Based Learning Discussion)

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Image Credit: http://www.arabianaerospace.aero/media/images/stories/Medevac%20services.jpg

THE MAN WITH NASTY CELLULITIS

A 73 year old man suspected to be in early septic shock (that is, believed to be developing sepsis syndrome) is to be transported to Miami from his southern Mexico "home away from home" via a Lear Jet equipped with a special patient stretcher and seating for pilot / copilot / MD / RN / paramedic and one relative (luggage space permitting).

The medical history for the patient started with a cut foot on the beach on a winter holiday, which somehow deteriorated into a nasty cellulitis involving most of the right leg. There has been a fever and leukocytosis of 36 hours duration. No oxygen is in use. An IV running TKVO is in place. Monitors include EKG and pulse oximetry, with intermittent BP, respiratory rate and temperature measurements. Temp 38.3 BP 100/70 HR 115 Pulse oximeter reads 91% Respiratory rate 25 WBC 25

Past medical history includes an appendectomy 10 years ago and an uncomplicated non Q wave MI last year at age 72, but is otherwise unremarkable in most other respects.

No allergies. Meds: IV cloxacillin.

What are the airway considerations in aeromedical evacuation of patients such as this individual?

What if this patient had proved difficult to intubate in the anesthetic for his appendectomy?

CONSIDERATIONS

What are the airway considerations in aeromedical evacuation of patients such as this individual?

The main airway-related considerations in aeromedical evacuation are as follows

- Relatively few physicians other than anesthesiologists have extensive clinical experience in airway management
- Fewer still physicians are experienced in advanced airway techniques such as special scopes or wands (anesthesiologists excepted)
- Confined space / difficult access to patient's head makes intubation and CVP line insertion difficult even for experienced experts.
- Airway equipment selection available is limited.
- Portable, battery-operated suction must be available to clear the airway of secretions.
- Oxygen supply is limited (E-size tanks vs. liquid oxygen system)
- The decreased atmospheric pressure in the cabin (as low as 8000 feet altitude) increases the chance that hypoxemia will occur at a given fracrtion of inspired oxygen and will also cause endotracheal tube cuffs to expand at altitude if filled with air (use water or saline instead, or use a cuff pressure gauge)

DISCUSSION

The patient is breathing adequately now, but will clearly need supplementary oxygen during the flight, and would likely benefit from oxygen even now, although he is technically not hypoxemic at an arterial saturation of 91%. Nasal prong oxygen at 4 liters per minute would likely suffice to meet his “need” for a saturation above 95%.

However, the patient could possibly deteriorate clinically during the evacuation flight where he might require intubation and positive pressure ventilation as well as volume resuscitation and inotropic support. Measures such as intubation and arterial line exertion are never easy to implement in flight, even if you have lots of ground experience, so they should be carried out prior to the flight is there is significant risk of clinical deterioration in the next few hours.

The patient is slightly hypotensive, slightly tachypneic, moderately tachycardic and has lowish arterial oxygen saturation by pulse oximetry. This profile is compatible with early sepsis syndrome, but more information (EKG, CXR, ABGs, electrolytes, urine output profile) is needed to decide exactly how sick this man really is and whether he is likely to get sicker on route. Special attention should be placed on his volume status and urine output using a Foley catheter. At the moment the hypotension / tachycardia is suggestive of hypovolemia. Colloids such

as Voluven are sometimes preferred over crystalloids such as normal saline where a lot of volume is expected to be needed (because of their 4-to-1 efficacy over crystalloid in restoring intravacsular volume).

The tachycardia implies an increased myocardial work load, risking myocardial ischemia or infarction in a setting of coronary artery disease, but slowing the heart rate with IV beta blockers (or, if you dare, neostigmine or edrophonium) is frought with its own special set of challenges (such as possible severe hypotension). Further more, prophylactic use of nitroglycerine to "protect" the heart would likely exacerbate the hypotension problem.

What if this patient had proved difficult to intubate in the anesthetic for his appendectomy?

In this case either intubate before going or at least make sure that a very experienced anaesthetist well-versed in difficult intubation is on the crew and has brought appropriate airway gadgets.

AEROMEDICAL AIRWAY KIT

- Resuscitator bag/valve/mask (eg Ambu, Laerdal) [adult, pediatric sizes]
- Laryngoscope kit with Mac and Miller blades (1,2,3,4) and spare batteries / bulbs. A GlideScope Ranger would be especially nice to have.
- Endotracheal tube (ETT) kit with stylettes, adapters, oropharyngeal airway set, nasopharyngeal airway set. Usual adult ETT sizes 6.5 / 7.5 / 8.5
- Battery operated portable suction system
- Oxygen Supply
- Gadgets: Gum elastic bougie / airway introducer, laryngeal mask airway or other supraglottic airway, according to physician preference, experience and availability
- Drugs to facilitate intubation: lidocaine, succinylcholine, rocuronium glycopyrolate, midazolam. Sugammadex would be nice to have in case giving rocuronium was a "mistake", but is not yet available in the USA.

***WARNING*:**
Do not use succinylcholine or rocuronium without special training and experience.

ABBREVIATIONS USED

ABGs	Arterial Blood Gases
BP	Blood Pressure
CVP	Central Venous Pressure
CXR	Chest X-ray
EKG	Electrocardiogram
ETT	Endotracheal tube (AKA tracheal tube)
FIO2	Fraction of Inspired Oxygen
HR	Heart Rate
IV	Intravenous
MI	Myocardial Infarction
TKVO	“To keep vein open”, e.g. 5-10 ml/hr
WBC	White Blood Cell count (Leucocyte count)