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RESEARCH ARTICLE

DIFFICULT INTUBATION IN FACE AND NECK BURN PATIENTS AT THE SEQUELAE STAGE

Hafid Amine El Alaoui[1], Atmani Walid[2], Aziz Benakrout[2], Anas El Bouti[2], Achbouk Abdelhafid[1], Khales Amine[1], Mustapha Bensghir[2] and Balkhi Hicham[2]

1. High Care Burn Unit, Mohamed V Military Teaching Hospital, Rabat, Morocco.
2. Anesthesiology and Intensive Care Unit, Mohamed V Military Teaching Hospital, Rabat, Morocco.

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Abstract

Tracheal intubation in face and neck burn patients at the sequelae stage can be challenging or even impossible in certain cases. Ventilation techniques using a laryngeal mask or intubation with a bronchial fiberoscope provide solutions to most difficult intubation scenarios. The authors present two cases involving female patients with face and neck burn sequelae.

Introduction:-

The incidence of difficult intubation among patients with facial and neck burns during the sequelae phase is high, estimated at around 5–7%. Difficult intubation is often strongly suspected during the pre-anesthetic assessment. The clinical detection of difficult intubation and airway management techniques must follow standardized protocols established within burn care units. We aim to discuss two cases of surgical interventions for sequelae of facial and neck burns, focusing on the clinical detection of difficult intubation and airway management techniques.

Case Reports

Case 1. A 50-year-old woman, weighing 70 kg and measuring 1.65 m, was admitted for sequelae of thermal flame burns affecting the neck, chest, and upper limbs. The total burned surface area was 25%, with 20% being third-degree burns, resulting in a UBS score of 85. The patient exhibited a retraction band in the neck limiting head extension, microstomia, and sternomental synechia requiring surgical intervention with expanded skin grafting (Figs. 1, 2).
Her anesthetic history included sedation with ketamine. Pre-anesthetic assessment revealed several predictors of difficult intubation: mouth opening (MO) of 1.5 cm, Mallampati grade IV, and thyromental distance (TMD) of 1.5 cm. Further findings included retraction of the lower jaw towards the sternum, cervical spine stiffness, and limited cervical mobility. Nasotracheal fibroscopy facilitated the insertion of a 5.0 armored endotracheal tube under propofol anesthesia.

Case 2. A 42-year-old woman, weighing 65 kg and measuring 1.60 m, was admitted for neck burn sequelae, including sternomental synechia, a scarred thoracic patch, (Fig. 3). Her history included a prior general anesthesia with blind intubation. Pre-anesthetic assessment identified predictors of difficult intubation: MO of 2.5 cm, Mallampati grade III, and TMD of 3.5 cm, with a stiff cervical spine. The surgery was performed under general anesthesia using a size 4 laryngeal mask.

Case 3. A 45-year-old man, weighing 72 kg and measuring 1.78 m, was admitted for neck burn sequelae, including sternomental synechia, a scarred thoracic patch, (Fig. 4). Pre-anesthetic assessment identified predictors of difficult

Corresponding Author:- Hafid Amine El Alaoui
Address:- High Care Burn Unit, Mohamed V Military Teaching Hospital, Rabat, Morocco.

intubation: MO of 2 cm, Mallampati grade III, and TMD of 3.5 cm, with a stiff cervical spine. The surgery was performed under general anesthesia using a size 4 laryngeal

Discussion:-

In burn patients with facial and neck sequelae undergoing surgery, there is a high risk of difficult intubation. Contractures and retractile scars in the neck result in irreversible neck flexion on the torso and microstomia, which can cause difficult or even impossible intubation. In such cases, depending on the circumstances, the use of a laryngeal mask or tracheal fiberoptic intubation may be indicated, as reported in our two cases.

Oral lesions can be intrinsic or extrinsic, often occurring together. Extrinsic sequelae are primarily traction-related.[1] They involve retraction near the mid or lower face. Sometimes, a labial commissure is pulled by a retractile band, causing microstomia with eversion of the lower lip. Intrinsic sequelae result from deep lip damage. The lips undergo intrinsic retraction due to the circular and orificial structure of the orbicularis oris muscle, leading to circular narrowing of the oral aperture. This results in tight microstomia, making laryngoscope insertion impossible. Retractile scars also cause loss of neck and thoracic skin elasticity. The cervico-mental angle diminishes (less than 50°), limiting cervical extension. Surgery becomes necessary to release this angle and facilitate intubation.[2]

Screening for difficult intubation is essential, and the pre-anesthetic consultation is crucial. Ideally, this consultation should occur several days before surgery.

The patient's history should reveal prior instances of difficult intubation and the measures taken to resolve them, including prolonged intubation history (e.g., smoke inhalation). The likelihood of difficult intubation depends on the burn location, including facial, cervical, and thoracic burns with cervico-facial sequelae, cervical adhesions, retractile bands, short neck, or microstomia.

Morphological criteria should be evaluated with the patient seated, observed from the front and side. This allows assessment of mandibular morphology, the cervico-mental angle, tongue size, and temporomandibular joint and cervical spine mobility.

Cass, James, and Lines' criteria for difficult intubation include the following:[3]

1. Short neck with complete dentition
2. Retrognathia with obtuse mandibular angles
3. Prominent upper jaw
4. Limited mandibular mobility hindering laryngoscope insertion (mouth opening typically >3.5 cm)
5. Narrow mouth with a high-arched palate

Other anatomical criteria include:

1. Mentum-to-thyroid cartilage distance <6 cm during full neck extension
2. Presence of retractile neck bands in burn patients

Mallampati clinical criteria, categorized into three classes and modified by Samson into four, predict glottic exposure during direct laryngoscopy based on pharyngeal structure visibility. These criteria are assessed with the patient seated, mouth open, tongue extended, and head in a neutral position (Fig. 4).

Cervical spine mobility, particularly atlanto-occipital joint mobility, is evaluated by measuring the upper jaw's motion from neutral to full extension (Fig. 5). Belhouse identified three predictors of difficult intubation:[4]

1. Limited atlanto-occipital extension (<35°)
2. Reduced mandibular space (<5 cm)
3. Increased tongue thickness

Wilson's criteria are also important. Wilson et al. identified five predictive factors for difficult intubation: weight, head and neck mobility, jaw mobility, retrognathia, and upper incisor size (Table I).[5]

In our practice, Mallampati, Wilson, and Belhouse criteria are employed during pre-anesthetic consultations.[4–7] The suspicion of difficult intubation often arises during this examination. Predictive scores should be documented in the anesthetic record.

Difficult intubation is defined as requiring more than 10 minutes or at least three laryngoscopy attempts by an experienced anesthetist.[8] The three main causes of difficult intubation in burn patients are:

1. Inability to insert the laryngoscope
2. Inability to visualize the glottis
3. Inability to insert the intubation tube

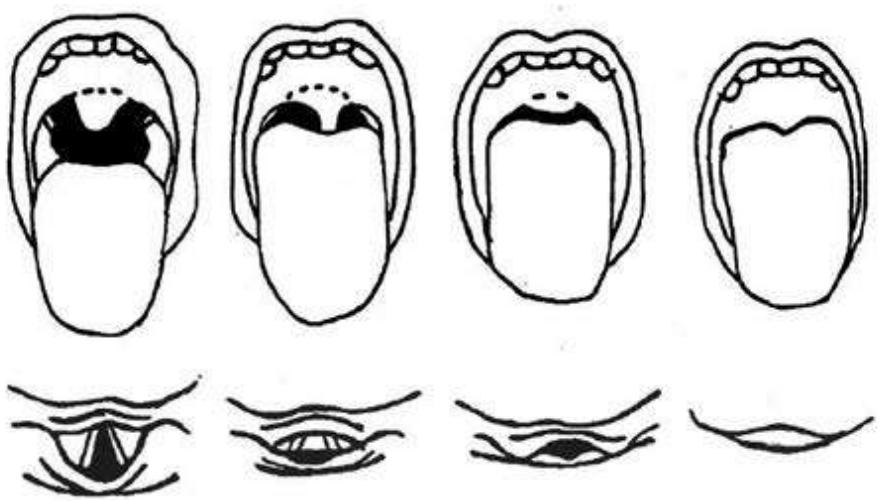
Anesthetic Imperatives

Key requirements include:

1. Maintaining spontaneous ventilation
2. Managing stress during awake intubation
3. Preparing for impossible intubation (e.g., subglottic band)[9]
4. Avoiding muscle relaxants and morphine derivatives

Proposed solutions include:

1. Readiness of difficult intubation equipment following a defined protocol familiar to the entire anesthesia team
2. Four-handed anesthesia
3. Intubation by a senior anesthetist
4. Preoxygenation with an expired oxygen fraction (FEO_2) >90%



D'après Samson et Young.

Classe 1 : visibilité du palais mou, de la luette, des piliers et de la paroi postérieure du pharynx.

Classe 2 : visibilité du palais mou, de la luette et de la paroi postérieure du pharynx.

Classe 3 : visibilité du palais mou et de la base de langue.

Classe 4 : palais mou invisible.

Les classes 3 et 4 sont prédictives d'intubation difficile.

Fig 5:- Glottic exposure during direct laryngoscopy based on the visibility of pharyngeal structures.

Techniques

Fiberoptic tracheal intubation is the gold standard for anticipated difficult intubation but requires expertise. For burn patients with sequelae and difficult intubation criteria, a fiberoscope should be readily available for vocal cord exposure challenges. We use an anesthetic protocol involving spontaneous ventilation under light anesthesia. For Gueugniaud et al., programmed fiberoptic intubations are performed under spontaneous ventilation or sedation using propofol, as in our young patient.[10]

The laryngeal mask airway (LMA) is also widely used. Karam's study of 23 burn patients showed successful LMA placement in 14 out of 15 cases with neck burn sequelae.[11] LMA is an excellent ventilation technique for burn surgery. Gueugniaud also recommends LMA for burns.[10],[12] Our second patient benefited from LMA insertion. Some teams perform preoperative tracheostomy for airway control.[13]

During reconstructive interventions in patients presenting with severe post-burn mento-sternal scar contracture, securing the airway forms a critical part of management. Extreme contracture is more likely to develop in patients who have had thoracic burns with ascending involvement of the neck and mandibular region. When cervical hyperextension and elevation of the mandible are impeded, post-burn contracture of the neck might render endotracheal intubation difficult 14 ;15

Conclusion:-

Assessing upper airway access and cervical mobility is critical in burn patients with sequelae, especially those with cervico-facial injuries. Pre-anesthetic consultation is pivotal for evaluation using predictive criteria for difficult intubation. However, these criteria should not create complacency. Special attention is needed for patients with cervico-facial lesions, loss of neck and thoracic skin elasticity, and cervico-mental angle evaluation. The goal is to anticipate and prepare for difficult intubation. Equipment and staff must be ready, and pre-established protocols should be followed. The challenge often lies more in ventilation and oxygenation than in intubation itself.

Fig 1:- Retraction of the lower jaw onto the sternum, sterno-mental symphysis, and microstomia.

Fig 2:- Naso tracheal intubation for neck and faces retraction due to severe burn.

Fig 3:- Neck burn sequelae, including sternomental synechia, a scarred thoracic patch.

Fig 4:- Neck burn sequelae, including sternomental synechia, and arms burn sequelae.

References:-

01. Glenn Lyle W., McCauley R.L., Robson M.C.: "Reconstruction of the head and neck", 492-8, W.B. Saunders Co., Philadelphia, 1995.
02. Kreulen M., Mackie D.P., Kreis R.W.: Surgical release for intubation purposes in post-burn contractures of the neck. Burns, 22: 310-2, 1996.
03. Cass N.M., James N.R., Lines V.: Difficult direct laryngoscopy complicating intubation for anaesthesia. Br. Med. J., 3: 488-9, 1956.
04. Wilson M.E., Spielgelhater D., Robertson J.A., Lesser P.: Predicting difficult intubation. Br. J. Anaesth., 41: 372-83, 1994.
05. Laplace E., Benefice S.: Intubation difficile: évaluation prospective des tests de Mallampati et de Wilson. Cah. Anesthésiol., 43: 205-8, 1995.
06. Mallampati S.R.: Clinical signs to predict difficult tracheal intubation. Can. Anaesth. Soc. J., 30: 316-7, 1983.
07. Belhouse C.P., Dore C.: Criteria for estimating likelihood of difficulty of endotracheal intubation with the MacIntosh laryngoscope. Anesth. Intensive Care, 16: 329-37, 1988.
08. Pottecher T.: Intubation difficile: expertise collective. Ann. Fr. Anesthésie-Réanimation, 15: 207-14, 1996.
09. Giraud O., Lienhard A., Nottet J.B., Lenoir B.: Une cause d'intubation impossible chez le brûlé: la bride sous-glottique. AFAR, 1998.
10. Gueugniaud P.Y., Bertin-Maghit M., Bouchard C., Petit P.: Anesthésie du brûlé. Conférence d'actualisation, 40ème Congrés National de la SFAR, Elsevier, Paris, 1998.
11. Karam R., Ibrahim G., Tohme H., Moukarzel Z., Raphael N.: Severe neck burns and laryngeal mask airway for frequent general anaesthetics. Middle East J. Anesthesiol., 3: 527-35, 1996.
12. Poltronieri J.: Le masque laryngé. Ann. Fr. Anesth. Réan., 9: 362-5, 1990.
13. Stéphanazzi J.: Anesthésie et analgésie du brûlé. Médecine et Armées, 4: 28: 2000.
14. Difficult Airway Management in a Patient With Post-burn Contracture Neck
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15. Managing difficult airway in a post burn neck contracture: A case report
Manisha Sahoo; Saurabh Vig*
Department of Onco-Anaesthesia and Palliative Medicine, National Cancer Institute, Jhajjar, India. All India Institute of Medical Sciences, New Delhi, India.
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