Awake Fibreoptic Intubation For Airway Burns

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SUMMARY: A young adult was admitted to a casualty department with severe burns sustained in a motor vehicle fire. His airway was initially patent, but in grave danger of obstruction due to inhalational injury. Conventional methods of airway management were unable to guarantee a patent airway and a novel approach is described.

Case Report

Three teenagers were involved in a high speed road traffic accident at 0430 hours, in which the saloon car in which they were travelling left the motorway, rolled down an approximately 20 metre high embankment and burst into flames. The vehicle was completely destroyed in the ensuing fire. The incident was reported in the national television news. The rear seat passenger was unable to escape and was incinerated. Of the two front seat occupants, one was apparently uninjured and was taken into custody at the scene. The other occupant was found some 10 metres from the vehicle, naked save for his boots, and having sustained severe burns.

Firemen sprayed the casualty with water, and medical treatment at the scene was provided by a paramedic ambulance crew, and an immediate-care doctor, but was limited to oxygen via a facemask, it having proved impossible to gain venous access.

On arrival in the casualty department less than fifteen minutes later, full thickness burns were apparent over the entire head, neck and anterior trunk. The initial approach to the patient followed standard Advanced Trauma Life Support (ATLS) guidelines, the author being responsible for the Airway and Breathing, whilst another anaesthetic registrar took responsibility for the Circulation.

Initial assessment of the airway showed the patient to be breathing without stridor or obstruction, with a rapid respiratory rate and small tidal volumes. A full thickness burn covered the entire head and neck, there was no hair remaining on the head and no nasal hairs to be seen. Examination within the nose and mouth revealed that all visible mucosa was already swollen and oedematous. The patient was able to obey the command to open his mouth, and mouth opening was restricted to approximately one fingerbreadth.

By this stage, venous and arterial access had been gained via a femoral approach, and intravenous morphine was being administered, titrated against his pain.

It seemed clear that the patient had sustained a significant airway burn and was in danger of losing his airway. The options for definitive airway management were therefore considered.

As the upper airway was already swollen and his mouth opening was so restricted, it would not have been possible

to guarantee maintenance of the airway after induction of general anaesthesia. In these circumstances, the standard of teaching of both ATLS and Battlefield Advanced Trauma Life Support (BATLS) is to obtain a definitive airway by using a surgical cricothyroidotomy(1). Examination of the neck showed such extensive burns that no landmarks were palpable between mandible and suprasternal notch, and it was impossible to locate the cricothyroid membrane. The option of tracheostomy under local anaesthesia was then considered, but no ENT surgeon capable of such a potentially difficult procedure was in the hospital. The surgeon was summoned from home, but would take some 15-20 minutes to arrive. It was by no means clear that the airway would remain patent that long. The decision was therefore taken to intubate the trachea awake, using a fibreoptic bronchoscope.

Being cognisant of the limited range of drugs available in a casualty department, it was not possible to instil cocaine in the nose. Instead an *ad hoc* mixture of 2% plain lignocaine and adrenaline 1 in 10,000 was dripped into the nose, the patient being instructed to swallow any surplus. Meanwhile, a lubricated uncut 7.0 cuffed endotracheal tube was mounted onto the bronchoscope. After two minutes, the fibreoptic bronchoscope was introduced via the left nostril, which was the larger. The instrument was advanced until epiglottis could be identified. Further 2% lignocaine was now sprayed via the instrument channel, in a "spray as you go" manner. It was possible to see a clear demarcation line across the epiglottis; above which tissues were oedematous or sooty, below which tissues appeared normal.

The bronchoscope was then steered between the vocal cords and advanced until the carina could be confidently identified. The endotracheal tube was then railroaded over the bronchoscope until the tip of the tube could be seen in the trachea and above the carina. The bronchoscope was then advanced briefly into the left and right main bronchi in turn, confirming the absence of inhalational injury at this level.

The endotracheal tube was then secured at the nares, and the patient anaesthetised to control his pain.

Discussion

The technique of awake fibreoptic intubation is well

described (2), but is normally reserved for more controlled circumstances than the patient reported here, the usual scenario being either elective anaesthesia in a patient with a known airway problem or urgent anaesthesia for ENT or maxillofacial surgery, such as a dental abscess. In all these situations, there is the time to plan and to assemble the equipment required and the staff experienced in its use.

In the patient presented here, standard airway management techniques were all contraindicated for one reason or another. The recent literature has not included a description of awake fiberoptic intubation in such circumstances, but has described other airway management techniques. The laryngeal mask has been used in severe burns (3), but was dismissed due to limited mouth opening. The combitube has been described for use in severe burns (4), but is not a popular airway tool in this country and again requires a greater degree of mouth opening than the patient presented. Finally, surgical release of the burnt tissue in the neck has been reported to facilitate intubation (5), but this would have required a skilled surgeon, and one was not available for some fifteen minutes. Anyway, if a definitive airway had not been obtained prior to the arrival of such a surgeon, then a tracheostomy under local anaesthesia would probably have been the airway of choice.

Finally, it is of note that even attempts at awake fiberoptic intubation can themselves provoke life-threatening airway obstruction (6). The technique should therefore only be performed by personnel skilled in the techniques of advanced airway management.

Recommendations

In the case presented here, it is doubtful if any other method of airway management could have guaranteed the patient's airway. It is acknowledged that this particular set of circumstances is rare. Nevertheless, it would seem prudent to recommend that every accident and emergency department has access to an intubating fiberoptic bronchoscope and to personnel skilled in its use.

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