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CORE TRAINING FOR DOCTORS

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Carotid blowout

Introduction

Carotid artery rupture, also known as carotid blowout, is a rare but catastrophic event, which most commonly occurs in patients with head and neck malignancies. In the experience of Maran et al (1989), it occurred in 4.3% patients after radical neck dissection over 19 years, and was fatal in all cases. McDonald et al (2012) reported that in patients who received salvage head and neck re-irradiation, carotid blowout was seen in 2.6% and was fatal in 76% of these cases.

For junior medical staff carotid blowout can be a daunting prospect to encounter, so this article outlines an approach to initial ward-based treatment and a simple strategy for further management, which can be broadly considered in terms of preparation, active resuscitation, intervention and palliation.

Types of event

Carotid blowout can be considered in three categories:

1. Threatened – no haemorrhage has occurred, but there is evidence to suggest inevitable haemorrhage in the immediate future
2. Impending – herald bleed which resolves spontaneously or with pressure
3. Acute – where haemorrhage is not stopped by packing or pressure (Cohen and Rad, 2004).

Presentation

As Cohen and Rad (2004) described, patients with threatened haemorrhages may be asymptomatic but have a high risk of bleeding because of factors such as exposure of the carotid artery. Risk factors for carotid blowout are detailed in *Table 1*, and clinical features associated with these, such as infection, fistulae and necrosis, can also be considered as signs of threatened carotid haemorrhage.

Zimmerman et al (1987) described several cases where patients have had angiographic abnormalities including pseudoaneurysms, which increase the risk of a future bleed. Impending carotid blowout typically presents as bleeds which are either self-limiting or those which require external compression (Bates and Shamsham, 2003; Upile et al, 2005). Acute bleeds can occur from the neck, oral cavity or nose as described by Alaraj et al (2011) and cause major catastrophic haemorrhages, with haemodynamic instability and altered cerebration.

Preparation

The most important factor is to consider carotid blowout as a potential complication, and to identify those patients at risk (*Table 1*). The most suitable management approach should be determined for each patient, most importantly whether this is active or palliative. Active management includes surgical exploration and vessel ligation, endovascular stenting and/or endovascular occlusion using balloons or coils (Desuter et al, 2005).

There are many factors to take into consideration:

Facilities

It is worth considering in advance whether your centre has appropriate surgical, radiological and anaesthetic support on site, or

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Table 1. Risk factors for carotid blowout

Surgery – radical neck dissection
Nodal metastasis
Tissue necrosis
Muco-cutaneous fistula
Recurrent tumour
Tumour invasion
Local infection
Wound breakdown
Radiotherapy (and re-irradiation)

Adapted from Maran et al (1989), Upile et al (2005), Powitzky et al (2010), Alaraj et al (2011), McDonald et al (2012)

whether an emergency transfer would be required. Consider which intervention could be undertaken quickest, and make yourself aware of the referral procedure necessary for this.

Location
While inpatients have quick access to medical support, patients in the community may deteriorate before reaching hospital. If a carotid blowout occurred perioperatively, it could be managed quickly with vessel ligation, compared to when an emergency transfer would be required before surgery.

Time of day
Hospitals usually operated with fewer staff out-of-hours, so think about how this would impact on an acute carotid blowout. While surgical cover will be continuous, will this include specialist surgical input required for vessel ligation? Similarly interventional radiology may not provide a 24-hour service for endovascular stenting or occlusion.

Patient fitness
Those with metastatic malignancies may not be suitable for surgical intervention based on their general fitness and disease burden.

Patient choice
If the patient is aware of the possibility of a carotid blowout, he/she may have expressed views on which management approach he/she would prefer. It is also important to consider the patient's views on resuscitation, and whether an advanced decision for refusal of treatment is valid and applicable to such a situation.

In the event that an unexpected carotid artery rupture occurs, it would be sensible to assume that active management is appropriate until further discussion with senior team members is possible. In view of the likely rapid deterioration this input should be requested as a priority.

For all patient in whom carotid blowout is considered, MacKay and Cook (2009) suggest a box of useful equipment should be set up (*Table 2*) in advance, and this can be invaluable in helping maintain a calm and organized atmosphere in an acute setting.

In patients for whom a palliative approach is most appropriate, discuss with the team whether a do not attempt resuscitation order should be in place. Ideally this should be discussed with the patient and relatives, and be kept valid, up to date and filed safely in the patient's records.

Active management
Initial approach
If you are alone, shout for help or use an emergency buzzer to alert other members of staff. Protect yourself, and ensure use of gloves and aprons which should be easily available on the ward. It is important that the patient is not left alone at any point, to minimize any distress and anxiety, and as rapid deterioration can occur in the short time which intervenes.

Request a cardiac arrest call to summon urgent medical and anaesthetic support. If the emergency box is not at the patient's bedside, someone should bring and open this, while you start performing the ABCD assessment.

ABCD assessment
Airway
Check for obstruction, which may be a result of bleeding into the oral cavity or pharynx. In patients with tracheostomies, the cuff should be inflated to secure the airway, and the tube inspected for patency. Use suction to remove visible pools of blood or clot from the mouth or tracheostomy, but beware of causing further damage to the delicate tissues beneath. When suitably skilled persons are present, tracheal intubation will secure the airway.

Breathing
Respiratory rate may be rapid as a result of anxiety and shock. The haemorrhage may result in hypoxia or aspiration, which can contribute to respiratory distress.

Circulation
Assess haemodynamic status with peripheral pulse rate and volume, capillary refill time, patient colour and presence of clamminess, and monitor blood pressure. Gain intravenous access and send urgent blood samples for full blood count, urea and electrolytes, cross-match and a coagulation screen. Start an intravenous infusion to replace lost volume, and consider transfusing with O-negative blood unless matched blood is readily available, for example following surgery. Apply pressure to bleeding sites using dark towels. Consider packing the oral cavity or pharynx around an endotracheal tube to achieve haemostasis.

Disability
Monitor conscious level, as hypovolaemia and hypoxia can lead to reduced consciousness, confusion and agitation. Intravenous midazolam can be used to relieve anxiety and for its amnesic properties, but can cause hypotension and apnoea so requires anaesthetic support.

Referrals
Once haemodynamically stable, you should immediately refer for further definitive intervention. Adequate planning should have already determined the patient's suitability for surgical or endovascular procedures, and identified the quickest referral pathway. If a transfer is

Table 2. 'Top 10' – what to put in the emergency box

1.	Gloves, aprons, goggles
2.	Dark-coloured towels
3.	Intravenous cannulae and syringes
4.	Intravenous fluids and giving sets
5.	Medication (intravenous midazolam)
6.	Suction equipment
7.	Intubation equipment
8.	Tracheostomy equipment
9.	Sterile dressings
10.	Clinical waste bags

Adapted from MacKay and Cook (2009)

required, nursing staff should request an emergency paramedic ambulance to undertake this.

Palliative management

The emphasis for these patients should be to minimize distress and anxiety to all involved, but it is still important to act swiftly in view of the potentially rapid deterioration. The initial approach should be similar to that for active management, with the exception of calling for a cardiac arrest team. Consider use of suction and oxygen to clear the airway, and use dark towels to minimize the visual impact of the bleeding.

Intravenous access is helpful to administer medications such as intravenous midazolam, which is a water-soluble benzodiazepine. It is an anxiolytic with powerful sedative effects, and can act to prevent memory of an event, therefore can be useful in an anxious or agitated patient, and when a bleed is not a terminal event. The *British National Formulary* (Joint Formulary Committee, 2011) suggests that it can take effect after 2 minutes when given intravenously, compared to 20 minutes for intramuscular administration, which would therefore be of little use in an acute carotid haemorrhage. It may be given subcutaneously, but it would have a longer onset of action of 5 minutes via this route, and potentially longer if haemodynamic compromise causes peripheral shutdown.

Nursing considerations

Consider moving patients to a side room to minimize distress to other patients and visitors, and in some circumstances increase the available space in which to manage the patient. Prepare an emergency equipment box, ensuring this is kept in a suitable accessible place, without causing further distress to the patient. In very high-risk patients it may be appropriate to consider having pre-drawn up syringes of midazolam available. Maintaining patent intravenous access can reduce delays in giving intravenous medications and fluid.

Post-event care

Carotid blowout is usually a terminal event when it occurs in patients with malignancy. All involved staff should participate in debrief immediately after the event, to provide support for all of the team. A case discussion at a later point may help to address any learning points identified, and provide a further opportunity for discussion related to the event. Some staff may be more affected than others, and consideration of professional support may be appropriate.

Any relatives who witnessed the event will have suffered a significant distress as well as bereavement. Palliative care services and professional bereavement support services can be of use. Relatives should be offered a discussion with the patient's consultant if they have any concerns regarding the death.

Conclusions

Carotid blowout is a rare but potentially catastrophic event, both for the patient and the medical team, particularly if they are unprepared. Pre-emptively identifying those patients at risk, adopting an ABC approach, having an emergency box to hand in the ward or department and seeking specialist opinion early will instil confidence in the junior doctor first on the scene and may help to limit any possible consequences. BJHM

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KEY POINTS

- Patients with can present with threatened, impending or acute haemorrhage.
- Risk factors include head and neck cancer with nodal involvement, as well as surgery and radiotherapy treatments and their complications.
- Plan management for each patient individually, considering the patient's views, current stage of disease, fitness, and also your site facilities, resources and protocols.
- Management can be active and interventional, or palliative and symptomatic.
- Consider the impact on all involved: staff, relatives, other patients and visitors; referral to professional bereavement or counselling services may be considered.

TOP TIPS

- Prepare, prepare, prepare. Identify at-risk patients, and discuss the most appropriate management strategy with the senior medical team in advance.
- Stay calm. Ensure someone stays with and reassures the patient at all times.
- For active management use an ABCD approach, get help quickly or if the patient is for palliative management give intravenous or intramuscular midazolam as soon as possible.