

Review Article

Clinical Update on Anesthetic Management of Free Flap Surgery in Cervico Facial Cancer Patients

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Introduction

Tumor excision of cervico facial cancer followed by complex reconstructive microvascular surgery of free flap to replace defect or secondary reconstruction after removal of damaged tissues such as osteoradionecrosis are complex challenges in cervicofacial cancer patients.

Our institution is a major leading hospital in Europe for cervico facial cancer and reconstructive surgery in Europe. We started free flap reconstruction in 1993 [1], with a current annual rate of 150 per year and 6 percent total graft failure. Most of the time a double team of cervico-facial and reconstructive surgery surgeons perform simultaneously alongside the anesthesiologists.

It is generally accepted that factors influencing final success of these procedures are mainly related to surgery and the patient itself such as vessel caliber, while anesthesia related factors have a lesser impact [2]. However duration of anesthesia which in fact is related to duration of surgery has a negative impact [3]. Nevertheless this does not mean the anesthetic technique has no effect at all since according to Hagen Poiseuille equation blood flow to the flap has a direct relation to systemic blood pressure [4]. In addition to free flap failure other complications such as hemorrhage, infection (local or sepsis) or respiratory insufficiency can at least increase the length of stay in the hospital without compromising the flap itself. Postoperative management can also be a confounding factor in the overall general process.

In this paper we briefly elaborate an updated practical anesthetic management for pre and intraoperative anesthetic management for this specific surgery.

The clinical protocol update

Preoperative assessment/anesthesia consultation: Special focus on airway management and road map for possible difficult intubation should be traced and discussed with the patient (mainly awake fiberoptic, awake videolaryngoscopy, cricothyroid puncture/jet ventilation)

In addition the possibility of postoperative tracheostomy should be discussed with surgeons and patients.

The site and side of the planned graft should be verified and

confirmed with patient and surgeon.

Laboratory test: cell blood count, electrolytes, clotting tests should be prescribed and checked and eventually adjusted several days before surgery.

Information on bleeding and transfusion risk should be clearly given.

Regional anesthesia with peripheral catheter proposition should be discussed for postoperative analgesia under sedation with remifentanyl TCI before general anesthesia.

The following sites are mainly used:

For Fibula graft: Sciatic bloc

Thigh anterolateral: Femoral block + lateral thigh

Ante-brachial (Chinese flap): Axillary block

Latissimus dorsalis or scapula : Paravertebral block

Jejunum: Transverse Abdominal Plain (TAP) block, epidural anesthesia is not performed because of low molecular weight heparin injection before graft vessels clamping.

Morphine Patient Controlled Analgesia, and visual analogic pain scale information.

Application for pre-rehabilitation in the case of non-weaned addictions or severe malnutrition

Surgical intensive care information (a 72h stay)

Intraoperative anesthetic management

Upon arrival in the operating room:

18/16 G peripheral venous catheter with multiple entry for vasoactive drug if needed.

Perform regional anesthesia with peripheral catheter guided and implemented with the help of ultrasound at the flap harvesting site.

Bolus of 200-400 mg of ropivacaine 2%. Most of these blocks can be performed before anesthesia and surgery under remifentanyl Target Controlled Infusion (TCI)

Induction of anesthesia Pre-oxygenation followed by propofol IV or hypnomidate if cardiac insufficiency and non-depolarizing muscle relaxants.

Classic oral or nasal intubation depending on site, or awake fiberoptic/videolaryngoscope intubation or cricothyroid puncture for jet ventilation under remifentanyl TCI in case of predicted difficult intubation.

Placement of ultrasound-guided invasive arterial line on the side opposite the flap (radial if negative Allen test or femoral or failure).

Pulse wave analysis monitoring for major surgery (EV1000®, pulsioflex®...)

Bispectral index and train of four monitoring of muscle relaxant, urinary catheter with thermal probe and external air heating.

If a jejunum flap: A tunneled femoral central venous catheter guided by ultrasound for postoperative parenteral nutrition should be placed, alternatively jejunostomy / feeding gastrostomy.

Antibiotics for prevention of infection such as Amoxicilline/ acid clavulanic should start before incision but need to be re-injected every 2h and followed for 24 h maximum 12g per 24h.

Maintenance of anesthesia

Remifentanyl TCI

Opioid Free Anesthesia (OFA):

Dexmedetomidine (DEX) 0.3-0.5 µg/kg in 15 min followed by DEX 0.2 to 1 µg/kg/h and a stepwise decrease every 2h in 0.2µg/kg/h and to be stopped 20 min before end of surgery. Ketamine 0.3 mg/kg followed ketamine 0.15 mg/kg to be stopped 1 hour before the end.

Lidocaine 1.5 mg/kg if no regional anesthesia is used intraoperatively followed by 1 mg/kg/h, to be stopped 1 h before the end of the procedure.

Sevoflurane 1 mac or Desflurane 1 mac if BMI > 35.

Protective positive ventilation strategy:

FiO₂ to reach SpO₂ > 95%, tidal volume: 6 à 8 ml/kg, PEP ≥ 5 cmH₂O

Recruitment maneuvers in the absence of hemodynamic instability.

Intraoperative hemodynamic management:

A mean arterial pressure (map) > 64 mmHg as part of goal directed therapy should be emphasize. Hypertension > 150 mmHg systolic should be avoided.

Transfusion if blood hemoglobin's blood drop to 9 g/dl especially after anastomosis

Enoxparin 30UI/kg before clamping.

Anticipation of postoperative analgesia 1 hour before the end of surgery..

Paracetamol, Non Steroidal Anti Inflammatory Drugs, Nefopam, at the end morphine 0.05 to 0.2 mg/Kg monitored by the respiratory frequency.

If tracheostomy is not needed every emergency aspect adapted to the local structure should be emphasized including the possibility of emergency intubation in case of an emergency surgery while difficult extubation should be anticipated with the presence of the surgeon and or devices such as Cook exchange catheter.

Overnight intubation might also be organized with the ICU if necessary.

Discussion

This later clinical protocol update is derived from a combination

of our clinical experiences and scientific publications.

The major updates are concern regional anesthesia for postoperative pain, and OFA. Indeed benefits of these techniques are outranking related risks.

Regional anesthesia: The positive effect of regional anesthesia on postoperative pain scores and decreased opioid consumption or length of hospital stay is documented [5,6].

OFA with DEX appears to be an acceptable alternative to remifentanyl based analgesia benefits include, lesser pain scores at the ICU, hemodynamic stability, less opioid consumption [7,8], however OFA with DEX does not prevent complications due to addiction [9].

Airway control (induction and extubation) are specifically the critical periods for anesthesiologist is these patients, while awake fiberoptic intubation remain a standard approach and awake videolaryngoscopy might also be useful when mouth opening is adequate [10]. Extubation difficulty after surgery is not related to tumor but major concern in these situations is oedema related to surgery, acute postoperative hemorrhage, or the necessity of rapid surgery due flap failure. Several protocol may permit a smooth extubation including tracheotomy, overnight intubation [11], or cook airway exchange catheter extubation [12]. however all of these techniques may have complications for example the cook exchange catheter has a rate of failure around 16% with airway complication such as pneumothorax around 8% [13] . therefore careful assessment with benefice risk is necessary before its use in this context.

With a transfusion risk of 28% in free flap cervicofacial surgery [14] . optimizing transfusion is a major concern in order to maintain adequate oxygen delivery to the new graft, consequently we dropped our optimum hemoglobin level [15]. from 10 to 9 g/dl as a hb of 8.75 g/dl appears to be the optimum cut off for flap survival [16].

Goal directed therapy [17] .with a MAP of 65 mmHg [16] appears to be the accepted cut-off for adequate peripheral perfusion and cardiac output monitoring [18].

The use of Vasopressors in free flap surgery is debated [19]. however we believe that there is no impact of vasopressors on free flap viability [20,21].

On the contrary hemodynamic instability will probably affect graft survival and might also yield cardiovascular complications it must also be emphasized that hypertension can yield hematoma [22,23].

Assessment of geriatric patients by oncogeriatrician is gaining momentum because a growing number of these patients are candidate for this type of reconstruction [24]. this assessment may permit to detect frail subjects and eventually prepare them for such a challenge in order to permit a better outcome including a faster recovery [25,26].

And finally body mass index is reported not to affect free flap failure [27]. however in a prospective case controlled study we could detect a positive correlation with higher BMI and flap failure [15].

Summary

Anesthesia for microvascular flap cancer surgery has specific

considerations and should only be performed in specialized centers. The anesthesia protocol should include the optimization of patients conditions for flap survival without increasing non-surgical morbidity. In addition, preoperative conditioning and intraoperative specific management in collaboration with cervico facial and plastic surgeons are mandatory to permit successful cancer treatment and reconstruction with minimum morbidity.

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