subclavian vein, we encountered six cases of contralateral hydrothorax, which occurred between the first and sixth day of cannulation.

We have documented the mechanism of these complications, using chest radiographs with contrast media, to be the gradual erosion of the right lateral wall of the superior vena cava by the catheter tip. After removal of the central line and chest tube placement, all patients recovered uneventfully.

Two factors should be considered with respect to delayed hydrothorax: first, it appears that the polyethylene catheters are too rigid, particularly at the terminal portion where the tip is often sharp.² Second, comparative studies of anatomic sections in the frontal plane through the innominate vein³ demonstrate that the catheter lies against the inferior border of the left innominate vein, with its stiff tip abutting against the right wall of the superior vena cava. Normal respiratory system movements and cough produce intrathoracic pressure variations and therefore modifications of the initial positioning of the catheter within the venous system. Movement of the catheter will be transmitted to the catheter tip. We suggest that movement of the stiff catheter can produce gradual vein erosion and in some cases perforation, with resulting hydrothorax.

When rigid lines (polyethylene or teflon) are used for left subclavian or left internal jugular vein cannulation, we therefore recommend that the catheter be inserted only to the point where its tip will be in the midline of the thorax (sagittal plane) and will lie in the left innominate vein, short of the superior vena cava. Softer polyurethane catheters, also usable with the Seldinger technique are preferable.

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A plan for the anaesthetic management of a patient coming to surgery

To the Editor:

With a view to assisting medical students, beginning anaesthesia residents, and possibly others, in organizing and applying their theoretical knowledge when faced with a clinical situation in anaesthesia, we wish to present the following plan. The object of this plan is to provide the user with the framework with which he or she can design a rational anaesthetic management plan. A quotation by Winnie¹ is relevant to our objectives in presenting this plan. "The technique to be used in any given case should be determined on the basis of the surgical site, the required level of anaesthesia, and the physical status and habits of the patient, not on the basis of the anaesthetist's bias or training."

We feel that sections I (Preoperative evaluation) and II (Preinduction period) are those portions of anaesthetic management which are most often neglected by beginning trainees and yet they are most important for the safe conduct of anaesthesia.

While a management plan of this type is likely to be in wide use, we are not aware of a previous similar publication. We hope that our plan will assist those beginning their training in anaesthesia, and that it will elicit interest amongst the readers of the Journal.

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- 1 Winnie AP. Plexus Anesthesia. Saunders, Philadelphia, 1983.

A plan for the anaesthetic management of the patient coming to surgery

I PREOPERATIVE EVALUATION: Given clinical situation

1 Problems specifically related to contemplated surgery

2 Information specifically related to anaesthesia

- Full stomach – time from last meal
 - gastro-intestinal disease – increased gastric residue
 - gastro-oesophageal reflux
 - occlusion
- Past anaesthetic history – unexplained postoperative fever or jaundice
 - malignant hyperthermia
 - atypical pseudocholinesterases
 - other anaesthesia-related complications
- Anaesthetic family history – malignant hyperthermia
 - atypical pseudocholinesterases
 - other
- Clinical evaluation (anaesthesia specific) – airway
 - proposed monitoring (Allen test, site of cannulation for CVP or PA catheter)
 - site for possible regional anaesthesia

3 General information

- Allergies
- Medications
- Review of all systems, with special reference to:
 - CNS: epilepsy, increased ICP, stroke, lower motor neuron disease
 - Pulmonary status – asthma, chronic lung disease, smoking history
 - arterial blood gases, chest x-ray, pulmonary function tests
 - Cardiovascular status – hypertension, angina, congestive heart failure, valvular disease, arrhythmias
 - EKG, chest x-ray, haemodynamic studies
 - Gastro-intestinal: full stomach, hepatic disease
 - Endocrine: diabetes, thyroid disease
 - Renal: acute or chronic renal failure
 - Haematologic: anemias, coagulation disorders
 - If present, is disease under optimal control?
 - Other relevant laboratory results
 - Consultations when required to optimize physical status

4 Determine physical status (ASA 1-2-3-4-5-E)

5 Choice of anaesthetic technique

- local
- regional
- general

6 Informed consent

7 Preoperative orders

- pre-operative fast
- usual medications – continued (usual or IV route)?
 - to be changed to alternative drug?
 - discontinued?
- medications related to anaesthesia management – antacids
 - H₂ receptor blockers
 - sedatives
- premedication
- check blood availability

II PRE-INDUCTION PERIOD

1 Evaluate need for help

- second anaesthetist
- assistant

2 Prepare anaesthesia equipment

- anaesthetic machine and circuit
- suction apparatus
- routine drugs (including availability of resuscitative drugs)
- special drugs (according to specific procedure)
- laryngoscope and endotracheal tubes
- warming devices
- calibrated electronic transducers

3 Check patient identification

4 Install non-invasive monitoring equipment

- “machine” monitors – oxygen
 - ventilation
- routine monitors – EKG
 - blood pressure
 - temperature
 - precordial or oesophageal stethoscope
 - peripheral nerve stimulator
- specific monitors – precordial Doppler
 - expired CO₂
 - EEG, cerebral function monitor
 - trans-cutaneous oxygen monitor

5 Intravenous lines: caliber, number, and site of insertion appropriate for contemplated surgery

6 Invasive monitoring equipment

- urinary catheter
- arterial line
- central venous catheter
- pulmonary artery catheter

7 Positioning the patient

- to prevent nerve compressions
- awake if skeletal fragility

III INDUCTION OF ANAESTHESIA

- 1 Regional anaesthesia
 - check equipment
 - proceed with specific procedure
- 2 General anaesthesia
 - mask anaesthesia
 - endotracheal anaesthesia
 - awake intubation
 - intubation under GA – patient breathing spontaneously
 - paralyzed
 - specific induction technique

IV MAINTENANCE OF ANAESTHESIA

- 1 Choice of gaseous agents: appropriate FiO_2 ; air or N_2O
- 2 Volatile agents
- 3 Narcotics
- 4 Muscle relaxants
- 5 Fluids
 - crystalloids
 - blood and blood derivatives
- 6 Choice of ventilatory pattern
 - spontaneous/assisted
 - mechanical: volume/frequency
- 7 Anticipate complications related to specific surgical procedure.

V EMERGENCE

- 1 Regional anaesthesia: according to specific procedure
- 2 General anaesthesia
 - diffusion hypoxia
 - extubation criteria
 - neuromuscular blocking drugs
 - narcotic antagonists

VI RECOVERY ROOM CARE

- 1 Transfer of patient to the recovery room
- 2 Pertinent information transferred to RR personnel
- 3 Evaluate hemodynamic status
- 4 Evaluate respiratory status and prevent hypoxemia
- 5 Postoperative analgesia
- 6 Discharge
 - home (attended)
 - to the ward
 - to the intensive care unit (follow-up)

Plan d'approche du malade devant être anesthésié

1 EVALUATION PRE-OPERATOIRE: Situation clinique donnée

1 Les problèmes en relation avec la chirurgie prévue

2 Renseignements *spécifiques à l'anesthésie*:

- estomac plein – durée du jeûne pré-opératoire
 - pathologie gastro-intestinale – résidu gastrique augmenté
 - reflux gastro-oesophagien
 - occlusion intestinale
- antécédents personnels – fièvre ou ictère post-opératoire inexpliqué
 - hyperthermie maligne
 - pseudocholinestérases atypiques
 - autre complication anesthésique
- antécédents familiaux – hyperthermie maligne
 - pseudocholinestérases atypiques
 - autres
- évaluation clinique – airway
 - selon monitoring prévu (test Allen, site de ponction pour TVC ou PAP)
 - site de ponction pour anesthésie régionale

3 Renseignements *généraux*:

- allergies
- médicaments
- revue de tous les systèmes, avec une attention particulière au système:
 - Nerveux: épilepsie, PIC augmentée, ACV, pathologie du neurone moteur inférieur
 - Pulmonaire – asthme, maladie pulmonaire chronique, tabagisme
 - gaz artériel, RX pulmonaire, épreuves de fonction
 - Cardio-vasculaire – hypertension, angine, insuffisance cardiaque, pathologies valvulaires, arythmies
 - ECG, RX pulmonaire, études hémodynamiques
 - Digestif: estomac plein, pathologie hépatique
 - Endocrinien: diabète, thyroïde
 - Rénal: insuffisance rénale aiguë ou chronique, électrolytes
 - Hématologique: anémies, coagulopathies
- autres résultats de laboratoire pertinents
- consultations au besoin, pour amener le patient en condition optimale

4 Statut physique (ASA 1-2-3-4-5-U)

5 Choix de la technique anesthésique

- locale
- régionale
- générale

6 Consentement éclairé**7 Prescriptions pré-opératoires:**

- période de jeûne
- médicaments usuels à – continuer (administration usuelle ou i.v.)
 - modifier pour R_x équivalent
 - cesser
- médicaments spécifiques à l'anesthésie – antacides
 - bloqueurs des récepteurs H₂
 - sédatifs
- la prémédication
- vérifier disponibilité du sang

II INSTALLATION DU PATIENT EN SALLE D'OPÉRATION**1 La présence d'un confrère ou d'un assistant est-elle nécessaire?****2 Préparation de l'équipement**

- machine d'anesthésie et circuit
- succion
- médicaments de routine (incluant réanimation)
- médicaments spécifiques à la procédure envisagée
- laryngoscopes et tubes endo-trachéaux
- prévention de l'hypothermie
- capteurs de pression calibrés

3 Vérifier l'identité du patient**4 Installation du monitoring non-invasif**

- monitoring "machine": oxymètre, ventilation, débranchement
- monitoring usuel – ECG
 - tension artérielle
 - température
 - stéthoscope précordial ou oesophagien
 - neuro-stimulateur
- monitoring spécifique – Doppler précordial
 - Capnographe
 - EEG, ou autre moniteur de fonction cérébrale
 - PO₂ trans-cutanée

5 Intra-veineuse: calibre, nombre et site d'insertion adéquats pour la chirurgie envisagée**6 Monitoring invasif**

- sonde urinaire
- canule artérielle
- tension veineuse centrale
- pression de l'artère pulmonaire

7 Positionnement du patient

- prévention des compressions nerveuses
- éveillé si fragilité musculo-squelettique

III INDUCTION DE L'ANESTHÉSIE**1 Régionale**

- vérification de l'équipement
- technique spécifique

2 Générale

- au masque
- par voie endo-trachéale
 - intubation éveillée
 - intubation SAG – en respiration spontanée
 - curarisé
- technique d'induction spécifique

IV MAINTIEN

- 1 Choix de l'agent gazeux: FiO₂ adéquate, air vs N₂O
- 2 Volatiles
- 3 Narcotiques
- 4 Curares
- 5 Liquides
 - crystalloïdes
 - sang et dérivés du sang
- 6 Choix du mode de ventilation
 - spontanée/assistée
 - mécanique: volume/fréquence
- 7 Prévoir les complications possibles spécifiques à la chirurgie en cours.

V EMERGENCE

- 1 Régionale: selon la technique employée
- 2 Générale
 - hypoxie de diffusion
 - critères d'extubation
 - décurarisation
 - antagonisme des narcotiques

VI SALLE DE REVEIL

- 1 Transport du patient
- 2 Transfert à l'infirmière des renseignements pertinents
- 3 Ré-évaluation hémodynamique
- 4 Ré-évaluation respiratoire et prévention de l'hypoxie
- 5 Analgésie post-opératoire
- 6 Congé
 - retour à la maison (accompagné si en externe)
 - transfert à l'étage
 - transfert aux soins intensifs

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