Deliberate Hypotension in Anaesthesia

An essay submitted for the fulfillment of
The Master Degree in Anaesthesiology

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بسم الله الرحمن الرحيم

﴿ رب اوزعنى ان اشكر نعمتك التى انعمت

علي

و على والدى و أن أعمل صالحا ترضاه و ادخلنى

برحمتك فى عبادك الصالحين ﴾

صدق الله العظيم

الآية (١٩) سورة النمل

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LIST OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

DH: Deliberate hypotension.

MAP: Mean arterial blood pressure.

V/Q: Ventilation perfusion mismatch.

ICP: Intracranial pressure.

CBF: Cerebral blood flow.

CVS: Cardiovascular system.

CNS: Central nervous system.

GFR: Glomerular filtration rate.

RBF: Renal blood flow.

CO: Cardiac output.

PEEP: Positive end expiratory pressure.

VMC: Vasomotor center.

ATP: Adenosine triphosphate.

GTN: Glyceryl trinitrate.

EEG: Electroencephalogram.

SVR: Systemic vascular resistance.

MAC: Minimum alveolar concentration.

$ETCO_2$: End tidal carbon dioxide.

CPP: Cerebral perfusion pressure.

SNP: Sodium nitroprusside.

CVP: Central Venous pressure.

PRA: Plasma renin activity.

Dinamap: Device for indirect non-invasive automated measurement of arterial blood pressure.

$Paco_2$: Carbon dioxide tension.

ABSTRACT

Deliberate hypotension represents a great challenge to the anaesthetist. Deliberate hypotension is effective in decreasing blood loss and provides better visibility in surgical field. There are corner stones to achieve a safe level of hypotension which maintain adequate perfusion to main vital organs. These corner stones includes: clinical considerations, techniques, monitoring, reversal of hypotension and problems & complications. The precise incidence of complications with deliberate hypotension is difficult to determine so the decision to use deliberate hypotension should not be made in the operating room without careful consideration of the potential complications.

Key words:

Deliberate hypotension – Clinical consideration – Techniques – Problems & complications.

INTRODUCTION

Introduction

Most studies define deliberate hypotension as reduction in systolic blood pressure to 80 to 90 mmHg. According to another definition, deliberate hypotension is a decrease in MAP to 50 to 60 mmHg in normotensive patients [1] and 20-30% from preoperative mean arterial blood pressure in chronic hypertensive patients [2].

The main purpose of deliberate inducing hypotension is to decrease blood loss, thereby improving operating conditions or decreasing the need to blood transfusions. The potentials for transmitting disease by blood transfusion have made deliberate hypotension an even more important consideration today than ever before [3].

The possible benefit to the surgeon is improved visibility of operative field during delicate procedures and major orthopedic procedures e.g. total hip arthroplasty, head and neck surgery, procedures on the cranium, middle ear and radical cancer operations [3].

When considering the many facts of deliberate hypotension the concern of the anesthesiologist should be directed towards not only selection of the most appropriate hypotensive drug but also

the type of surgery, length of the procedure, need to decrease blood loss, and patient suitability [3].

Several techniques are available to induce deliberate hypotension. Physiological techniques like positioning and ventilation. Pharmacological techniques are including volatile anesthetics, direct acting vasodilator drugs, autonomic ganglion blocking drugs, alpha adrenergic blocking drugs, combined α and β adrenergic receptor blocking drugs, calcium channel blocking drugs, prostaglandin E_1. Regional techniques like spinal & epidural anaesthesia. Deliberate hypotension decreases arterial blood pressure by decreasing cardiac output, systemic vascular resistance or both [4].

The effects of hypotension on various organ beds are complex, depending on the drugs used and the magnitude and length of hypotension [3].

Beat to beat measurement of arterial blood pressure, electrocardiography monitoring is mandatory for patients undergoing clinically significant deliberate decrease in arterial blood pressure. Routinely temperature and pulse oximetry are essential [3].

The contraindications to deliberate hypotension have relaxed over the years because of better drugs, monitoring, and more experience with the techniques, However, several contraindications must be considered, cerebrovascular disease, liver dysfunction, renal dysfunction, or severe peripheral claudication suggest that the patient is less likely to have organ perfusion., Patients with severe anemia and hypovolaemia are not suitable candidates [4].

The precise incidence of complications with deliberate hypotension is difficult to determine but it is usually related to the nervous system, anuria and oliguria, postoperative bleeding to the operative side [5].

The decision to use deliberate hypotension should not be made in the operating room without careful consideration of the potential complications [5].

AIM OF WORK

Aim of work

Deliberate Hypotension presents a great challenge to the anesthesiologist. So the aim of this study is to discuss the following items:

- Clinical Considerations which includes:
  - Indications
  - Contraindications
  - Effect on organ function
- Techniques for Deliberate hypotension which includes:
  - Physiological factors
  - Pharmacological methods
  - Regional anaesthesia
- Monitoring.
- Reversal of deliberate hypotension.
- Problems, complications and postoperative care.

CHAPTER 1