Ministry of Higher Education and Scientific Research

University of Alkitab

Medical Technical College/Department of Anesthesia

Hypertension Patient And Anesthesia

A graduation project

The graduation thesis submitted to the presidency in the Department of Anesthesia for partial investigation of the Bachelor's degree in the Department of Anesthesia Techniques through:

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Abstract

A cross-sectional study was conducted on patients undergoing surgery under general anesthesia in the general surgery unit, where 50 samples were collected for both sexes from adults of different ages who were admitted for elective surgery at Sharqat General Hospital, starting from 1/7/2020 and ending on 1 \ 9 \ 2020 .

The result of this study was that all patients suffer from fear before the operation and at different levels. One of the most important difficulties facing the study is the lack of studies on this topic, as the marital status, academic achievement and age group had a clear effect on the level of fear among people, and data were collected. Through interviews with patients before. Half an hour after surgery after verbal approvals are obtained in the preparation room. The ages of the participants in this study ranged between (20-59) years, more than half of them were males (30) people and the rest were women (20) women. The study recommended that patients need psychological support to help them. Dealing with anxiety. Teaching patients relaxation skills is an important duty of individuals undergoing surgery.

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Chapter One

Introduction

1-1 Introduction

Patients with hypertension who undergo anesthesia and surgery have higher rates of morbidity and mortality. Recent advances in our understanding and treatment of hypertension provide an opportunity to improve outcomes [1]. There are still many controversies regarding the perioperative management of hypertensive patients. This review aims to provide relevant instructions based on the evidence regarding the treatment of these patients. Mild to moderate hypertension is not independently responsible for perioperative cardiac complications. The situation is less clear for patients with severe hypertension. A randomized study showed no benefit for the traditional practice of delaying elective surgery in severely hypertensive patients until better blood pressure control was achieved. Perioperative use of beta-blockers or alpha-2 agonists has been shown to maintain perioperative circulation stability and thus prevent major cardiac complications. It may not be necessary to postpone surgery solely for the purpose of controlling blood pressure, especially in the case of mild to moderate hypertension. However, great care must be taken to ensure perioperative hemodynamic stability because fluctuating hemodynamics, rather than preoperative hypertension per se, appears to be closely associated with adverse cardiovascular complications. Emergence from anesthesia and endotracheal extubation may be associated with Hypertension, tachycardia, and elevated plasma catecholamine levels [1]. These responses can lead to heart failure, pulmonary edema, and cerebrovascular haemorrhage, especially in hypertensive patients [2]. Therefore, prevention of these hemodynamic changes during extubation is of particular clinical importance in these patients. Various pharmacological regimens and techniques have been used from time to time to moderate the pressure response to laryngoscopy and intubation, and unfortunately, many of the antihypertensive drugs currently used to control perioperative hypertension have undesirable side effects. Beta-blockers are usually avoided in patients with asthma, COPD and congestive heart failure [3].

1-2 Importance of the study:

Patients with high blood pressure require anesthetic agents and analgesic drugs before surgery, and the single most important reason for preoperative patients is to reduce anxiety because if anxiety is adequately differentiated, it causes all signs of sympathetic stimulation and tension. The heart rate and systolic pressure rise, the skin becomes pale and often sweats, and the veins are characteristically constricted. There may be beats or in extreme circumstances ventricular fibrillation. Greater stress or anxiety before surgery is associated with a slower and more complex recovery during and after surgery[3].

1-3 problem Statement:

Hypertensive Patient And Anesthesia

1-4 Objectives of the study:

1- To assess the level of hypertension before surgery among hypertensive patients.

2- Identifying anesthesia and surgery concerns for hypertensive patients

3- Check the level of high blood pressure caused by anesthesia and/or surgical intervention

4- The various methods adopted to reduce the patient's blood pressure level in such difficult circumstances.

1-5 Definition of terms:

1-5-1 (hypertension):- is a common condition in which the long-term force of the blood against the walls of the arteries is high enough to eventually cause health problems, such as heart disease**.**

1-5-2A patient:- is any person who receives medical attention, care, or treatment. This person is often sick or injured and needs treatment by a doctor or any other medical specialist. A person who visits a doctor for a periodic examination is considered

1-5-4 Anesthesia: insensitivity to pain, especially as artificially induced by the administration of gases or the injection of drugs before surgical operations.

Chapter Two

Literature Review

2-1 High blood pressure (hypertension)

It is a common condition in which the long-term force of the blood against the walls of the arteries is high enough that it can eventually cause health problems, such as heart disease.

Blood pressure is determined by the amount of blood your heart pumps and the amount of resistance to blood flow in your arteries. The more blood your heart pumps and the narrower your arteries, the higher your blood pressure. A blood pressure reading is measured in millimeters of mercury (mm Hg). It has two numbers.

Top number (systolic pressure). The first or top number measures the pressure in your arteries when your heart beats.

The bottom number (diastolic pressure). The second, or lower, number measures the pressure in the arteries between beats.

2-1-1 **Symptoms hypertention:**

Most people with high blood pressure have no signs or symptoms, even if blood pressure readings reach dangerously high levels.A few people with high blood pressure may have headaches, shortness of breath or nosebleeds, but these signs and symptoms aren't specific and usually don't occur until high blood pressure has reached a severe or life-threatening stage.

2-1-2 Causes

There are two types of high blood pressure.

Primary (essential) hypertension

For most adults, there's no identifiable cause of high blood pressure. This type of high blood pressure, called primary (essential) hypertension, tends to develop gradually over many years.

Secondary hypertension

Some people have high blood pressure caused by an underlying condition. This type of high blood pressure, called secondary hypertension, tends to appear suddenly and cause higher blood pressure than does primary hypertension. Various conditions and medications can lead to secondary hypertension, including:

- Obstructive sleep apnea
- Kidney disease
- Adrenal gland tumors
- Thyroid problems
- Certain defects you're born with (congenital) in blood vessels
- Certain medications, such as birth control pills, cold remedies, decongestants, over-the-counter pain relievers and some prescription drugs
- Illegal drugs, such as cocaine and amphetamines

2-1-3 Risk factors

High blood pressure has many risk factors, including:

- **Age.**
- **Race.**
- **Family history.**
- **Being overweight or obese.**
- **Not being physically active. Using tobacco.**
- **Too much salt (sodium) in your diet.**
- **Too little potassium in your diet.**
- **Drinking too much alcohol.**
- **Stress.**
- **Certain chronic conditions**

2-1-4 Complications

The excessive pressure on your artery walls caused by high blood pressure can damage your blood vessels as well as your organs. The higher your blood pressure and the longer it goes uncontrolled, the greater the damage.

Uncontrolled high blood pressure can lead to complications including:

- **Heart attack or stroke.**
- **Aneurysm.**
- **Heart failure.**
- **Weakened and narrowed blood vessels in your kidneys.**
- **Thickened, narrowed or torn blood vessels in the eyes.**
- **Metabolic syndrome.**
- **Trouble with memory or understanding.**
- **Dementia.**

2-4 Anesthesia

Anesthesia or anaesthesia (from Greek "without sensation") is a state of controlled, temporary loss of sensation or awareness that is induced for medical purposes. It may include some or all of analgesia (relief from or prevention of pain), paralysis (muscle relaxation), amnesia (loss of memory), and unconsciousness. A patient under the effects of anesthetic drugs is referred to as being anesthetized. Anesthesia enables the painless performance of medical procedures that would otherwise cause severe or intolerable pain to an unanesthetized patient, or would otherwise be technically unfeasible.

2-4-1 Tow broad categories of anesthesia exist:

1- **General anesthesia**:- suppresses central nervous system activity and results in unconsciousness and total lack of sensation, using either injected or inhaled drugs.
2- **Regional and local anesthesia**:- which blocks transmission of nerve impulses from a specific part of the body. Depending on the situation, this may be used either on its own (in which case the patient remains fully conscious), or in combination with general anesthesia or sedation. Drugs can be targeted at peripheral nerves to anesthetize an isolated part of the body only, such as numbing a tooth for dental work or using a nerve block to inhibit sensation in an entire limb. Alternatively, epidural and spinal anesthesia can be performed in the region of the central nervous system itself, suppressing all incoming sensation from nerves outside the area of the block.

2-4-2 The purpose of anesthesia

The purpose of anesthesia can be distilled down to three basic goals or endpoints:-

1- hypnosis (a temporary loss of consciousness and with it a loss of memory. In a pharmacological context, the word hypnosis usually has this technical meaning, in contrast to its more familiar lay or psychological meaning of an altered state of consciousness not necessarily caused by drugs—see hypnosis).

2- analgesia (lack of sensation which also blunts autonomic reflexes).

3- muscle relaxation

2-4-3 Sedation

Sedation (also referred to as dissociative anesthesia or twilight anesthesia) creates **hypnotic**, **sedative**, **anxiolytic**, **amnesic**, **anticonvulsant**, and centrally produced muscle-relaxing properties. From the perspective of the person giving the sedation, the patient appears sleepy, relaxed and forgetful, allowing unpleasant procedures to be more easily completed. Sedatives such as **benzodiazepines** are usually given with pain relievers (such as **narcotics**, or **local anesthetics** or both) because they do not, by themselves, provide significant **pain relief**[39].

2-4-4 Risks and complications

Risks and complications as they relate to anesthesia are classified as either morbidity (a disease or disorder that results from anesthesia) or mortality (death that results from anesthesia). Quantifying how anesthesia contributes to morbidity and mortality can be difficult because a person's health prior to surgery and the complexity of the surgical procedure can also contribute to the risks.

Direct comparisons between mortality statistics cannot reliably be made over time and across countries because of differences in the stratification of risk factors, however, there is evidence that anesthetics have made a significant improvement in safety.

Morbidity can be major (myocardial infarction, pneumonia, pulmonary embolism, kidney failure/chronic kidney disease, postoperative cognitive dysfunction and allergy) or minor (minor nausea, vomiting, readmission)[38].

Chapter Three Methodology

Methodology

3-1 Design of the study:

A non-experimental descriptive study was conducted starting from 1/3/ 2022 and ending on 1/ 4/ 2020.

3-2 Setting Of The Study:

The study was prepared At Al- Sharqat General Hospital.

3-3 Study stage:

The present study was undertaken in the following stages.

1- A personal interview with the study sample members in their place.

2- The study instrument is a closed questionnaire that was prepared and used to assess the level of hypertension patients before the operation and its effect on anesthesia.

3 – 4 Administrative Arrangement :

For the initiation and initiation of this study, initial consents were obtained, starting from Al-Kitab University and Shirqat General Hospital, and with all these consents, we obtained the consent of the participants prior to commencing with the study questionnaire collection. Topics.

3 –5 Population of the study:

All residents who were interrogated about fear and anxiety were residents of Sharqat specifically in Sharqat General Hospital for different categories, levels of education, different ages, and different social status. For fifty people.

3-6 Sample collection stage

Samples were collected using the questionnaire sheet for the research, which will be attached at the end of the research. The Arabic and English versions were approved for the purpose of asking questions. Researchers distributed questionnaire papers to patients before entering the operating theater for those who will undergo surgery.

3-7 Study obstacles

One of the main obstacles to this study is the lack of adequate studies regarding our topic.

3-8 statistical data analysis

The data were collected and analyzed in a descriptive manner, and the results were presented using an excel program using graphs and statistical tables

This is to use the percentage(%) of results to display and discuss.

Al-Kitab University

Medical technical college

Department of Anesthesiology

The fourth stage

2021-2022

Graduation research

Difference between lidocaine and Marcaine in spinal Anesthesia

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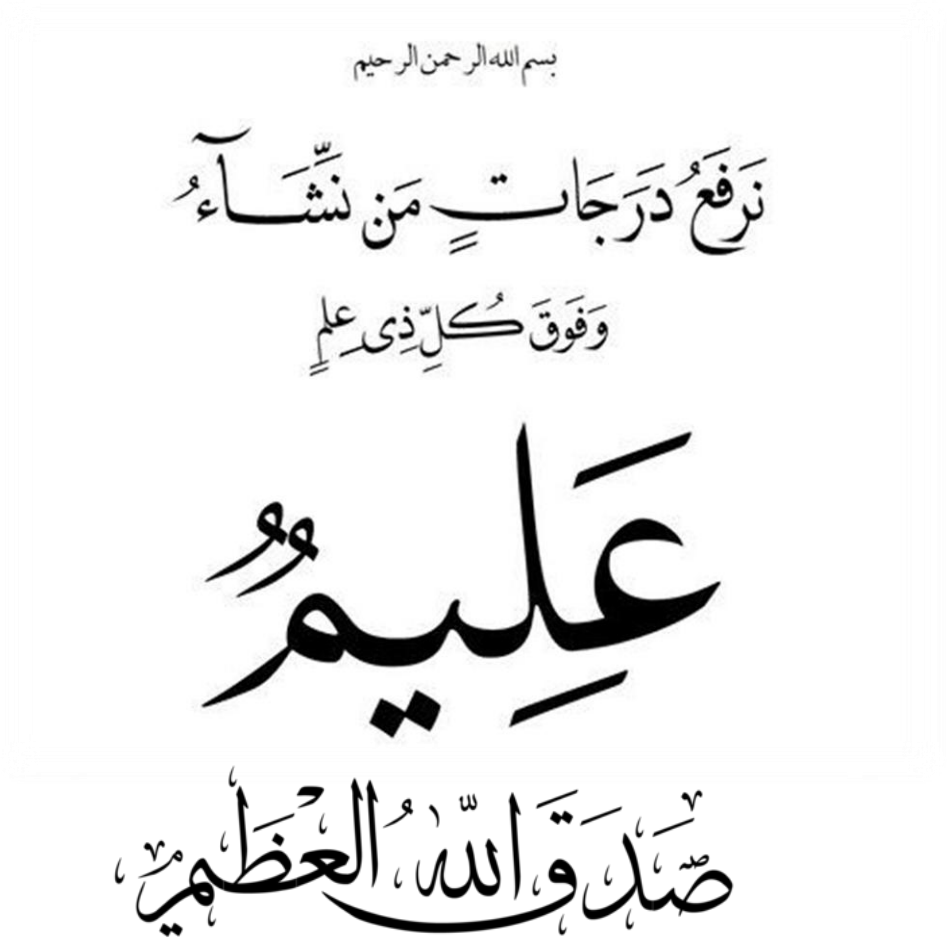

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سورة يوسف : الآية (76)

شكر و تقدير

الحمد لله الذي انعم علينا ليتم هذا العمل وله الحمد اولاً وآخرا والسلام على سيد المرسلين محمد صلى الله عليه وعلى آلهِ وصحبهِ وسلم.

ونحن ننهي بحثنا هذا يسرنا ويسعدنا ان نقدم خالص الشكر وعظيم الأمتنان لأستاذنا الفاضل د.أياد نجم لتفضله بالإشراف على هذا البحث ومتابعته العلمية الجادة وتوفير كل مستلزمات نجاحنا في هذا البحث وما لقيناه منه من رعاية أبوية صادقة ومعاملة كانت غاية في الطيب واعطانا معلوماته التي لم يبخل علينا بشيء منها وهذا كله أوجد في نفسنا كل الاحترام والتقدير الأمر الذي حثنا على السير الحثيث قدما نحو تطلعات مستقبلية اكبر.

INTRODUCTION

Spinal anesthesia is a type of neuraxial anesthesia; local anesthetic (LA) is injected into cerebrospinal fluid (CSF) in the lumbar spine to anesthetize nerves that exit the spinal cord. Spinal anesthesia is most commonly used for anesthesia and /or analgesia for a variety of lower extremity, lower abdominal, pelvic, and perineal procedures. Spinal anesthesia is also .occasionally used for spine surgery

Spinal anesthesia is performed by placing a needle between the lumbar .vertebrae and through the dura to inject anesthetic medication

The central nervous system (CNS) comprises the brain and spinal cord. The term neuraxial anesthesia refers to the placement of local anesthetic in or around the CNS. Spinal anesthesia is a neuraxial anesthesia technique in which local anesthetic is placed directly in the intrathecal space (subarachnoid space). The subarachnoid space houses sterile cerebrospinal fluid (CSF), the clear fluid that bathes the brain and spinal cord. There are roughly about 130 to 140 mL of CSF in an adult human which continually cycles throughout the day. Approximately 500 mL of CSF gets produced daily.

INTRODUCTION

Neuraxial anesthesia is used as a sole anesthetic or in combination with general anesthesia for most procedures below the neck. As mentioned in the introduction, spinal anesthesia is in common use for surgical procedures involving the lower abdomen, pelvis, perineal and lower extremities; it is .beneficial for procedures below the umbilicus

There needs to be patient counseling regarding the procedure, and signed informed consent is necessary. Since the procedure is usually performed on awake or slightly sedated patients, the indication for spinal anesthesia and what to expect during placement of neuraxial, risks, benefits, and alternative procedures are some of the discussions that can help allay anxiety. It is crucial to let patients understand that they will have little or no ability to .move their lower extremities until the resolution of the block

Spinal anesthesia is best for short procedures. For more extended procedures or procedures that would compromise respiration, general anesthesia is usually preferable.

THE THEORETICAL PART

A prospective, randomized study was conducted during the years 2013–2014 in King Abdul-Aziz hospital in Kingdom of Saudi Arabia. Patients were scheduled for elective knee arthroscopy like arthroscopic exploration of knee last only 10 min up to 1 h, whereas operation of meniscus, capsules and ligaments, on synovial of the knee and longer operation for osteochondritis or severe osteomyelitis was excluded. The study enrolled 50 patients who were American Society of Anesthesiologists (ASA) physical status I and II, aged 18–60 years, and from both sexes. Exclusion criteria were unwilling patients, coagulopathies, cardiac diseases, hypertensive patients, neurological disorders, spinal deformity and patients with skin infection of the back at site of lumbar block. Patients received 10 mg of oral diazepam and prophylactic antibiotics. All patients were preloaded with 500 mL of 0.9% saline. Standard monitoring (electrocardiogram, noninvasive blood pressure and pulse oximetry) was used for all patients. Hypotension and bradycardia were defined as a decrease >20% of base-line of blood pressure or heart rate, and treated by ephedrine or atropine respectively.

THE THEORETICAL PART

A tourniquet around the thigh, inflated 300–350 mmHg, was used in the operative extremity after anesthesia. Under all aseptic precautions, after infiltrating the skin with local anesthetic, subarachnoid block was performed with 25 Gauge, Quincke-Babcock spinal needle (Becton-Dickinson) as midline approach at L3–4 intervertebral space.

Fifty patients were randomized by a computer generated random number table and by 1:1 ratio into two groups of 25 each. Group B (Bupivacaine group) or unilateral spinal group: Patients injected with 3 mg hyperbaric Bupivacaine (Astra Zeneca, USA) 0.5% (0.6 ml) plus fentanyl (Janssen Cilag, Belgium) 10 μg (0.2 ml) total volume was 0.8 ml. The study drug was injected by rate 0.4 ml/min (over 2 min).

The specific gravity of the solution containing marcaine and fentanyl (3:1) was 1.026 at 20°C. Intrathecal injection was done on the lateral decubitus position on the operative limb. Patients remained on that position for 20 min then turned on supine position. The bevel of the needle was turned laterally towards the nerve roots involved. Group B patients came 30 min early to the operating room (OR) to avoid delaying OR time. Group L (lidocaine group) or bilateral spinal group: Patients received intrathecal injections with lidocaine (Hospira, USA) 2% 1 ml (20 mg) plus fentanyl 25 μg (0.5 ml) then

THE THEORETICAL PART

Completed to 3 ml by sterile water for injection. Patients injected on sitting a position over 10 s then immediately turn to the supine position. Lidocaine solution was hypobaric and had specific gravity 1.002. The direction of the bevel of the needle oriented caudally. In both groups; Sensory level and motor block were assessed by pinprick and modified Bromage scale

(0 = full movement, 1 = movement of knee only, 2 = movement of ankles only, and 3 = no movement) .

respectively, every 5 min after lidocaine till establishing fixed sensory level (two consecutive assessment) and every 5 min till 30 min after Bupivacaine then at the end of surgery and in recovery room every 15 min till discharging home.

The response to surgical stimulation was evaluated by ordinal scale (none, mild and severe), the rescue analgesia started from fentanyl 100 μg intravenous (I.V.) till turned to general anesthesia (GA) and it was considered failure of spinal anesthesia which recorded and excluded from the study. Acceptable operating condition was recorded from the surgeon as scale (excellent = 3, good = 2, fair = 1 and bad = 0) by same surgeon. The duration of sensory block judged as time from the block till first postoperative analgesia required by the patients. The duration of motor block by starting from the return to Bromage scale of 0–1. Tourniquet tolerance time was recorded and compared between groups

(patients start to complain from Tourniquet). Intraoperative hypotension or bradycardia was reported and managed in both groups. Postoperative pain was assessed by visual analogue score from (0 = no pain and 10 = the worst pain imaginable) and postoperative analgesia was given according to it as pethidine 1 mg/kg I.V. or paracetamol 1 g I.V. The criteria to transfer to ambulatory surgical unit (ASU) were full recovery from motor block and sensory block not above T12, vital stability and no pain. If the mentioned criteria were fulfilled at the end of the operation after releasing of the tourniquet, the patient bypassed post-anesthesia care unit (PACU); it was fast-tracked. After SSA the PACU discharge was evaluated by using both the new fast-tracking scoring system.

(modified Aldrete's score plus pain and postoperative nausea and vomiting [PONV] assessment) and minimum score was 12/14 with no zero scores was required for the patients to be fast-tracked.

LIDOCAINE DRUG

Lidocaine, also known as lignocaine and sold under the brand name Xylocaine among others, is a local anesthetic of the amino amide type. It is also used to treat ventricular tachycardia.When used for local anaesthesia or in nerve blocks, lidocaine typically begins working within several minutes and lasts for half an hour to three hours.Lidocaine mixtures may also be applied directly to the skin or mucous membranes to numb the area.It is often used mixed with a small amount of adrenaline (epinephrine) to prolong its local effects and to decrease bleeding.

Medical uses

- Local numbing agent

The efficacy profile of lidocaine as a local anaesthetic is characterized by a rapid onset of action and intermediate duration of efficacy. Therefore, lidocaine is suitable for infiltration, block, and surface anaesthesia. Longer-acting substances such as bupivacaine are sometimes given preference for spinal and epidural anesthesia's; lidocaine, though, has the advantage of a rapid onset of action. Adrenaline vasoconstricts arteries, reducing bleeding and also delaying the resorption of lidocaine, almost doubling the duration of anesthesia.

LIDOCAINE DRUG

- Heart arrhythmia

Lidocaine is also the most important class-1b antiarrhythmic drug; it is used intravenously for the treatment of ventricular arrhythmias (for acute myocardial infarction, digoxin poisoning, cardioversion, or cardiac catheterization) if amiodarone is not available or contraindicated.

- Epilepsy

- Other

Intravenous lidocaine infusions are also used to treat chronic pain and acute surgical pain as an opiate sparing technique. The quality of evidence for this use is poor so it is difficult to compare it to placebo or an epidural.

- Lidocaine side effects

- CNS excitation: nervousness, agitation, anxiety, apprehension, tingling around the mouth (circumoral paranesthesia), headache, hyperesthesia, tremor, dizziness.
- exposure: drowsiness, lethargy, slurred speech, hypoesthesia, confusion, disorientation, loss of consciousness.
- Cardiovascular: hypotension, bradycardia, arrhythmias, flushing, venous insufficiency, increased defibrillator threshold, edema, and/or cardiac arrest – some of which may be due to hypoxemia secondary to respiratory depression.
- Respiratory: bronchospasm, dyspnea, respiratory depression or arrest
- Gastrointestinal: metallic taste, nausea, vomiting

LIDOCAINE DRUG

- Ears: tinnitus
- Eyes: local burning, conjunctival hyperemia, corneal epithelial changes/ulceration, diplopia, visual changes (opacification(
- Skin: itching, depigmentation, rash, urticaria, edema, angioedema, bruising, inflammation of the vein at the injection site, irritation of the skin when applied topically
- Blood: methemoglobinemia
- Allergy

MARCAINE DRUG

Bupivacaine, marketed under the brand name Marcaine among others, is a medication used to decrease feeling in a specific area. In nerve blocks, it is injected around a nerve that supplies the area, or into the spinal canal's epidural space. It is available mixed with a small amount of epinephrine to increase the duration of its action. It typically begins working within 15 .minutes and lasts for 2 to 8 hours

Possible side effects include sleepiness, muscle twitching, ringing in the ears, changes in vision, low blood pressure, and an irregular heart rate. Concerns exist that injecting it into a joint can cause problems with the cartilage. Concentrated bupivacaine is not recommended for epidural freezing. Epidural freezing may also increase the length of labor. It is a local anesthetic of the amide group.

Medical uses

Bupivacaine is indicated for local infiltration, peripheral nerve block, sympathetic nerve block, and epidural and caudal blocks. It is sometimes used in combination with epinephrine to prevent systemic absorption and extend the duration of action. The 0.75% (most concentrated) formulation is used in retro bulbar block. It is the most commonly used local anesthetic in epidural anesthesia during labor, as well as in postoperative pain management. Liposomal formulations of bupivacaine (brand name EXPAREL) have shown to be more effective in providing pain relief than plain solutions of bupivacaine.

MARCAINE DRUG

- Marcaine side effects

Compared to other local anesthetics, bupivacaine is markedly cardiotoxic.However, adverse drug reactions are rare when it is administered correctly. Most reactions are caused by accelerated absorption from the injection site, unintentional intravascular injection, or slow metabolic .degradation. However, allergic reactions can rarely occur

Clinically significant adverse events result from systemic absorption of bupivacaine and primarily involve the central nervous and cardiovascular systems. Effects on the central nervous system typically occur at lower blood plasma concentrations. Initially, cortical inhibitory pathways are selectively inhibited, causing symptoms of neuronal excitation. At higher plasma concentrations, both inhibitory and excitatory pathways are inhibited, causing central nervous system depression and potentially coma. Higher plasma concentrations also lead to cardiovascular effects, though cardiovascular collapse may also occur with low concentrations.Adverse effects on the central nervous system may indicate impending cardiotoxicity and should be carefully monitored.

FENTANYL DRUG

Fentanyl, also spelled fentanil, is a powerful opioid used as a pain medication and, together with other medications, for anesthesia. It is also used as a recreational drug, sometimes mixed with heroin, cocaine, or methamphetamine. Its potentially deadly overdose effects can be neutralized by naloxone.Fentanyl is commonly used to create counterfeit pills disguised as OxyContin, Xanax, Adderall, among others. It has a rapid onset and its effects generally last under two hours.Medically, it is used by injection, nasal .spray, or skin patch, or absorbed through the cheek as a lozenge or tablet

Common side effects of fentanyl include nausea, vomiting, constipation, itching, sedation, confusion, and injuries related to poor coordination.Serious side effects may include respiratory depression, hallucinations, serotonin .syndrome, low blood pressure, or development of an opioid use disorder

Fentanyl works primarily by activating μ-opioid receptors. It is around 100 times stronger than morphine and about 50 times stronger than heroin. Some fentanyl analogues such as carfentanil are up to 10,000 times stronger than morphine.

FENTANYL DRUG

Medical uses

- Anesthesia

Intravenous fentanyl is often used for anesthesia and to treat pain. To induce anesthesia, it is given with a sedative-hypnotic, like propofol or thiopental, and a muscle relaxant. To maintain anesthesia, inhaled anesthetics and additional fentanyl may be used. These are often given in 15–30 minute intervals throughout procedures such as endoscopy and surgeries and in emergency rooms.

Regional anesthesia

- Fentanyl is the most commonly used intrathecal opioid because its lipophilic profile allows a quick onset of action (5–10 min.) and intermediate duration of action (60–120 min.). Spinal administration of hyperbaric bupivacaine with fentanyl may be the optimal combination. The almost immediate onset of fentanyl reduces visceral discomfort and even nausea during the procedure.

FENTANYL DRUG

Obstetrics

Fentanyl is sometimes given intrathecally as part of spinal anesthesia or epidurally for epidural anaesthesia and analgesia. Because of fentanyl's high lipid solubility, its effects are more localized than morphine, and some clinicians prefer to use morphine to get a wider spread of analgesia. It is widely used in obstetrical anesthesia because of its short time to action peak (about 5 min.), the rapid termination of its effect after a single dose, and the occurrence of relative cardiovascular stability.

Pain management

The bioavailability of intranasal fentanyl is about 70–90%, but with some imprecision due to clotted nostrils, pharyngeal swallow, and incorrect administration. For both emergency and palliative use, intranasal fentanyl is available in doses of 50, 100, and 200 µg. In emergency medicine, safe administration of intranasal fentanyl with a low rate of side effects and a promising pain-reducing effect was demonstrated in a prospective observational study in about 900 out-of-hospital patients.

FENTANYL DRUG

Fentanyl side effects

- upper respiratory infection
- urinary retention
- Cardiac arrest and ST-segment elevation
- sinusitis
- Application site reaction, erythema 14%
- headache 9%
- itch 6%
- urinary retention 3%
- Anemia 3%
- %2drop in blood pressure
- Body as a Whole: Abdominal pain, back pain, pain in the extremities, chest pain, chills, abdominal distension, asthenia, abscess, hypothermia
- Cardiovascular system: syncope, postural hypotension, vasodilatation, hypertension, atrial fibrillation, bradycardia, tachycardia, twins, arrhythmia, myocardial infarction
- Digestive system: constipation, flatulence, indigestion, ileus, dry mouth, diarrhea
- Metabolic and nutritional system: peripheral edema, abnormal healing, edema, and dehydration
- Musculoskeletal system: leg cramps, myalgia
- Nervous system: insomnia, anxiety, drowsiness, confusion, paresthesia, dysesthesia, nervousness, agitation, abnormal dreams, tremor
- Respiratory: hypoxia, hypoventilation, dyspnea, apnea, increased cough, asthma, hiccups, atelectasis, rhinitis, hyperventilation

COMPARISON

WHAT IS XYLOCAINE ?

Xylocaine (lidocaine HCl) Injection is a local anesthetic used for local or regional anesthesia.

WHAT IS MARCAINE ?

Marcaine (bupivacaine hydrochloride) Injection is an anesthetic (numbing medicine) used as a local (in one area) anesthetic for a spinal block.

ARE XYLOCAINE AND MARCAINE THE SAME THING ?

-Xylocaine (lidocaine) and Marcaine (bupivacaine hydrochloride) are local anesthetics (numbing medicines used in one area)

-Marcaine is longer acting and used for a spinal block. Lidocaine is used for local or regional anesthesia. A brand name for lidocaine injection is Xylocaine.

COMPARISON

WHAT ARE POSSIBLE SIDE EFFECTS OF XYLOCAINE ?

Common side effects of Xylocaine include :

- **nausea**
- **dizziness**
- **numbness in places where the medicine is accidentally applied, or**
- **bruising, redness, itching, or swelling where the medication was injected**

Unlikely but serious side effects of Xylocaine include:

- drowsiness,
- mental/mood changes,
- ringing in the ears,
- dizziness,
- vision changes,
- tremors,
- numbness,
- headache, or
- backache.

COMPARISON

WHAT ARE POSSIBLE SIDE EFFECTS OF MARCAINE?

Common side effects of Marcaine include:

- **nausea,**
- **vomiting,**
- **chills or shivering,**
- **headache,**
- **back pain,**
- **dizziness,**
- **problems with sexual function,**
- **restlessness,**
- **anxiety,**
- **dizziness,**
- **ringing in the ears,**
- **blurred vision, or**
- **tremors.**

WHAT DRUGS INTERACT WITH XYLOCAINE?

Xylocaine may interact with monoamine oxidase inhibitors (MAOIs), antidepressants, phenothiazines, butyrophenones, vasopressor drugs, ergot-type oxytocic drugs, or drugs that can cause drowsiness such as medicine for sleep, sedatives, tranquilizers, anti-anxiety drugs, narcotics, psychiatric medicines, anti-seizure drugs, muscle relaxants, or antihistamines. Tell your doctor all medications and supplements you use.

WHAT DRUGS INTERACT WITH MARCAINE?

Marcaine may interact with blood thinners, ergot medicines, MAO inhibitors, or antidepressants. Tell your doctor all medications you use. During pregnancy, Marcaine should be used only if prescribed. This medication may be harmful to a fetus.

COMPARISON

HOW SHOULD XYLOCAINE BE TAKEN?

For normal healthy adults, the individual maximum recommended dose of Xylocaine should not exceed 4.5 mg/kg (2 mg/lb) of body weight, and in general it is recommended that the maximum total dose does not exceed 300 mg.

HOW SHOULD MARCAINE BE TAKEN?

The dose of Marcaine varies with the anesthetic procedure, the area to be anesthetized, the vascularity of the tissues, the number of segments to be blocked, the depth of anesthesia and degree of muscle relaxation required, the duration of anesthesia desired, individual tolerance, and the physical condition of the patient. The smallest dose and concentration required to produce the desired result should be administered.

The Practical Part

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Respiratory Effect of covid19 on pregnant woman

A project report
Submitted to the council of the College of Medical Technology
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In partial fulfillment of the requirement for the degree for bachelor in the Medical Anesthesia Technique

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Researchers

CHAPTER ONE
INTRODUCTION

1.1 Overview

Corona virus comprises of a large family of viruses that are common in human beings as well animals (camels, cattle, cats, and bats). There are seven different strains of corona virus. [15]

229E (alpha coronavirus)
NL63 (alpha coronavirus)
OC43 (beta coronavirus)
HKU1 (beta coronavirus)
MERS-CoV (the beta coronavirus that causes Middle East Respiratory Syndrome, or MERS)
SARS-CoV (the beta coronavirus that causes severe acute respiratory syndrome, or SARS)
SARS-CoV-2 (the novel coronavirus that causes coronavirus disease 2019, or COVID-19)

Sometimes corona virus from animals infect people and spread further via human to human transmission such as with MERS-CoV, SARS-CoV, and now with this COVID 19 (Corona disease 2019). The virus that causes COVID-19 is designated severe

acute respiratory syndrome corona virus 2 (SARS-CoV-2); previously, referred to as 2019-nCoV Towards December 2019, this novel corona virus was identified as a cause of upper and lower respiratory tract infections in Wuhan, a city in the Hubei Province of China. It rapidly spread, resulting in an epidemic throughout China and then gradually spreading to other parts of the world in pandemic proportions. It has affected almost every continent in this world, except Antarctica. In February 2020, the World Health Organization designated the disease COVID-19, which stands for corona virus disease 2019

1.2 Aim of this research

The aim of this project is to study Covid 19 and Respiratory effect of on pregnancy Woman

1.3 Arrangement of research

- Chapter ONE will be a general introduction
- Chapter TWO will include COVID 19 and it Respiratory effect on human body and Clinical Features
- Chapter THREE will be taken into consideration pregnancy woman
- Chapter FOUR will focus on effect Covid 19 on of pregnancy Woman
- Chapter FIVE will be a conclusion and Recommendations of the research.

CHAPTER TWO
Covid-19

2.1. Introduction

Epidemiology

Since the first reports of cases from Wuhan, at the end of 2019, more than 80,000 COVID-19 cases have been reported in China; including all laboratory-confirmed cases as well as clinically diagnosed cases in the Hubei Province. Increasing numbers of cases have also been reported in other countries across all continents except Antarctica. The rate of new cases outside of China has outpaced the rate in China which led world health organiza- tion (WHO) to declare COVID-19 as a pandemic.

Updated till: March 21st 2020

Covid-19 Case	Deaths	Recovered
2,77,049	**11,422**	**91,986**

Table: 2.1 Updated till: March 21st 2020

2-2 Clinical Features

Incubation period

The exact incubation period is not known. It is presumed to be between 2 to 14 days after exposure, with most cases occurring within 5 days after exposure [8, 9, and 10].

The spectrum of illness severity

Most infections are self limiting. COVID-19 tends to cause more severe illness in elderly population or in patients with underlying medical problems. As per the report from Chinese center for disease control and prevention that included approximately 44,500 confirmed Infections with an estimation of disease severity

• Mild illness was reported in 81% patients
• Severe illness (Hypoxemia, >50% lung involvement on imaging within 24 to 48 hours) in 14%
• Critical Disease (Respiratory failure, shock, multi-organ dysfunction syndrome) was reported in 5 percent
• Overall case fatality rate was between 2.3 to 5%

Age affected

- Mostly middle aged (>30 years) and elderly.
- Affects pregnant women
- Symptomatic infection in children appears to be uncommon, and when it occurs, it is usually mild

Clinical Presentation

In a study describing 1099 patients with COVID-19 pneumonia in Wuhan, the most common clinical features at the onset of illness were

•Fever in 88% •Fatigue in 38% •Dry cough in 67% •Myalgias in 14.9% •Dyspnea in 18.7%

Pneumonia appears to be the most common and severe manifestation of infection.

In this group of patients breathing difficulty developed after a median of five days of illness. Acute respiratory distress syndrome developed in 3.4% of patients.

2-3 Other symptoms
•Headache
•Sore throat
•Rhinorrhea
•Gastrointestinal symptoms
About 80% of confirmed COVID-19 cases suffer from only mild to moderate disease and nearly 13% have severe disease (dyspnea, respiratory frequency ≥30/minute, blood oxygen saturation≤93%, PaO2/FiO2 ratio <300, and/or lung infiltrates >50% of the lung field within 24-48 hours).
Critical illness (respiratory failure, septic shock, and/or multiple organ dysfunction/failure) is noted in only in less than 6% of cases.

Chapter three
Pregnancy

3-1 Overview

Pregnancy occurs when a sperm fertilizes an egg after it's released from the ovary during ovulation. The fertilized egg then travels down into the uterus, where implantation occurs. A successful implantation results in pregnancy..

On average, a full-term pregnancy lasts 40 weeks. There are many factors that can affect a pregnancy. Women who receive an early pregnancy diagnosis and prenatal6 care are more likely to experience a healthy pregnancy and give birth to a healthy baby.

Knowing what to expect during the full pregnancy term is important for monitoring both your health and the health of the baby. If you'd like to prevent pregnancy, there are also effective forms of birth control you should keep in mind.

3-2 Symptoms of pregnancy You may notice some signs and symptoms before you even take a pregnancy test. Others will appear weeks later, as your hormone levels change.

3-3 Missed period A missed period is one of the earliest symptoms of pregnancy (and maybe the most classic one). However, a missed period doesn't necessarily mean you're pregnant, especially if your cycle tends to be irregular.

Headache: Headaches are common in early pregnancy. They're usually caused by altered hormone levels and increased blood volume. Contact your doctor if your headaches don't go away or are especially painful.

Spotting: Some women may experience light bleeding and spotting in early pregnancy. This bleeding is most often the result of implantation. Implantation usually occurs one to two weeks after fertilization.

Early pregnancy bleeding can also result from relatively minor conditions such as an infection or irritation. The latter often affects the surface of the cervix (which is very sensitive during pregnancy).

Bleeding can also sometimes signal a serious pregnancy complication, such as miscarriage, ectopic pregnancy, or placenta previa.

3-4 Pregnancy-induced hypertension High blood pressure, or hypertension, sometimes develops during pregnancy. A number of factors can increase your risk, including:

- being overweight or obese
- smoking
- having a prior history or a family history of pregnancy-induced hypertension

Hormones released during pregnancy can sometimes relax the valve between your stomach and esophagus. When stomach acid leaks out, this can result in heartburn.

Chapter FOUR

Respiratory Effect of COVID-19 On Pregnant Woman

4-1 Coronavirus disease 2019 (COVID-19) is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and is an emerging disease. There has been a rapid increase in cases and deaths since it was identified in Wuhan, China, in early December 2019, with over 4,000,000 cases of COVID-19 including at least 250,000 deaths worldwide as of May 2020. However, limited data about the clinical characteristics of pregnant women with COVID-19 have been reported. Given the maternal physiologic and immune function changes during pregnancy, pregnant women may be at a higher risk of being infected with SARS-CoV-2 and developing more complicated clinical events. Information on severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS) may provide insights into the effects of COVID-19's during pregnancy. Even though SARS and MERS have been associated with miscarriage, intrauterine death, fetal growth restriction and high case fatality rates, the clinical course of COVID-19 pneumonia in pregnant women has been reported to be similar to that in non-pregnant women. In addition, pregnant women do not appear to be at a higher risk of catching COVID-19 or suffering from more severe disease than other adults of similar age. Moreover, there is currently no evidence that the virus can be transmitted to the fetus during pregnancy or during childbirth. Babies and young children are also known to only experience mild forms of COVID-19.Around the end of December 2019, a new beta-coronavirus from Wuhan City, Hubei Province, China began to spread rapidly. The new virus, called SARS-CoV-2, which could be transmitted through respiratory droplets, had a range ofmild to severe symptoms, from simple cold in some cases to death in others. The disease caused by SARS-CoV-2 was named COVID-19 by WHO and has so far killed more people than SARS and MERS. Following

the widespread global outbreak of COVID-19, with more than 132758 confirmed cases and 4955 deaths worldwide, the World Health Organization declared COVID-19 a pandemic disease in January 2020.Earlier studies on viral pneumonia epidemics has shown that pregnant women are at greater risk than others. During pregnancy, the pregnant woman is more prone to14 infectious diseases. Research on both SARS-CoV and MERS-CoV, which are pathologically similar to SARS-CoV-2, has shown that being infected with these viruses during pregnancy increases the risk of maternal death, stillbirth, intrauterine growth retardation and, preterm delivery. With the exponential increase in cases of COVID-19 throughout the world, there is a need to understand the effects of SARS-CoV-2 on the health of pregnant women, through extrapolation of earlier studies that have been conducted on pregnant women infected with SARS-CoV, and MERS-CoV. There is an urgent need to understand the chance of vertical transmission of SARS-CoV-2 from mother to fetus and the possibility of the virus crossing the placental barrier. Additionally, since some viral diseases and antiviral drugs may have a negative impact on the mother and fetus, in which case, pregnant women need special attention for the prevention, diagnosis, and treatment of COVID-19.

4-2 Investigating the Impact of COVID-19 During Pregnancy
Based on what is known at this time, pregnant and recently pregnant women are at an increased risk for severe illness from COVID-19 compared to nonpregnant women. Additionally, pregnant women with COVID-19 are at increased risk for preterm birth and might have an increased risk of other adverse pregnancy outcomes.

CDC is supporting multiple efforts to understand the impact of COVID-19 on pregnant women and infants. Data collected as part of these efforts can help direct public health action and inform clinical guidance for the care of affected pregnant women and their infants.

Pregnancy and Neonatal Surveillance Health departments report cases of COVID-19 to CDC, including cases among pregnant women.
Health departments can also submit their data on COVID-19 cases among pregnant women and infants up to 6 months of age to CDC through an existing surveillance activity—Surveillance for Emerging Threats to Mothers and Babies Network (SET-NET). Data collected include information about the following: Timing of SARS-CoV-2 infection (the virus that causes COVID-19) during pregnancy Severity of COVID-19 disease Outcome of the pregnancy Whether the newborn was also diagnosed with COVID-19 Supplement CDC's Division of Reproductive Health is collaborating with the Council of State and Territorial Epidemiologists external iconto provide support and resources to state, tribal, local, and territorial public health agencies to add a COVID-19 questionnaire supplement to existing maternal and infant health surveillance systems. One example is the Pregnancy Risk Assessment Monitoring System (PRAMS), which routinely collects population-based data on maternal behaviors and experiences before, during and shortly after pregnancy. The questionnaire supplement collects data on the effect of COVID-19 on pregnant and postpartum women and infants. Findings will inform federal, state, local, tribal, and territorial public health response activities to support pregnant and postpartum women and infants.

4-3 Effect of COVID-19 on pregnant women
Pregnant women do not appear more likely to contract the infection than the general population.
The majority of pregnant women who are infected with SARS-CoV-2 will be asymptomatic: the PregCOV-19 Living Systematic Review13 reporting on universal screening in pregnancy found an estimated 74% (95% CI 51–93) of women were asymptomatic, while another study14 from the USA reported that 86% of women who were admitted in labour and who tested positive for SARS-CoV-2 were asymptomatic.

Most symptomatic women experience only mild or moderate cold/flu-like symptoms.15 The PregCOV-19 systematic review13 has so far included over 64 000 pregnant women worldwide with suspected or confirmed COVID-19 (repor ted prior to 29 November 2020). In this review, the most common symptoms of COVID-19 in pregnant women were cough (41%) and fever (40%). Less frequent symptoms were dyspnoea (21%), myalgia (19%), loss of sense of taste (14%) and diarrhoea (8%). Pregnant women with COVID-19 were less likely to have fever or myalgia than non-pregnant women of the same age.The PRIORITY (Pregnancy CoRonavirus Outcomes RegIsTry) study,16 an ongoing prospective cohort study of pregnant women from the United States, found the most prevalent first symptoms in infected women were cough (20%), sore throat (16%), myalgia (12%) and fever (12%). In this group of 594 symptomatic women, one-quarter had persistent symptoms 8 or more weeks after onset.At present, it is unclear whether pregnancy will impact on the proportion of women who develop prolonged signs and symptoms after an acute SARS-CoV-2 infection, (so-called 'long COVID' or post COVID-19 condition). NICE has produced a rapid guideline outlining the care of individuals who develop long-term effects of COVID19

4-4 Severe illness with COVID-19 in pregnant women
Key findings

- More than two-thirds of pregnant women with COVID-19 are asymptomatic.
- Compared to non-pregnant women with COVID-19, pregnant women with COVID-19:

o have higher rates of intensive care unit (ICU) admission; this may reflect a lower threshold for admission to ICU, rather than more severe disease.
o are not at increased risk of death from COVID-19, according to the largest systematic review.

o were however found in more recent data from the USA and Mexico to have a slightly higher risk of death in these specific national healthcare settings.

Compared to pregnant women without COVID-19, pregnant women with symptomatic COVID-19 requiring hospitalisation have overall worse maternal outcomes, including an increased risk of death, although that risk remains very low (the UK maternal mortality rate from COVID-19 is 2.2 per 100 000 maternities).

4-5 Frequency of severe illness in pregnant women

COVID-19 ranges from asymptomatic infection, through to mild disease (no evidence of pneumonia or hypoxia), moderate disease (viral pneumonia), severe disease (severe pneumonia, e.g. with SpO2 below 90% on room air) and critical disease (Acute Respiratory Distress Syndrome [ARDS], sepsis, septic shock, or complications such pulmonary embolism or acute coronary syndrome).

Severe illness, such as that requiring ICU admission, is relatively uncommon in women of reproductive age, but can occur. During the initial wave of the pandemic, there were case reports and case series of women with severe COVID-19 infection at the time of birth who have required ventilation and extracorporeal membrane oxygenation (ECMO),18 and of maternal death.19 In the PregCOV-19 Living Systematic Review Consortium analysis,13 73/11 580 women with confirmed COVID-19 were recorded as having died of any cause, and 16/1935 women required ECMO.A large US study20 published in January 2021 compared outcomes for pregnant women with and without COVID-19 from April–November 2020, drawing the information retrospectively from a database that covers about 20% of the American population.

4-6 Data from studies comparing severity of COVID-19 in pregnant and non-pregnant women It was not clear earlier in the pandemic whether pregnancy itself was a risk factor for severe illness from COVID-19.There is now growing evidence that pregnant women may be at increased risk of severe illness from COVID-19 compared with non-pregnant women, particularly in the third trimester.The most consistent signal of increased severity of COVID-19 in pregnancy is an increase in ICU admissions for pregnant women. However, ICU admission rates must be interpreted with caution, as the threshold for ICU admission for a pregnant woman may be lower than for a non-pregnant woman. Moreover, there is currently no robust data from the UK comparing pregnant and non-pregnant women with COVID-19.The studies in this section are from countries with different healthcare systems, populations and different baseline maternal risks, and should therefore be interpreted with caution from a UK perspective.

Intensive care admission is likely to be more common in pregnant women with COVID-19 than in non-pregnant women with COVID-19 of the same age.The PregCOV-19 Living Systematic Review Consortium analysis13 concluded that pregnant women are more likely than non-pregnant women to be admitted to intensive care (OR 1.62, 95% CI 1.33–1.96) and require invasive ventilation (OR 1.88, 95% CI 1.36–2.60). This finding was based overwhelmingly on a single study29 published by the US Centers for Disease Control and Prevention (CDC); in this study two major limitations of the results were acknowledged. The first was that admissions for indications related to pregnancy and those for COVID-19 could not be distinguished.

The second was that pregnancy status was missing for three-quarters of the women of reproductive age; a pregnancy rate of 9% was identified – higher than the expected 5%. This could account for significant bias in the results.

4-7 Effect on pregnancy

Symptomatic maternal COVID-19 is associated with a two to three times greater risk of preterm birth, principally from iatrogenic preterm birth.The PregCOV-19 Living Systematic Review13 estimated the risk of preterm birth at approximately 17%. Most of these preterm births (94%) were iatrogenic. In the initial UKOSS study,23 the median gestational age at birth was 38 weeks of gestation (IQR 36–39weeks of gestation). Of the women who gave birth, 27% had preterm births: 47% of these were iatrogenic for maternal compromise and 15% were iatrogenic for fetal compromise.The updated UKOSS study24 confirmed that preterm birth was more likely for women with COVID-19: 19% of women with symptomatic COVID-19 and 9% of women with asymptomatic COVID-19 gave birth before 37 weeks of gestation. Compared to a historical cohort of pregnant women without SARS-CoV-2, pregnant women with symptomatic COVID-19 were more likely to give birth before 32 weeks of gestation (adjusted OR [aOR] 3.98, 95% CI 1.48–10.70) and before 37 weeks of gestation (aOR 1.87, 95% CI 1.23–2.85). Pregnant women with asymptomatic COVID-19 were not, however, at increased risk of preterm birth. For women with symptomatic COVID-19, 78% of preterm births were iatrogenic. Preterm birth is associated with perinatal mortality, but also with long term morbidity.36 It is the single biggest cause of neonatal morbidity and mortality in the UK, with about 7% of babies in the UK born preterm.37 The preterm birth rate in women with symptomatic COVID-19 appears to be two to three times higher than this background rate. Although the PregCOV-19 Living Systematic Review13 found that stillbirth and neonatal death rates were not raised for women with COVID-19, it is concerning that the preterm birth rate is raised to such an extent.

Maternal COVID-19 is also associated with an increased rate of caesarean birth.Again,from the initial UKOSS study,23 59% of women had caesarean births; approximately half of these were because of maternal or fetal compromise.The remainder were for obstetric reasons (e.g. progress in labour, previous caesarean

birth) or maternal request (6%). Of the women having a caesarean birth,20% required general anaesthesia (GA).Approximately two-thirds
of the women who had a GA were intubated for maternal respiratory compromise, and the other third to facilitate urgent birth.The updated UKOSS data24 confirmed this trend, with a 49% caesarean birth rate for women with symptomatic COVID-19 versus 29% for a historical control group from 2018 (before COVID-19).

Risk factors that appear to be associated both with being infected and being admitted to hospital with COVID-19 include:
1. Black, Asian and minority ethnic (BAME) background
2. Having a BMI of 25 kg/m2 or more
3. Pre-pregnancy co-morbidity, such as pre-existing diabetes and chronic hypertension
4. Maternal age 35 years or older13,23
5. Living in areas or households of increased socioeconomic deprivation (data not specific to pregnancy).

4-8 Effect of COVID-19 on the fetus
Key findings
• Symptomatic maternal COVID-19 is associated with an increased likelihood of
iatrogenic preterm birth.
• Aside from preterm birth, there is no evidence that COVID-19 infection has an adverse effect on the fetus or on neonatal outcomes.

4-9 Effect of service modifications during the COVID-19 pandemic on maternal and perinatal experience and outcomes
During the first wave of the COVID-19 pandemic, changes were made to the provision of maternity services with the aim of reducing nosocomial transmission, the unintended consequences of which have yet to be determined.
In the UK, two survey studies have demonstrated that during April 2020, the majority of units reduced antenatal and postnatal

appointments, adopted remote consultation methods, restricted access to midwifery-led birth settings or home birth, and changed methods of screening for FGR and gestational diabetes. These service changes impacted on the experience of women and their families.An online questionnaire survey of 1451 pregnant or recently pregnant women in the UK found that the majority felt there were barriers
to accessing maternity care while anxieties were expressed about changes to antenatal, intrapartum and postnatal services.

4-10 Antenatal care during the COVID-19 pandemic
• Women should be advised to continue their routine antenatal care, although it may be modified, unless they meet self-isolation criteria for individuals or households (including social bubbles) with suspected or confirmed COVID-19.
• S ervice modifications are required to enable social distancing measures, to reduce the risk of transmission between women, staff and other clinic/hospital visitors, and to provide care to women who are self-isolating for suspected or confirmed COVID-19 for whom a hospital attendance is essential.
• The NICE recommended schedule of antenatal care should be offered in full wherever possible. Ideally and where safe, these appointments should be offered in-person, particularly to those from BAME communities, those with communication difficulties or those living with medical, social or psychological conditions that put them at higher risk of complications, or adverse outcomes, during pregnancy.

- Particular consideration should be given to pregnant women who have comorbidities which make them
- clinically vulnerable to the effects of COVID-19. Shared waiting areas should be avoided.
- If women who are in this group attend hospital, where possible, they should be cared for in single rooms.
- Women should be able to notify the unit regarding non-attendance owing to self- isolation for COVID-19 using

- standard telephone numbers that are already available to them.
- Continuity of care should be maintained wherever possible, particularly for women from vulnerable groups who may also be at greater risk from COVID-19.
- Healthcare professionals should be aware that women may not have the privacy within their home to disclose private, personal and sensitive information. Efforts should be made at in-person appointments, such as ultrasound scans, to discuss sensitive issues such as domestic violence, sexual and psychological abuse, psychiatric illness and recreational drug use.
- When in-person appointments are required (e.g. for blood tests, maternal examination or ultrasound scans) these should be arranged alongside other in-person maternity appointments to limit repeated clinic attendance.
- Appropriate screening for diabetes in pregnancy should still be provided, following NICE guidance as far as possible, with awareness that modifications to screening protocols are associated with a reduction in the detection of cases of gestational diabetes.
- Particular consideration should be given to pregnant women who have comorbidities which make them clinically vulnerable to the effects of COVID-19. Shared waiting areas should be avoided.
- For women receiving antenatal care across different sites, units must ensure that there are clear pathways for communication via handheld notes, electronic records and correspondence to general practitioners.
- Open access to day assessment and maternity triage services should be maintained. Women should be actively encouraged to attend if they have concerns about their or their baby's wellbeing.

CHAPTER FIVE

CONCLUSIONS &RECOMMENDATIONS

5-1 Conclusion

- Corona virus disease 2019 (COVID-19) was reported as cluster of disease in China in December 2019
- It has since spread to all continents except Antarctica and WHO declared COVID-19 as a pandemic.
- Elderly persons with co-morbidities are more affecte
- It spreads mainly via Respiratory droplets
- Pneumonia is the most common complication
- Severe cases have a mortality rate of 2.3 to 5%
- Containment and prevention is the best option
- There is a strong guide that the pregnancy increases the risk of severe corona virus, so experts prefer to be vaccinated, being needed to protect more than healthy adults.
- Pregnant COVID-19 patients are 5 times more likely to need intensive care or a ventilator compared to those who are not pregnant.
- Pregnant women are more likely to die from COVID-19 than non-pregnant women with the disease of the same age.
- Severe infection with the coronavirus increases other pregnancy risks, such as premature birth, cesarean delivery, high blood pressure disorders and postpartum hemorrhage,
  according to data from the US National Institutes of Health

5-2 RECOMMENDATIONS

In this prospective study, we found that Covid 19 affects pregnant women more, and it is possible that after birth the child remains in intensive care for a certain period, everyone must wear masks to prevent Covid 19 and also keep distances from people and not mix with people in case of pregnancy because This will negatively affect the woman and the fetus,, Congenital malformations of the fetus may occur due to the lack of oxygen for the mother when infected with the epidemic Corona virus, we also have to enter the pregnant woman infected with Covid 19 to a special intensive care room and follow the medical and professional rules for her safety and the safety of the fetus, stay away
from closed places Overcrowded with people, taking vaccinations from health centers and hospitals in order to eliminate the virus.

Summary

A new virus called the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was identified as the cause of a disease outbreak that began in China in 2019. The disease is called coronavirus disease 2019 (COVID-19).In March 2020, the World Health Organization (WHO) declared COVID-19 a pandemic. Public health groups, including the U.S. Centers for Disease Control and Prevention (CDC) and WHO, are monitoring the pandemic and posting updates on their websites. These groups have also issued recommendations for preventing the spread of the virus.

Data has shown that the virus that causes coronavirus disease 2019 (COVID-19) mainly spreads from person to person among those in close contact (within about 6 feet, or 2 meters). The virus spreads by respiratory droplets released when someone infected with the virus coughs, sneezes, breathes, sings or talks. These droplets can be inhaled or land in the mouth, nose or eyes of a person nearby.Sometimes the COVID-19 virus can spread when a person is exposed to small droplets that stay in the air for several minutes or hours — called airborne transmission. It's not yet known how common it is for the virus to spread this way.It can also spread if a person touches a surface with the virus on it and then touches his or her mouth, nose or eyes, but this isn't a main way it spreads The risk of pregnant women contracting COVID-19 is generally low. But pregnancy increases the risk of severe symptoms and death in case of infection with Covid 19. Pregnant women with Covid 19 appear to be more likely to develop respiratory complications that require intensive care compared to women who are not pregnant, according to the Centers for Disease Control and Prevention (CDC).Pregnant women are also more likely to be placed on respirators compared to non-pregnant women.In addition, it appears that pregnant women of African or Latin American origin are more likely to be affected by Covid-19 infection. Pregnant women with underlying medical conditions, such as diabetes, may be at increased risk of severe illness from COVID-19.Some studies indicate that pregnant women with COVID-19 are more likely to have premature and caesarean deliveries, and are more likely to have their babies admitted to the neonatal unit.

الملخص

تم التعرف على فيروس جديد يسمى فيروس كورونا المتلازمة التنفسية الحادة الوخيمة 2 (SARS-CoV-2) باعتباره سبب تفشي المرض الذي بدأ في الصين في عام 2019. ويطلق على المرض اسم مرض فيروس كورونا 2019 (COVID-19).

في مارس 2020 ، أعلنت منظمة الصحة العالمية (WHO) أن كوفيد -19 أصبح وباءً. مجموعات الصحة العامة ، بما في ذلك المراكز الأمريكية لمكافحة الأمراض والوقاية منها (CDC) ومنظمة الصحة العالمية ، تراقب الوباء وتنشر التحديثات على مواقعها الإلكترونية. كما أصدرت هذه المجموعات توصيات لمنع انتشار الفيروس.

أظهرت البيانات أن الفيروس المسبب لمرض فيروس كورونا 2019 (COVID-19) ينتشر بشكل أساسي من شخص لآخر بين الأشخاص الذين هم على اتصال وثيق (في نطاق 6 أقدام أو مترين). ينتشر الفيروس عن طريق الرذاذ التنفسي الذي يتم إطلاقه عندما يسعل شخص مصاب بالفيروس أو يعطس أو يتنفس أو يغني أو يتحدث. يمكن استنشاق هذه القطرات أو سقوطها في فم أو أنف أو عيون شخص قريب.

في بعض الأحيان ، يمكن أن ينتشر فيروس COVID-19 عندما يتعرض الشخص لقطرات صغيرة تبقى في الهواء لعدة دقائق أو ساعات - يُسمى الانتقال الجوي. لم يُعرف بعد مدى شيوع انتشار الفيروس بهذه الطريقة.

يمكن أن ينتشر أيضًا إذا لامس الشخص سطحًا به الفيروس ثم لمس فمه أو أنفه أو عينيه ، ولكن هذه ليست طريقة رئيسية لانتشاره.إن خطر إصابة النساء الحوامل بـ COVID-19 منخفض بشكل عام. لكن الحمل يزيد من خطر الأعراض الشديدة والوفاة في حالة الإصابة بـ Covid 19. يبدو أن النساء الحوامل المصابات بـ Covid 19 أكثر عرضة للإصابة بمضاعفات في الجهاز التنفسي تتطلب عناية مركزة مقارنة بالنساء غير الحوامل ، وفقًا لمراكز الأمراض. السيطرة والوقاية (CDC).

من المرجح أيضًا وضع النساء الحوامل على أجهزة التنفس مقارنة بالنساء غير الحوامل. بالإضافة إلى ذلك ، يبدو أن النساء الحوامل من أصل أفريقي أو من أمريكا اللاتينية أكثر عرضة للإصابة بعدوى Covid-19. قد تكون النساء الحوامل المصابات بحالات طبية أساسية ، مثل مرض السكري ، أكثر عرضة للإصابة بأمراض خطيرة من COVID-19. تشير بعض الدراسات إلى أن النساء الحوامل المصابات بـ COVID-19 أكثر عرضة للولادة المبكرة والقيصرية ، وأكثر عرضة للإصابة به. يتم إدخال أطفالهم إلى وحدة حديثي الولادة.

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LAPAROSCOPY CHOLECYSTECTOMY

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1. INTRODUCTION

First successful cholecystectomy had been done in 1882, and for >100 years, it was the standard treatment for symptomatic cholelithiasis. In 1987, laparoscopic cholecystectomy was introduced by Philippe Mouret in France and quickly revolutionized the treatment of gallstones. It not only supplanted open cholecystectomy, but also more or less ended attempts for noninvasive management of gallstones, such as extracorporeal shock wave and bile salt therapy. surgery aims to minimize trauma of the interventional process still a satisfactory therapeutic result. It is commonly performed because of various advantages such as reduced postoperative pain, faster recovery and more rapid return to normal activities, shorter hospital stays, and reduced postoperative pulmonary complications. The operative technique requires pneumoperitoneum to facilitate surgical procedure. An intra-abdominal pressure (IAP) of **10-15** mmHg is used. Carbon dioxide (CO_2) is commonly used because it does not support combustion, is cleared more rapidly than other gases, and is highly soluble in blood. However, the disadvantage of CO_2 is that the absorption of CO_2 can cause hypercapnia and respiratory acidosis [1].

Laparoscopic cholecystectomy (LAPCHOLE) procedure offers several advantages such as a reduction in stress response, postoperative pain, postoperative wound infection rate, intraoperative bleeding, impairment of respiratory function and pulmonary complications, short recovery time, and cosmetic appearance [1,2]. LAPCHOLE reduces hospital stay but has no overall effect on postoperative mortality [3]. The risk factors for perioperative complications in patients undergoing LAPCHOLE can be estimated based on patient characteristics, clinical findings and the surgeon's experience [4]. The advantages should be balanced with potential adverse effects caused by CO_2 pneumoperitoneum.

The physiological effects of intra-abdominal CO_2 insufflation combined with the variations in patient positioning can have a major impact on cardiorespiratory function. In addition, the sequential effects of anesthesia combine to produce a characteristic hemodynamic response. A thorough understanding of these physiological changes is fundamental for optimal anesthetic care. Several anesthetic techniques can be performed for LAPCHOLE. General anesthesia using balanced anesthetic technique including intravenous drugs, inhalation agents and muscle relaxants is usually used. Short acting drugs such as propofol, atracurirm, vecuronium, sevoflurane or desflurane represent the maintenance drugs of choice. *preoperative* assessment and preparation, appropriate monitoring and a high index of suspicion can result in early diagnosis and treatment of complications. This study done in Kirkuk Governorate on patient admitted for Lapchole to Al-Hawija general hospital, Azadi teaching hospital and Kirkuk general hospital from April-2022 to June- 2022(two months)

ANATOMY & PHYSIOLOGY OF THE GALLBLADDER

Location and Description

The gallbladder is a pear-shaped sac lying on the under surface of the liver. It has a capacity of 30 to 50 mL and stores bile, which it concentrates by absorbing water. The gallbladder is divided into the fundus, body, and neck & ducts. The gallbladder concentrates bile; stores bile; selectively absorbs bile salts, keeping the bile acid; excretes cholesterol; and secretes mucus.
The cystic artery, usually a branch of the right hepatic artery runs in Calotte's triangle supplies the gallbladder, The cystic vein drains directly into the portal vein, The lymph drains into a cystic lymph node to the hepatic nodes and then to the celiac nodes, the nerve supply is by sympathetic and parasympathetic vagal fibers form the celiac plexus [4]

PATIENTS AND METHODS

When patient admitted to hospital as elective case (cold case) during the period from April-2022 to June- 2022(two months). Most patients come diagnosed in outpatient clinic and has previous valid consent and referred by his personal specialist.

Diagnosis and investigation

This study follows the methods that used in Kirkuk hospitals, so when patient admit to hospital or specialist take:

Diagnosis

1- History

- **a- ID**
- **b- Chief complaint**
- **c- PMH**
- **d- Social history**
- **e- Airway assessment**
- **f- medication**

2- Investigations

- **a- CXR**
- **b- LFTs**
- **c- ECG**
- **d- U/S**
- **e- Viral screen**
- **f- Blood group (rare)**

When patient is diagnosed with cholelithiasis(fit) give the patient date to admit to surgery and prepare for laparoscopic cholecystectomy.

Monitoring

Summary

Standard intraoperative monitoring including:

1- **noninvasive blood pressure.**
2- **electrocardiogram**
3- **pulse oximeter**
4- **airway pressure**
5- **end tidal carbon dioxide ($ETCO_2$)**
6- **body temperature**

Equipment used:

a) Two laparoscopic monitors.
b) One laparoscope (5/10 mm, 0/30 degrees *lenses*) including camera cord and light source.
c) Carbon dioxide source and tubing for insufflation.
d) 5 mm to 12mm trocars (average three 5 mm working trocars and one 10 mm to 12 mm trocar).
e) Laparoscopic instruments: Atraumatic graspers, Maryland grasper, clip applier, electrocautery (e.g., hook, spatula), and a retrieval bag.
f) Scalpel (11/15 blade), forceps, needle driver, and absorbable sutures.

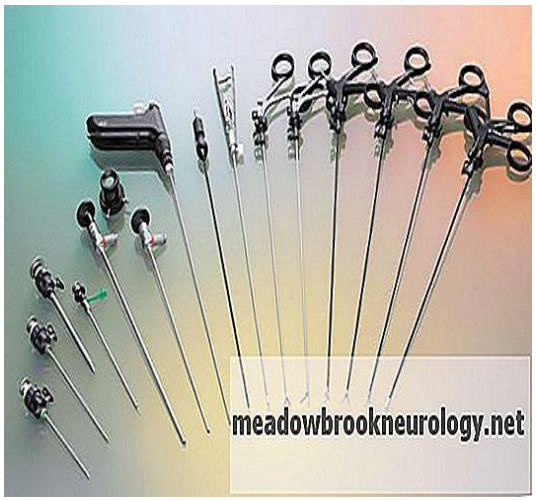

Figure 1

g) Major open tray, for possible conversion. (**Figure 1**)

Personnel:

a) The patient is placed supine on the operating table
b) Operating surgeon (patient's left), Some surgeons prefer to stand between the patient's legs while doing laparoscopic procedures. [4]
c) Surgical assist (patient's right)
d) Scrub tech/nurse (patient's left)
e) Anesthetist staff at head's patient (**Figure 2**)

Figure

Results

60 cases operated through laparoscopic cholecystectomy procedure. Out of 60 patients included in this study 52 were female (86%) and 8 male (14%) *TAB*. There was wide variation of age ranging from 25 years to 55 years. The *patients presented* with pain in *RHC* 75%, pain in RHC along with pain in epigastrium 25%, Nausea & Vomiting 16.6%, dyspepsia 10% and fever in 8.33% of cases. The abdomen an ultrasound report showed single stone in 11(18.33%) patients whereas multiple stones in 30(50%) Per Operative findings were adhesions in calot's patients and associated findings included impacted triangle 9(15%) cases, severe & tight adhesions stone at the neck of gallbladder in 4(2.73%), thick wall gall bladder in 4(6.66%) patients, empyema gallbladder 1(8.9%) patients, contracted gallbladder 5 (8.33%) cases,

Age & gender		
A 25-35 (F 75 % , M 25%)	4	6.6%
B 35-45 (F83.3 % , M 16.6%)	12	20.1%
C 45-55 (F 94% M 6%)	33	55%
D Age >55 (F 72% , M 27 %)	11	18.3%
Clinical features		
Asymptomatic	45	75%
Pain in RHC & Epigastrium	15	25%
Nausea & Vomiting (biliary colic)	10	16.66%
Dyspepsia	6	10%
Fever	3	8.33%
Abdominal Ultrasound Findings		
Single Stone	11	18.33%
Multiple Stone	30	50%
Impacted Stone at Neck of Gallbladder	9	15%
Thick Wall Gallbladder	4	6.66%
Empyema	1	1.66%
Contracted Gallbladder	5	8.33%

Table No. (2) Preoperative Assessment

Variable	Number of Patient	%
ASA classification		
ASA I	23 A B C D	38.33%
ASA II	27	45%
ASA III	??? Table10	16.66%
Airway Assessment		
Class 1	32	53.3%
Class2	16	26.6%
Class3	12	20%

Pre-operative assessment

60 cases of gallstone disease were operated through laparoscopic cholecystectomy procedure. Dependent on ASA Physical Status Classification System; Out of 60 patients included in this study are ASA I 23 (38.33%) Healthy Patient, ASA II 27 (45%) patient with controlled chronic hypertension and Diabetic, ASA III 10 (16.66%) patient with unstable hypertension And Smoking. And By Airway assessment was class I 32(53.3%) —soft palate, fauces, uvula, and pillars are visualized; class II 16 (26.6%) —soft palate, fauces, and pillars are visualized, but the uvula is masked by the base of the tongue; and class III 12 (20%) —only the soft palate can be visualized. Each Class I and Class II was Easily intubation, Class III was Difficult intubation.

Capnography and Laparoscopy

Capnography has three important applications during laparoscopic surgery:

1. It serves as a non-invasive monitor of PaCO2 during CO2 insufflation and therefore can be used to adjust ventilation.
2. It may help in the detection of accidental intravascular CO2 insufflation.
3. It may help in the detection of complications of CO2 insufflation such as pneumothorax, and hemorrhage.

It was found from present study that 55% of anesthesiologist doesn't use the capnograph and the absence of capnograph during the operation leads to not knowing the PETCo2, and this is a dangerous thing

$PETCO_2$ after CO_2 insufflation

It was found from present study that in both group (group A Laproscopic Cholecystectomy under Spinal Anesthesia, Group B Laproscopic cholecystectomy under GA) there was significant progressive rise in $PETCO_2$ after CO_2 insufflation, with peak at 30 min and thereafter plateau till the end of procedure (avg. duration 45-60 min). In group A i.e. laparoscopic surgery under spinal anaesthesia with (spontaneous respiration) the rise in $PETCO_2$ was significant as compared to the group B i.e. laparoscopic surgery under general anaesthesia with controlled ventilation. The heart rate increased after CO_2 insufflation in both the group, but it was significant in group A. The increase in SBP, DBP, MAP were less in group A as compared to group B. SPO_2 showed no significant changes and it remained above 97% in all patients throughout surgery. All values come to baseline 15 min after insufflation.

Discussion

LAPAROSCOPIC CHOLECYSTECTOMY

is indicated for the treatment of cholecystitis (acute/chronic), symptomatic cholelithiasis, biliary dyskinesia, acalapcholeulous cholecystitis, gallstone pancreatitis, and gallbladder masses/polyps. The patient selected according to age, gender, presentation, symptoms.

Preoperative assessment

History and physical examinations are generally must be done. The patients with cardiorespiratory diseases require additional investigation. To aid in assessment risk, the American Society of Anesthesiologists (**ASA**) has developed a classification system for patients, which categorizes individuals on a general health basis. In this preoperative assessment, there are no differences in a routine practice between the laparoscopy and the open surgery. Investigation that followed in Kirkuk hospital includes: **CXR** (Chest X-ray), **ECG** (some patient was not documented in case sheath), **U/S** for bladder (some patient was not documented in case sheath), **blood pressure** (for all patients), **LFTs** (changes of LFTs are transient and clinically silent in patients with a normal liver function), **drug history** (in some hospital didn't ask patient about drug uses for example the

Anesthetic management

Patient monitoring

Appropriate patient selection with proper monitoring to detect and reduce complications must be used to ensure optimal anesthesia care during LAPCHOLE. Standard intraoperative monitoring including noninvasive blood pressure, electrocardiogram, pulse oximeter, airway pressure, end tidal carbon dioxide ($ETCO_2$), body temperature and peripheral nerve stimulation is routinely used. Invasive hemodynamic monitoring may be appropriate in the patients with hemodynamic unstable or those with compromised cardiopulmonary function [1].

$ETCO_2$ is most commonly used as a noninvasive indicator of PaCO2 in evaluating the adequacy of ventilation. Careful consideration should be taken for the gradient between PaCO2 and the tension of CO2 in expired gas ($PECO_2$) because of V/Q mismatch. However, in the patients with compromised cardiopulmonary function, the gradient between PaCO2 and PECO2 increases to become unpredictable. Direct arterial blood gas analysis may be considered to detect hypercarbia. Generally, the airway pressure monitor is routinely used during intermittent positive pressure ventilation. The high airway pressure can help detection of excessive elevation in IAP.

Anesthetic techniques

Various anesthetic techniques can be performed for LAPCHOLE. However, general anesthesia with endotracheal intubation for controlled ventilation is the most common anesthetic technique. In short procedures and in certain patients, ventilation using supraglottic airway device can be used as an alternative. General anesthesia without endotracheal intubation can be used safely and effectively with a ProSeal laryngeal mask airway in non-obese patients [15]. The use of laryngeal mask airway results in less sore throat and provide smoother emergence with less post-extubation coughing compared with endotracheal intubation [16].

General anesthesia

General anesthesia using balanced anesthesia technique including inhalation agents, intravenous drugs and muscle relaxant drugs is usually used. The uses of rapid and short acting volatile anesthetics such as sevoflurane and desflurane as well as rapid and short acting intravenous drugs such as propofol, etomidate, remifentanil, fentanyl, atracurium, vecuronium and rocuronium are commonly used and have allowed anesthesiologists to more consistently achieve a recovery profile. Propofol is effective and safe even in children and elderly patients [17-21].

Ventilation should be adjusted to keep ETCO2 of around 35 mmHg by adjusting the minute ventilation [1]. In patients with chronic obstructive pulmonary disease and in patients with a history of spontaneous pneumothorax or bullous emphysema, an increase in respiratory rate rather than tidal volume is preferable to avoid increased alveolar inflation and reduce the risk of pneumothorax [22].

Furthermore, the use of an auditory evoked potential or Bispectral index monitor to titrate the volatile anesthetics leads to a significant reduction in the anesthetic requirement, resulting in a shorter postanesthesia care stay and an improved quality of recovery from the patient's perspective [23].

Combination of local anesthetic wound infiltration, intraperitoneum spray of local anesthetic, paracetamol and non-steroidal anti-inflammatory drugs or cyclooxygenase 2 inhibitors provides the most effective pain relief, which can be supplemented with small doses of opioids.

GENERAL INTRAOPERATIVE PRINCIPLES:[4]

There are two methods for creation of a pneumoperitoneum: open and closed:

The closed method involves blind puncture using a Verres needle. This method is fast and relatively safe but significant potential for intestinal or vascular injury on introduction of the needle or first trocar, the routine use of the open technique avoids the morbidity related to a blind puncture.
To achieve this:
a 1-cm vertical or transverse incision is made at the level of the umbilicus.
Two small retractors are used to dissect bluntly the subcutaneous fat and expose the midline fascia.
Two sutures are inserted each side of the midline incision.
the creation of a 1-cm opening in the fascia.
Hasson trocar (or other blunt-tip trocar) is inserted and anchored with the fascial sutures (Figure 4).

The open method it is quick, efficient and safe overall. Optical entry to the abdomen under direct vision using optical ports (especially in bariatric surgery) is gaining favour with many laparoscopic surgeons. This allows quick and safe entry to the peritoneal cavity using bladeless see-through trocars that allow the different layer to be dissected through using the laparoscope within an optical port to be inserted into the abdomen.

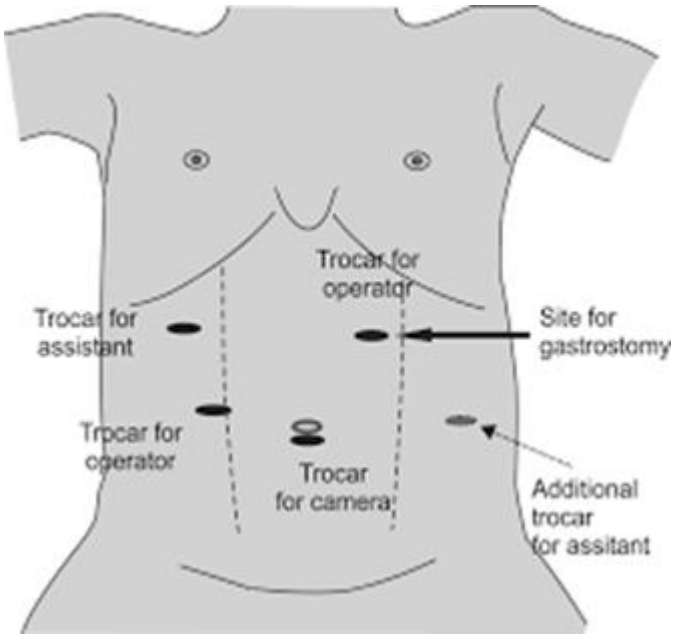

Figure 3: shown laparoscopic approach

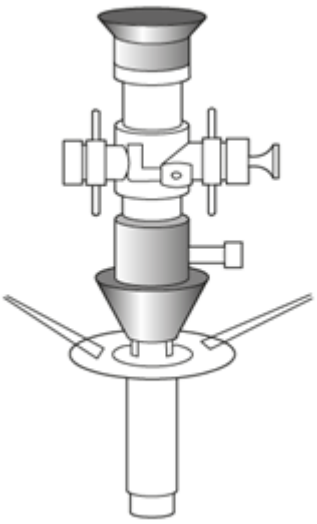

figure 4

Pathophysiological effects during laparoscopic cholecystectomy

1- Physiological effects of pneumoperitoneum

Carbon dioxide was shown to be affected by raising the intra-abdominal pressure (IAP) above the venous pressure which prevents CO_2 resorption leading to hypercapnia. Hypercapnia activates the sympathetic nervous system leading to an increase in blood pressure, heart rate, arrhythmias and myocardial contractility as well as it also sensitizes myocardium to catecholamines [5]. Increased IAP may compress venous vessels causing an initial increase in preload, followed by a sustained decrease in preload.

Respiratory effects

The changes in pulmonary function during LAPCHOLE include reduction in lung volumes, decrease in pulmonary compliance, and increase in peak airway pressure [6]. Increased IAP shifts the diaphragm cephalad and reduces diaphragmatic excursion, resulting in early closure of smaller airways leading to intraoperative atelectasis with a decrease in functional residual capacity. Additionally, the upward displacement of diaphragm leads to preferential ventilation of nondependent parts of lung, which results in ventilation-perfusion (V/Q) mismatch with a higher degree of intrapulmonary shunting. Oxygenation is minimally affected with no significant change in alveolar arterial oxygen gradient [7]. Higher IAP reduces the thoracic compliance and may cause pneumothorax and pneumomediastinum due to the increased in alveolar pressures [6].

Cardiovascular effects

Hemodynamic changes include the alterations in arterial blood pressure, arrhythmias and cardiac arrest. These cardiovascular changes depend on the interaction of several factors including patient positioning, neurohumoral response and the patient factors such as cardiorespiratory status and intra-vascular volume. The principal responses are an increase in systemic vascular resistance, mean arterial blood pressure and myocardial filling pressures, with little change in heart rate [2]. CO2 pneumoperitoneum is associated with increased preload and afterload in patients undergoing LAPCHOLE. It also decreased heart performance (fractional shortening), but does not affect cardiac output [8]. The patients with normal cardiovascular function are able to well tolerate these hemodynamic changes. At IAP levels greater than 15 mmHg, venous return decreases leading to decreased cardiac output and hypotension [9]. However, these changes are short lived and have no stat- istical significance at 10 minutes from the time that the patient undergoes pneumoperitoneum [10].

Bradyarrhythmias are attributed to vagal stimulation caused by insertion of the needle or the trocar, peritoneal stretch, stimulation of the fallopian tube during bipolar electrocauterization, or carbon dioxide embolization [11]. These may induce cardiovascular collapse during laparoscopy even in the healthy patients. Increased concentrations of CO2 and catecholamines can create tachyarrhythmias.

Paroxysmal tachycardia and hypertension, foll- owed by ventricular fibrillation, have been reported [12].

2.4. Effects of other systems

Increases in IAP, cardiovascular responses to peritoneal insufflations, changes in patient position and alterations in CO2 concentration can alter intracranial pressure (ICP) and cerebral perfusion. ICP shows a significant further increase. Cerebral blood flow has been shown to increase significantly during CO2 insufflation.

Pneumoperitoneum reduces renal cortical and medullary blood flow with an associated reduction in glomerular filtration rate (GFR), urinary output and creatinine clearance [2]. The reduction of renal blood flow may be due to a direct pressure effect on renal cortical blood flow and renal vascular compression as well as an increase in antidiuretic hormone (ADH), aldosterone and renin. Pretreatment with an ADH antagonist improves urine output and urea excretion despite an unaltered GFR.

Increased in IAP reduces femoral venous blood flow. This is due to increased pressure on the inferior vena cava and iliac veins, which reduces venous blood flow in the lower extremetries. It also has been shown to reduce the portal blood flow, which may lead to transient elevation of liver enzymes.

The C-reactive protein and interleukin-6 levels are less elevated after laparoscopy compared to the open surgery, suggesting an attenuation of the surgical inflammatory response [13].

Patient positions can further compromise cardiac and respiratory functions, can increase the risk of regurgitation and can result in peripheral nerve injuries. Head-up position reduces venous return, cardiac output, cardiac index and mean arterial blood pressure as well as an increase in peripheral and pulmonary vascular resistance [5,14]. Head-down position increases volume and cardiac output back towards normal. Respiratory function is impaired because of the cephalad shifting of diaphragm is exaggerated. Intracranial pressure is increased.

Intraoperative complications

Misplacement of the needle can lead to intravascular, subcutaneous tissue, preperitoneal space, bowel, and omentum. Inadvertent insufflation of gas into intravascular vessels, tear of abdominal wall or peritoneal vessels, can produce to gas embolism. Although, it is rare but it is a potentially lethal complication and can result in severe hypotension, cyanosis, arrhythmias and asystole. Subcutaneous emphysema may occur after direct subcutaneous gas insufflations. The majority of subcutaneous emphysema has no specific intervention. It can resolve soon after the abdomen is deflated and nitrous oxide is discontinued to ovoid expansion of closed space.

Pneumothorax can occur when the airway pressure is high. The gas traverses into the thorax through the tear of visceral peritoneum, parietal pleura during dissection, or spontaneous rupture of pre-existing emphysematous bulla [1]. Pneumothorax can be asymptomatic or can increase the peak airway pressure, decrease oxygen saturation, hypotension, and even cardiac arrest in severe cases. The treatment is according to the severity of cardiopulmonary compromise [32].

Extension of subcutaneous emphysema into thorax and mediastinum can lead to pneumomediastinum. Pneumopericardium can occur when the gas is forced through the inferior vena cava into the mediastinum and pericardium. Their managements depend on the severity of the cardiovascular dysfunction. The other complications can be presented. Accidental insertion of the trocar or needle into the major or minor vessels, gastrointestinal tract injuries and urinary tract injuries can occur [32].

Hypothermia:

The temperature gradually decreased over time in both laparotomy & laparoscopy. In the laparotomy group the decrease reached 0.20 °C, at 80 min. During laparoscopy the temperature decrease was 0.43 degree C at the same time. No pathophysiologic repercussions associated with these results.

Postoperative period

The efficacy of post-anesthesia care units is therefore important to facilitate return to normal functions. In the early postoperative period, respiratory rate and ETC02 of laparoscopic patients breathing spontaneously are higher as compared with open surgery. So, the ventilation requirement is increased. The patients with respiratory dysfunction can have problems excreting excessive CO2 load, which results in more hypercapnia. Additionally, the patients with cardiovascular diseases are more prone to hemodynamic changes and instabilities. Although LAPCHOLE results in less discomfort compared with the open surgery, postoperative pain still can be considerable. Several medications used intraoperatively for prevention and treatment of postoperative pain are the uses of local anesthesia, opioids, nonsteroidal anti-inflammatory drugs, and multimodal analgesia techniques. Additionally, preprocedure administration of parecoxib is clinically effective [33].

Postoperative nausea and vomiting (PONV) is a common and distressing symptom following LAPCHOLE. The use of multimodal analgesia regimens and the reduction of opioid doses are likely to reduce the incidence of PONV. Propofol-based anesthesia has been associated with reduced PONV [34]. Ondansetron has been found to provide effective prophylaxis against PONV [35]. Administration of ondansetron at the end of surgery produces a significantly greater anti-emetic effect compared to pre-induction dosing. Reduced preoperative anxiety by providing more information should also relieve postoperative adverse effects in order to promote faster and better postoperative recovery period.

Conclusions:

1. **type of anesthesia**
   From the present study it can be concluded that balanced general anaesthesia using IPPV with moderate hyperventilation, as the preferred anaesthetic technique for laparoscopic surgery.

2. **Capnography should be used in any case of laparoscopic surgery to knowing PETCo2 and to avoiding cardiorespiratory changes (hypercapnia, arrhythmia, and decrease contractility)**

3. **Preload fluid before Pneumoperitoneum (500-1000 ml) of saline solution.**

4. **Good depth of anesthesia**

5. **Good muscle relaxant (to get relaxed abdominal muscles to accommodate gas insufflation).**

6. **Good analgesia which attenuates stress reflexes by effective fentanyl doses.**

7. **Vasodilating agents & β- blocking agent.**

8. **Maintain body temperature with normothermia. laparoscopic surgery even when the abdominal cavity is not exposed to room air, induces a loss of temperature that is greater than that of laparotomy, because of insufflation of CO2 at 4 degrees C. The decrease was 0.4 degree C for every 50 l of CO2 insufflated during the study.**

6. Summary

Laparoscopic cholecystectomy has proven to be a major advance in the treatment of patients with symptomatic gall bladder diseases. Several advantages from this procedure are minimal tissue trauma, reduction of postoperative pain, quicker recovery, shortening the hospital stay. Pneumoperitoneum induces intraoperative cardiorespiratory changes. Arterial CO_2 increases because of CO_2 absorption from the pneumoperitoneum. Improved knowledge of pathophysiological changes in the patients allows for successful anesthetic management. Proper patient selection and preparation as well as adequate monitoring should be performed. General anesthesia and controlled ventilation comprise the accepted anesthetic technique. Balanced anesthesia technique including inhalation agent, intravenous drug and muscle relaxant is commonly used. Intraoperative complications may arise due to physiologic changes associated with patient positioning and pneumoperitoneum. Multimodal analgesic regimen combining opioids, non-steroidal anti-inflammatory drugs, and local anesthetic infiltration is the most effective regimen for postoperative pain management.

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Complication of spinal Anesthesia

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1443ه **2022م**

﴿ رَبِّ أَوْزِعْنِي أَنْ أَشْكُرَ نِعْمَتَكَ الَّتِي أَنْعَمْتَ عَلَيَّ وَعَلَى وَالِدَيَّ وَأَنْ أَعْمَلَ صَالِحًا تَرْضَاهُ وَأَصْلِحْ لِي فِي ذُرِّيَّتِي إِنِّي تُبْتُ إِلَيْكَ وَإِنِّي مِنَ الْمُسْلِمِينَ ﴾

(سورة الأحقاف – آية-15)

الإهداء

الى من علمني النجاح والصبر

إلى من افتقده في مواجهة الصعاب

لم تمهله الدنيا لأرتوي من حنانه ..أبي

إلى من تتناسق الكلمات لتخرج معبرة عن مكنون ذاتها

من علمتني و عانت الصعاب لأصل إلى ما أنا عليه ألان وعندما تكسوني الهموم أسبح في بحر حنانها ليخفف من ألآمي ..أمي

إلى جميع الكادر التدريسي في قسم التخدير الذي لم يتوانا احد منهم عن واجبه تجاهنا نهديهم و نشاركهم فرحة نجاحنا و تخرجنا ....

شكر وتقدير

أول من يشكر و يحمد آناء الليل و أطراف النهار هو العلي القهار الأول و الأخير و الظاهر و الباطن.. الذي أغرقنا بنعمه التي لا تحصى ولا تعد و أغدق علينا برزقه الذي لا يفنى.. وأنار دروبنا فله جزيل الشكر و الحمد والثناء العظيم.

هو الذي أنعم علينا إذ أرسل فينا عبده ورسوله محمدآ بن عبداللة علية أزكى الصلوات وأطهر التسليم أرسله بالقرآن المبين فعلمنا ما لم نعلم و حثنا على طلب العلم

لله الحمد و الشكر الذي وفقنا وألهمنا الصبر على المشاق التي واجهتنا لإنجاز هذا العمل المتواضع

الشكر موصول إلى كل معلم أفادنا بعلمه من أولى المراحل الدراسية حتى هذه اللحظة كما نرفع كلمة الشكر إلى الدكتورة المشرفة (هديل وضاح مهدي) و رئيس قسم التخدير الدكتور(وضاح مهدي) التي ساعدونا على إنجاز بحثنا كما نشكر جميع أساتذة قسم تقنيات التخدير و العناية المركزة في جامعة الكتاب الذين لم يبخلوا علينا بنصائحهم وإرشاداتهم

و في الختام لا يسعنا إلى أن ندعو الله عز وجل أن يرزقنا السداد و الرشاد والعفاف والغنى و أن يجعلنا هداة مهتدين

Introduction

Spinal anesthesia celebrated its first centennial in 1998 and still is one of the centerpieces of modern regional anesthesia. August Bier from Germany was the first to publish a report of the first successful spinal anesthesia with cocaine on his friend and assistant Hildebrandt. Since then, spinal anesthesia has gained worldwide popularity and an impressive safety record. However, the history of complications of spinal anesthesia is as old as the method itself.1 The very first spinal anesthetics were followed by postdural puncture headaches (PDPHs) as Bier and Hildebrandt both developed a headache after their experiment that, at least with Bier himself, was posture related. The wine and cigars consumed during the celebration of a successful experiment may have augmented the development of headache.

In the early days of spinal anesthesia, it was claimed to be a very safe method of anesthesia and was used successfully even in operations on the head, neck, and thorax, with low mortality.2 After initial great popularity, some tragic events occurred with spinal anesthesia, at a time when major advances were being made in inhalation anesthesia, that almost made this technique obsolete, at least in the United Kingdom. The most famous of these tragedies was the Woolley and Roe case in which two patients, in adjoining operating rooms, became paraplegic following spinal anesthesia for relatively minor procedures.3 It is probable that this tragedy was caused by contamination of the spinal needles or syringes during the sterilization process.4 In the 1950s, the reputation of spinal anesthesia was restored, mostly as a result of several reports from Vandam and Dripps5 involving more than 10,000 patients. They showed that spinal anesthesia was a safe technique and only rarely caused serious morbidity and mortality.

With modern equipment and developed techniques, this old anesthesia method remains an important and cost efficient part of modern anesthesiology. With advanced knowledge of the mechanisms, this versatile anesthesia method can be adjusted according to our needs. In the last one or two decades, there have been many changes in the treatment of patients and spinal techniques. More and more operations are being performed on an ambulatory basis and spinal anesthesia methods have been adjusted to meet the demands of a busy environment. The focus of complications with these patients has changed accordingly. Mortality or major complications are not usually an issue with short-stay patients, but we should be able to provide them “fast track” anesthesia without side effects and with a high degree of patient satisfaction. However, we should be able to use spinal anesthesia safely for major operations in elderly patients with numerous comorbidities.

Failure of Spinal Anesthesia

Failure of spinal anesthesia is one of the most embarrassing complications for the patient and the anesthesiologist. Spinal anesthesia, in contrast to many other regional anesthesia methods, has a clear end point indicating correct needle placement [free flow of cerebrospinal fluid (CSF) from the needle]. Despite this, there is, in common with other regional anesthesia techniques, a potential risk for failure. Correspondingly, even general anesthesia may be associated with failure, as patients can be aware

of the surgical operation during anesthesia. Failure rates may be reduced by proper selection of patients, timing, and the skill of the anesthesiologist. The reasons for failure in spinal blocks are in most cases related to technical factors rather than to the anesthetic agent used.6

The incidence of failure with spinal anesthesia varies in different studies, ranging from 3% to 17%.6–9 In some smaller studies, failure rates as high as 30% have been reported. Spinal anesthesia can be classified as a failure if the surgical operation cannot be performed without the addition of general anesthetic or an alternative regional block. The subarachnoid space may be impossible to locate or the needle may move during the injection of the anesthetic. The spinal puncture may be difficult to perform because of abnormal anatomy, obesity, or poor cooperation or pain experienced by the patient. One cannot give unambiguous instructions regarding when the spinal technique should be abandoned and the anesthesia plan changed. Regardless, if the spinal puncture does not succeed after several attempts and especially if many paresthesias have been attained, the anesthesiologist should change the planned anesthesia. Good clinical judgment and cooperation with the patient are essential to prevent complications associated with multiple punctures in close proximity to the spinal canal and nerve roots. Unfortunately, most often patients who are at risk for unsuccessful spinal anesthesia tend to be high-risk patients for general anesthesia as well.

The anesthesiologist should make the best possible effort to prevent unsuccessful spinal anesthesia by careful technique, which ensures free flow of CSF before injection of local anesthetic and good fixation of the spinal needle during the injection to prevent needle movement. In some cases, failure occurs despite free-flowing CSF from the needle hub, and this may be caused by the needle entering an arachnoid cyst that is not in direct communication with the subarachnoid space.

The Sprotte needle has been implicated in higher failure rates, and this may be because the side hole is large and elongated and located distal to the tip. However, in a prospective study comparing failure rates between Sprotte and Quincke needles, there was no difference noted.10

The use of low-dose spinal anesthesia for ambulatory surgery has gained popularity in recent years. Interestingly, the use of low-dose spinal anesthesia (bupivacaine less than 10 mg) for day surgery has not increased the risk of failure if a proper technique has been used.11–13 Usually, low-dose spinal anesthesia is used for surgery of the lower extremities, although it can be used also for bilateral anesthesia, such as for tubal ligation. With low-dose, selective or unilateral spinal anesthesia, the proper technique is even more important than with higher doses. The position of the patient (sitting, lateral decubitus position, prone) is essential with respect to baricity of local anesthetic. The maintenance of the selected position affects the spread of anesthesia. With conventional (larger) doses of local anesthetics, even a longer period of time spent in the lateral decubitus position does not prevent bilateral block.14

With hyperbaric bupivacaine and ropivacaine, the sensory level of analgesia can be modified with repositioning of the patient after local anesthetic injection. With isobaric bupivacaine, the sensory level of analgesia is difficult to predict and more diffi-

cult to modify after puncture. However, there is a tendency for a higher level when a higher lumbar interspace for spinal anesthesia is used.15

Hemodynamic Complications

Cardiovascular side effects are common during spinal anesthesia, hypotension being the most common.16,17 Decrease of blood pressure can be considered a normal physiologic effect of spinal anesthesia. In some cases, the decrease can be so severe that it can be considered a complication. There is no agreement at which level the low blood pressure should be treated. Clinical judgment is needed to decide when an individual patient needs treatment for a low blood pressure.

Hypotension

The reported incidence of hypotension during spinal anesthesia varies from 0% to more than 50% in nonpregnant patients. Pregnant patients are more susceptible to hypotension with incidences ranging from 50% to more than 90%. The high variation among publications may be explained by different definitions of hypotension, varying patient materials, and different methods used to prevent hypotension. Systolic blood pressures less than 85–90 mm Hg or a decrease of more than 25%–30% from the preanesthetic value have been used to define hypotension.16,17

Hypotension during spinal anesthesia results principally from the preganglionic sympathetic blockade. Systemic vascular resistance decreases as a result of a reduction in sympathetic tone of the arterial circulation. This leads to peripheral arterial vasodilatation, the extent of which depends on the number of spinal segments involved. Other theories are proposed to explain hypotension during spinal anesthesia, among them: 1) direct depressive circulatory effect of local anesthetics, 2) relative adrenal insufficiency, 3) skeletal muscle paralysis, 4) ascending medullary vasomotor block, and 5) concurrent mechanical respiratory insufficiency.18 Hypotensive effects of spinal anesthesia are exaggerated in advanced pregnancy because of aortocaval compression caused by the gravid uterus. Nerve fibers in pregnant patients are also more sensitive to the effect of local anesthetics19, probably because of chronic exposure of progesterone altering the protein synthesis in nerve tissue.20

Risk factors for hypotension include older patients, patients with peak block height greater than or equal to T5, and patients undergoing combined spinal and general anesthesia.16,17

Bradycardia

Loss of sympathetic input to the heart, leaving vagal, parasympathetic innervation unopposed, and a decrease in cardiac preload are the main reasons for bradycardia during spinal anesthesia. The extent of sympathetic blockade is not always comparable with the sensory level21, and this may be the reason why cardiovascular complications do not always occur despite high sensory levels.22 Younger patients and those with sensory levels above T6 are more susceptible to bradycardia during spinal anesthesia.23 Baseline heart rates less than 60 beats/minute and current therapy with beta-adrenergic–blocking drugs also increase the risk factors for bradycardia.17

The decrease of venous return to the heart leads to decreased stretch to the right side of the heart leading to decreased heart rate (Bainbridge reflex). Also, a paradox- ical form

of the Bezold-Jarisch reflex has been thought to occur rarely during spinal anesthesia, leading to severe bradycardia and asystole.24 During spinal anesthesia, a sudden decrease in ventricular volume (an empty ventricle) coupled with a vigorous ventricular contraction leads to activation of the mechanoreceptors, and subsequently increased vagal tone and decreased sympathetic activity as the heart perceives itself to be full. Other possible mechanisms of bradycardia during spinal anesthesia include excessive sedation, preexisting autonomic dysfunction, heart block, vasovagal reaction,25 or athletic heart syndrome.26

Treatment and Prevention of Hypotension and Bradycardia

Preventive procedures before spinal anesthesia are more frequently used for pregnant patients because these subjects are more susceptible to the hypotensive effects of spinal anesthesia. A decrease in blood pressure lasting more than 2 minutes may have a deleterious effect on the neonate.27

Relative hypovolemia caused by spinal anesthesia may be successfully prevented either with sympathomimetic medication or by preloading with crystalloid or colloid. Even leg-wrapping has been used with good success in patients scheduled for cesarean delivery.28 Crystalloid preload has often been used but it does not seem to lessen the cardiovascular complication frequency even with elderly patients in good health.29 However, if the patient is preoperatively hypovolemic, the hypovolemia must be corrected before establishing the block.

The most common sympathomimetic drugs used in the prevention and treatment of hypotension are ephedrine (combined alpha and beta effects, with predominant beta-adrenergic effects) and etilefrine (which has combined alpha and beta effects). They can be both infused according to blood pressure response or given as boluses and have quite similar effects on patients. Methoxamine and phenylephrine (pure alpha-adrenergic agonists) are other sympathomimetics used. Ephedrine is mostly used for pregnant patients because it restores uterine blood flow despite the increase in maternal blood pressure.30 Small increments of phenylephrine have also been considered safe for the fetus. The use of phenylephrine may be indicated if the increase in heart rate in the mother is not tolerated. Because bradycardia during spinal anes- thesia is most often caused by decreased preload to the heart, restoring the blood pressure is the best treatment for bradycardia. Stimulating an empty heart with atro- pine may be deleterious, especially if the patient has coronary disease. Increased work load (tachycardia) increases the oxygen demand of the heart without increasing the oxygen supply.

Whenever serious hemodynamic instability occurs with spinal anesthesia, it is most likely attributable to some interference with the venous return. Therefore, one of the most important steps to take in treatment is to check the position of the patient and if not optimal place the patient in a position that will enhance venous return. One should also make sure that the surgeon is not interfering with the venous return during surgical manipulation. In the words of one of the great masters of spinal anesthesia, Professor Nicholas Greene, “The sine qua non of safe spinal anesthesia is maintenance of the venous return.”

Nausea and Vomiting

Nausea and vomiting are quite rare during spinal anesthesia and most often associated with hypotension. Therefore, nausea in these cases is alleviated in combination with the successful treatment of hypotension and does not need any specific treatment itself. The other suggested mechanisms for nausea during spinal anesthesia are cere- bral hypoxia, inadequate anesthesia, and traction-related parasympathetic reflexes provoked by surgical manipulation. Female gender, opiate premedication, and sensory level of analgesia above Th6 have all been shown to be significant risk factors for nausea during spinal anesthesia.23 A history of motion sickness has also been associ- ated with nausea during spinal anesthesia.17

Cardiac Arrest

In recent studies, the incidence of cardiac arrest during spinal anesthesia has been reported to be between 2.5–6.4 per 10,000 anesthesias.31–33 Cardiac arrest is often associated with a perioperative event such as significant blood loss or cement place- ment during orthopedic surgery. It is often difficult to determine whether surgical, anesthesia, or patient factors are the most significant leading up to the problem. Fortunately, the frequency of cardiac arrests has decreased significantly over the last two or three decades.33 The reason for this decrease is not clear. The awareness of this potential complication may have increased after Caplan and colleagues34 reported 14 cases of sudden cardiac arrests in healthy patients who had spinal anesthesia for minor operations. Also, the use of pulse oximetry has become a standard during spinal anesthesia, although no randomized studies have been or will be done to confirm the effectiveness of pulse oximetry with this respect. Patients should be moni- tored during spinal anesthesia as vigorously as during general anesthesia and side effects should be treated aggressively as soon as possible to prevent life-threatening complications. Cardiac arrest during neuraxial anesthesia has been associated with an equal or better likelihood of survival than a cardiac arrest during general anesthesia.33

Urinary Retention

There is a high incidence of micturition difficulties postoperatively. Acute urinary retention can occur following all types of anesthesia and operative procedures. The etiology of postoperative urinary retention involves a combination of many factors, including surgical trauma to the pelvic nerves or to the bladder, overdistention of the bladder by large quantities of fluids given intravenously, postoperative edema around the bladder neck, and pain- or anxiety-induced reflex spasm of the internal and external urethral sphincters.35,36 Urinary retention is more likely to occur after major surgery and with elderly male patients. Opiates and confinement to bed may also be likely explanations for the development of urinary retention after surgery. The type of anesthetic and the management of postoperative pain may have little effect on the occurrence of postoperative urinary dysfunction.36

Disturbances of micturition are common in the first 24 hours after spinal anes- thesia. There is a higher frequency of these disturbances after bupivacaine than lido- caine

spinal anesthesia.37 After administration of spinal anesthesia with bupivacaine or tetracaine, the micturition reflex is very rapidly eliminated. Detrusor muscle contraction is restored to normal 7–8 hours after the spinal injection. On average, patients recover enough motor function to be mobilized 1–2 hours before the micturition reflex returns. Full skin sensation is usually restored at the same time or slightly before patients are able to micturate. To avoid protracted postoperative bladder symptoms, careful supervision of bladder function is of great importance in patients receiving spinal anesthesia with long-acting anesthetics.38 A single episode of excessive bladder distention may result in significant morbidity. Overfilling of the bladder can stretch and damage the detrusor muscle, leading to atony of the bladder wall, so that recovery of micturition may not occur when the bladder is emptied. Patients at risk for urinary retention should be encouraged to void and provided a quiet environment in which to do so. They should be encouraged to sit, stand, or ambulate as soon as possible.36 Expedient catheterization when needed and the prophylactic placement of indwelling catheters in patients with previous disturbances are recommended.36,37

Urinary Retention and Outpatient Surgery

The reported frequency of urinary retention after intrathecal administration of opioids varies considerably. The risk for urinary retention is increased with higher doses of opioids or local anesthetics. Many patients who receive opioids intrathecally are catheterized because they are more likely to develop urinary retention postoperatively. However, 10–20 g of fentanyl administered with small-dose bupivacaine for ambulatory surgery does not seem to increase the risk for urinary retention or prolong discharge times.39–41 Small-dose or unilateral spinal anesthesia is associated with a lower risk for urinary retention than conventional methods.

During the past few years, the home discharge criteria have been changed. The routine requirement of voiding before discharge can be considered mandatory only for high-risk patients. These high-risk patients include those with preoperative diffi- culties in urinating, operations in the perineal area, older men, etc. All patients must receive oral and written instructions before discharge regarding when, where, and whom to contact in case of difficulty voiding. A follow-up phone call is recommended for all patients who are discharged before they have voided.

Transient Neurologic Problems

Radiculopathy

Damage to a nerve root can occur during identification of the subarachnoid space or during the insertion of a spinal catheter. Paresthesia with or without motor weakness is the presenting symptom, and although the majority of patients recover completely, a small number may be affected permanently. Although neurologic complications may present immediately postoperatively, some may require days or even weeks to emerge. Should neurologic dysfunction occur, early detection and intervention are required to promote complete neurologic recovery.42 Documentation of critical data concerning spinal anesthetic technique, such as level of needle placement, needle type, and local anesthetic solution, is an important part of the anesthesia procedure. As demonstrated

by the Closed Claims Study database, nerve damage is a major source of anesthetic liability. Therefore, the same consideration must be given to the documentation of prudent regional anesthetic practice as is given to its delivery.43

Auroy et al.31 found, in their prospective, multicenter study of 40,640 spinal anesthetics and 30,413 epidural anesthetics, 19 cases of radiculopathy after spinal anesthesia and five cases of radiculopathy after epidural anesthesia. In 12 of the 19 cases of radiculopathy after spinal anesthesia and in all five cases of radiculopathy after epidural anesthesia, the needle insertion or drug injection was associated with paresthesia or pain. In all cases, the radiculopathy was in the same distribution as the associated paraesthesias.

Oblique lateral entry into the ligamentum flavum may direct the needle into the dural cuff region. This may result in direct trauma to a nerve root, with resultant unisegmental paresthesia; such a sign should warn the anesthesiologist not to persist with needle insertion in this position and not to attempt to thread a catheter.44

To avoid trauma to nerves, careful technique and accurate anatomic knowledge are mandatory. Low lumbar interspace for puncture should be chosen as the spinal cord terminates in normal adults, usually at L1 level although this is variable and it may be as low as L3. It has also been shown that the anesthesiologist quite often estimates the interspace for puncture incorrectly, although this has little clinical significance in most cases. Paresthesia during the insertion of a spinal needle is common with inci- dences varying between 4.5%–18%.45–49 Fortunately, in most cases, no harmful effects occur following paresthesia. In one study, elicitation of a paresthesia during needle placement was identified as a risk factor for persistent paresthesia.43 If a paresthesia is elicited during spinal needle advancement into the subarachnoid space, it is reasonable to draw the needle 0.5–1.0 mm before injecting the anesthetic, in order to avoid direct trauma to a single spinal nerve. One should never continue injecting anesthetic if the patient complains of pain during injection.

Backache

Backache after spinal anesthesia is quite common and rarely a major issue. Incidences of approximately 20% have been described.10 The long duration of operation is associ- ated with higher incidence of back problems and the incidence is quite similar with spinal anesthesia as with general anesthesia. Relaxation of the back muscles leads to

unusual strain and this can lead to postoperative back pain. A pillow under the lumbar area is a cheap and effective method to prevent at least some of the back problems.

If unusual back pain is encountered postoperatively, local infection and spinal hematoma should be excluded. Strict aseptic technique during the administration of spinal anesthesia should be used to prevent infectious complications. Local infection can be associated with tenderness, redness, and other usual signs of infection.

The increased use of low-molecular-weight heparins (LMWHs) for thromboprophylaxis has caused concern about the use of spinal anesthesia for these patients. Patients taking preoperative LMWH can be assumed to have altered coagulation, and needle placement should occur at least 10–12 hours after the LMWH dose. The deci-

sion to perform spinal anesthesia in a patient receiving antithrombotic therapy should be made on an individual basis, weighing the small, though definite, risk of spinal hematoma with the benefits of regional anesthesia for a specific patient. Alternative anesthetic and analgesic techniques exist for patients considered an unacceptable risk. It must also be remembered that identification of risk factors and establishment of guidelines will not completely eliminate the complication of spinal hematoma.50

Signs of cord compression, such as severe back pain, progression of numbness or weakness, and bowel and bladder dysfunction, warrant immediate radiographic evaluation because spinal hematoma with neurologic symptoms must be treated within 6–8 hours in order to prevent permanent neurologic injury.

Transient Neurologic Symptoms

For almost 60 years, lidocaine has proven to be safe and reliable for spinal anesthesia in a hyperbaric 5% solution.51,52 Hyperbaric lidocaine has been implicated as a causative agent in the cauda equina syndrome, associated with the use of spinal microcatheters.53 The first report of transient neurologic symptoms (TNSs), termed initially transient radicular impairment or transient radicular irritation (TRI), after single- shot spinal anesthesia with hyperbaric 5% lidocaine was published by Schneider and colleagues54 in 1993. This finding has later been confirmed by several other studies.47,55–59

Definition

TNSs are defined as back pain and/or dysesthesia radiating bilaterally to the legs or buttocks after total recovery from spinal anesthesia and beginning within 24 hours of surgery. Usually no objective signs of neurologic deficits can be demonstrated.49,54,55 The pain is usually moderate and relieved by nonsteroidal antiinflammatory agents, but opioids are also often needed.49,59 In some cases, the patients state that the tran- sient neurologic pain is worse than their incisional pain.59

Etiology

The cause and etiology of TNSs have not yet been elucidated. Even the name of this syndrome is controversial and different suggestions appear in the literature every now and then. To avoid confusion, it is not reasonable to change the name of the syndrome until the etiology is clear.

It is surprising that this new syndrome was not recognized until the beginning of the 1990s. Lidocaine has been used since 1948 for spinal anesthesia in millions of patients without major central nervous system sequelae. The reason for a new syn- drome may be either a change in methods or prior lack of recognition. One reason for the high number of reports of TNSs after spinal anesthesia may be that these symptoms are being sought more aggressively after the first case reports.

The practice of spinal anesthesia has changed radically in recent years. Use of premedication before spinal anesthesia has diminished. New, small-gauge Quincke and pencil-point spinal needles have been introduced for everyday use. Patients are

now ambulated as soon as possible after surgery. It is not clear if any of these changes could be responsible for the establishment of TNSs.
The delayed recognition of this phenomenon may be attributable to a high under- lying rate of nonspecific back pain. A heightened awareness of the potential for local anesthetic–induced neurotoxicity after the association of lidocaine and microcathe- ters with cauda equina syndrome and the recognition of a distinct pattern of symptoms may have a part in the recognition of these symptoms.60

Identification of Risk Factors

Possible causes or contributing factors to TNSs include a specific local anesthetic toxicity, neural ischemia secondary to sciatic nerve stretching, spinal cord vasocon- striction, patient positioning, needle trauma, or pooling of local anesthetic secondary to small-gauge, pencil-point needles. Patient diseases or some other undefined patient factors predisposing them to neurologic abnormalities and infection should also be ruled out. Musculoskeletal disturbances in the back and leg symptoms cannot be totally excluded. TNS frequency was observed to be high with outpatient surgery and lithotomy position in one study.61 However, in two randomized studies, early ambula- tion did not increase the risk for TNSs.62,63
After the initial report of TNSs with lidocaine, this syndrome has also been associ- ated with other local anesthetics. The incidence of TNSs with 5% lidocaine has been between 10% and 37%.45,47,59 The risk for TNSs is highest with lidocaine and also with mepivacaine and there seems to be approximately a seven times higher risk of devel- oping TNSs after intrathecal lidocaine than after bupivacaine, prilocaine, or pro- caine.64 It is thought that a local anesthetic toxic effect may be an important contributing factor in the development of TNSs after spinal anesthesia with concentrated solu- tions.65,66 Because the toxicity is believed to be concentration related, a rational approach to the problem would be to look at the comparative efficacy of lower con- centrations of lidocaine for spinal anesthesia. However, in clinical studies, decreasing the concentration of lidocaine from 5% to 2% did not prevent the development of TNSs.47,59
The incidence of TNSs after 4% mepivacaine for spinal anesthesia has been high and up to 30%.49 Three randomized studies combined gave a similar incidence of TNSs with mepivacaine than with lidocaine.64 The incidence of these symptoms with 0.5% tetracaine containing phenylephrine was 12.5%, but only 1.0% when 0.5% tet- racaine without phenylephrine was used.48 The incidence of TNSs after hyperbaric 0.5% or 0.75% bupivacaine was 0%–3%.45,49,59,67 The duration of symptoms after bupivacaine spinal anesthesia was less than 12 hours compared with 12–120 hours after mepivacaine spinal anesthesia.49 Prilocaine has also been associated with a low incidence of TNSs (between 0% and 4%).64
The dorsal roots of spinal nerves are positioned most posteriorly in the spinal canal54 and therefore hyperbaric solution pools in this area when the patient is supine. Individual physical characteristics of patients may predispose to the development of transient radicular symptoms after spinal anesthesia. Anatomic configuration of the spinal column affects the spread of subarachnoid anesthetic solutions that move under

the influence of gravity.68 Both lumbar lordosis and thoracic kyphosis will differ among individuals, particularly with respect to the lowest point of the thoracic spinal canal.69

Sacral maldistribution of local anesthetic with pencil-point needles has been suggested to cause toxic peak concentrations of lidocaine. Maldistribution has been shown in spinal models when the side port of a Whitacre needle is directed sacrally (between 0% and 4%) and the speed of injection is slow. In contrast, the distribution from a sacrally directed Quincke needle was uniform even with slow injection rates,56 well-distributed blocks, and with different types of spinal needles.45,55,70 However, in clinical practice, TNSs have occurred following well-distributed blocks.

In addition to toxic effects of the local anesthetics, the lithotomy position during surgery has been thought to contribute to TNS.54 The lithotomy position may contribute to TNSs by stretching the cauda equina and sciatic nerves, thus decreasing the vascular supply and increasing vulnerability to injury. During knee surgery, where the position of the operative leg is varied and nerve stretching may occur, there is an increased risk for TNSs. The incidence of TNSs is higher after knee arthroscopy compared with inguinal hernia repairs.59

Spinal cord vasoconstrictors may be implicated through either localized ischemia or prolonged spinal anesthesia because of decreased uptake of local anesthetic. Adding phenylephrine to tetracaine spinals increased the frequency of transient radicular symptoms.48 Intrathecal tetracaine increases spinal cord blood flow and the effect can be reversed or prevented by epinephrine.71 Lidocaine induces less vasodilatation in the spinal cord72 and bupivacaine is a vasoconstrictor.73 Epinephrine added to lidocaine did not increase the incidence of TNSs compared with lidocaine without epinephrine. However, different concentrations of lidocaine (5% with epinephrine and 2% without epinephrine) were used.59 Preliminary animal data suggest that the concurrent administration of epinephrine enhances sensory deficits resulting from subarachnoid administration of lidocaine.74 It is not clear whether animal data have clinical relevance for TNSs.

It has been speculated that profound relaxation of the supportive muscles of the lumbar spine may result in straightening of the lordotic curve, and even transient spondylolisthesis, when the patient is lying on the operating table. This may be responsible in part for the radiating back symptoms that can occur after intense motor block.49

Needle-induced trauma is typically unilateral and closely associated with needle insertion or local anesthetic injection. TNSs appear after otherwise uneventful spinal anesthetics and no correlation with paraesthesias and incidence of symptoms has been found.45,48,49,55,59 Chemical meningitis or arachnoiditis is an improbable cause of these syndromes because there is no progression of symptoms and they usually resolve promptly without special treatment. However, results of one case report of magnetic resonance imaging (MRI) of two patients with TNSs after lidocaine spinal anesthesia showed enhancement of the cauda equina and the lumbosacral nerve roots that according to the authors may support the theory of a direct toxic effect of lidocaine. The MRI findings are suggestive of pial hyperemia or breakdown of the nerve root–

blood barrier by a noninfectious inflammatory process.75 No association with TNSs and patient sex, weight, or age has been found.49,59
Studies exploring a possible etiologic role of hyperosmolarity secondary to glucose suggests that it does not contribute to transient radicular symptoms.46,48,65,76 Glucose can also promote maldistribution of local anesthetics and thus contribute indirectly to neural injury. However, a similar incidence of TNSs was found after spinal anes- thesia with 5% hyperbaric lidocaine with epinephrine and 2% isobaric lidocaine without epinephrine.59
The site of local anesthetic action is in sodium channels, and therefore a logical step toward determining a mechanism for the local anesthetic neurotoxicity is in establishing whether ongoing blockade of sodium channels is causative for neurotoxicity. According to Sakura et al.,77 the local anesthetic toxicity does not result from the blockade of sodium channels, and they suggest that the pursuit of a Na channel blocker not associated with TNSs is a realistic goal.

Clinical Implications

The clinical significance of TNSs is still unclear. Although it is possible that TNSs represent the lower end of a spectrum of toxicity, their relationship to neurologic injury remains speculative at the present time78, even more than 10 years after the discovery of this syndrome. There are not even any case reports that would indicate that TNSs are permanent or have not disappeared completely. Whether the use of lidocaine or mepivacaine should be continued for spinal anesthesia is controversial. Adding epinephrine to lidocaine seems to potentiate persistent sensory impairment induced by subarachnoid lidocaine75 and may explain cauda equina syndrome after single-shot spinal anesthesia.70 There is no reason to add epinephrine to lidocaine because the solution can be substituted with bupivacaine.60,78 It has been suggested that lidocaine should be used sparingly – if at all – in anesthetic procedures in which product pooling, nerve stretching, or both could compromise neural viability.79 It may be wise to substitute lidocaine with bupivacaine or ropivacaine until the etiology and clinical significance of TNSs are determined. Decreasing the dose of bupivacaine makes it a suitable alternative for short-stay surgery.59 However, there is still a place for a new nontoxic, effective, and short-acting local anesthetic.

Headache

Nonspecific headache after spinal anesthesia can be more common than usually reported in the anesthesiology literature. Incidences of approximately 15%–20% have been described in recent publications.80,81 Dehydration, fasting, and possibly associated hypoglycemia, deprivation from intake of caffeine, anxiety, and immobilization leading to muscle tension could explain the occurrence of nonspecific headache.81 This headache is not pathognomonic for spinal anesthesia because similar incidences have been reported after general anesthesia for various operations. The treatment is symptomatic.

Postdural Puncture Headache

PDPH used to be a common postoperative side effect of spinal anesthesia. With the development of thinner needles and needle tip design, this harmful complication has become rarer. But despite these positive developments, we still cannot promise our patients that they will not get this complication if spinal anesthesia is chosen for their anesthesia method.

Definition

PDPH is a typical headache that is usually bifrontal and occipital and is aggravated by upright posture and by straining. Nausea and vomiting are also common symptoms. The headache may first be experienced several hours to days after the dural puncture. It is relieved by lying down. The headache is different than any headache that the patient has had before (except possible previous PDPH). PDPH needs to be differentiated from tension/migraine headache, aseptic or infective meningitis, cortical vein thrombosis, or cerebral/epidural hematoma.

The pain is often associated with other symptoms that can be related with the nerve involved. Usually these symptoms resolve with the recovery from the headache. Auditory disturbances may occur secondary to eighth nerve dysfunction. These include unilateral or bilateral deafness that may go unnoticed if not specifically asked about from the patient. Traction on the abducens nerve can cause visual disturbances, diplopia being the most common symptom.

Etiology

The spinal dura mater extends from the foramen magnum to the second segment of the sacrum. It contains the spinal cord and nerve roots that pierce it. Usually after dural puncture the hole caused by the needle will close, but in some cases the hole remains open with subsequent loss of CSF through the hole. The dynamic relationship between dural and arachnoideal tear may have a role in the closure of the puncture hole. There is a clear relationship between the loss of CSF and the severity of the symptoms. According to present knowledge, the typical headache in the upright position is caused by the traction of the cerebral structures when the brain descends. Also, the compensatory cerebral vasodilatation due to loss of CSF can also cause headache.

Dura mater is a dense, connective tissue layer made up of collagen and elastic fibers that are running in a longitudinal direction at least in the superficial layer of the dura. However, light and electron microscopic studies of human dura mater have contested this classical description of the anatomy of the dura mater. Measurements of dural thickness have also demonstrated that the posterior dura varies in thickness, and that the thickness of the dura at a particular spinal level is not predictable within an individual or between individuals.82 Dural perforation in a thick area of dura may be less likely to lead to a CSF leak than a perforation in a thin area, and may explain the unpredictable consequences of a dural perforation.

Despite the new knowledge about dural anatomy, cutting spinal needles should still be orientated parallel rather than at right angles to these longitudinal dural (and also

arachnoideal) fibers (or spine) to reduce the number of fibers cut. The cut dural fibers, previously under tension, would then tend to retract and increase the longitudinal dimensions of the dural perforation, increasing the likelihood of a postspinal headache. Clinical studies have confirmed that postdural puncture headache is more likely when the cutting spinal needle is orientated perpendicular to (versus parallel) the direction of the dural fibers.10,83

As previously mentioned, the risk for the occurrence of PDPH may be highest if the puncture is aimed at the thinnest part of the dura. However, the anesthesiologist does not have any possibility to aim the spinal needle to the thicker part of the dura. There are some patient groups that are at a higher risk to develop PDPH than the others (Table 9-1). Especially, younger and obstetric patients and those who have had PDPH before have a higher risk for this syndrome. There are differing opinions about the effect of gender, as in some studies it did not have any effect and in some other studies even nonpregnant women have been more susceptible to PDPH. There are also some risk factors that the anesthesiologist can influence. If spinal anesthesia is chosen for a risk patient, proper technique should be used. Multiple punctures should be avoided. Thin spinal needles should be used. However, the smallest available spinal needles (29-gauge) are more difficult to use and more expensive than the thicker ones. The anesthesiologist should use the spinal needle that he or she is familiar with to avoid technical difficulties during the puncture. Modern 27-gauge, pencil-point needles are quite easy to use after some practice and may offer the optimal balance between ease of puncture and incidence of complications. With these modern needles, CSF appears in the needle hub so fast that it does not hamper the procedure. Thus, even routine use of the 27-gauge (0.41 mm) Whitacre spinal needle when performing spinal anesthesia has been recommended.81

Epidural Blood Patch

EBP has been shown to be the only curative treatment for PDPH that shortens effectively the duration of PDPH with high incidence of succession and low incidence of complications. Patient's autologous blood is injected into epidural space near the spinal puncture site to seal the hole and stop the CSF leak. EBP should be considered if the patient's PDPH is so severe that he or she is bedridden because of headache and consents to the procedure. Breast-feeding mothers with newborn babies should be offered EBP if PDPH hampers breast feeding and prevents them from enjoying the pleasures of recent motherhood.

The timing of EBP is controversial. Some authorities recommend a prophylactic blood patch if a dural tap is encountered during epidural puncture. However, not everyone gets PDPH even after dural puncture with a 16-gauge epidural needle. These patients would be exposed to an unnecessary procedure with potential side effects. Also, the results with prophylactic blood patches have not been convincing. The success rate has been higher if EBP has been administered 24 hours after the dural puncture instead of earlier.85

According to present theory, the rapid effect of EBP is caused by the volume effect of the blood in the epidural space. The blood compresses the dural canal and increases

the CSF pressure and the headache is relieved. An MRI study has confirmed the tamponade effect of the 20-mL EBP, which is believed to be responsible for the immediate resolution of PDPH.86 In the later stage, the blood is clotting into dura and the hole will close, preventing the further leakage of CSF. There are no good studies indicating how long the patients should be treated in the hospital after the EBP and what they can or cannot do to achieve best possible results. Our practice is to keep the patient supine for 30 minutes after the EBP. Thereafter, sitting and standing is tried. Patients are released from the hospital 1 hour after the procedure. They are advised to avoid any strain such as lifting during the first 24 hours after the EBP.
Thereafter, the patients can return to their normal activities. They can contact the hospital again if there are problems or the headache returns.
The contraindications to EBP are those that normally apply to epidurals (patient refusal, local infection, bleeding disorders, etc.). The anesthesiologist should interview the patient before EBP to find out if the symptoms are typical for PDPH. When in doubt, a neurologic opinion should be sought and perhaps a computed tomography scan or MRI taken to exclude other possible pathologic findings in the central neural system. Viral infection and malignancy are at least relative contraindications. There are not enough data to exclude the possibility that viruses or neoplastic cells introduced into the epidural space are potentially harmful to the patient.
The success rate with EBP has been approximately 70%–90%. In the first report by Gormley only 2–3 mL of blood was recommended.87 Higher blood volumes seem to lead to higher success rate of EBP. Volumes between 15–20 mL have been used most often, although even 30-mL volume has been used without complications. Strict aseptic technique should be used during the procedure. The administrator of EBP should be experienced with epidural technique because a dural tap with a Tuohy needle makes things only worse. According to Szeinfeld and colleagues,88 the blood spreads more in cephalad than caudad direction in the epidural space. Therefore, if the same interspace that was used for the lumbar puncture cannot be used, it may be wise to choose a lower one. Usually the patient feels a sensation of “fullness” during the injection. If there is persistent pain or paresthesia during the injection, the injec- tion should be stopped. If the first EBP fails, the procedure can be repeated with a similar success rate. Usually, the PDPH is at least milder after EBP even if the head- ache returns. If two EBPs do not relieve the symptoms, even more caution than before should be used to exclude other reasons for headache.

Pruritus

Pruritus may be a problem if intrathecal opioids are used in combination with local anesthetics. Fentanyl is used quite often in combination with low-dose local anesthetic in order to intensify the block without delaying the discharge. Sufentanil and morphine are used more often for postoperative analgesia of the inpatients. Most often, the pruritus is mild and does not need any treatment. In some cases, itching can become a real problem and needs rescue medication. A 5-HT antagonist ondansetron has been shown to alleviate the symptoms effectively.

Continuous Spinal Anesthesia

Spinal catheters can be used for repeating dosing or continuous infusion of drugs into the subarachnoid space. Excessive block can be avoided with careful titration of the drugs into catheter. With more restricted block, there is smaller risk for cardiovascular complications such as hypotension and bradycardia. If the duration of surgery is long, additional doses of local anesthetics can be injected. The use of catheters can be extended also for postoperative analgesia.

In the beginning of the 1990s, 14 cases of cauda equina syndrome were reported in association with the use of small-gauge spinal catheters. This led to the withdrawal of the microcatheters from the market in the United States and Canada. The mecha- nism of these unhappy events was probably attributable to direct toxic effect of local anesthetic. Maldistribution or potential pooling of local administered through the catheters near the roots of cauda equina is the most likely explanation. Therefore, hyperbaric local anesthetics should be avoided with microcatheters. Injection of hyperbaric solution through a single-hole microcatheter may lead to neurotoxic con- centrations of local anesthetic in CSF. The risk seems to increase when the catheter is directed caudad and glucose-containing solutions are injected. Unfortunately, it is impossible to predict the direction of a subarachnoid catheter despite attempts to direct it cranially at least with sharp-beveled needles.89 More accurate positioning may

Conclusion

Spinal anesthesia is one of the oldest and most reliable techniques in anesthesia today and its use now spans three centuries. The circumstances surrounding its introduction are fascinating. The basic technique has changed very little in more than 100 years of use. We now have better needles, local anesthetics, and catheters. We now add opiates to our local anesthetic solutions which have many benefits but also add to the list of complications. The phenomenon of TRI or TNSs is fascinating and inexplicable. We have learned a great deal about the physiology of spinal anesthesia in the last 50 years thanks to outstanding contributions made by Sir Robert Macintosh and Professor Nicholas Greene. It is very likely that anesthesiologists will still be performing spinal anesthesia 100 years from now. We owe a debt of gratitude to Bier and Hildebrandt for the gift of spinal anesthesia.

Result

15 cases were performed under regional anesthesia, 10 patients were female (66.6%) and 5 were male (33.3%) There was a significant variation in ages ranging from 1 year to 40

years Patients experienced post-operative pain %33.33, nausea and vomiting %20, headache %20, urinary retention 6.66%, and postoperative hypotension %20 of cases.

Table no.1

N	Variable	N0.OF PATIENT	%
1	Male Female	5 10	33.33% 66.66%
2	Age; 1-20 20-30 30-38	 5 5 5	 33.33% 33.33% 33.33%
3	Clinical features; Pain after the operation Vomiting and nausea Headache urinary retention haypotension	 5 3 3 1 3	 33.33% 20% 20% 6.66% 20%

Table ..2

ANESTHESIA TYPE	HAVING ASTHMA	SMOKING TYPE	WEIGHT	OPERATION TYPE	AGE	LENGTH	GENDER	1
Regional anesthesia	no	No	65	appendix	20	160	Man	2
Regional Anesthesia	no	No	76	cesarean	37	167	Women	3
Regional Anesthesia	no	No	78	cesarean	30	170	Women	4
Regional Anesthesia	no	No	68	appendix	27	173	Women	5
Regional Anesthesia	no	No	80	hernia	38	179	Man	6
Regional Anesthesia	no	No	28	hernia	7	103	Man	7
Regional Anesthesia	no	No	71	cesarean	35	167	Women	8
Regional Anesthesia	no	No	64	cesarean	22	158	Women	9
Regional Anesthesia	no	No	16	hernia	2	74	Man	10

Regional Anesthesia	no	No	74	appendix	23	162	Women	11
Regional Anesthesia	no	No	68	cesarean	26	168	Women	12
Regional Anesthesia	no	No	74	cesarean	37	177	Women	13
Regional Anesthesia	no	No	48	appendix	12	144	Women	14
Regional Anesthesia	no	No	9	hernia	1	66	Man	15

In this rank, we dealt with the study of several cases during the hospital visit, and in this study we dealt with the gender of the patient, where the percentage of females (66.66%) who receive spinal anesthesia and they are more than men, where the percentage of men (33.33%) during the study period

And we were interested in several details of the patients, exhorting their gender, including weight and type of operation, as most of the females had caesarean sections, and we also dealt with the smoking rate of patients who underwent this type of anesthesia, and their percentage was (0%.(

And patients who had chronic diseases such as asthma were (0%) and this was stated during the study period in that hospital.

DISCUSSION

Curvature is key in spinal

anesthetics (no matter in epidurals). Note that in the lumbar area, the spinous processes are near-perpendicular to the VB, whereas in the thoracic area they point downwards. Also in the thoracic area, the interlaminar space is only a few millimeters. The sacral hiatus (unfused opening between S4 and S5) is missing in 8% of adults. C7 is the bony knob at the bottom of the neck. T7-8 is at the lower limits of the scapulae. Terminal point of 12th ribs is at L2. The line across the iliac crests crosses L4 VB. Posterior iliac spines are at S2 (caudal limit of dural sac in adults). The cord itself terminates at L1 in adults and at L3 in infants.

Vertebral Level .....Landmark

C7__Bony knob at base of neck..

T7-8__Lower limits of scapulae..

L2 __Terminal point of 12th ribs..

L4 __Line across iliac crests..

S2__Posterior iliac spines..

{2}

Timing of Anesthesia

When giving a spinal anesthetic, the first 5-10 minutes are critical in terms of monitoring the cardiovascular response as well as the level. Temperature changes are

the first to go, and a wetted alcohol swab can give an early indicator of the level (30-60 seconds), allowing the anesthesiologist to change the patient's position if need be.
Sensory Level Type of Surgery
S2-S5 Hemorrhoidectomy
L2-L3 Foot surgery
L1-L3 Lower extremity
T10 (umbilicus) Hip,
TURP,
vaginal delivery T6-T7 (xiphoid) Lower abdomen,
appendectomy T4 (nipple) Upper abdomen,
C-section

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