Introduction

There are advances in anesthetic techniques, more and more regional blocks are being tried to take care of post operative pain. The choice of anesthetic block technique depends upon the site of surgical incision proposed. Transversus abdominis plane (TAP) block is a novel approach in which local anesthetic agent is injected into the plane between the internal oblique and transversus abdominis muscles ***(Kuppuvelumani et al., 1993).***

The technique of TAP block has been found to be a safe and effective tool in a variety of general, gynecological, and urological surgery, and it is suggested as a part of the multimodal anesthetic approach to enhance recovery after lower abdominal surgeries ***(Johns et al., 2012).***

Transversus abdominis plane (TAP) block is a regional anesthetic technique which blocks neural afferents from the anterolateral abdominal wall. With the aid of ultrasound or anatomical landmark guidance, local anesthetic is injected into the transversus abdominis fascial plane, where the nerves from T6 to L1 are located. The initial clinical trials assessing the analgesic effect of TAP blockade showed an effect for up to 24 hr postoperatively ***(McDonnell et al., 2007).***

The abdominoplasty, commonly referred to as a "tummy tuck," is a procedure to reduce the excessive skin and fat around the abdomen and strengthen the abdominal wall musculature. This procedure results in an aesthetically pleasing abdomen. With the rise in bariatric surgery, the abdominoplasty has become a significant resource to help these patients with an excess abdominal tissue after their weight loss ***(Hafezi et al., 2006).***

The transversus abdominis plane (TAP) block is a technique of regional anaesthesia that blocks the sensorial afferent nerves localized between the transversus abdominis muscle and the internal oblique muscle ***(Araco, 2010).***

Opioids can effectively control postoperative pain, however, are associated with dose-related side effects including respiratory depression, sedation, pruritis, nausea, and vomiting. Hence, alternatives such as regional nerve block have been incorporated to improve analgesia after abdominoplasty ***(Salama, 2018).***

Transversus abdominis plane (TAP) block was first described in 2001 and was designed to anaesthetize the anterior rami of T6 through L1 while they traverse the space between the transversus abdominis muscle and internal oblique muscle.it was hypothesised that TAP block would have many advantages which would translate directly into decreased opioid needs and its unwanted associated side effects, better analgesia, and earlier ambulation during the postoperative period ***(Mukhtar, 2009)***.

Aim of the Work

The aim of this study is to compare postoperative analgesia between ultrasound guided bilateral transversus abdominis plane block and intravenous opioids after abdominoplasty surgeries.

Chapter 1

OBESITY

Criteria and classification

Obesity is defined as an excess accumulation of body fat. To measure fat in the body accurately is difficult, and no method is easily available for routine clinical use. Traditionally, overweight and obesity have been evaluated by anthropometric measurement of weight-for-height. More recently, BMI has been used. The normal range is 19–24.9 kg/m^2, overweight is 25–29.9 kg/m^2, and obesity ≥ 30 kg/m2. Not only is the total amount of fat an individual carries important, but also where the fat is distributed in the body. Fat in a central or upper body (android) distribution is most related to health risk. The most accurate way to measure central obesity is by magnetic resonance imaging or computer-assisted tomography scanning, but this approach is too expensive for routine use. Simple anthropometric measurements can be used, such as waist circumference. A waist circumference of greater than 1020 mm in men and 880 mm in women is a risk factor for insulin resistance, diabetes mellitus and cardiovascular disease ***(Xavier Pi-Sunyer, 2000).***

Table 1: WHO adult BMI classification

Classification	**BMI (kg/m^2)**
Underweight	<18.5
Normal weight	18.5–24.9
Overweight	25.0–29.9
Obese Class I	30.0–34.9
Obese Class II	35.0–39.9
Obese Class III	≥ 40

(Kinlen et al., 2018)

Pathophysiology of obesity

Under normal circumstances, the amount of fat in adipose tissue remains constant despite the continuous turnover. This means that the reactions controlling fat synthesis and storage are perfectly balanced with the reactions controlling fat breakdown and mobilization. Fat accumulate in adipose tissues by two mechanisms. The first and the most important is the transfer of plasma lipids to fat cells.

Lipoprotein-bound triglyceride is converted by lipoprotein lipase enzymes into its constituents, fatty acids and glycerol. The second mechanism is responsible for fat storage which involves the uptake of glucose from the dietary carbohydrates and its conversion by fat cells into fatty acids, hence triglycerides. This is called the de novo synthesis pathway ***(Farkas, 1973)***.

Complications of obesity

Diabetes

Currently over 12% of adults in the US have diabetes and this is projected to rise to 21–33% by 2050.Most patients with type 2 diabetes are obese and the global epidemic of obesity largely explains the explosion in cases of T2DM over the past two decades. The risk of T2DM rises with increasing body weight; a study of over 21 000 adults in the National Health and Nutrition Examination Survey (NHANES) found the risk rising from 8% in normal weight people to 43% in individuals with morbid obesity. A study in the NHS in the UK showed a 100-fold increased risk of diabetes over 14 years in nurses with a BMI > 35 compared with those with BMI < 22 ***(Kinlen et al., 2018).***

Cerebrovascular Disease

Currently available evidence shows that the risk of haemorrhagic and ischaemic stroke, in relation to obesity, is increased in men. In women this relation is true with ischaemic stroke but not haemorrhage stroke ***(Segula, 2014).***

Lately, central obesity (where fat is preferentially distributed around the trunk) has been shown to be important in predicting stroke mortality. In the Israel heart disease study, stroke mortality was predicted by trunk obesity alone independent of BMI, hypertension, diabetes and socioeconomic status ***(Segula, 2014).***

Cardiovascular disease

Hypertension

Obese children are approximately three times likelier to have hypertension than non-obese children. In adults, there is a nearly linear relationship between BMI and blood pressure (BP) and weight loss reduces BP in most hypertensive individuals ***(Kinlen et al., 2018).***

Dyslipidaemia

The effects of obesity on lipid metabolism include high levels of low-density lipoprotein cholesterol, very low-density lipoprotein cholesterol, triglycerides and low levels of the protective high-density lipoprotein cholesterol ***(Kinlen et al., 2018).***

Coronary heart disease

One study found that for every 4 kg/m^2 increase in BMI there is a 26% increase in odds for coronary heart disease (CHD). Data from the NHANES study including death information for 2.3 million American adults showed that obesity was associated with significantly increased mortality from both CHD and other forms of CVD. Although BMI may also affect CHD risk through intermediate factors such as hypertension, dyslipidaemia and diabetes ***(Kinlen et al., 2018).***

Heart failure

Obesity has been shown to affect the heart as early as in childhood, with obese children having significantly higher left ventricular mass. The Framingham Heart Study, which followed 6000 adult subjects without a history of heart failure for a mean of 14 years, found that the risk of heart failure was doubled in obesity. After adjusting for established risk factors, the risk of heart failure increased 5% in men and 7% in women for each extra 1 kg/m^2 in BMI. A review of 28 studies found that both overweight and obesity are associated with increased risk of heart failure. However, in people with established heart failure, several studies have observed better outcomes in obese compared with lean individuals.This has been termed the obesity paradox, and proposed explanations have included that obesity is associated with less cardiac cachexia, earlier presentation due to more impaired quality of life, greater metabolic reserves and protective adipokines ***(Kinlen et al., 2018).***

Overweight and obesity are associated with cardiac autonomic neuropathy. A 10% increase in body weight is associated with a decline in parasympathetic tone and an increase in heart rate. Changes in autonomic nervous system function might be an important cause of cardiovascular events and mortality ***(Klieger, 2005)***.

Pulmonary abnormalities

Obstructive sleep apnea

Several studies have linked obesity and obstructive sleep apnea (OSA). In the Wisconsin Sleep Cohort study, obesity had a strong association with OSA. There have been two mechanisms that have been thought to contribute to OSA. Firstly, is the direct effect of increased fat tissue along the airway which impinges on the lumen. Secondly, increased fat tissue has been implicated in increasing the collapsibility of the airway ***(Segula, 2014).***

Asthma

Asthma is another condition that may occur as a complication of obesity. There is evidence that obesity increases the risk of asthma. In one prospective multicentre study, the prevalence of asthma was observed to increase in obese patients. Seventy five per cent that presented with an asthmatic emergency were either obese or overweight. Further prospective studies have shown that obesity predicts asthma. The mechanism linking obesity and asthma includes increased airway hyper-responsiveness, decreased functional and tidal volumes, chronic systemic inflammation driven by increased inflammatory cytokines and chemokines, adipocytes derived factors leptin, adiponectin and plasminogen activator inhibitor ***(Segula, 2014).***

Immune system

Obesity induces a dysregulated immune system which can be seen from childhood. It is associated with increased susceptibility to infections of numerous types, including surgical-site, urinary tract, nosocomial and skin. Furthermore, obese individuals don’t respond as well to vaccines and were found to be at greater risk of death during the H1N1 influenza pandemic in 2009.

It has been suggested that the parallel rise in autoimmune disease and obesity seen in the past few decades are causally linked. There is strong evidence supporting obesity driving an increased risk of rheumatoid arthritis (RA) (OR = 1.2–3.4), Multiple Sclerosis (OR = 2), Psoriasis and Psoriatric Arthritis (OR = 1.48–6.46) ***(Kinlen et al., 2018).***

Gastrointestinal

Liver disease

Non-alcoholic fatty liver disease (NAFLD) is now the commonest cause of chronic liver disease worldwide, estimated to be present in 20–35% of adults in the developed world. One-third of these cases progress to non-alcoholic steatohepatitis (NASH), characterized by liver inflammation and injury, which can lead to cirrhosis and hepatocellular carcinoma. NAFLD is considered the hepatic manifestation of metabolic syndrome and its risk is strongly correlated with BMI. One study found rates of steatosis to be 15% in non-obese persons, 65% in people with Class I or II obesity and 85% in Class III obesity. Weight loss is the best treatment for NAFLD with studies showing bariatric surgery-induced weight loss leading to resolution of NASH in 80% of cases ***(Kinlen et al., 2018).***

Gallbladder disease

A meta-analysis of 17 prospective studies covering nearly 2 million participants found a relative risk of 1.63 for a 5 unit increment in BMI. The risk of gallbladder disease doubled from lower to upper limit of the normal BMI range, suggesting even moderate weight gain increases risk. Rapid weight loss also increases the risk of gallstone formation with ursodeoxycholic acid ***(Kinlen et al., 2018).***

Obesity is associated with greater risk of pancreatitis and is a poor prognostic factor in the disease. It is als o considered a major reason for the 2-fold increase in incidence of gastroesophageal reflux disease and its associated conditions Barrett’s oesophagus and oesophageal adenocarcinoma Weight loss has been found to be the most effective way to treat reflux ***(Kinlen et al., 2018).***

Kidney Disease

Overweight and obesity are risk factors for hypertension, diabetes, and other conditions associated with impaired renal function. A study following up over 8 million person-years found that, compared with lean people, the relative risk for End-Stage Renal Failure (ESRF) was 1.87 for overweight individuals, 3.57 for those with class I obesity, 6.12 for those with class II obesity, and 7.07 for those with class III obesity. After adjusting for other risk factors, higher BMI remained an independent predictor of ESRF ***(Kinlen et al., 2018).***

Reproductive disease

Polycystic ovary syndrome (PCOS), characterized by anovulation, hyperandrogenism and a polycystic ovary, is associated with obesity as well as insulin resistance. It has been noted that increased visceral fat assessed by waist circumference of more than 88cm is associated with hyperandrogenemia in patients with PCOS and that reduction of insulin resistance by weight loss or drugs that increase peripheral sensitivity of insulin leads to improve hormonal aberrations and ovulation.

In men, abdominal obesity has been associated with impotence and infertility. In one single blinded randomised controlled trial of 110 obese men with erectile problems but no other risk factors namely diabetes, hyperlipidemia or hypertension, there was improvement of sexual function associated with decreased BMI.

There are other reproductive complications of obesity that occur in pregnancy and labour. These include gestational diabetes, macrosomia, dystocia and increased rates of caesarean sections ***(Segula, 2014).***

Musculoskeletal

Obesity is associated with significant reductions in physical activity levels and is one of the main risk factors for osteoarthritis. The greatest impact is on the knee, but there is also increased risk in hand joints, suggesting an inflammatory as well as a mechanical cause. Radiating lower back pain is increased in obesity ***(Kinlen et al., 2018).***

Metabolic syndrome

According to the National Cholesterol Education Program's Adult Treatment Panel III (NCEP: ATP III), the metabolic syndrome is defined when an individual has any 3 of the following 5 features: (i) waist circumference above 40 inches for men and >35 inches for women, (ii) Triglycerides above 150mg/dl, (iii) HDL cholesterol below 40mg/dl for men and 50mg/dl for women, (iv) Blood pressure above 130/85 mmHg, (v) Fasting glucose above 100mg/dl.

Central obesity and insulin resistance, which leads to altered lipid and glucose metabolism, appear to be the basis for the features seen in metabolic syndrome. The syndrome was originally intended for prediction of the risk of cardiovascular disease, however, this has recently been questioned as the sum of the combined risk factors appears not to offer more than the sum of individual factors ***(Segula, 2014).***

Psychosocial

Obese individuals are often exposed to public disapproval and stigma due to their weight, with women experiencing more discrimination. This takes place in employment, healthcare, education and other areas. Depression is more common in obesity, particularly in women and younger people, while weight loss is associated with improved mood. Adolescents who are obese or overweight, are more likely to engage in risk behaviour than those of normal weight. This can involve substance abuse ***(Kinlen et al., 2018).***

Cancer

There is considerable evidence of an association between obesity and some cancers. These include cancer of gallbladder, esophagus (adenocarcinoma), thyroid, kidney, uterus, colon and breast. This link has further been strengthened by the observation that there is reduced incidence of cancer and mortality with weight loss. However the underlying mechanism linking these cancers to obesity is not clear. For uterus and breast cancers, it is thought to be due to higher oestrogen levels synthesized from fat tissue in obese women ***(Segula, 2014).***

Quality of life (QOL) and health related quality of life (HRQOL) involves a person’s experience, believes and