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The analgesic efficacy of Transversus abdominis plane block after upper abdominal surgery in comparison to single injection thoracic epidural block

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LIST OF ABBREVIATIONS

A	
ACTH	AdrenoCortico-Trophic Hormone
ADH	Antidiuretic Hormone
ASA	American Society of Anesthesiologists
B	
BMI	Body Mass Index
C	
CCS	Canadian Cardiovascular Society
CLcr	Creatinine Clearance
CNS	Central Nervous System
CPR	Cardiopulmonary Resuscitation
CSF	Cerebrospinal Fluid
D	
DBP	Diastolic Blood Pressure
E	
ECG	Electrocardiogram
$ETCO_2$	End-tidal CO_2
H	
HR	Heart Rate
I	
INR	International Normalized Ratio
IV	Intravenous
M	
MABP	Mean arterial blood pressure
N	
NSAIDs	Non- Steroidal Anti-Inflammatory Drugs
NYHA	New York Heart Association
n	Number
P	
PCA	Patient Controlled Analgesia
PHHS	Prince Henry Hospital Score
PONV	Postoperative Nausea and Vomiting

PT	Prothrombin Time
PTT	Partial Thromboplastin Time
P-value	The level of significance
R	
RA	Rectus Abdominis
RR	Respiratory Rate
S	
SBP	Systolic Blood Pressure
SD	Standard Deviation
SpO_2	Oxygen Saturation
SPSS®	Statistical Package for Social Science
T	
TAP	Transversus Abdominis Plane Block
V	
VAS	Visual Analogue Scale

INTRODUCTION

A substantial component of the pain experienced by patients after abdominal surgery is derived from abdominal wall incision**.** ***(Bonnet and Marret, 2005)***

The benefits of adequate postoperative analgesia are clear, and include a reduction in the postoperative stress response, reduction in postoperative morbidity, and in certain types of surgery, improved surgical outcome. Effective pain control also facilitates rehabilitation and accelerates recovery from surgery. Other benefits of effective regional analgesic techniques include reduced pain intensity, decrease incidence of side effects from analgesics, and improved patient comfort **.** ***(Bonnet and Marret ., 2005)***

Thoracic Epidural analgesia is an effective method of providing post-operative analgesia for patients following upper abdominal surgery but also it carries complications as hypotension, intrathecal catheter placement, inadequate or "patchy" block. ***(Vukosavljevic et al.,2008)***.

The Transversus abdominis plane (TAP) block is a new, rapidly expanding regional anesthesia technique that provides analgesia following abdominal surgery. Introduced long ago in Ireland, where there was a lack of facilities and staff for acute postoperative pain treatment, it became increasingly popular

worldwide because of its relative simplicity and efficacy ***(McDonnell et al., 2007).***

The block is carried out in the triangle of "petit" formed by latissmus dorsi posteriorly, external oblique anteriorly and the iliac crest inferiorly***. (McDonnell et al., 2004).***

The analgesic efficacy of TAP block in upper abdominal surgeries is not well studied.

AIM OF WORK

The aim of the work is to study the clinical efficacy of transversus abdominis plane block compared to single injection thoracic epidural analgesia for patients undergoing upper abdominal surgeries.

ANATOMY OF ANTERO-LATERAL ABDOMINAL WALL

The abdominal muscles are group of muscles that provide movement and support to the trunk, often called the core. They also assist in the breathing process. The deeper the muscle is located (i.e. the closer to the spine), the more powerful effect it will have, and therefore, the greater capacity it will have for creating and maintaining a healthy spine ***(Kyung,*** *and Harold****, 2007)***

A. Surface Anatomy of the Antero-lateral Abdominal Wall:

a) The umbilicus lies at the level of the intervertebral disc between L3 and L4 vertebrae. This is midway between the xiphoid process and the pubic symphysis ***(Frank, 2006).***
b) The linea alba is a median fibrous white line or band, dividing the anterior abdominal wall into right and left halves. It lies in the anterior median line and is clearly visible in thin muscular persons**.**
c) The linea semilunaris is a curved line or groove (convex laterally) that extends from the 9^{th} costal cartilage to the pubic tubercle. This indicates the lateral border of the rectus abdominis muscle ***(Frank, 2006).***

B. Muscles of the Antero-lateral Abdominal Wall:

The abdominal wall consists of 3 muscular layers (figure1), each of which has its fibers running in different directions, extending between the thoracic cage and the bony pelvis. There are four important paired muscles in the anterior abdominal wall: three flat muscles (external oblique, internal oblique, and Transversus abdominis), and one strap-like muscle (rectus abdominis) ***(Kyung,*** *and Harold****, 2007)***.

(a) External oblique muscle:

This is the largest and most superficial of the three flat abdominal muscles. It is located in the anterolateral aspect of the abdominal wall. Its fleshy part forms the anterolateral portion and its aponeurosis forms the anterior part ***(Frank, 2006)***.

Its fibers run inferoanteriorly and medially in the same direction as do the extended digits when they are in one's side pockets. It originates from external surfaces of 5^{th} to 12^{th} ribs and insertion; the fibers pass medially, they become aponeurotic. This aponeurosis ends medially in the linea-alba, pubic tubercle and anterior half of the iliac crest. Innervation is via the inferior six thoracic nerves and subcostal nerves ***(Frank, 2006)***.

Inferiorly, it folds back on itself to form the inguinal ligament between the anterior superior iliac spine and the pubic tubercle. Just superior to the medial part of the inguinal ligament,

there is an opening in the aponeurosis called the superficial inguinal ring ***(keith, and Anne, 2006).***

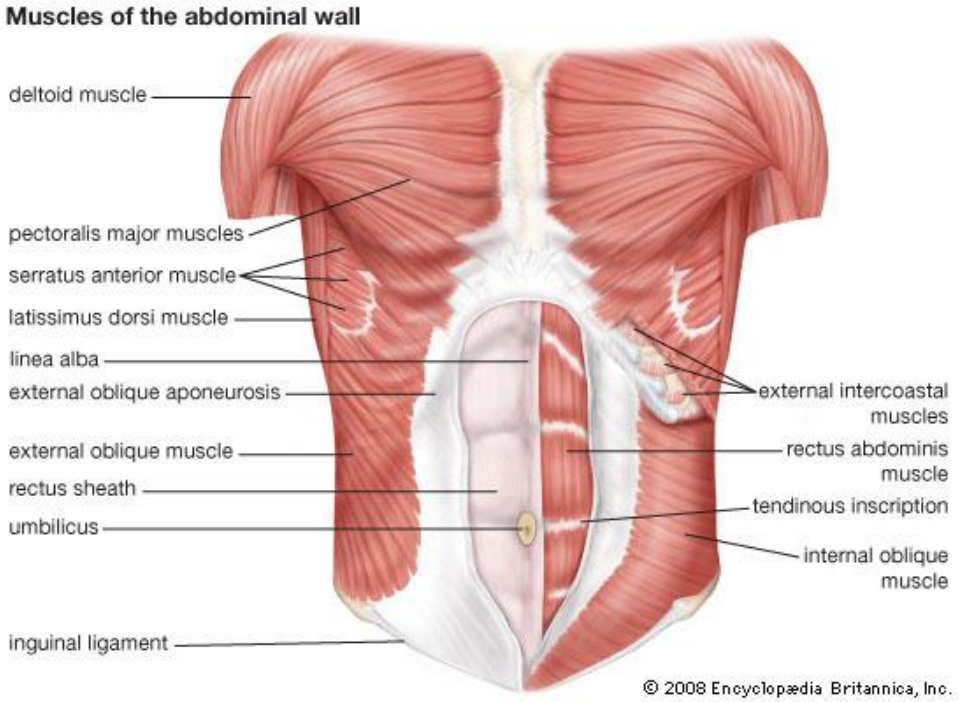

Fig. (1): Muscles of anterior abdominal wall ***(DeBakey et al, 2008)***

(b)Internal oblique muscle:

This is the intermediate layer of the three flat abdominal muscles. It originates from the thoracolumbar fascia, anterior two-thirds of iliac crest, and lateral half of inguinal ligament and become inserted into the inferior borders of 10^{th} to 12^{th} ribs, linea alba, and the pubic via the conjoint tendon. Innervation is via ventral rami of inferior six thoracic and first lumbar nerves.

Its fibers also become aponeurotic and the aponeurosis splits to form a sheath for the rectus abdominis muscle. The