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Ultrasound Guided Transversus Abdominis Plane Block Combined with Transversalis Fascia Plane Block Versus Ultrasound Guided Transversus Abdominis Plane Block Alone for Pain Relief in Patients Undergoing Laparotomy

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Abstract

Background: A substantial component of the pain experienced by patients after abdominal surgery is derived from the abdominal wall incision. An approach to provide post-operative analgesia after abdominal incision is to block the sensory nerve supply to the anterior abdominal wall.

Subjects and Methods: Twenty eight patients undergoing laparotomy were randomized into two equal groups. Those in group A received combined TAPB & TFPB and those in group B received TAPB alone. Heart rate and blood pressure were obtained intraoperatively.

Results: Our study demonstrates that real time ultrasound guided combined TAP with TFP block provides additional benefit to multimodal analgesia more than the real time ultrasound guided TAP block alone in adults undergoing laparotomy with infra-umbilical incision. The patients who received the combined block required less intraoperative as well as postoperative analgesic requirements

Conclusion: Our study demonstrates that real time ultrasound guided combined TAP and TFP block provides additional benefit to multimodal analgesia in adults undergoing laparotomy. The patients who received combined TAP and TFP block required less intraoperative analgesic requirements, as well as postoperative rescue analgesiathan patients who received TAP block alone.

Key Words: *Ultrasound guided blocks – Transversus abdominis block – Transversalis fascia block – Haemodynamics – Intra-operative.*

Introduction

A SUBSTANTIAL component of the pain experienced by patients after abdominal surgery is derived from the abdominal wall incision. The skin, muscles, and parietal peritoneum of the anterior abdominal wall are innervated by the lower six thoracic nerves and the first lumbar nerve [1].

An approach to provide post-operative analgesia after abdominal incision is to block the sensory nerve supply to the anterior abdominal wall. However, the clinical utility of such approaches to the blockade of these nerve afferents, such as abdominal field blocks, is limited, and the degree of block achieved can be unpredictable [2]. A major reason is the relative lack of clearly defined anatomic landmarks, leading to uncertainty regarding the exact needle positioning, and the lack of a clear indication that the local anesthetic is being deposited in the correct anatomical plane [3].

The description of the landmark technique for performing transversus abdominis plane block (TAP) block advocated a single entry point, the triangle of Petit, to access a number of abdominal wall nerves that course through the neurofascial plane between the internal oblique and the transversus abdominis muscles. This triangle is bounded posteriorly by the latissimus dorsi muscle and anteriorly by the external oblique, with the iliac crest forming the base of the triangle, and is a fixed and easily palpable landmark [4].

Transversalis fascia is a thin layer of fascia in the anterior abdominal wall. It lines the transversus abdominis muscle and lies between the muscle and the extraperitoneal fascia.

The lateral cutaneous branches (LCB) of the thoracoabdominal nerves (T6 to L1) arise proximal to the angle of the rib, run a short distance with the main nerve, and emerge obliquely through the overlying muscles in the midaxillary line to supply

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the skin of the lateral thorax, the abdomen, the iliac crest and the upper thigh as far as the greater trochanter of the femur. During Transversus Abdominis Plane (TAP) block, local anesthetic (L-A) is deposited in the plane between internal oblique muscle and transversus abdominis muscle. This is rare to produce block of the LCB of the subcostal (T12) and iliohypogastric (L1) nerves when performing ultrasound-guided transversus abdominis plane block **[5]**.

The subcostal and iliohypogastric nerves pass deep over the anterior surface of quadratus lumborum muscle, which extends from the 12th rib to the iliac crest.

Local anesthetic injected between the transverses abdominis muscle and its deep investing transversalis fascia will spread over the inner surface of the quadrates lumborum muscle and block the proximal portions of the T12 and L1 nerves. This transversalis fascia block (TFP) targets these nerves anatomically between the lumbar plexus block and the TAP block **[6]**.

Material and Methods

This study was performed in Kasr Al-Ainy Hospital of Cairo University after obtaining approval by the Hospital Ethics Committee and a written informed consent from the patients start from April 2012 to March 2014. Patients were randomly allocated by a computer-generated table into one of the 2 study groups; the randomization sequence was concealed in sealed envelopes. Twenty eight patients undergoing laparotomy were enrolled in the study. Group A → combined TAPB & TFPB (n=14) underwent Ultrasound (U.S) guided transversus abdominis plane (TAP) block combined with transversalis fascia plane (TFP) block after induction of general anaesthesia and Group B → TAPB (n=14) underwent Ultrasound (U.S) guided transversus abdominis plane (TAP) block only after induction of general anaesthesia. All patients were assessed clinically and investigated for exclusion of any of the above mentioned contraindications. Laboratory work needed was: Complete blood count (CBC); prothrombin time and concentration (PT & PC); partial thromboplastin time (PTT); bleeding time (BT); clotting time (CT) and liver function tests. The ultrasound machine and scanning probe should be prepared before patient entry to operating room. The ultrasound used was CONCEPT 1000 (EUROPEAN, SERIAL NO 2105); the scanning probe was curved multi-frequency transducer; The needle used was the UNIEVER (20G/90mm). After insertion of venous access, all patients received premedication in the form of metocloperamide at a dose of 10mg and ranitidine 50mg I.V. Perioperative monitoring included continuous ECG, pulse oximetry, non-invasive arterial blood pressure, and capnography.

Anesthesia was induced with IV fentanyl (1-1.5 mic g/kg to a maximum of 150 mic/kg), propofol (2-3mg/kg) and atracurium (0.5mg/kg). Anesthesia was maintained by isoflurane (1-1.5%) and atracurium (10mg/20-30min). After induction and 20min before skin incision either technique of blocks were performed. In all study groups, the patient was supine while performing the block and sterilization of the site of the ultrasound and needle entry was performed using Betadine from midline to posterior axillary line between costal margin above and upper border of iliac crest below.

Intra-operative an increase in heart rate and/or arterial blood pressure by more than 20% of baseline values in response to surgical stimulus or thereafter throughout the whole operation was considered as inadequate or incomplete block (i.e block did not work yet) and this warranted the administration of intravenous fentanyl (0.5µg/kg).

Statistical analysis and sample size calculation:

Data were statistically described in terms of mean standard deviation (SD), median and range, or frequencies (number of cases) and percentages when appropriate. Comparison of numerical variables between the study groups was done using Student *t*-test for independent samples when normally distributed and Mann Whitney U-test for independent samples when not normally distributed. For comparing categorical data, Chi square (2) test was performed. Exact test was used instead when the expected frequency is less than 5. *p*-values less than 0.05 was considered statistically significant. All statistical calculations were done using computer program SPSS (Statistical Package for the Social Science; SPSS Inc., Chicago, IL, USA) version 15 for Microsoft Windows.

Results

This was a randomized controlled trial performed in Kasr Al-Ainy Hospital of Cairo University after obtaining approval by the Hospital Ethics Committee, and a written informed consent from the patients between May 2012 and April 2014. Twenty eight patients undergoing laparotomy were enrolled in the study. They were randomly allocated by a computer-generated table into one of the 2 study groups; the randomization sequence was concealed in sealed envelopes.

Patients' characteristics including age, gender, A.S.A, body mass index (demographic data), and duration of surgical procedure are demonstrated in (Table 1). There was no significant difference in the demographic data of all two groups of the study.

The age of the patients in the two groups ranged from 20-40 years. In group the mean age (in years) was 30.79±6.229, in group B the mean age was 31.36±7.196. The height of patients (in centimeters) in group A had a mean of 166.07±5.609, in group B the mean height was 170.36±6.344.

Body mass index (BMI) of the patients in group A had a mean of 35.14±3.394, in group B BMI mean was 36.07±2.947. The A.S.A of the patients in group A had a mean of 1.5±0.519, in group B the mean A.S.A was 1.64±0.633. The surgical time duration in the two study groups ranged from Sixty to one Hundred Twenty minutes, in group A the mean surgical time was 106.07±19.921, in group B the mean surgical time was 107.14±12.967.

Table (1): Patient demographic data + surgical time (n=28) expressed as mean±SD.

	TAPB & TFPB Group (A) (n=14)	TAPB Group (B) (n=14)	*p* value
Age (yrs)	30.79±6.229	31.36±7.196	0.836
A.S.A	1.50±0.519	1.64±0.633	0.584
Height (cm)	166.07±5.609	170.36±6.344	0.108
BMI (kg/m^2)	35.14±3.394	36.07±2.947	0.430
Surgicaltime (min)	106.07±19.921	107.14±12.967	0.766

The twenty eight patients underwent laparotomy with an infra-umbilical incision, (Table 2) summarizes the type, frequency & percent of operations done for the patients of the 2 study groups. (Table 3) also summarizes the type, frequency & percent of incisions done for the patients of the 2 study groups.

Table (2): Type, frequency & percent of operations done for the patients of the 2 study groups (n=28).

Type of operation	Group A (n=14)	Group B (n=14)
Appendicectomy	3 (21.4%)	3 (21.4%)
Rt. Inguinal hernia	2 (14.3%)	1 (7.1%)
Lt varicocele	4 (28.6%)	5 (35.7%)
Lt. inguinal hernia	2 (14.3%)	2 (14.3%)
Abdominal Swelling	1 (7.1%)	1 (7.1%)
Incisional hernia	2 (14.3)	2 (14.3%)

Table (3): Type, frequency & percent of incisions done for the patients of the 2 study groups (n=28).

Type of incision	Group A (n=14)	Group B (n=14)
Mc. Burnyes incision	3 (21.4%)	3 (21.4%)
Rt. inguinal incision	2 (14.3%)	1 (7.1%)
Lt. inguinal incision	6 (42.86%)	7 (50.0%)
Rt. Para median incision	3 (21.4%)	3 (21.4%)

The intraoperative mean heart rate values of group B were higher than group A with significant difference in all times except at skin incision (T1) where the difference wasn't significant (*p*-value 0.055) (Table 4).

Table (4): Mean ± S.D of heart rate for the two groups.

Group	A (n=14)	B (n=14)	*p*-value
T1	74.86±8.900	81.14±7.624	0.055
T2	73.50±9.230	81.00±7.369	0.025
T3	72.29±8.222	80.21±7.308	0.012
T4	70.50±7.753	79.50±6.700	0.003
T5	69.29±7.760	77.93±7.205	0.005
T6	69.14±6.655	77.21±7.526	0.006
T7	68.43±7.208	76.14±7.113	0.008
T8	67.29±5.863	75.00±7.380	0.005
T9	66.79±5.466	74.43±6.595	0.003
T10	67.00±5.132	75.07±6.933	0.002
T11	66.67±4.658	75.36±6.640	0.001
T12	67.70±4.855	76.10±7.078	0.006
T13	70.13±4.518	77.83±7.250	0.030

T1 = Skin incision.
T2 = 5 minutes after skin incision
T3 = 10 minutes after skin incision.
T4 = 15 minutes after skin incision.
T5 = 20 minutes after skin incision.
T6 = 25 minutes after skin incision.
T7 = 30 minutes after skin incision.
T8 = 45 minutes after skin incision.
T9 = 60 minutes after skin incision.
T10 = 75 minutes after skin incision.
T11 = 90 minutes after skin incision.
T12 = 105 minutes after skin incision.
T13 = 120 minutes after skin incision.

The intraoperative mean systolyic blood pressure values of group B were higher than group A with statistically significant difference at all times (T2-T12) except at times of skin incision (T1) (*p*-value 0.375) and at end of surgery (T13) (*p*-value 0.061) where the difference wasn't statistically significant (Table 5).

Table (5): Mean ±S.D of systolic blood pressure for the two groups.

Group	A (n=14)	B (n=14)	*p*-value
T1	120.00±13.214	128.64±9.865	0.061
T2	118.14±12.228	127.29±9.244	0.034
T3	117.14±10.791	125.71±8.606	0.028
T4	114.71±9.918	124.00±8.762	0.014
T5	113.07±9.261	122.36±8.643	0.011
T6	111.50±8.364	121.14±8.690	0.006
T7	110.71±8.489	119.79±9.784	0.14
T8	110.36±70164	119.71±8.175	0.003
T9	109.21±7.905	120.64±8.758	0.001
T10	110.54±8.383	119.29±7.927	0.010
T11	113.17±6.672	122.00±7.756	0.005
T12	115.20±7.239	123.90±7.992	0.020
T13	120.13±7.434	124.00±8.270	0.375

T1 = Skin incision.
T2 = 5 minutes after skin incision
T3 = 10 minutes after skin incision.
T4 = 15 minutes after skin incision.
T5 = 20 minutes after skin incision.
T6 = 25 minutes after skin incision.
T7 = 30 minutes after skin incision.
T8 = 45 minutes after skin incision.
T9 = 60 minutes after skin incision.
T10 = 75 minutes after skin incision.
T11 = 90 minutes after skin incision.
T12 = 105 minutes after skin incision.
T13 = 120 minutes after skin incision.

There were no significant differences between the intraoperative values of the mean diastolic blood pressure of the two groups at all times (T1-T13) except at time 75 minutes of skin incision (T10) where the mean diastolic blood pressure of group B was higher than group A with statistically significant difference (*p*-value 0.048) (Table 6).

Table (6): Mean ± S.D of diastolic blood pressure for the two groups.

Group	A (n=14)	B (n=14)	*p*-value
T1	76.50±7.014	78.07±6.330	0.539
T2	75.71±6.799	76.07±5.890	0.883
T3	73.86±6.526	74.86±5.531	0.665
T4	72.29±6.580	73.43±6.211	0.640
T5	71.00±5.684	72.21±6.241	0.595
T6	69.14±5.736	70.79±5.673	0.453
T7	69.43±5.529	71.14±6.150	0.445
T8	69.14±7.124	71.14±6.455	0.443
T9	69.14±5.749	72.14±6.597	0.211
T10	68.31±5.513	73.36±6.946	0.048
T11	69.92±5.518	74.79±6.693	0,057
T12	73.60±6.132	76.80±6.286	0.264
T13	76.13±4.853	79.67±6.282	0.256

T1 = Skin incision.
T2 = 5 minutes after skin incision
T3 = 10 minutes after skin incision.
T4 = 15 minutes after skin incision.
T5 = 20 minutes after skin incision.
T6 = 25 minutes after skin incision.
T7 = 30 minutes after skin incision.
T8 = 45 minutes after skin incision.
T9 = 60 minutes after skin incision.
T10 = 75 minutes after skin incision.
T11 = 90 minutes after skin incision.
T12 = 105 minutes after skin incision.
T13 = 120 minutes after skin incision.

In group A there was one patient who developed sleep difficulty due to pain in comparison to group B where 3 patients developed sleep difficulty due to pain but of no statistic significance (Table 7).

Table (7): Frequency & percent of patients who developed sleep difficulty as a result of pain in the 2 groups (n=28).

Incidence of sleep difficulty	A (n=14)	B (n=14)
No	13 (92.9%)	11 (78.6%)
Yes	1 (7.1%)	3 (21.4%)
Total	14 (100%)	14 (100%)

Patients satisfaction was more obvious in group A than group B, but of no statistic significance (Table 8).

Table (8): Frequency and percent of degree of patient satisfaction for the two groups.

Group	Excellent	Good	Moderate	Poor	Total
A (n=14)	7 (50.0%)	6 (42.9%)	1 (7.1%)	0 (0%)	14 (100%)
B (n=14)	4 (28.6%)	6 (42.9%)	3 (21.4%)	1 (7.1%)	14 (100%)

Discussion

The inability to provide safe, reproducible analgesia after abdominal surgery remains one of the impediments to the introduction of regional anaesthesia techniques for this surgical population. The abdominal wall is supplied by the lower six thoracic and upper two lumbar sensory nerves, either through extensions of the intercostal branches or, for the more caudal nerves, through the musculature of the abdominal wall. These nerves pass through a number of plexuses and there is therefore a variation in the course of individual nerves from one patient to another. As a result, the use of anatomical knowledge to achieve analgesia after abdominal surgery and the evolution of approaches over time have resulted in a variety of analgesic techniques that are used in current clinical practice **[7]**.

The extensive origin of the nerves that must be blocked to provide analgesia for large abdominal incisions poses significant problems in the search for suitable regional anaesthesia techniques. Limited operative fields are much more amenable to regional techniques. Technological advances, such as real-time ultrasonography, allow more accurate identification of plexuses and peripheral nerves, with a corresponding improvement in block success. As a result, there is a better appreciation of individual anatomy. These advances also allow the anaesthetist to perform blocks more distally, e.g. in the abdominal field. Although regional anaesthesia is not the only change in managing these patients, the introduction of new techniques or new approaches to old techniques has resulted in ever-increasing numbers of patients who receive non-central neuraxial blockade for abdominal surgery, and warrants discussion **[8]**.

Transversus abdominis plane (TAP) block has been reported to provide effective analgesia after lower abdominal surgery, but there are few data comparing ilioinguinal/iliohypogastric nerve (IHN) block with ultrasound-guided TAP block in patients undergoing inguinal hernia repair.

Local anesthetic agent, volume, concentration, and delivery method differ between studies, these regimens have not yet been compared against each other. Therefore, there is insufficient evidence to support any particular combinationin lieu of another **[9]**.

Hakan Kulacoglu et al., 2011 made a study comparing percutaneous truncular ilioinguinal-iliohypogastric block and step-by-step infiltration technique by using cadaver dissections. The study was performed on an adult male cadaver by using blue dye injection. A percutaneous nerve block simulation was done on right side and the dye was given in between the internal oblique and transversus muscles. On the left side, a skin incision was deepened and the dye was injected under the external oblique aponeurosis. Following the injections, stained areas were investigated superficially and within the deeper tissues with dissection. There was a complete superficial staining covering the iliohypogastric and ilioinguinal nerves in the inguinal floor at both sides. On the right side, intraabdominal observation showed a wide and intense peritoneal staining, while almost no staining was seen on the left side. They stated that It may not always be easy to keep the percutaneous block within optimum anatomical limits without causing adverse events. A step-by-step infiltration technique under direct surgical vision seems to be safer than percutaneous inguinal block for patients undergoing inguinal hernia repair **[10]**.

To show the significance of using ultrasound in blocks, Weintraud et al. (2009) made a prospectively randomized study on 70 children (8-84 months of age, ASA 1-2) scheduled for inguinal hernia repair to receive either a landmark based or an ultrasound guided (US group) ilioinguinal nerve block (INB), in addition to a standardized general anesthesia. The authers showed that, the landmark-based technique for INB resulted in IM injection in 80% with a 40% failure rate, whereas the ultrasound-guided technique was associated with a success rate of 95% because of exact intermuscular administration of the LA around the nerve structures **[11]**.

In the current study, The intraoperative mean heart rate values of group B (TAP alone) were higher than group A (combined TAP & TFP 2) with significant differences in all times except at skin incision (T1). The intraoperative mean systolyic blood pressure values of group B were higher than group A with statistically significant difference at all times (T2-T12) except at times of skin incision (T1) and at end of surgery (T13). There were no significant differences between the intraoperative values of the mean diastolic blood pressure of the two groups at all times (T1- T13) except at time 75 minutes of skin incision (T10) where the mean diastolic blood pressure of group B was higher than group A with statistically significance difference.

Zhang et al. (2011) made a study on Bilateral Ultrasound-Guided Transversus Abdominis Plane Block Combined with Ilioinguinal-Iliohypogastric Nerve Block for Cesarean Delivery where they describe 4 women who had contraindications to neuraxial anesthesia, who underwent cesarean delivery with ultrasound-guided bilateral transversus abdominis plane block combined with ilioinguinal-iliohypogastric nerve block using 40mL 0.5% ropivacaine. Breakthrough pain during the delivery of the fetus was treated with small doses of IV ketamine and propofol. They found that hemodynamic variables were stable in their patients, except for transient hypertension observed after IV ketamine administration, as well as transient tachycardia after an IV infusion of 20 IU oxytocin injection after removal of the placenta. These responses resolved spontaneously without additional intervention (124). It is worth noting that to the best of our knowledge, hemodynamics were not reported in many studies performed on TAP block. This may be because the aim in these studies was mostly focused on recording extra analgesic requirements intraoperatively or because it was estimated that the block takes up to 30 minutes to be effective as well as it does not block visceral sensation. Another reason may be that not all studies performed the TAP block after induction of anesthesia. McDonnell and his colleaguesin 2008 examined posterior TAP block efficacy after cesarean section delivery where 50 elective patients for caesarean section (via spinal anesthesia and Pfannenstiel incision) were randomized to receive posterior TAP block (landmark method) versus placebo in addition to standard analgesia (paracetamol, diclofenac and intravenous morphine) and the TAP block was performed at the end of surgery **[5]**.

In the current study, The intraoperative mean heart rate values of group B (TAP alone) were higher than group A (combined TAP & TFP 2) with significant differences in all times except at skin incision (T1). The intraoperative mean systolyic blood pressure values of group B were higher than group A with statistically significant difference at all times (T2-T12) except at times of skin incision (T1) and at end of surgery (T13). There were no significant differences between the intraoperative values of the mean diastolic blood pressure of the two groups at all times (T1-T13) except at time 75 minutes of skin incision (T10) where the mean diastolic blood pressure of group B was higher than group A with statistically significance difference.

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الملخص العربى

ان استخدام الموجات الصوتية فى عمل التخدير الجزئى، يعتبر حديث نسبيا ولكنه لاقى اهتمام كبير فى مجال التخدير. وتعتبر المنافع المرجوة من استخدام الموجات الصوتية فى هذا المجال كثيرة فهى سهلة الاستخدام، كما أن نسبة نجاحها عالية و تقلل من كمية المواد المخدرة الموضعية وبالتالى تزيد من الأمان أثناء التخدير.

يمثل الالم الناتج من الجرح بالبطن جزء كبير من الالم الناتج جراء العمليات الجراحية فى البطن. ويتغذى جدار البطن بأعصاب تمر فى الغشاء ما بين العضلة البطنية المستعرضة و العضلة البطنية الداخلية.

ويعتبر التخدير الشامل لجدار البطن قديم نسبيا وكثير الاستخدام، ولكنه بالرغم من ذلك يحتاج لحقن الكثير من المواد المخدرة الموضعية فى نقاط كثيرة كما يعتمد على نقاط فقدان الضغط مما يجعل من نجاحها غير قابل للتوقع.

ويعتبر التخديرالموضعي للبطن عن طريق استخدام نقطة واحدة تقع ما بين العضلة البطنية العرضية والعضلة البطنية الداخلية من خلال المثلث القطنى (lumbar triangle of Petit)، سهل نسبيا ويمكن أن يغطى معظم الاعصاب المغذية لجدار البطن.

وقد تم مؤخرا القيام بهذا التخدير مستخدمين الموجات الصوتية وقد أعطى هذا نتائج مبشرة لزيادة سهولة ونجاح هذا النوع من التخدير الجزئى.

وتنقسم طرق قياس الالم الى تقرير شخصى، ملاحظة السلوك والتصرف وقياس المؤشرات الحيوية. ويعتبر طرق القياس التى تستخدم اكثر من طريقة كاستخدام المؤشرات الحيوية وملاحظة السلوك، أفضل من استخدام طريقة واحدة.

هذا وينتشر استخدام طرق التخدير وتسكين الالم الموضعى والجزئى فى العمليات الجراحية المختلفه. لان التخدير الجزئى يقلل من استخدام المسكنات القوية المخدرة التى تعطى عن طريق الحقن العضلى أو الوريدى أو عن طريق الفم، كما يزيد من رضا المرضى بعد اجراء العمليات الجراحية.

وقد تم ادخال التخدير الموضعى للبطن (TAP block) فى معظم المستشفيات التعليميه وغيرها .

وفى الدراسة الحالية، قد تم المقارنة بين استخدام التخدير الموضعى للعضله البطنيه المستعرضه متحدا مع اللفافه المستعرضه للبطن (Combined TAP & TFA block)، والتخدير الموضعى للعضله البطنيه المستعرضه فقط (TAP block alone) لعمل التخدير الموضعى. وقد تم قياس الفارق بين الطريقتين فى تخفيف ألالم بعد اجراء العمليات الجراحية على البطن. وقد شملت الدراسة مجموعاتان هما:

- مجموعة (أ): التخدير الموضعى للعضله البطنيه المستعرضه متحدا مع اللفافه المستعرضه للبطن (Combined TAP & TFA block) وعددها ١٤مريض.
- مجموعة (ب): التخدير الموضعى للعضله البطنيه المستعرضه فقط (TAP block alone) وعددها ١٤ مريض.

ان جهاز السونار المستخدم هو جهاز ١٠٠٠ CONCEPT الاوروبى مستخدمين المجس المتعدد الترددات.

وقد كان العدد الكلى للمرضى فى الدراسة ٢٤مريض تتراوح أعمارهم ما بين ٤٠-٢٠سنه و قدتم اجراء عمليات جراحية لهم على البطن فى مستشفى قصر العينى. وقد تم اعطاء المرضى المخدر الموضعى بعد المخدر الكلى.

وقد تم التوصل إلى أن إستخدام السونار لعمل التخدير الموضعى للعضله البطنيه المستعرضه متحدا مع اللفافه المستعرضه للبطن (Combined TAP & TFA block) يعطى فوائد إضافية للمسكنات المتعددة التى يتم إعطائها للمرضى الذين يجرون عمليات جراحية على البطن. وقد إحتاج هؤلاء المرضى فى المجموعة الاولى مسكنات أقل أثناء وبعد العملية مقارنة بالمرضى فى المجموعة الثانية الذين تم إعطائهم التخدير الموضعى للعضله البطنيه المستعرضه فقط (TAP block alone).

وكان هناك فارقا إحصائيا ملحوظا بين المجموعتين.

هذا و لم يتم تسجيل أى مضاعفات لهذا التخدير الموضعى للبطن أثناء أو بعد العملية. كما أن نسبة رضا المرضى كانت عالية فى المجموعة الأولى اكثر من الثانية.