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Analgesic efficacy of a laparoscopic-guided transversus abdominis plane block versus no transversus abdominis plane block in bariatric gastric bypass surgery a retrospective analysis among 332 individuals

Gianluca De Santo[1*†], Oliver Stumpf[1†], Peter Look[1], Marc Abdelmalek[1], Rolf Lefering[2], René Mantke[3] and Christoph Paasch[4]

Abstract

Background To reduce opioid consumption and improve early mobility, the administration of a transversus abdominis plane block (TAP) was introduced in abdominal surgery decades ago. But the usefulness of this nerve block prior to laparoscopic Roux-Y gastric bypass (LRYGB) in patients with obesity is still under debate. Hence, the study at hand was conducted.

Methods In 2023 a retrospective single-centre analysis among patients who did or did not receive a laparoscopic (L) TAP block prior to LRYGB was performed. The primary objective was the early postoperative pain level (1 h) using the visual analog scale (VAS) after LRYGB. Main secondary objectives were the determination of the pain level from 1 to 80 h after surgery and the cumulative postoperative painkiller use.

Results A total of 111 individuals received and 202 did not receive a L-TAP block prior to LRYGB. The groups were homogeneous with respect to age, gender distribution and Body Mass Index. No L-TAP related complications occurred. After multivariate analysis the administration of the nerve block had no effect on relevant pain (VAS ≥ 6) from one to 80 h after LRYGB. One hour after surgery, the individuals who received the L-TAP suffered, with significance, from less pain (VAS score 2.77 vs. 3.84: $p < 0.001$) in comparison to those who did not receive the nerve block. No difference was revealed in terms of cumulative postoperative opioid painkiller use.

Conclusion The L-TAP block is a safe procedure and sufficiently reduces post-operative pain one hour after gastric bypass surgery, but does not bring any benefits in the further course.

Keypoints

1. The L TAP block significantly reduces pain one hour after laparoscopic Roux en Y gastric bypass.
2. No significant difference in pain levels between groups from 8 to 80 hours post surgery were observed.

†Gianluca De Santo and Oliver Stumpf shared first authorship.

*Correspondence:
Gianluca De Santo
gianluca.desanto@helios-gesundheit.de
Full list of author information is available at the end of the article

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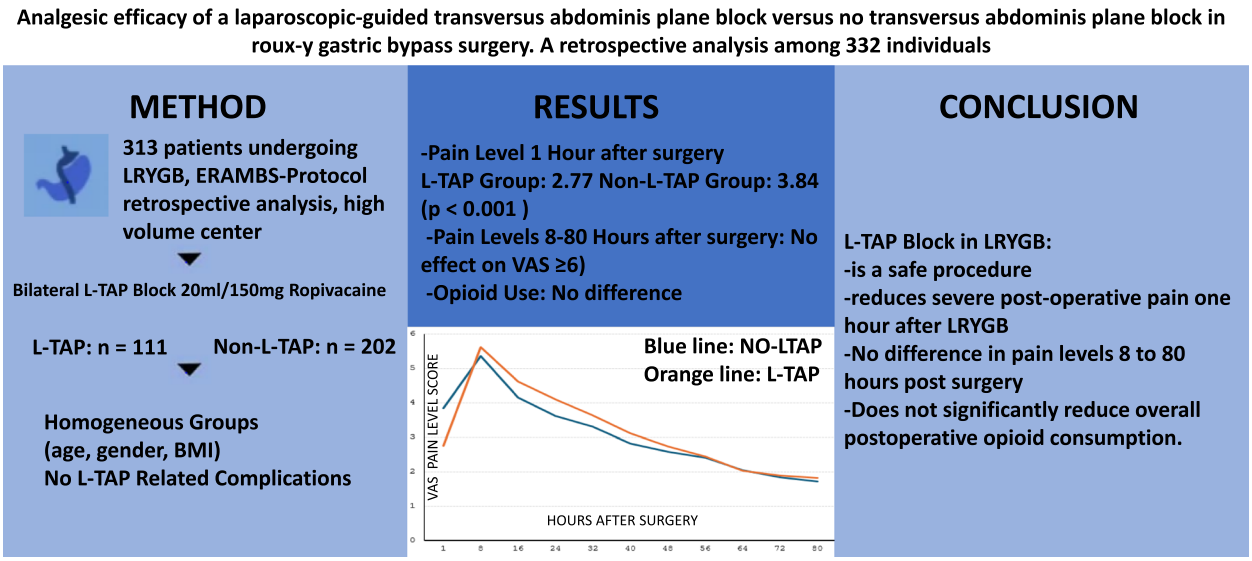
3. The L TAP block does not significantly reduce overall postoperative opioid consumption.

4. No complications from L TAP block occurred.

Keywords Transversus abdominis plane block, Pain, Roux-en-Y gastric bypass, Obesity

Graphical Abstract



Introduction

To reduce the need for pain (opioid) medication and to speed up physical recovery, the administration of local and regional anaesthetics has been integrated into the daily routine of abdominal surgery [1–3]. The TAP block introduced by Rafi in 2001 is of particular interest in this context [4]. It has been reported that the TAP block administration leads to a reduced cumulative opioid consumption and lower postoperative pain level after abdominal surgery [1–3].

In line with the so-called 'Enhanced Recovery Pathways for Metabolic and Bariatric Surgery' [5], which provide for early ambulation, and against the background of the ongoing opioid crisis [6], the need of opioid use reduction, nerve blocks in general and the TAP block in particular became a study subject also in bariatric surgery.

We acknowledge the existence of numerous studies investigating TAP blocks across various surgeries, noting that while they show benefits in laparoscopic cholecystectomy, hernia repair, and gynecologic surgeries, their impact in bariatric surgery, particularly RYGB, remains inconclusive. The complex anatomy and varying trauma from different trocar placements further complicate uniform data extrapolation across minimally invasive surgeries. Therefore, focused studies on specific procedures, like our investigation on RYGB, are crucial to understanding the nuanced effects of TAP blocks. In 2020 a meta-analysis was conducted by Aamir et al. (7 × Randomized clinical trials, TAP block versus No TAP block). The data of 617 individuals who underwent laparoscopic bariatric surgery were analyzed. The authors revealed a high statistical heterogeneity across the studies and no significant differences in narcotic consumption. The TAP block was associated with significantly less time to ambulation [7]. In addition, some authors reported less pain intensity after administration of TAP blocks [8] and others reported no differences in this area [9].

In summary, the data are heterogeneous with regard to the method of administration, the study design and the patient population [7–9]. Therefore, no general recommendation can be made for the administration of TAP blocks in bariatric surgery, as further clinical studies are required.

One of these approaches that needs further investigation is the administration of L-TAP prior to LRYGB surgery in patients with obesity. Only two retrospective studies (Total n = 394) have been published to date [10, 11]. The authors reported a reduced opioid consumption in the L-TAP group.

The main objective of our study project was therefore to further evaluate the L-TAP block in terms of reducing pain intensity and analgesic consumption. The results should allow a meaningful comparison with previously reported results [10, 11].

Patients and methods

Following promising yet limited evidence on the laparoscopic transversus abdominis plane (L-TAP) block prior to laparoscopic Roux-en-Y gastric bypass (LRYGB) in the literature (Table S1), this technique was introduced at Helios Klinikum Berlin-Buch, Germany, in 2021. To evaluate its impact, we conducted a retrospective single-center analysis in 2023, comparing outcomes in patients with obesity who underwent primary LRYGB without L-TAP in 2020 (control group) versus with L-TAP in 2022 (intervention group). The year 2021 served as a familiarization period for L-TAP implementation, and thus, patients from this year were excluded from analysis.

Patients were divided into groups based on the year of surgery, reflecting the adoption of L-TAP into standard practice: the control group (2020) included all eligible patients before L-TAP use, and the intervention group (2022) included all eligible patients after its routine integration. To minimize selection bias, consecutive cohort inclusion was applied within each period. All procedures were performed by three experienced senior consultants with over 15 years of expertise. Postoperatively, patients were followed per German bariatric surgery guidelines at our cooperating medical care center, with immediate readmission for complications. The study adhered to the Declaration of Helsinki and was approved by the Berlin Medical Association Ethics Committee (ETH-20/24). It was registered with the German Register of Clinical Trials (DRKS00034186).

Study population

The study population consisted of individuals who suffered from morbid obesity with the indication to conduct a LRYGB as a primary bariatric procedure. To rule out selection bias the recruitment was done by strict consecutive cohort inclusion until the needed patient numbers for statistical power was reached.

Objectives

The primary objective was the early postoperative pain level (1 h) using the visual analog scale (VAS) after primary LRYGB.

Secondary objectives were the determination of the pain level follow up until 80 h after LRYGB (VAS scoring after 1, 8, 16, 24, 32, 40 and 48 and 80 h), pain medication requirement, cumulative requirement for opioids up to 80 h postoperatively, maximum pain level postoperatively, length of hospitalisation (days) and duration of surgery (minutes). Further secondary objectives were the need for other non-opioid painkillers from induction of anaesthesia to 80 h postoperatively and the rate of postoperative complications according to Clavien-Dindo classification up to 30 days after LRYGB. The procedures of both study arms were carried out by three experienced senior counsultants with at least 15 years of professional experience.

Inclusion criteria's

Adult individuals of all genders who suffered from morbid obesity with the indication to conduct a primary LRYGB.

Exclusion criteria's

All other bariatric surgery procedures (Gastric sleeve resection, omega bypass approach, secondary/revisional RYGB etc.) were excluded from the analysis. Furthermore, revision surgery in the event of treatment failure or late complications, conversion to open surgery and persons under the age of 18 were excluded.

L-TAP procedure

L-TAP is performed at the beginning of the operation under direct visualisation with the laparoscope. The surgeon inserts a (19-gauge) needle percutaneously above the iliac spine and below the edge of the costal arch as laterally as possible within the surgical field of intervention. Laparoscopic guidance consists of inserting the needle until the tip protrudes onto the peritoneal layer without passing through it. The needle is then withdrawn 3 mm into the abdominal wall, which represents the estimated thickness of the preperitoneal space and the transversus abdominis muscle, so that the local anaesthetic (150 mg Ropivacaine, elimination half-life: 1.6–6 h/ 20 ml 0,9% Saline) is bilateral injected into the space between the internal oblique abdominal muscle and the transversus abdominis muscle. The injection of the anaesthetic into this space induces the formation of a bulge that is milder than the bulge that occurs when injected directly in the preperitoneal space.

Target of this approach are the sensory nerves innervating the abdominal wall originating from T7 to L1 (intercostal, ilioinguinal, subcostal, and iliohypogastric nerves).

Analgesic medication

Anaesthesia was induced with propofol, sufentanil and atracurium. Dexamethasone and ondansetron were administered to prevent postoperative nausea and vomiting. Anaesthesia is maintained during the operation with desflurane and remifentanil, and metamizole is used for pain therapy. In the recovery room, an antiemetic (droperidol) is administered, and pain management is based on the VAS scale. If the VAS score is < 6/10, 1 g paracetamol i.v. and eventually 40 mg parecoxib are administered; if > 6/10, 3 mg oxycodone i.v. is administered. A drinking and pain protocol is explained to the patients on the ward. The medication includes pantoprazole, VAS-based pain therapy and weight-adjusted thrombosis prophylaxis. If the VAS is > 6/10, 7.5 mg piritramide is administered if necessary. Metamizole or paracetamol was administered intravenously every 6 h on the day of surgery and orally from the first postoperative day. From the second day onwards, metamizole and paracetamol were administered up to 1 g/6 h as required.

Sample size calculation

Three primary endpoints are to be analysed, whereby the number of cases is planned based on the NRS pain value after 24 h. Due to the three target values, the alpha error according to Bonferroni is corrected: instead of 0.05, 0.017 is set as the threshold for statistical significance.

It is known from many studies that pain values measured with a VAS or NRS (0–10 scale) have a standard deviation of around 1.5–2.0 points, and we have assumed 1.7 points. With a case number of around 165 cases in each of the two cohorts, the detectable difference at SD = 1.7 is around 6 points, assuming an alpha of 0.017 and a power of 80% (t-test).

A clinically relevant advantage is certainly seen at a difference of 10 points, whereas a difference of less than 5 points is considered no relevant.

Statistical analysis

In the event that individual pain values were not documented (e.g. during the night, or if the patient was not in his room during the rounds, or was discharged earlier), the missing pain values are interpolated as follows. So-called "gaps" with valid values before and after are interpolated linearly. At the end of the observation period, Last Observation Carried Forward is applied, i.e. the last valid pain value is carried forward. A detailed description of the data interpolation is stated in the supplementary material (Supplement_Inputation).

Depending on the distribution of the measured values, the t-test, or the Mann–Whitney U-test is used for the group comparison. The opioid requirement is coded binary and evaluated with Fisher's exact test.

For the multivariate analysis of postoperative pain, a postoperative maximum pain of at least 6 points of VAS was defined as 'relevant'. Such relevant pain occurred in 199 cases (64%). In a logistic regression analysis with relevant postoperative pain as the dependent variable, the following possible predictors were analysed: L-TAP (yes/no), Age (under 40 years), Gender (M), Opioid administration (yes/no), postoperative complications (yes/no), long operation time (≥ 90 min), Body Mass Index (≥ 50 kg/m^2).

Review of literature

Against the background of a large number of heterogeneous studies on this topic (TAP block and bariatric surgery), a literature review was compiled. The aim of the review was to identify studies that are largely comparable with our study project.

The database Pubmed was used. As search terms "Gastric bypass" AND "transversus abdominis plane block" AND/OR "TAP block" have been used.

Studies consisting of a TAP control group and participants who underwent non-minimally invasive bariatric surgery were excluded.

Results

Data from a total of 360 patients was available for evaluation. 221 patients were operated on without L-TAP in 2020 and 139 cases were operated on with L-TAP in 2022. A complete presence of the variables was the exception. A total of 17 data sets were complete with regard to the 11 pain measurement points. Most cases had 8 or more measured values (54%). Thus, after replacing missing pain values (Last Observation Carried Forward, Supplement_Inputation), 201 cases (91%) from the year 2020 without L-TAP and 111 cases (80%) from the year 2022 with L-TAP were available. The following analysis refers to these 312 patients in total.

Baseline and perioperative data

The groups were homogeneous with respect to age, gender distribution and Body Mass Index. The average age was 39.3 years (SD 11.8) in the no L-TAP group and 38.0 years (SD 11.7) in the L-TAP group ($p = 0.32$). The mean BMI at the time of surgery was 46.2 kg/m^2 (SD 6.1) for the no L-TAP group and 46.9 kg/m^2 (SD 5.7) for the L-TAP group ($p = 0.26$). Regarding comorbidities, the groups were homogeneous with respect to pain

medications before surgery and prior diagnosis of psychiatric disorder. The ASA score distribution revealed a higher proportion of ASA II patients in the L-TAP group (73% vs. 54%) and fewer ASA III patients (5% vs. 16%) compared to the no L-TAP group ($p=0.001$).

Significantly, patients in the L-TAP group had a lower ASA score and a longer duration of LRYGB (92 (±30) minutes versus 79 (±18) minutes). Postoperative complications (Clavien-Dindo classification) up to 30 days post-LRYGB were recorded, with no L-TAP-related issues noted. Overall rates were similar between groups: 16/201 (8%) in the no L-TAP group vs. 10/111 (9%) in the L-TAP group ($p=0.51$). Specific complications included GI bleeding (8 vs. 8), intraabdominal bleeding (2 vs. 2), diabetic ketoacidosis (1 vs. 0), volume deficiency (2 vs. 0), and peritonitis/ileus (3 vs. 0), with most being Grade I–II. Baseline and perioperative data are detailed in Table 1.

Pain measurement

The maximal pain level on average was a VAS score of 6.3 (2.2) in the No L-TAP group and 6.4 (2.0) in the L-TAP group (Table 2).

One hour after surgery, the individuals who receive the L-TAP suffered with significance from less pain (L-TAP group: VAS: 2,77: No L-TAP group: VAS: 3.84: $p<0.001$, Fig. 1, Table S2). Between 8 and 48 h, the cases without L-TAP have slightly less pain. From the 56th hour there was no difference. All data on pain on each time period is depicted in Table S2.

Table 1 Univariate analysis on baseline characteristics and perioperative data

Variable		No L-TAP prior to LYRGB *n= 201*	L-TAP prior to LYRGB *n= 111*	*p*-value
Age	*years*	39.3 (11.8)	38.0 (11.7)	0.32
Sex	*m* *f*	43 158	22 89	0.77
BMI at operation	*kg/m²*	46.2 (6.1)	46.9 (5.7)	0.26
Psychiatric disorder Opioid medication Other pain medication		16 (7,96%) 2 (0.99%) 18 (8.96%)	13 (11,71%) 2 (1.80%) 9 (8.11%)	0.37 0.93 0.96
ASA Score	*I* *II* *III*	60 (30%) 108 (54%) 33 (16%)	24 (22%) 81 (73%) 6 (5%)	**0.001**
Duration of Surgery	*minutes*	*92* (30.00) Median 88	79 (18) Median 77	**0.001**
Duration of hospital stay days	*days*	*3.1* (0.6) Median 3	3.0 (0.7) Median 3	0.12
Clavin-Dindo Grade[#]	0 *I* *II* *III*	185 1 7 8	101 3 1 6	0.52
Complications		16 (8%)	10 (9%)	0,51
	GI-Bleeding	8	8	
	Intraabdominal Bleeding	2	2	
	Diabetic ketoacidosis	1	0	
	Volume deficiency	2	0	
	Peritonitis/Ileus	3	0	

Table 2 Univariate analysis on pain medication and pain level

Variable		No L-TAP prior to LYRGB *n= 201*	L-TAP prior to LYRGB *n= 111*	*p*-value
Maximal pain level within hopsital stay	VAS	6.3 (2.2)	6.4 (2.0)	0.6
Pain level one hour After surgery	VAS	3.84 (2.45)	2.77 (1.88)	**< 0.001**
Cumulative opioid consumption				
In the Recover room				
Oxycodone	n (%) *mg*	62 (30.8) 5.2 (4.3)	25 (22.5) 4.6 (2.0)	0.12 0.14
On the day of surgery on the ward				
Piritramide	n (%) *mg*	26 (12.9) 13.0 (6.2)	13 (11.7) 8.4 (2.2)	0.75 0.62

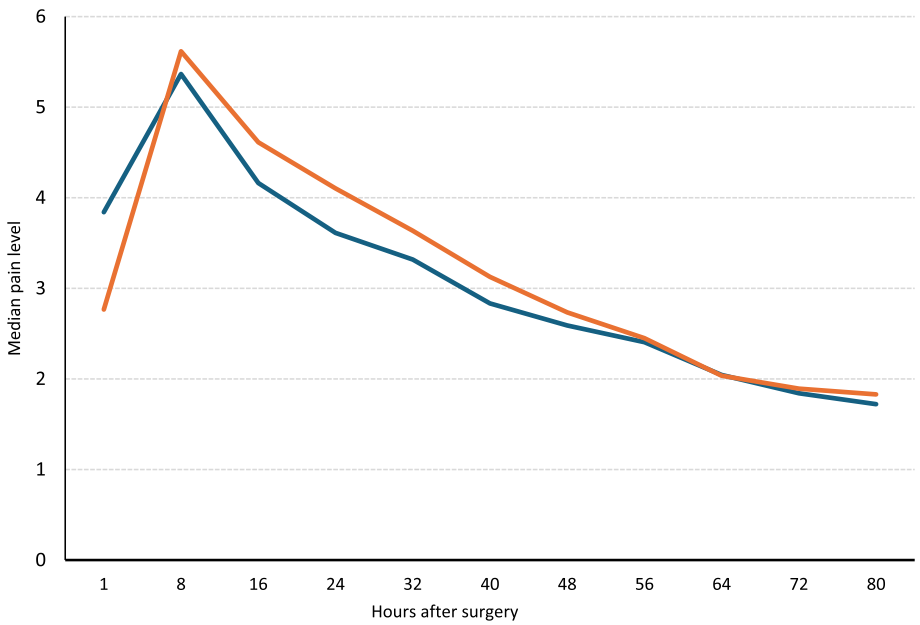


Fig. 1 The blue line depicts the pain level of patients who did not receive the L-TAP. The orange line depicts the pain level of individuals who received the L-TAP. A statistically significant difference (tested with the Mann–Whitney U-test) was only found at 1 h ($p < 0.001$) and 24 h ($p = 0.039$)

Painkiller consumption

There was no difference in the use of non-opioid pain relievers parecoxib and paracetamol between the two groups. There was no difference in the use of the opioid painkiller's oxycodone and piritramide between the two study groups.

Within the first hour after surgery, pain levels assessed via the Visual Analog Scale (VAS) were significantly

lower in the L-TAP group (2.77 ± 1.88) compared to the no L-TAP group (3.84 ± 2.45, p < 0.001), indicating an early analgesic benefit. Regarding opioid consumption in the recovery room, 30.8% of patients in the no L-TAP group received oxycodone compared to 22.5% in the L-TAP group (p = 0.12), with mean dosages of 5.2 mg (± 4.3) versus 4.6 mg (± 2.0), respectively (p = 0.14). On the ward, piritramide use within the first 24 h was comparable between groups (12.9% in the no L-TAP group vs. 11.7% in the L-TAP group, p = 0.75), with mean dosages of 13.0 mg (± 6.2) versus 8.4 mg (± 2.2), respectively (p = 0.62). While these findings show a numerical reduction in opioid use in the L-TAP group, particularly in the recovery room, the differences did not reach statistical significance beyond the initial pain reduction in the first hour. Detailed findings on pain killer consumption are summarized in Table 2.

Multivariate analysis on relevant postoperative pain (≥ 6 VAS)

The administration of opioids showed an approximately threefold higher probability of the occurrence of relevant pain. With an Odds ratio of 2.0, relevant pain occurs about twice as often in younger patients as in older patients (p = 0.006). Higher obesity (Body Mass Index ≥ 50 kg/m^2) tends to speak against relevant pain (Odds ratio 0.55). Postoperative complications showed no significant impact on pain outcomes in the multivariate analysis (p = 0.31). Multivariate analysis showed no significant association between gender and relevant postoperative pain (p = 0.249).

The administration of the L-TAP block had no (adjusted) effect on relevant pain (Table 3).

Discussion

The major aim of our study project was to evaluate the L-TAP block in terms of reduction of pain level and painkiller consumption after LRYGB. After data analysis we may postulate, that the L-TAP block is a safe procedure and sufficiently reduces post-operative pain one hour after gastric bypass surgery. Our results allow a comparison with the 2 studies that were conducted in almost the same way [10, 11].

Seiler et al. (2022) conducted a retrospective analysis among 150 individuals. A total of 75 received a L-TAP block when performing a LRYGB surgery. The exact timing (pre- or post-incisional) was not stated in the publication The control group received a local infiltration. The painkiller consumption was reduced in the intervention group. The pain level was not assessed [11].

Bhakta et al. (2018) et al. also chose a retrospective approach. The authors analyzed a total of 244 patients in a highly similar manner as Seiler et al. did. [10]. The L-TAP block was administrated pre-incisional (pre-Bypass conduction). A reduced pain medication intake in the intervention group was also observed after LRYGB

Table 3 Multivariate analysis on relevant postoperative pain (≥6 VAS)

Variable	exp (Beta)	95% CI[1]	*p*-value
Gender			
male	-	-	
female	1.44	0.78, 2.65	0.249
Age (< 40 years)	2.03	1.22, 3.38	**0.006**
Body-Mass index (>50kg/m^2)	0.55	0.33, 0.93	**0.023**
Postoperative complication			
yes	-	-	
no	1.66	0.62, 4.47	0.312
L-TAP block	1.14	0.67, 1.93	0.632
Administration of Opioids	3.18	1.86, 5.46	**<0.001**
Duration of surgery (>90 minutes)	1.20	0.71, 2.0	0.49

surgery. However, the pain intensity within the first 24 h (assessed with a VAS) was even higher in the L-TAP group. In summary, the results of Bhakta et al. (2018) and Seiler et al. (2022) (total n = 394) with regard to painkiller consumption and pain reduction are not consistent with the findings of our study. We cannot explain this finding. It is obvious that prospective studies on exactly this study population and the TAP approach are needed as results are contradictive.

We acknowledge the existence of numerous randomized controlled trials (RCTs) investigating TAP blocks across various surgeries. We reviewed following studies and present our findings below:

A RCT on laparoscopic cholecystectomy comparing L-TAP vs U-TAP showed no significant differences. Sample size: 60 patients [12]. A RCT on laparoscopic cholecystectomy comparing LTAP vs U TAP vs NOTAP indicated that TAP blocks were superior to no TAP. Sample size: 110 patients [13]. A RCT on laparoscopic cholecystectomy comparing posterior TAP vs subcostal TAP found no significant differences. Sample size: 126 patients [14]. A RCT on laparoscopic inguinal hernia repair comparing TAP vs anterior quadratus lumborum block found no significant differences. Sample size: 53 patients [15]. A RCT on laparoscopic donor nephrectomy comparing catheter TAP vs single injection TAP found no significant differences. Sample size: 70 patients [16]. A RCT in minor gynecologic surgery comparing TAP and rectus sheath block vs no block indicated that blocks were superior. Sample size: 104 patients [17]. A RCT in bariatric surgery comparing TAP vs Port-Site Infiltration found no significant differences. Sample size: 113 patients [18]. These studies encompass a range of procedures and present heterogeneous outcomes regarding the use of TAP blocks. The impact of TAP blocks seems vary depending on the specific surgical context. Specifically, there is evidence supporting the advantage of TAP blocks in laparoscopic cholecystectomy [12–14] and laparoscopic hernia repair [1], as well as in laparoscopic gynecologic surgeries [16]. However, in bariatric surgery, the variability of operative procedures and results complicates the assessment of TAP block efficacy. Notably, in our study focusing exclusively on Roux-en-Y gastric bypass (RYGB) procedures, we found no significant difference between TAP block and no block (except in the first hour postoperatively. Our study did not utilize the PSI (port site infiltration) technique, adding a new dimension to the discussion of TAP block efficacy in RYGB-Surgery.

Heterogeneous operative procedures result in heterogeneous traumatisation of the abdominal wall through different positioning of trocars. As the anatomy and innervation of the abdominal wall are complex, in our view it is safe to assume, that this can lead to different postoperative localisation or severity of pain. For example, in cholecystectomy, sleeve gastrectomy and nephrectomy, the mini-laparotomy through which the specimen is recovered can cause significant variation in abdominal wall trauma. In inguinal hernia repair, there is substantial traumatisation of the abdominal wall in the inguinal region. In RYGB, the traumatisation of the abdominal wall differs as there is no specimen recovery. These variations make it difficult to uniformly extrapolate data across different MIS (minimally invasive surgeries), highlighting the importance of studies focused on specific MIS procedures.

Several studies have been published on TAP block in bariatric surgery [7–9, 18], but the data are heterogeneous with regard to the method of administration (Ultrasound-guided TAP/ L-TAP), applied study design (blinding, placebo control, prospective, retrospective), time of administration (pre-, postoperative or intraoperative (pre- or postincisional) and the study groups (patients undergoing open or minimal invasive RYGB, sleeve resection etc.). One might ask why we chose this particular study design and patient population. The study population consisted of patients who underwent LRYGB. Firstly, bariatric surgery is generally performed in a minimally invasive manner. Secondly, the LRYGB approach is commonly performed in bariatric surgery and has been shown in some meta-analyses to be to some extend superior to sleeve resection in terms of weight loss and treatment of dyslipidemia [19, 20].

In terms of timing, we decided to perform the TAP block preoperatively before the Roux-Y gastric bypass. This decision, which is also based on our previous published experience in hernia surgery (L-TAP block before laparoscopic hernia surgery [1]), was made to enable a meaningful comparison with two very similar study projects on this topic [10, 11]. To this end, Seiler et al. (2022) as well as Bhakta et al. (2018) conducted a comparable evaluation of the L-TAP block in patients undergoing LRYGB [10, 11]. They also administered L-TAP preoperatively. On the other hand, it has been published that the preoperative administration of a TAP block could be superior in terms of postoperative pain reduction. This seems plausible, as the analgesic effect of the TAP block covers a larger part of the early postoperative period. However, the evidence for this is limited [21].

In regard to the method of administration we aimed to shorten the overall perioperative time. Sharma et al. (2023) performed a randomized clinical trial evaluating the laparoscopic versus ultrasound guided TAP block in patients undergoing bariatric surgery (n = 60). The authors reported that the L-TAP procedure was, with significant, less time consuming than the Ultrasound-guided TAP-block (3.58 ± 0.67 min vs. 12.47 ± 1.61 min, $p < 0.001$)

[22]. Therefore, the laparoscopic TAP with direct visualisation was conducted and evaluated. In addition, visual control may lead to less organ injuries caused by ultrasound-guided needle insertions [23].

The two groups differed significantly in terms of ASA score. Patients who underwent surgery and did not receive L-TAP (2020) had a higher ASA score. This can be explained by the fact that during the first period of the COVID 19 pandemic healthier patients were more likely postponed. The two groups differed also in operation time, this can be explained by the fact that two consultants started to work in 2020 in our Center of Obesity and Metabolic Surgery. For this reason, the L-TAP-Block cases of 2022 all the surgeons were more experienced (Table 1).

Postoperative pain in RYGB may stem more from phrenic nerve irritation due to pneumoperitoneum than abdominal wall trauma, with port site pain less prominent absent specimen extraction. Our early pain reduction with L-TAP (1 h) may reflect temporary nerve blockade, but its lack of sustained effect or opioid sparing suggests limited utility. Alternatives like port site infiltration warrant exploration, though NSAIDs are contraindicated in RYGB due to bleeding risks. The multivariate analysis on severe postoperative pain (≥6 VAS) revealed that an age below 40 years was a risk factor (OR 2.03, p=0.006, Table 3). It was also shown that patients with a Body Mass Index of more than 50 kg/m^2 had a lower risk of suffering from early relevant post-operative pain (OR 0.55, p=0.023, Table 3). We defined severe pain as a VAS score of≥6, as the mean values for maximum pain were 6.3 and 6.4 points respectively (Table 3). When reviewing and summarising publications on transversus abdominis plane block and laparoscopic gastric bypass surgery in patients with obesity (Compared to a Non-TAP control group, Table S1) we revealed 7 relevant publications [8–11, 18, 24, 25], of which 2 were highly comparable to our study design and population [10, 11]. One publication with the exact study design was not found. Only Bhakta et al. (2018) performed a multivariate analysis on pain and age. The authors did not reveal that lower age was at higher risk and higher Body Mass Index at less risk for relevant postoperative pain. These findings are in accordance with findings on that topic in thoracic (single-center retrospective study, n=3159 [26]) and lumbar surgery (Prospective non-randomized trial, n=377 [27]). The multivariate analysis also showed that opioid use was a risk factor for relevant postoperative pain. These results are to be expected, as patients in pain tend to take opioids (OR 3.18, <0.001, Table 3). One could argue that the L-TAP approach is not worth the effort. No effect on pain medication consumption was found. Pain levels were only lower within the first hour after surgery (Fig. 1, Table 2). Only a small amount of additional (also non-opioid) pain medication could have the same effect as the L-TAP. Moreover, it can not be ruled, that the lower VAS score among patients of the TAP-group was caused by more administration of opioids or non-opioids agents in the recovery room. On the other hand, L-TAP is a procedure that can be performed quickly and safely.

The retrospective study design is a study limitation. We refer to the comprehensive meta-analysis [28], which found no difference or a very small difference between effect estimates from RCTs and observational studies. These findings are largely consistent with recently published research [29]. Factors other than study design need to be considered when exploring reasons for a lack of agreement between results of RCTs and observational studies, such as differences in the population, intervention, comparator, and outcomes investigated in the respective studies.

In addition, only 17 data sets were complete with regard to the 11 pain measurement points. However, most cases had 8 or more readings (54%). Missing data was imputed using the 'Last Observation Carried Forward' method.

Interestingly, there is a noticeable difference in the frequency of missing information on the VAS scheme scores between the patient groups: L-TAP: 461/1242 (37.1%), NO-LTAP: 221/1991: (18.2%). This could indicate a general satisfaction of the patients with the tap block, who may not have documented the absence of pain. Another possible reason for the underpowering is that the difference between the groups is very small, which may indicate that the clinical significance of the TAP block in this context is limited.

The time of ambulation was not measured in this study, on the other hand all patients are instructed to stand up by a specialized physiotherapist in the recovery room 1 h after surgery. These findings reflect to some extend the applied so called "Enhanced Recovery Pathways for Metabolic and Bariatric Surgery" [5], which includes early ambulation.

Conclusion

The L-TAP block is a safe procedure that reduces postoperative pain at one hour after LRYGB but offers no sustained benefit in pain intensity or opioid consumption beyond this period. Prospective randomized trials are essential to define L-TAP's role in bariatric surgery.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12893-025-02880-2.

Supplementary Material 1: Table S1. Publications on laparoscopic and ultrasound-guided transversus abdominis plane block prior and laparoscopic gastric bypass surgery in patients with obesity. Table S2. Pain level at 11 different times

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Clinical Trial Registration details
Registry: DRKS—Deutsches Register Klinischer Studien (DRKS—German Clinical Studies Register).
Registration number: DRKS00034186 data of registration: https://www.drks.de/search/de/trial/DRKS00034186.

Author contributions
G.D., O.S. and C.P. wrote and edited the manuscript; O. S., P. L. and G. D. performed the procedures; G.D. and M.A. revealed the data. R.L. conducted the statistical analysis. R. M. supervised the manuscript writing. All authors reviewed the manuscript.

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Data Availability
The datasets analyzed during the current study are available upon an editorial request. Please contact Gianluca De Santo, (gianluca.desanto@helios-gesundheit.de) at Helios Hospital Berlin-Buch for further information.

Declarations

Ethics approval and consent to participate
The study project was approved by the ethics committee of Berlin Medical Association (ETH-20/24).
The need for informed consent was waived by the ethics committee that approved this study.

Consent of publication
Not applicable.

Competing interests
The authors declare no competing interests.

Author details
[1]Center of Obesity and Metabolic Surgery, Helios Klinikum Berlin Buch, Schwanebecker Chaussee 50, 13125 Berlin, Germany. [2]Institute for Research in Operative Medicine (IFOM), Witten/Herdecke University, Cologne, Germany. [3]Faculty of Health Sciences Brandenburg, Brandenburg Medical School Theodor Fontane, Brandenburg, Germany. [4]Department of General Surgery, Brandenburg Medical School Theodor Fontane, University Hospital Brandenburg, Brandenburg, Germany.

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