



Transversus abdominis plane blocks for rescue analgesia following Cesarean delivery: a case series

Le bloc dans le plan du muscle transverse de l'abdomen pour l'analgésie de secours après un accouchement par césarienne: une série de cas

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Abstract

Purpose *The role of routine transversus abdominis plane (TAP) blocks at the time of surgery for Cesarean delivery analgesia is uncertain. Previous studies have shown no additional analgesic benefit in patients receiving intrathecal morphine. We present a series of three cases where TAP blocks were used for rescue analgesia in patients who had severe post-Cesarean delivery pain after a standard spinal anesthetic containing bupivacaine 12 mg, fentanyl 10 µg, and morphine 200 µg.*

Clinical features *All three women experienced severe incisional pain in the postanesthetic care unit (PACU) after offset of spinal anesthesia. When the pain did not subside with intravenous opioids, the women were offered either additional intravenous opioids or a TAP block. They chose the latter. Bilateral TAP blocks were performed in a sterile posterior approach under ultrasound guidance with 0.375% ropivacaine 20 mL with epinephrine 1:400,000. All three patients experienced significant pain relief that lasted 10–19 hr and allowed for a timely discharge from the PACU.*

Conclusion *These cases show that TAP blocks may play a valuable role as a rescue analgesic technique rather than as a routine preemptive block for all Cesarean delivery patients. Use of TAP blocks reduced the need*

for escalating intravenous opioid doses and potential maternal opioid-related side effects. Rescue TAP blocks should be considered after Cesarean delivery when intrathecal morphine does not provide adequate pain relief or for early breakthrough pain after offset of spinal anesthesia.

Résumé

Objectif *Le rôle du bloc dans le plan du muscle transverse de l'abdomen (transversus abdominis plane block – TAP block) de routine pour l'analgésie au moment de la chirurgie pour un accouchement par césarienne est incertain. Les études précédentes n'ont démontré aucun avantage analgésique supplémentaire chez les patientes recevant de la morphine intrathécale. Nous présentons une série de trois cas dans lesquels des TAP blocks ont été utilisés pour une analgésie de secours chez des patientes qui souffraient de fortes douleurs après un accouchement par césarienne, pour lequel elles avaient reçu un anesthésique rachidien standard contenant de la bupivacaine 12 mg, du fentanyl 10 µg et de la morphine 200 µg.*

Éléments cliniques *Les trois femmes ont souffert de fortes douleurs au site d'incision en salle de réveil, une fois l'effet de la rachianesthésie passé. Lorsque la douleur ne s'est pas amenuisée avec des opioïdes intraveineux, on a proposé aux patientes des opioïdes intraveineux supplémentaires ou des TAP blocks, qu'elles ont choisi. Des TAP blocks bilatéraux ont été réalisés par une approche postérieure stérile sous échoguidage avec 20 mL de ropivacaine 0,375 % et 1:400 000 d'épinéphrine. Les trois patientes ont ressenti un soulagement important de la douleur d'une durée 10–19 h, ce qui a permis un congé opportun de la salle de réveil.*

Conclusion *Ces cas démontrent que les TAP blocks pourraient jouer un rôle précieux en tant que technique d'analgésie de secours plutôt que comme bloc préventif de routine chez toutes les patientes subissant un accouchement*

Author contributions *Farheen Mirza and Brendan Carvalho helped with patient care, reviewed the clinical data, and helped write the manuscript. Farheen Mirza collected the clinical data and is the author responsible for archiving the study files. Brendan Carvalho proposed the case series and helped report the data.*

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par césarienne. L'utilisation de TAP blocks a réduit le besoin de doses croissantes d'opioïdes intraveineux et d'effets secondaires potentiels liés aux opioïdes pour la mère. Il faudrait envisager de réaliser des TAP blocks de secours après un accouchement par césarienne lorsque la morphine intrathécale ne fournit pas un soulagement adéquat de la douleur ou pour la douleur aiguë précoce une fois l'effet de la rachianesthésie passé.

Transversus abdominis plane (TAP) blocks have been shown to decrease postoperative pain and analgesic requirements following open and laparoscopic abdominal surgery.¹ When performed at the time of surgery, TAP blocks decrease the 24-hr morphine requirements in women who undergo Cesarean delivery under general anesthesia;^{2,3} however, the analgesic efficacy of TAP blocks for Cesarean delivery under neuraxial anesthesia is uncertain. Pain and analgesic consumption have been found to be reduced in patients with TAP blocks at the time of Cesarean delivery under spinal anesthesia without intrathecal morphine;⁴⁻⁶ however, minimal additional analgesic benefit is found in women receiving intrathecal morphine with multimodal analgesia.^{6,7} Additionally, studies show that intrathecal morphine provides better post-Cesarean delivery analgesia compared with TAP blocks.^{6,8-10}

The role of TAP block for rescue analgesia following surgery is not well described and poorly studied. Borglum *et al.* describe a four-point TAP block technique as a rescue procedure in 25 patients who had undergone abdominal surgery other than Cesarean delivery under general anesthesia.¹¹ In a brief report of a retrospective audit of seven patients who underwent rescue TAP blocks after abdominal surgery (one of whom had a Cesarean delivery), the authors did not specify the surgical anesthetic technique, the analgesics utilized prior to and after the TAP blocks, or the duration of analgesic efficacy after the TAP blocks.¹² In two previous case reports describing the use of rescue TAP blocks post-Cesarean delivery, the TAP blocks were applied in unusual circumstances, i.e., for neuropathic pain two weeks post-delivery¹³ and for pain from a large abdominal hematoma 36 hr after Cesarean delivery.¹⁴

We present three cases in which bilateral TAP blocks were used as rescue analgesia in healthy patients who had severe postoperative pain following elective Cesarean delivery under spinal anesthesia with intrathecal morphine.

Case summaries

All patients described in this case series gave written informed consent for publication of this article. The patients

all received our institution's standard Cesarean delivery spinal anesthetic, which consists of 0.75% hyperbaric bupivacaine 12 mg, intrathecal fentanyl 10 µg, and intrathecal morphine 200 µg. Postoperatively, patients routinely receive nonsteroidal anti-inflammatory drugs (NSAIDs) for 48-72 hr. The NSAID protocol consists of oral ibuprofen 600 mg every six hours or intravenous ketorolac 15 mg every six hours if they cannot tolerate oral medications. All three patients reported in this case series experienced standard intraoperative estimated blood loss (700-1,000 mL). The primary oral opioid analgesic for breakthrough postoperative pain is oral oxycodone 5 mg with acetaminophen 325 mg (Percocet®, Endo Pharmaceuticals, Chadds Ford, PA, USA) and up to 10 mg of oxycodone every four hours. Intravenous fentanyl, hydromorphone, and/or morphine are available for severe pain or pain not responding to oral opioid analgesics. Over the past year, we began offering patients the option of receiving TAP blocks for severe post-Cesarean pain that does not respond to routine analgesics outlined above. Since introducing rescue TAP blocks as an analgesic option, we perform an average of one to two rescue TAP blocks each month for severe Cesarean delivery pain that is unresponsive to standard analgesics. Patients in this case series represent the first three patients to undergo this treatment after the decision was made to evaluate this protocol.

All patients in this case series experienced severe pain in the recovery room. Despite being given the standard postanesthetic care unit (PACU) protocol of both oral and intravenous opioids, the pain did not decrease significantly; consequently, TAP blocks were offered to the patients. Bilateral TAP blocks were performed using a classic TAP approach in a sterile manner under ultrasound guidance. Standard monitors (noninvasive blood pressure cuff, pulse oximeter, and three-lead electrocardiogram) were applied prior to performing the TAP blocks. A high-frequency (10-5 MHz) 38-mm linear ultrasound probe (Sonosite L38, Bothell, WA, USA) with an ultrasound machine (Sonosite M-Turbo, Bothell, WA, USA) was utilized. The probe was placed laterally between the 12th rib and the iliac crest. Once all three (external, internal, and transversus abdominis) muscle layers were visualized, a 21-G 100-mm Stimuplex® needle (B. Braun, Bethlehem, PA, USA) was inserted on the lateral edge of the probe. Immediately following, 0.375 % ropivacaine 20 mL (APP Pharmaceuticals, Schaumburg, IL, USA) with epinephrine 1:400,000 was administered bilaterally between the internal oblique and transversus abdominis muscle layers. The concentration of 0.375% ropivacaine used at our institution is based on the dosage by Costello *et al.*⁷ Epinephrine (1:400,000) was added in an attempt to prolong the duration of the block. Good spread of the local anesthetic solution was observed.

Case 1

A 31-yr-old G3P2 female with a history of two prior Cesarean deliveries, gestational diabetes, and obesity (body mass index [BMI] $46 \text{ kg}\cdot\text{m}^{-2}$) underwent an uncomplicated Cesarean delivery under combined spinal-epidural anesthesia. Total surgical time was 54 min. Sixty minutes after surgery, the patient complained of 9/10 pain (on a numerical verbal pain scale [NVPS] 0-10 with 0 = no pain, and 10 = worse pain imaginable) over her surgical incision, which remained unchanged after she received oral oxycodone 10 mg with acetaminophen 650 mg. She remarked that she did not experience pain in the recovery room after her first and second Cesarean deliveries. On a request by the obstetrician, the patient did not receive NSAIDs because there was inadequate intraoperative uterine tone requiring intramuscular methylergonovine, a small area of bleeding at uterine closure that was repaired by a figure of eight suture, and multiple adhesions between the uterus and abdominal wall limiting uterine exteriorization to look for other sites of bleeding. She was given hydromorphone (total of 1 mg *iv*) and morphine 4 mg *iv*, which resulted in some sedation but minimal decrease in her pain score. Bilateral ultrasound-guided TAP blocks were performed as outlined above, and within 20 min, the patient's pain decreased from a 9 to a 2 on the NVPS. She was discharged from the PACU 62 min later. The patient's next request for further analgesia was 12.3 hr after the TAP blocks (Table).

Case 2

A 34-yr-old G2P1 female with one prior Cesarean delivery underwent an uncomplicated repeat Cesarean delivery under spinal anesthesia. In the PACU, she complained of sharp incisional pain (10 on the NVPS) 31 min after the end of surgery when her spinal anesthesia block had resolved (no residual motor block or sensory level to ice). She was in severe distress and stated that she had not experienced such pain with her first Cesarean delivery. No NSAID had been administered because of intraoperative uterine atony requiring treatment with intramuscular methylergonovine as well as multiple sites of bleeding on the anterior abdominal

wall where adhesions were present. She was initially given oral oxycodone 5 mg with acetaminophen 325 mg and fentanyl 100 μg *iv* with no decrease in pain. Additional boluses of morphine (total of 12 mg *iv*) and hydromorphone (total of 2 mg *iv*) resulted in a minimal decrease in her pain score to 9 on the NVPS. The patient complained of dizziness and sedation after opioids were given. She was then offered and agreed to receive a TAP block. Eighteen minutes after bilateral TAP blocks, her pain score decrease from 10 to 3 on the NVPS. Her next request for further pain medication was 10.3 hr after the TAP blocks (Table).

Case 3

A 39-yr-old G2P1 with a history of ulcerative colitis, for which she underwent colectomy, and one prior Cesarean delivery underwent a routine repeat Cesarean delivery under combined spinal-epidural anesthesia. Surgery was uncomplicated and lasted 56 min. In the PACU, the patient experienced stabbing incisional pain (9 on the NVPS) diffusely over her lower abdomen. She stated that she had never experienced pain this severe with either of her prior surgeries. Due to her history of ulcerative colitis, NSAIDs were withheld to prevent any potential exacerbation or relapse of her disease. She vomited twice and declined oral analgesics for fear of worsening nausea. She received fentanyl 50 μg *iv* and hydromorphone (total of 2 mg *iv*) with minimal decrease in her pain score to 8 on the NVPS. She experienced both worsening nausea and increased somnolence with the intravenous opioids. The patient was offered either more intravenous hydromorphone or TAP blocks, and she chose the latter. Bilateral TAP blocks were performed and her pain score decreased within 27 min from 9 to 2 on the NVPS. Pain relief lasted 19.9 hr before she requested further analgesia (Table).

Discussion

Postoperative pain following Cesarean delivery can be moderate to severe and is incompletely relieved by current pain management protocols.¹⁵ At our institution, 5-10% of

Table Demographics of the three patients and the analgesic effects of rescue transversus abdominis plane (TAP) blocks following Cesarean delivery

	Age (yr)	BMI ($\text{kg}\cdot\text{m}^{-2}$)	Parity	NVPS-Pre (0-10)	NVPS-Post (0-10)	Time to NVPS reduction (min)	Analgesic time (hr)
Case 1	31	45	2	9	2	20	12.3
Case 2	34	31	1	10	3	18	10.3
Case 3	39	20	1	9	2	27	19.9

BMI = body mass index; NVPS-Pre = numerical verbal pain scale (NVPS) rating (0-10 with 0 = no pain, and 10 = worse pain imaginable) prior to TAP rescue block; NVPS-Post = NVPS rating after TAP rescue block; Time to NVPS Reduction = minutes to decrease in NVPS after placement of the TAP block; Analgesic time = hours from rescue TAP block placement to first request for additional analgesics

patients who receive intrathecal morphine for elective Cesarean delivery experience severe breakthrough pain. Pain during and after Cesarean delivery is the most undesirable outcome in women undergoing Cesarean delivery.¹⁶ The role of TAP blocks at the time of surgery for post-Cesarean delivery analgesia has been studied.^{1,6} The utility of a TAP block as an additional analgesic intervention in women undergoing Cesarean delivery under spinal anesthesia with intrathecal morphine (and multimodal with NSAIDs and acetaminophen) appears limited.^{1,6,7} A recent editorial and a meta-analysis suggest that the current role of TAP blocks at the time of Cesarean delivery may be limited to women who do not receive intrathecal morphine.^{6,17}

In our view, the role of TAP blocks in the setting of Cesarean delivery (with intrathecal morphine and multimodal analgesia) may be better suited as a *rescue* analgesic technique for those women who have severe breakthrough pain following surgery, rather than as a *routine* block in all patients at the time of Cesarean delivery. These three cases show the utility for TAP blocks as a technique to manage breakthrough pain after Cesarean delivery with intrathecal morphine, and they confirm the efficacy of rescue TAP blocks described following abdominal (non-Cesarean delivery) surgery.^{11,12}

Since introducing TAP blocks as a rescue analgesic option at our institution, we have performed approximately one to two TAP blocks per month, and the vast majority of patients receive analgesic benefit. Nevertheless, future studies are required to assess the potential number of patients who may benefit from rescue blocks after Cesarean delivery as well as the overall analgesic benefit attained from these blocks. While prospective randomized controlled studies are needed to prove the utility of TAP blocks for rescue analgesia in the Cesarean delivery setting, study design might prove particularly challenging, and we may need to rely on case series and clinical experience for “proof” of analgesic efficacy for rescue analgesia. Although these cases show the utility of offering TAP blocks when pain is unresponsive to intravenous opioids and analgesics, TAP blocks could also be considered as an alternative to intravenous opioids to manage breakthrough pain in patients not receiving intrathecal morphine and/or when NSAIDs are contraindicated.

With intrathecal morphine 200 µg combined with multimodal analgesia (NSAIDs and acetaminophen) we would expect approximately 5-10 % of patients to require intravenous opioids or have severe pain that is difficult to manage.^{18,19} Worth mentioning, all three of the patients reported here did not receive NSAIDs postoperatively because of concerns with bleeding. At our institution, the obstetricians may withhold postoperative NSAIDs because of continued localized bleeding in the surgical field, uterine atony or inadequate uterine tone, and any medical condition in which NSAIDs are contraindicated. The type of analgesia provided by NSAIDs has been shown to be

directed against the visceral cramping pain occurring after Cesarean delivery,^{20,21} however, all three patients complained of predominantly somatic incisional pain (as opposed to visceral pain) for which TAP blocks are particularly indicated.⁸⁻¹⁰ The analgesic efficacy of TAP blocks for these three women indicates that the pain was likely predominantly somatic incisional pain. Differentiation between incisional and cramping pain is important before offering TAP blocks as a rescue analgesic technique, as visceral pain from the uterus will not be adequately treated with TAP blocks.

These cases highlight the potential opioid-sparing effects of TAP blocks and the likely prevention of more opioid-related side effects in both the mother and the breast-feeding infant. A significant limitation of a single-shot TAP block is the duration of analgesia. Although the duration of analgesia in these cases was limited to 10-19 hr, it was significantly longer than the six hours reported after single-shot rescue TAP blocks for non-Cesarean abdominal surgery¹¹ and did facilitate discharge from the PACU. A recent case report suggests a role for continuous TAP blocks following Cesarean delivery;²² however, there is a need for randomized controlled studies to confirm the utility of continuous TAP catheters following Cesarean delivery.

In conclusion, these cases highlight a potential indication for TAP blocks to manage breakthrough pain after offset of spinal anesthesia following Cesarean delivery. In light of literature that shows limited efficacy for routine TAP blocks at the time of surgery in patients receiving intrathecal morphine and multimodal analgesia, the proposed rescue analgesic indication may be the optimal role for TAP blocks in this setting. With TAP blocks, there is a potential to reduce the need for escalating intravenous opioid doses and the associated opioid-related side effects. While these cases clearly highlight the analgesic efficacy of TAP blocks to treat breakthrough pain, future prospective studies are required to provide a better outline of the utility of TAP blocks for rescue analgesia in the Cesarean delivery setting.

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Competing interests None declared.

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