

# PAINMEDICINE NEWS

## Interventional

APRIL 9, 2018

# The TAP Block: Rapidly Evolving From Managing Acute Post-Op Pain to Treating Chronic Abdominal Pain

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## Purpose

This review article describes the increasing use of the transversus abdominis plane (TAP) block for treating various forms of chronic abdominal pain.

## Background

The original anatomic TAP block at the Petit triangle was described by Rafi in 2001.<sup>1</sup> The ultrasound-guided TAP block was described by Hebbard et al in 2007.<sup>2</sup> The TAP block has been used more commonly over the last decade for postoperative pain management for a variety of surgeries of the abdominal wall. This increased use is substantially due to the fact that bedside ultrasound has become widely available in modern hospitals.

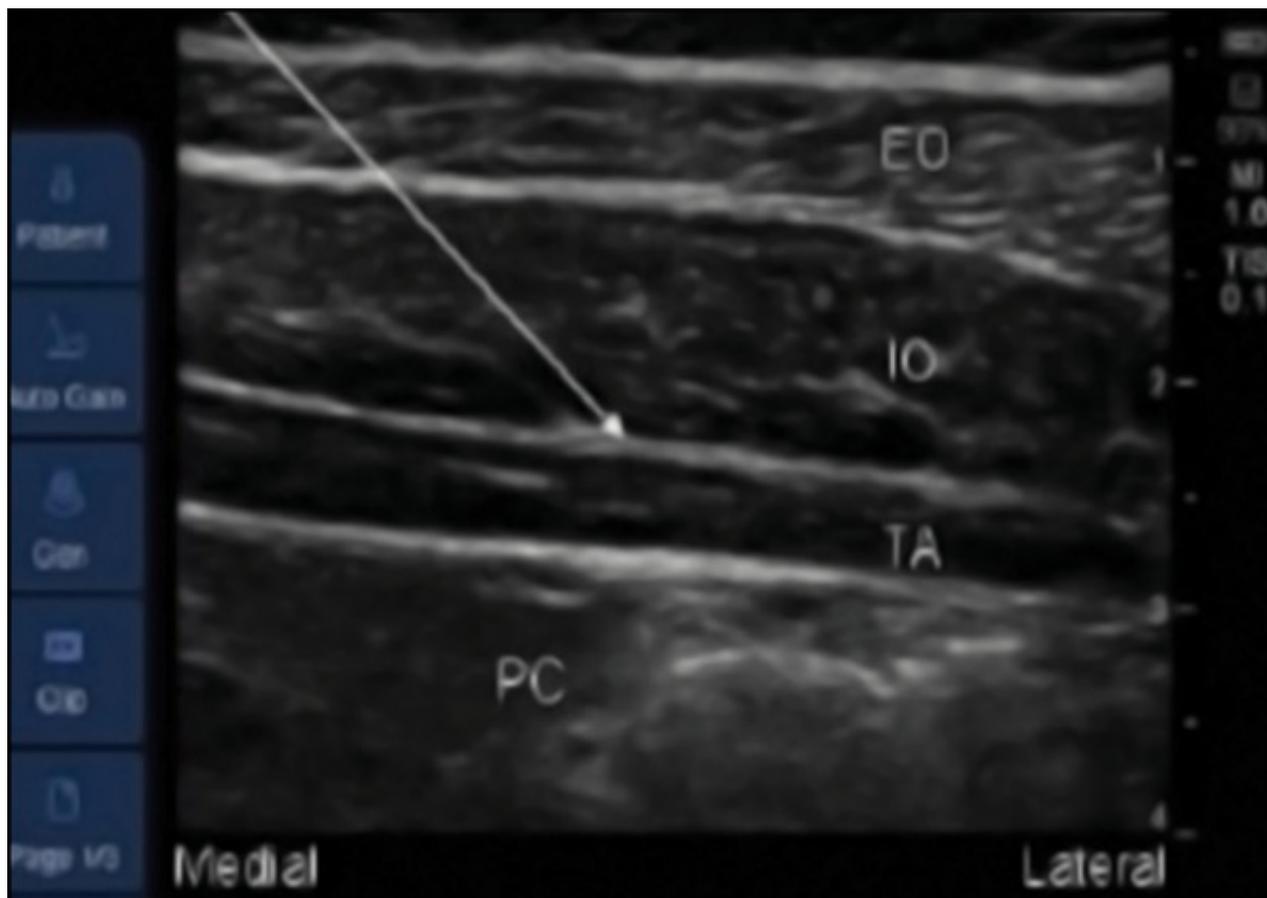
The TAP, which lies between the internal oblique and the transverse abdominal muscle, contains the thoracic and first lumbar anterior spinal nerves. Blockade of these nerves provides excellent analgesia to the mid and lower abdominal wall down to the inguinal area. Either single-shot blockade or catheter placement in this plane has provided excellent postoperative analgesia for a variety of abdominal procedures, including laparotomy, inguinal hernia repair, total abdominal hysterectomy, partial hepatectomy, pancreatic surgery, and large- and small-bowel resection.<sup>3</sup>



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**An external view (above) of a ultrasound-guided lateral approach to transversus abdominis plane block, and the internal ultrasound image (below). The arrow shows the transversus abdominis plane.**

Reproduced from Børglum J, Jensen K. Abdominal surgery: advances in the use of ultrasound-guided truncal blocks for perioperative pain management. In: Derbel F, ed. *Abdominal Surgery*. Rijeka, Croatia: InTech; 2012:69–94. (<https://creativecommons.org/licenses/by-nc/4.0/>)<sup>19</sup>



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## Early Studies

In the past few years, there has been an emergence in the literature of the TAP block being performed for a variety of chronic pain syndromes.

One of the earliest descriptions of the use of TAP blocks to treat chronic abdominal wall pain was by Simpson et al in 2011.<sup>4</sup> A 13-year-old girl with a 2-year history of chronic abdominal pain after resection of an ovarian teratoma presented to the pediatric chronic pain service. The patient underwent bilateral subcostal TAP injections with 0.25% bupivacaine with epinephrine. There was a reported improvement in pain and functionality for up to 1 month post-procedure.

In 2013, Guirguis et al<sup>5</sup> described use of TAP catheters to treat chronic abdominal pain in an 18-year-old woman. The patient had chronic abdominal pain from an uneventful laparoscopic cholecystectomy. She failed multiple modalities of treatment, including 3 celiac plexus blocks. An indwelling TAP catheter was left for 2 weeks. Subsequently, she had excellent pain relief and was able to wean off opioids at 3, 6, and 9 months' follow-

up. The researchers noted that they had dosed the catheters empirically, and further study was required to determine the best choice of local anesthetic and whether steroid administration would be beneficial.

Takimoto<sup>6</sup> published a report in 2014 describing the use of indwelling bilateral TAP catheters in an ICU patient. A 68-year-old woman presented 93 days after an enterotomy to the ICU in septic shock. Underlying anticoagulation, hypotension, and sepsis precluded the use of neuraxial analgesia for the chronic abdominal pain. After indwelling TAP catheters were placed, all analgesics were stopped on day 13. The catheters were left in place for 31 days with excellent results.

### **TAP Blocks for Acute Flare-ups Of Chronic Pancreatitis**

It is a common belief that TAP blocks are effective only for somatic abdominal wall pain and not visceral pain. Indeed, this block has been recommended as a diagnostic test for differentiating between these 2 types of pain. However, acute flare-ups of chronic pain from pancreatitis have been treated with these procedures.

Smith et al<sup>7</sup> produced 2 case reports in 2014 demonstrating excellent to complete pain relief for over a week in flare-ups of acute pancreatitis after TAP blocks.

The first case was a 46-year-old woman with a 15-year history of chronic pancreatitis who presented with a 4-day history of epigastric and right-sided abdominal pain. When IV opioids had shown limited benefit, a right-sided TAP block with 30 mL of 0.5% bupivacaine and 150 mcg of epinephrine was performed, which gave her almost complete pain relief for 2 to 7 days, as evidenced by phone calls after the procedure.

The second case was a 30-year-old man with a history of gallstone pancreatitis and an infected pancreatic pseudocyst. The patient presented with severe acute and chronic pain from pancreatitis. He had consumed up to 200 mg of oxycodone in the 24 hours prior to admission. A bilateral TAP block was done with 20 mL of 0.25% bupivacaine and 40 mg of methylprednisolone (Depo-Medrol, Pfizer) per side. His pain score was 1 to 2 of 10 at 7 days.

In his analysis of the mechanism behind the pain relief, Smith et al speculated there are pain pathways in the spinal cord that we have yet to understand.<sup>7</sup> Visceral and somatic pain distinctions may not be as clear as previously thought. Immunohistochemical and electrophysiologic studies demonstrate significant overlap of somatic and visceral afferents in the dorsal horn of mammalian species.<sup>8</sup> Additionally, systemic uptake of local anesthetics can influence nociceptive pathway formation and subsequent analgesic effect.<sup>9,10</sup>

### **TAP Plane Neurolysis in Cancer Pain Palliation**

Two case reports describe phenol neurolysis in the TAP for cancer pain. Gebhardt and Wu<sup>11</sup> described a 55-year-old woman with epithelioid sarcoma of the mons pubis and inguinal lymphadenopathy. She was seen after radiation therapy and exploratory laparotomy in their pain clinic. She described her pain as “crampy, aching” and exacerbated by eating. She benefited from a trial TAP block with a local anesthetic. She then advanced to TAP neurolysis with phenol. Her pain returned at 3 weeks, and she had a repeat successful trial block and then a repeat TAP neurolysis. The authors charted a dramatic decrease in numerical pain scores and daily opioid consumption in this patient.

In 2014, Restrepo-Garces et al<sup>12</sup> described a subcostal TAP phenol neurolysis in a patient with refractory cancer pain of the abdominal wall. The patient had severe abdominal wall pain from metastatic cervical cancer refractory to medication management. She had severe side effects from high-dose oxycodone and IV hydromorphone. She underwent neurolytic TAP blocks with 20 mL of 6% aqueous phenol injected per side. Up to 2 months’ follow-up, the patient had a 50% decrease in oxycodone consumption and no longer required IV hydromorphone for breakthrough pain.

The investigators suggested that larger studies need to be conducted to identify the role of TAP neurolysis in cancer pain treatment algorithms.

### **Neuromodulation in TAP Blocks**

A completely new paradigm was opened up in 2014; Gupta and Goodson<sup>13</sup> introduced the new application of TAP neuromodulation in treating chronic abdominal pain. A 60-year-old woman with a history of chronic abdominal pain after multiple laparotomies was

trialed and then permanently implanted with an 8-lead dorsal column stimulator lead in the TAP. The authors reported near complete pain relief on a sustained basis and a dramatic reduction in opioid consumption.

## **New Research**

Abd-Elsayed and Malyuk<sup>14</sup> produced an excellent study documenting the benefit of TAP blocks with local anesthetic and steroids. Thirty chronic abdominal pain patients previously treated with 45 blocks were examined retrospectively. These patients had failed other modalities of pain management. In unilateral blocks, 8 mL of 0.25% bupivacaine mixed with 40 mg of triamcinolone were injected. In bilateral blocks, 9 mL of 0.25% bupivacaine with 40 mg of triamcinolone were injected on each side. The TAP block improved pain in 79.5% of patients. The percentage of improvement was 54.7% ±36.4%. There was a significant reduction in the use of gabapentin before and after the procedure.

Of note, the study did not show a reduction in opioid consumption, but the reduction in gabapentin consumption implies that further investigation might reveal efficacy in opioid sparing with TAP blocks.

Baciarello et al<sup>15</sup> described a case series in which 5 patients presenting with chronic abdominal wall pain received TAP blocks with local anesthetic and steroids. Four of these patients reported greater than 50% pain relief. Two of them maintained low pain intensities at 6 and 12 months after treatment.

Both studies show that prospective randomized studies are needed to identify the role of TAP blocks in the management of chronic abdominal pain.

## **Conclusion**

The TAP, which has been used almost exclusively for acute postoperative pain, is now evolving into another functionality. We have more evidence that TAP blocks have efficacy in treating chronic abdominal wall pain, particularly chronic pain arising from abdominal surgeries. Case reports describe the TAP block's efficacy in relieving acute and chronic pain from pancreatitis. Additionally, the off-label use of a neurostimulation catheter in the TAP has been reported to lead to sustained relief from chronic pain after laparotomy.

We have reason to believe that visceral pain and somatic abdominal wall pain are not completely separate entities as was once believed. In the future, when we have a better understanding of pain pathways in the central nervous system, we may have a better explanation for how the TAP block is being used to treat an increasingly diverse array of abdominal pain syndromes.

## About the Author

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