

## Case Report

# Evaluation of Pain after Laminectomy Fusion with Fentanyl Transdermal Patch and Paracetamol Infusion: Case Report

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## ABSTRACT

Pain can occur due to many things, one of which is trauma and surgical procedures. Fentanyl transdermal patch and paracetamol are analgesics that can be used as alternatives to control the pain. The use of the fentanyl transdermal patch is easy to use because it is needle free, the duration of use can be up to 72 hours, and it is used for chronic with moderate to severe intensity. Paracetamol is also an NSAID that is easy to find and often used. The following is a case series regarding three patients with a diagnosis of Lumbar Tumor at L4-L5 vertebrae, Spinal Cord Injury at C6-C7 vertebrae, Canal Stenosis at L4-S1 vertebrae who received a laminectomy fusion procedure. The three patients received fentanyl transdermal patch and paracetamol therapy as postoperative management. Almost all patients reported a decrease in pain scale after using fentanyl transdermal patch and paracetamol, monitoring pain using the Number Pain Rating Scale (NPRS) and Behavioral Pain Rating Scale (BPS) at the 6<sup>th</sup>, 12<sup>th</sup>, 24<sup>th</sup> and 48<sup>th</sup> hours postoperatively. Differences can occur due to internal and external factors. In this case, most patients felt a decrease in pain scale at 12 and 24 hours after receiving fentanyl transdermal patch and paracetamol therapy, so that it can be used as an option for postoperative pain management.

**Keywords** :analgetics, behavioral pain rating scale (bps), fentanyl transdermal patch, numeric rating scale (nrs), post operation pain

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## INTRODUCTION

Pain is an unpleasant sensory and emotional experience that feel by a person. The unpleasant experience is related to actual or potential tissue injury. Pain that occurs can be either acute or chronic pain. Pain can arise from surgery. Perioperative pain

management is an important element for good postoperative outcome. The choice of strategy as pain management needs to be considered to improve postoperative recovery. Pharmacocoeutical combinations for analgesic effects that are commonly used postoperatively include non-steroidal anti-inflammatory drugs (NSAIDs) such as the opioid group. This opioid is one of the analgesics of choice to relieve intraoperative and postoperative pain (Raja *et al*, 2020; Kwon *et al*, 2019).

One of the strong agonist opioid analgesics is fentanyl. Fentanyl has an effect like morphine which acts as an agonist at  $\mu$  receptors which causes analgesia effects by binding to opioid receptors in the central nervous system and spinal cord which play a role in modulating pain. Fentanyl can be given intravenously or transdermally. Transdermal use of fentanyl can be used to control postoperative pain and reduce the use of rescue analgesia by attaching the transdermal fentanyl. This case series aims to report the profile of postoperative pain with transdermal fentanyl and paracetamol infusion in patients undergoing laminectomy surgery (Kwon *et al*, 2019).

## CASE REPORT

In this case series, we report 3 cases of patients at who received postoperative pain treatment using Fentanyl Transdermal Patch 12 mcg on the patient's left shoulder and Paracetamol injection 1g/8 hours. Monitoring the pain scale in patients 1st and 3rd using the Numeric Rating Scale (NRS) and in the 3rd patient using the Behavioral Pain Scale (BPS) which was carried out four times, namely at the 6th hour, 12th hour, 12th hour, 24th and 48th hour.

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The first patient was a 72 year old woman with American Society of Anesthesiologists (ASA) II with geriatrics and stage 1 hypertension. The patient complained of weakness in both legs. The patient was diagnosed with L4-L5 lumbar tumor and underwent tumor excision with laminectomy fusion. Fentanyl Transdermal Patch is given as soon as the surgical procedure is finished. In addition, the patient received an injection of paracetamol 1g/8 hours. Pain monitoring in the first case obtained a pain scale of 2 at the 6th and 12th hours, and 1 at the 24th and 48th hours.

The second patient was a 14 year old male, ASA I, with complaints of back neck pain with weakness in both hands. The patient was diagnosed with C6-C7 compression Spinal Cord Injury and received Laminectomy Fusion therapy. Fentanyl Transdermal Patch is given as soon as the surgical procedure is finished. The patient was also given injections

of paracetamol 1g/8hours, morphine 1mg/hour, and ibuprofen 400mg/8hours. Pain monitoring in the first case obtained a pain scale of 7 at the 6th hour, 6 at the 12th hour, 3 at the 24th hour and 3 at the 48th hour.

The third patient was a 71 year old woman, ASA II with grade 1 geriatrics and hypertension, with complaints of back pain and weakness in both legs. The patient was diagnosed with Lumbar Canal Stenosis and received Laminectomy fusion therapy. Fentanyl Transdermal Patch is given as soon as the surgical procedure is finished. Patients were also given injections of paracetamol 1g/8 hours, ketorolac 30 mg/8 hours, and tramadol 50mg/8 hours. Pain monitoring in the first case obtained a pain scale of 6 at the 6th hour, a pain scale of 4 at the 12th hour, a pain scale of 4 at the 24th hour, and a pain scale of 2 at the 48th hour. Patient demographic data are listed in Tables 1 and observation data for patient pain scales are shown in table 2.

**Table 1.** Patient Demographic Data

Case	Sex	Age	ASA	Post Operative Diagnosis	Treatment
case 1	female	72	II	lumbar tumor L4-L5	fusion laminectomy
case 2	male	14	I	spinal cord injury compression C6-C7	fusion laminectomy
case 3	female	71	II	canal stenosis lumbalis L4-S1	fusion laminectomy

**Table 2.** Patient pain scale evaluation data

Case	6 <sup>th</sup> hours post operation	12 <sup>th</sup> hours post operation	24 <sup>th</sup> hours post operation	48 <sup>th</sup> hours post operation
case 1	2	2	1	1
case 2	7	6	3	3
case 3	6	4	4	2

## DISCUSSION

Pain is a form of the body's protective mechanism due to tissue damage. According to the International Association for the Study of Pain (IASP), pain is an unpleasant emotional experience due to actual or potential damage, or describes the condition of tissue damage. Pain can be classified based on its type, namely, nociceptive pain, neurogenic pain, and psychogenic pain; based on its duration, namely, acute pain and chronic pain which can be assessed by a pain scale; based on the etiology, namely, oncological pain and non-oncological pain; and based on the degree of pain, namely, mild, moderate, and severe pain. Postoperative pain is a form of acute nociceptive pain accompanied by a local inflammatory response due to tissue damage, either due to the underlying disease or the surgical procedure itself (Guyton and Hall, 2011).

Management options for acute pain can be determined based on the pain intensity scale. On a mild scale spontaneous conditions (headaches, upper respiratory tract infections)

can be given Rice Ice Compression Elevation (RICE) and Non-Steroid Anti-Inflammation Drugs (NSAIDs), in conditions of mild trauma (immunizations, catheter insertion) can be given topically such as lidocaine. On a moderate scale in spontaneous conditions and trauma conditions, patients can be given RICE therapy, NSAIDs, and if needed, opioids can be given. Meanwhile, on the severe scale, in spontaneous or traumatic conditions, patients need to be given multimodal analgesics with stronger opioids (Morgan and Mikhail, 2006; Hair, Keating and McKeage, 2008).

Fentanyl transdermal patch is a transdermal patch that contains fentanyl. Fentanyl is a synthetic opioid analgesic similar to morphine but 80-100 times stronger, which has a mechanism of action interacting with opioid receptors. Fentanyl accumulates in the skin, is first absorbed through the topmost layer of the epidermis (stratum corneum) until it enters the circulatory system and provides analgesia for 72 hours. Fentanyl transdermal patch has several preparations containing fentanyl doses of 12, 25, 50, 75 and 100 $\mu$ g/hour. Serum fentanyl concentration increased gradually at 12 hours and remained constant for 72 hours. The analgetic effect continues after the patch is removed as the fentanyl concentration slowly drops to 50% after 17 hours. Fentanyl is metabolized in the liver via the CYP450 enzyme system, particularly CYP3A4. Has a half-life of 3-7 hours, 75% excreted via urine and 9% via feces (Hoy and Keating, 2008; Stevens, 2020; Ramos-Matos, Bistas and Lopez-Ojeda, 2022; KP, K and A, 2022).

Intravenous paracetamol is used as a safe and effective antipyretic and analgesic agent. The main mechanism of action of paracetamol is related to its inhibitory effect on the synthesis of prostaglandins (PGs). Paracetamol inhibits both COX isoforms (COX-1 and COX-2). The maximum recommended therapeutic dose of paracetamol is 4 g/day in adults and 50-75 mg/kg/day in children. Paracetamol easily crosses the blood-brain barrier and shows its central analgesic effect within 15-20 minutes, starting to decrease after 4 hours of administration. Paracetamol is preferred in most surgical patients because it does not affect mental status, bleeding, respiratory drive, gastric mucosal integrity, or renal function (Mayes and Ferrone, 2006; Hayward *et al.*, 2015; Gerriets, Anderson and Nappe, 2022).

Pain scale assessment was carried out in this case report series using the Numeric Rating Scale (NRS) in patients A and C and the Behavioral Pain Scale (BPS) in patient C which was carried out in each patient post laminectomy fusion surgery at 6, 12 hours., 24, and 48 hours. There was a decrease in NRS and BPS scores in patients B and C within 12 hours after administration of the Fentanyl transdermal patch and paracetamol infusion. In case A, there was a decrease in the NRS score 24 hours after administration of Fentanyl transdermal patch and paracetamol infusion. In case A, the NRS score persisted at 24-48 hours with a score of 0-1. Whereas in case B, the BPS score decreased significantly at the 12th and 24th hour with a BPS score of 6 to 3. Then in case C, the NRS score decreased at the 12th and 48th hour with an NRS score from 4 to 3.

The results of the NRS performed on both patients at the 6th hour postoperatively were in the range 2-6, also the BPS score obtained a score of 6, in both male and female patients where this value indicated a mild-moderate pain scale. This is in line with research conducted by Sutiyono (2019), which stated that the pain of post laminectomy patients in the first 6 hours ranged from 2, although some were not in line. In addition, other studies also stated that postoperative patients predominantly felt mild pain on the first, second, and third days (CPS, 2016).

Things that might cause differences are gender and age, where several studies state that women are considered to have a lower tolerance than men, so they are more prone to feeling more severe pain. In addition, the age difference also has an effect, namely the younger age feels more severe pain than the old age. Another reason that may also be the cause is that the absorption of the Fentanyl transdermal patch in each individual varies, depending on, among other things, depending on the thickness of the stratum corneum, skin hydration, accompanying skin diseases, ethnic differences and body temperature, in addition to the location where the patch is placed, ambient temperature, albumin in the blood, BMI, kidney and liver function (Nelson and Schwaner, 2009; Calcaterra *et al.*, 2015; Coombs and Butterworth, 2019).

The three patients received another analgesia therapy, paracetamol infusion. The administration of these other analgesia can affect the patient's pain score because of the synergistic interaction between analgesic drugs. These additional types of analgesics produce different levels of pain. Postoperative pain management is important, where the effectiveness of analgesics is a consideration in every surgery. The effectiveness of using fentanyl, in this case in the form of a fentanyl transdermal patch, accompanied by paracetamol infusion in postoperative patients is important for reducing moderate-severe intensity pain, the effectiveness of using the patch itself is also influenced by environmental factors and internal factors of the patient's own body (Gupta and Singh, 2015; Comer and Cahill, 2018; Coombs and Butterworth, 2019).

## CONCLUSION

Fentanyl transdermal patch is a transdermal patch that contains fentanyl. Serum fentanyl concentration increased gradually at 12 h and remained constant until 72 h. Paracetamol is used as a safe and effective antipyretic and analgesic agent. Its central analgesic effect appears within 15-20 minutes and begins to decline after 4 hours of administration. In this case series, it was found that most of the patients felt a significant decrease in pain scale at 24 hours. One patient had felt a decrease in pain scale at 12 hours. Differences in the pain scale can be influenced by gender, age, each individual's tolerance to pain, thickness of the stratum corneum, skin hydration conditions, accompanying skin diseases, pain scale instruments, use of other analgesic drugs, body temperature, BMI, kidney and liver function, and ambient temperature.

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