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Local Infiltration Analgesia compared with Epidural and Intravenous PCA after Surgical Hip Dislocation for the Treatment of Femoroacetabular Impingement in Adolescents

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Abstract

Background—Open treatment of femoroacetabular impingement (FAI) through a surgical hip dislocation (SHD) approach has been reported to allow for improvement in pain and function. However, the approach requires a trochanteric osteotomy and may be associated with high level of pain after surgery. Currently, there is no systematic approach for pain management after SHD for treatment of FAI.

Methods—A retrospective chart review was used to collect data from 121 subjects (12 to 21 years old) who received periarticular local infiltration analgesia (LIA, n=20), epidural analgesia (n=72), or intravenous patient-controlled analgesia (PCA, n=29) after SHD from January 2003 to June 2014. Verbal pain scores, opioid consumption, incidence of side effects/complications, and length of hospital stay (LOS) were recorded. All non-opioid medications with analgesic potential were included in the statistical models as potential confounding variables.

Results—Twelve hours after surgery, the odds of moderate/severe pain were higher in the PCA group [Odds Ratio: 20.5, 95% CI: 1.7 to 243.8, p = 0.0166] and epidural group [Odds Ratio: 5.2, 95% CI: 0.7 to 92.0, p = 0.3218] compared to the LIA group. There was no difference in pain scores across all groups one [p=0.0675] or 24 hours [p=0.3473] postoperatively. Total opioid consumption in the LIA group was 59.8% [95% CI: 15.0 to 81.0%, p=0.0175] lower than the total opioid consumption in the Epidural group and 60.7% [95% CI: 17.3 to 81.3, p = 0.0144] lower than the total opioid consumption in the PCA group. Hospital length of stay was increased in the epidural [Mean Difference: 22.1, 95% CI: 6.8 to 37.4 hrs, p = 0.0051] and PCA [Mean

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Conflict of Interest

The authors have no relevant financial conflicts of interest to disclose.

Difference: 16 hours, 95% CI: 1 to 31.5 hrs, $p = 0.0367$] groups relative to the LIA group. There were 0 (0%) complications in the LIA group compared to 11 (15.3%) in the epidural group.

Conclusion—Local infiltration analgesia was more effective at controlling pain 12 hours after surgery in comparison to PCA with similar pain control to epidural. LIA was associated with significantly lower need for opioids and shorter LOS compared to the PCA and epidural protocols. Periarticular infiltration should be considered for pain management after SHD for treatment of FAI in adolescents.

Level of Evidence—III-Retrospective Comparative Study

Introduction

Femoroacetabular impingement (FAI) is a well-described cause of hip pain associated with limitation of physical activities and a long-term risk of hip osteoarthritis. [1] Surgical strategies for treatment of FAI include surgical hip dislocation (SHD) approach, [2] mini-open anterior approach [3] and hip arthroscopy [4]. Although open treatment of FAI has been associated with good clinical results [5–8], the SHD approach is an invasive procedure that includes a trochanteric osteotomy and may be associated with high level of postoperative pain.

Uncontrolled postoperative pain and narcotic-related adverse side effects can lead to a slower rehabilitation process, prolonged hospital stays, and decreased patient satisfaction. [9, 10] Multimodal analgesia featuring local infiltration analgesia (LIA) has been increasingly used for pain management after various major orthopaedic surgeries including total knee arthroplasty (TKA) [11] and total hip arthroplasty (THA), [12]. LIA has been reported to allow for adequate pain control, low opioid consumption, decreased incidence of opioid-related side effects, improved postoperative immobilization, and earlier hospital discharge. [10, 13]

We recently developed a multimodal pain management protocol featuring a local intraoperative periarticular infiltration (LIA) combined with an extra-articular continuous infusion of local anesthetics for postoperative pain control after SHD. The purpose of our study was to compare our LIA protocol to epidural and intravenous patient-controlled analgesia (PCA) in regards to (1) pain relief; (2) opioid consumption; (3) incidence of side effects; and (4) length of hospital stay after SHD for the treatment of FAI in adolescents.

Materials and Methods

Patients

Following institutional review board approval, we identified 266 patients between the ages of 12 to 21 years old who underwent a SHD from January 2003 to June 2014. Since 2011, we have started using a periarticular infiltration and continuous infusion of local extra-articular ropivacaine for postoperative pain management. Of the 121 SHD cases meeting the inclusion criteria (Figure 1), 20 patients received periarticular local infiltration analgesia (LIA group), 72 patients received epidural analgesia and 29 received intravenous patient-controlled analgesia (PCA group). Age at surgery, gender, body mass index (BMI) and

history of previous surgery was retrospectively collected. Intraoperative morphine-equivalent opioid dose, surgery duration as well as length of stay in the post-anesthesia care unit were also recorded. Among patients that underwent bilateral procedures, only data from the initial surgery was included.

Indications for surgery included persistent hip and/or groin pain despite conservative treatment including activity modifications, physical therapy and non-steroidal anti-inflammatory medications. In all cases physical examination revealed a positive anterior impingement test [14]. All patients in this study had an anteroposterior pelvic radiograph and a lateral radiograph of the hips as well as a magnetic resonance imaging. Radiographic evidence of FAI-related deformities including a non-spherical femoral head-neck junction (cam-type FAI) [15] and/or pincer-type FAI [15] were present in all patients. Two surgeons, using the technique described by Ganz et al [2], performed all surgical procedures. All patients received the same rehabilitation protocol of protected weight bearing with crutches for 6 weeks.

Anesthesia Protocols

Periarticular local infiltration analgesia (LIA)—The majority of patients (80%) in the LIA group received preoperative oral pregabalin 75 mg, acetaminophen 1000 mg, celecoxib 200 mg and extended-release oxycodone 10 mg. Intraoperatively, after the hip capsule was closed and before the trochanteric osteotomy was fixed with screws, the hip capsule (posterior, superior and anterior aspects), the gluteus minimus and medius, the indirect and direct head of the rectus femoris and the tensor fascia lata were infiltrated with a solution of ropivacaine 0.2% 0.3 ml/kg (max 20 ml or 40 mg), preservative free morphine 0.1 mg/kg (max 5 mg), methylprednisolone 0.5 mg/kg (max 40 mg), and preservative free saline with epinephrine 1 mcg/ml to create a desired volume of typically 50 ml. After the greater trochanter was reduced and fixed, a 20-gauge polyamide epidural catheter with a closed tip (B. Braun Bethlehem, Pennsylvania, USA) was placed anteriorly to the hip joint in the interval between the vastus lateralis and gluteus medius with careful insertion to assure the catheter was placed outside the joint. (Figure 2) An infusion of ropivacaine 0.2% was run at 6 ml/hr, until the next morning after surgery when the catheter was removed. Patients also received oral acetaminophen (maximum 500 mg every 6 hrs); intravenous ketorolac (0.5 mg/kg every 6 hrs for a maximum dose of 30 mg every 6 hrs) and oral standard release oxycodone (5mg every 4–6 hrs) with rescue intravenous hydromorphone, typically ordered as 0.002–0.015 mg/kg/dose on an as-needed basis.

Epidural Anesthesia—Preemptive medications including acetaminophen, oxycodone SR, and pregabalin were administered orally to 12% of the patients. In addition, 4.2% of epidural patients received midazolam preoperatively, 1.4% received acetaminophen preoperatively, and 2.8% received diazepam preoperatively; in total, 21% of epidural patients received facility-administered medications prior to the start of surgery. Under general anesthesia, a lumbar epidural was placed intraoperatively and an infusion of epidural anesthetic (ropivacaine 0.075%–0.2% or bupivacaine 0.075%–0.1%) with an opioid (hydromorphone 3–5 mcg/ml or fentanyl 1–3 mcg/ml) with or without clonidine (0.5 or 1 mcg/ml) was titrated to patient comfort. Intravenous opioids (hydromorphone 0.5 mg/kg/dose) were

available as a nurse-administered bolus for breakthrough pain and titrated for patient comfort. Patients also received intravenous ketorolac (0.5 mg/kg every 6 hrs for a maximum dose of 30 mg every 6 hrs). All patients were managed by the acute pain service until successful transition to oral medications.

Intravenous Patient Controlled Analgesia (PCA)—Patients in the PCA group received general anesthesia and no regional anesthesia was performed. Preoperatively, 55.2% of the patients received acetaminophen, oxycodone SR, and pregabalin. One patient (1/29, 3.4%) received midazolam preoperatively; in total, 59% of PCA patients received medications prior to surgery. The PCA was transitioned to oral medications at the discretion of the surgeon, typically on the first postoperative day.

Outcome measures—Outcome variables included verbal pain scores, opioid consumption, incidence of complications, and hospital length of stay. Pain scores were self-reported using a 0–10 numerical rating scale (NRS) and were defined as moderate/severe (NRS ≥ 4) or mild/no pain (NRS < 4). [16] For the sake of consistency, only pain scores recorded 1 hour (while the patient was in the post anesthesia care unit), 12 and 24 hours after surgery were used in the analysis.

Opioid administration was recorded as total opioid dose consumed by the patient during the first 24 hours post-surgery. Due to potential differences in duration of hospitalization across the three groups, we elected to only consider opioids during the first 24 hours to avoid biasing the group estimates regarding total opioid consumption. All opioid doses were normalized to patient weight and were converted into an IV morphine equivalent dose [mg/kg] according to previously published conversion factors. [17] Clinical notes were reviewed for the purpose of identifying the incidence of all opioid-related side effects including nausea/vomiting and pruritus that required medication. Hospital length of stay (LOS) was calculated as the difference in hours between time of discharge and time of surgery closure. Complications related to the pain management protocols were recorded. For the purpose of this study, a complication was defined as deviations from the postoperative pain care requiring changing in management.

Statistical Analysis

Chi-square, Fisher's exact or Student's t-tests, when appropriate, were used to compare group differences in demographics and clinical characteristics. An alpha level of 0.15 was used as the cutoff for selecting the demographic and/or clinical characteristic variables that were included in the multivariable models as potential confounding variables (pre/intra-operative narcotic dose, gender, surgery time, and age). Additionally, all non-opioid medications with analgesic potential were included in the statistical models as potential confounding variables. Due to inconsistencies in the types of non-narcotics administered across the study groups, the frequency of NSAID administration and the frequency of acetaminophen administration pre-, intra-, and post-operatively was included in all models as count variables. The administration of pregabalin and benzodiazepines were also included in the statistical models as dichotomous variables. A generalized logistic regression analysis was used to compare pain scores (no pain/mild pain vs. moderate/severe pain) across the

three groups. A generalized estimating equation approach was used to account for correlation due to repeated measures. NSAID and acetaminophen count were treated as time varying covariates relative to post-operative pain. Variables representing NSAID and acetaminophen count prior to each individual time point (1, 12, and 24 hours) were included in the generalized logistic regression model. Multi-variable linear regression models were used to test the association between pain protocol and total opioid consumption in the first 24 postoperative hours and hospital length of stay, respectively. A multivariable logistic regression analysis was used to compare occurrence of opioid-related side effects (nausea and/or pruritus) across the groups. A log transformation was applied to the opioid dose variables (intra/pre and postoperative opioid consumption). All tests were 2-sided with an alpha level of 0.05.

Results

The distribution of demographics and clinical characteristics in the study groups is described in Table 1. After adjusting for potential confounding variables (see Table 2), there was no difference in the likelihood of moderate/severe pain across three groups one hour [$p=0.0675$] as well as 24 hours after surgery [$p=0.3473$]. However, 12 hours post-surgery there was a significant difference across the study groups [$p = 0.0235$]. Compared to the LIA group, the odds of moderate severe pain were higher in the epidural group [Odds Ratio: 5.2, 95% CI: 0.7 to 92.0, $p = 0.3218$] and the PCA group [Odds Ratio: 20.5, 95% CI: 1.7 to 243.8, $p = 0.0166$]. At 12 hours, there was no difference in the odds of moderate/severe pain in the PCA group compared to the Epidural group [Odds Ratio: 2.5, 95% CI: 0.8 to 7.6, $p = 0.1078$]. After controlling for potential confounding variables (see Table 3), the total opioid consumption in the LIA group was 59.8% [95% CI: 15.0 to 81.0%, $p=0.0175$] lower than the total opioid consumption in the Epidural group (Figure 4) and 60.7% [95% CI: 17.3 to 81.3, $p = 0.0144$] lower than the total opioid consumption in the PCA group. There was no difference in opioid consumption in the epidural group relative the PCA group [Mean Difference: 2.3% decrease, 95% CI: 41.9 decrease to 64.5% increase, $p = 0.9310$].

The crude incidence of nausea and/or vomiting was 65% in the PCA group, 72.2% in the epidural group and 40% in the LIA group. The crude incidence of pruritus was 41% in the PCA group, 46% in the epidural group, and 0% in the LIA group. After controlling for potential confounding variables (see Table 4), compared to the LIA group, the odds of opioid-related side effects were higher in the epidural [Odds Ratio: 3.3, 95% CI: 0.6 to 18.7, $p = 0.1766$] and PCA [Odds Ratio: 2.8, 95% CI: 0.5 to 15.8]. The odds of opioid-related side effects were higher in the epidural group relative to the PCA group [Odds Ratio: 1.2, 95% CI: 0.3 to 4.6, $p = 0.8064$].

The unadjusted average length of stay was 38 hrs [range: 21–67 hrs] in the LIA group compared to 61 hours [range: 23–99 hrs] and 72 hours [range: 25–120 hrs] in the PCA and epidural groups, respectively. After adjusting for potential confounding variables (see Table 5), hospital length of stay was increased in the epidural [Mean Difference: 22.1, 95% CI: 6.8 to 37.4 hrs, $p = 0.0051$] and PCA [Mean Difference: 16 hours, 95% CI: 1 to 31.5 hrs, $p = 0.0367$] groups relative to the LIA group. Length of stay was 6 hours higher [95% CI: –4.8 to 16.5 hours, $p = 0.2797$] in the epidural group compared to the PCA group.

There were no complications in the LIA group. After an average of 1.1 years (range 0.3–2.3 years) of follow-up, no cases of hip chondrolysis were identified. In contrast, eleven (15.3%) patients experienced epidural-related complications requiring discontinuation of the epidural infusion. In 9 patients, the epidural infusion was discontinued because of complete motor block and patient intolerance. In one patient the high thoracic dermatome level was an indication to discontinue the epidural infusion. In one patient the epidural was discontinued due to migration and dislodgement of the catheter. In addition, 4 (5.5%) patients from the epidural group required adding an intravenous-PCA (3 hydromorphone PCA, 1 morphine PCA) to optimize their pain control. No patients in periarticular group required rescue PCA analgesia.

Discussion

Surgical treatment of FAI using the SHD approach is associated with improvements in hip pain, function and physical activity level in adolescent patients. [6, 18, 19] However, SHD requires a relatively large skin incision, extensive soft tissue dissection, and a trochanteric osteotomy, which can lead to postoperative pain. In the original study by Ganz et al [2] and subsequent studies of SHD for treatment of FAI, [6–8, 15, 19–22] there were no references to any adjunct method of analgesia or postoperative pain protocol; except for the description that surgery is performed under general anesthesia. In this study, we describe a protocol for pain management using an intraoperative periarticular infiltration combined with an extra-articular continuous infusion of local anesthetics.

We found similar pain control for the three protocols at one hour and 24 hours after surgery, however, 12 hours after surgery LIA was associated with better pain management compared to PCA and similar pain control compared to epidural. This is in line with a randomized clinical trial showing that when compared to epidural analgesia, LIA provided similar pain control during the first 20 hours after THA. [12] We found that LIA was associated with significantly lower opioid consumption relative to the epidural and PCA groups. The LIA protocol involves a multimodal approach to pain management, which was reflected in the higher dose of non-narcotic medications compared to epidural and PCA groups. A multimodal analgesic approach utilizing a combination of analgesic agents to target different areas of the nervous system has been recommended whenever possible to reduce opioid-related adverse side effects that can impede the recovery and rehabilitation process [23].

In our study, patients who received LIA had lower incidence of nausea and/or vomiting and pruritus compared to patients who received epidural and PCA, however, it was not statistically significant. Opioid side effects were observed more often with epidural. A possible explanation for this finding is that the potential side effects related to opioid use are more commonly associated with the neuraxial use. [24] Our findings are in line with a previous study investigating postoperative analgesia after THA using PCA, epidural and regional blockade that demonstrated lower incidence of side effects in the regional anesthesia group compared to epidural (72%) and PCA (59%). [25]

We found that patients who received our LIA protocol were more likely to have a shorter hospital stay when compared to epidural and PCA pain management. We believe that the

shorter hospital stay represents an important advancement in clinical care for patients undergoing SHD. Historically, SHD has been associated with a relatively long hospital stay. Ganz et al [2] reported the mean length of stay after surgery was five days (3 to 9 days) while Espinosa et al [20] reported 5–7 days of hospitalization. In a retrospective study of 94 patients treated for FAI using the SHD Peters et al [21] reported that patients were hospitalized an average of 3 days (range, 2–5 days). It is possible that institutional factors may play a role in time to discharge. However, we believe that our LIA protocol allows patients to mobilize earlier and to be discharged sooner in comparison to epidural analgesia, which is often associated with motor block or weakness that can extend LOS after the infusion is discontinued. [26]

Patients in the LIA protocol group experienced no complications compared to 15% of patients in the epidural group that developed complications including extensive motor block requiring discontinuation of the epidural analgesia. We did not observe any case of infection or delayed wound healing in the LIA group. Chondrolysis after continuous intra-articular infusion of ropivacaine [27] and most commonly bupivacaine [28, 29] has been reported and it is another potential source of concern. Although we acknowledge that our study has a relatively low number of patients to address safety concerning chondrolysis, none of the 20 patients treated with our LIA protocol developed such complication. During surgery the mixture is injected into the capsule and peri-capsular muscles and the catheter for continuous infusion is placed in the interval between the vastus lateralis and the gluteus medius after capsule closure and outside of the hip joint. Careful attention to the technique, leaving the catheter outside of the joint is important to avoid articular cartilage exposure and to avoid the risk of chondrolysis.

We acknowledge several limitations of this study, most of them related to the retrospective, non-controlled study design. The three different pain control methods, LIA, epidural and PCA, were compared without blinding and there was no standardized protocol for intraoperative anesthesia in this study. The choice of inhalational agent versus intravenous and use of intraoperative dexamethasone for antiemetic prophylaxis were at the discretion of the attending anesthesiologist, which could have affected the pain scores and rates of postoperative nausea and/or vomiting. In addition, 80% of the LIA group received preemptive medications compared to 21% and 59% of patients in the epidural and PCA groups, respectively. Due to the lack of standardization in anesthesia protocols, administration of drugs was not consistent. As a result, some drugs were frequently given in one group and never administered in another group. To address the inconsistency in the non-narcotic medications administered before and after surgery, we elected to count the frequency of non steroidal anti-inflammatory and acetaminophen doses and to create indicator variables (yes vs no) for the other non-narcotic drugs with analgesic potential (benzodiazepines and pregabalin). Although we would have preferred to have included a total dose of non-narcotic medications administered, this was not possible as the analgesic equivalency of many of the non-narcotic medications administered in this study has not been established. Overall, we elected to consider all non-opioid medications with analgesic potential as confounding variables by including them in the multi-variable statistical models. However, the purpose of this study was not to determine which aspects of each protocol were most effective. We tested the protocols as a whole. In this way, conclusions should

reflect the observation that the LIA protocol was more effective than other pain control strategies. The exact components of the LIA protocol that were most effective were not clear. To address the limitations of the current study and to distinguish between efficacy and effectiveness of different aspects of each protocol, further research should focus on prospective, randomized, blinded and controlled trials.

Patients who received our LIA protocol for postoperative pain control after SHD reported similar pain scores to patients who received epidural analgesia, and better pain scores compared to PCA. This retrospective study supports multimodal pain management with a LIA protocol as a safe strategy for postoperative analgesia following SHD that allows for high quality of pain control, decreased opioid consumption, low incidence of side effects and a shorter hospital stay.

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Figure 1.

Diagram with cohort of patients undergoing surgical hip dislocation for the treatment of femoroacetabular impingement in the study period.

Figure 2.

Intraoperative photography at the time of catheter insertions shows the interval (*) between the vastus lateralis (black arrow) and the gluteus medius (white arrow) that is dissected to allow for insertion extra-articular placement of the catheter in the anterior aspect of the hip joint.

Table 1

Demographics and Clinical Characteristics

	PCAN = 29	Epidural N = 72	LIA N = 20	P value			
Demographics							
Female Gender, N (%)	21	72.4%	52	72.2%	8	40.0%	0.0196
Previous Hip Surgery, N (%)	6	20.7%	26	36.1%	4	20.0%	0.1788
Surgery Duration [hrs], mean (stdev)	2.6	±0.4	2.7	±0.6	3.7	±0.4	<0.0001
PACU Duration [hrs], mean (stdev)	1.2	±0.6	1.2	0.6	1.5	±0.5	0.1616
BMI [kg/m ²], mean (stdev)	23.8	±4.48	23.4	±5.2	22.5	±4.7	0.6816
Age at Surgery, mean (stdev)	17.4	±2.3	16.3	±2.5	16.8	±2.1	0.1098
Medications							
Benzodiazepine, N (%) [‡]	21	72.4%	46	63.9%	17	85.0%	0.1784
Pregabalin, N (%)	15	51.7%	9	12.5%	18	90.0%	<0.0001
Pre and Intra-Operative Narcotics, Median (IQR) [*]	0.3	0.2–0.4	0.3	0.2–0.5	0.4	0.4–0.6	0.0301
Acetaminophen Dose Frequency, Median (IQR) [‡]	2	0–3	3	2–4	5	4–6	0.0003
NSAID Dose Frequency, Median (IQR) [‡]	3	1–5	2	1–4	5	4–5	<0.0001

^{*} Morphine equivalents mg*kg-1

[‡] Includes Diazepam (Valium) or Midazolam

[‡] Includes intra-, pre-and post-operative doses

Table 2

Likelihood of Moderate/Severe Pain

	OR	95% CI	P value
Effect Sizes for Potential Confounding Variables			
Male vs. Female	0.4	0.2 to 0.9	0.0241
Per 1 minute Increase in Operative Time	1.2	0.7 to 2.2	0.5207
Benzodiazepine (Yes vs. No)	2.4	1.1 to 5.2	0.0287
Pregabalin (Yes vs. No)	1.0	0.4 to 2.5	0.9788
NSAID per 1 Dose Increase	1.1	1.0 to 1.2	0.0064
Acetaminophen per 1 Dose Increase	1.2	1.0 to 1.4	0.1048
Intra/Pre-Operative Narcotics per 1 mg*kg ⁻¹	1.0	0.7 to 1.4	0.9246
Age per 1 Year Increase	0.9	0.8 to 1.0	0.0461

OR = Odds Ratio

Table 3**Opioid Consumption in First 24 hours**

	Percent Difference	95% CI	P value
Effect Sizes for Potential Confounding Variables			
Male vs. Female	-56.8	-71.6 to -34.2	0.0001
Per 1 minute Increase in Operative Time	3.4	-28.4 to 49.4	0.8558
Benzodiazepine (Yes vs. No)	-6.6	-38.1 to 40.9	0.7425
Pregabalin (Yes vs. No)	40.9	-21.0 to 151.2	0.2432
NSAID per 1 Dose Increase	2.4	-8.9 to 15.1	0.6878
Acetaminophen per 1 Dose Increase	-7.0	-17.3 to 4.5	0.2192
Intra/Pre-Operative Narcotics per 1 mg*kg ⁻¹	-15.5	-35.2 to 10.1	0.2095
Age per 1 Year Increase	2.5	-5.2 to 10.9	0.5283

Table 4

Likelihood of Opioid Related Side Effects

	Odds Ratio	95% CI	P value
Effect Sizes for Potential Confounding Variables			
Male vs. Female	0.4	0.2 to 1.1	0.0726
Per 1 minute Increase in Operative Time	0.7	0.3 to 1.7	0.4488
Benzodiazepine (Yes vs. No)	1.4	0.5 to 4.0	0.5117
Pregabalin (Yes vs. No)	0.7	0.2 to 3.0	0.6167
NSAID per 1 Dose Increase	0.9	0.7 to 1.3	0.6291
Acetaminophen per 1 Dose Increase	1.0	0.7 to 1.4	0.9700
Intra/Pre-Operative Narcotics per 1 mg*kg ⁻¹	1.3	0.7 to 2.4	0.4943
Age per 1 Year Increase	1.1	0.9 to 1.4	0.3135

Table 5

Duration of Length of Stay [minutes]

	Difference	95% CI	P value
Effect Sizes for Potential Confounding Variables			
Male vs. Female	-5.0	-13.6 to 3.6	0.2550
Per 1 minute Increase in Operative Time	2.0	-5.6 to 9.5	0.6048
Benzodiazepine (Yes vs. No)	1.9	-6.5 to 10.4	0.6472
Pregabalin (Yes vs. No)	-8.4	-20.2 to 3.5	0.1639
NSAID per 1 Dose Increase	-2.0	-4.4 to 0.4	0.0965
Acetaminophen per 1 Dose Increase	-1.6	-4.0 to 0.8	0.1832
Intra/Pre-Operative Narcotics per 1 mg*kg ⁻¹	6.9	1.5 to 12.3	0.0131
Age per 1 Year Increase	1.1	-0.5 to 2.7	0.1922