

Survey of Postoperative Satisfaction and Pain Following Femoral Nerve Block and On-Q Pain
Pump Catheter in Total Knee Replacement

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Abstract

Total knee replacement patients at the Lehigh Valley Hospital Cedar Crest site were interviewed to gain insight into what type of anesthesia is most effective in managing postoperative pain. Based on a review of literature, it was hypothesized that a regional anesthetic would yield less pain and greater patient satisfaction. Aiming to determine which type of regional anesthetic was most effective, the results of this study suggest that a femoral nerve block was the best mode of anesthesia delivery for those electing to undergo total knee replacement as compared with the On-Q Pain Pump (a catheter that infuses anesthetic) and other modes of anesthesia; such as general anesthesia and a spinal nerve block. Overall, recipients of the femoral nerve block reported consistently lower subjective pain scores, greater comfort and satisfaction, and a shorter length of stay, than recipients of other modes of anesthesia; suggesting that a femoral nerve block controls postoperative pain most effectively, leading to better recovery and outcome.

Intro/Background/Purpose

Patients typically elect to undergo total knee replacement due to intense or worsening pain or severe arthritis. Many patients experience symptoms that interfere with their activities of daily living (ADL's); such as an uneven gait, pain walking up or down stairs, getting out of a car, and difficulty walking long distances, as well as decreased range of motion and weakness (Mancuso, 1996). By replacing a worn-out joint with a new, stainless steel one, the vast majority of patients are able to live more fulfilling lives with greater independence and less pain (Bourne, 2008).

Before the first incision is made, decisions concerning anesthesia for total knee replacement patients are made. Many patients are given a combination of anesthesia. Total knee

replacement patients can be given a femoral nerve block; where an anesthesiologist inserts a small catheter into the groin, blocking sensation in the majority of the leg. Some patients receive the On-Q Pain Pump, an anesthetic similar to a nerve block, where the catheter remains for approximately 24 hours and allows Ropivacaine to infuse into the nerve and continue to block pain and sensation over a longer period of time. Some patients are given a spinal nerve block to help control pain after patients leave the operating room. Spinal nerve blocks make patients numb from the umbilical region and inferiorly. In a handful of patients, the spinal block does not work, and general anesthesia must be used instead.

The purpose of this study was to evaluate the effectiveness in different methods of anesthesia in pain management following total knee replacement surgery. The study also aimed to evaluate overall satisfaction of patients who underwent total knee replacement. By gauging patient satisfaction following total joint replacement, one can gain insight into what improvements can be made in the typical hospital pathway for TKA patients.

Literature Reviews

In one study concerning TKR patient satisfaction in 2007, Baker asserts that “patients with higher scores relating to pain . . . had a lower level of satisfaction.” Another study suggests that the numbing effects of femoral nerve blocks last longer than general anesthesia (Williams-Russo, 1996). Those given general anesthesia tend to sleep into postoperative day one whereas those given a nerve block are more lucid the day after surgery, and therefore more engaged during physical therapy sessions (Allen, 1994). Based on these studies, it is suspected that regional anesthesia is more effective in pain management than general anesthesia. This study aimed to determine which type of regional anesthetic yields less pain and greater satisfaction and comfort following surgery; a femoral nerve block, or the On-Q Pain Pump.

Methods

Data collection for this study occurred over a five-week period. Fifty-two TKA patients were interviewed the day of their surgery, and every day until discharge. All results were inputted into an iPad. Patients were asked to rate their pain (weight-bearing and non-weight bearing), confidence in performing daily activities, overall satisfaction, and overall comfort on a scale from one to ten. Patients were asked to respond “yes” or “no” to “difficulty falling and staying asleep” and to report any side effects; such as headaches, nausea, vomiting, or dizziness. Then patients were asked to complete a double-blind survey in which they rated their satisfaction with their nursing care, surgeon, anesthesiologist, physical therapy staff, facilities, and miscellaneous staff on a scale from one to five. On the day of discharge, patients were asked what they would do differently, if they were to undergo another joint replacement, what advice they would give to friends undergoing a joint replacement, and how strongly they would recommend Lehigh Valley Hospital Network, (LVHN) to a family member on a scale from one to five.

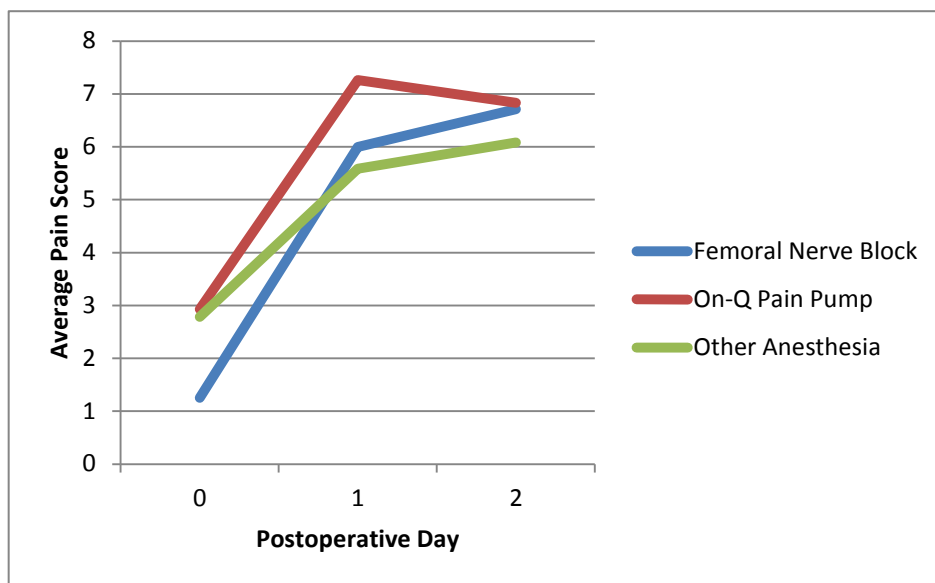
In addition to interviewing the patient, various metrics were taken from each patient’s chart, and from Centricity electronic medical records. Anesthesia mode, age, gender, degree of flexion, strength of extremity, time of arrival to 7K, time of discharge, opioid consumption, and ability to bear weight were recorded. All data was collated into an Excel spreadsheet for analysis.

Results

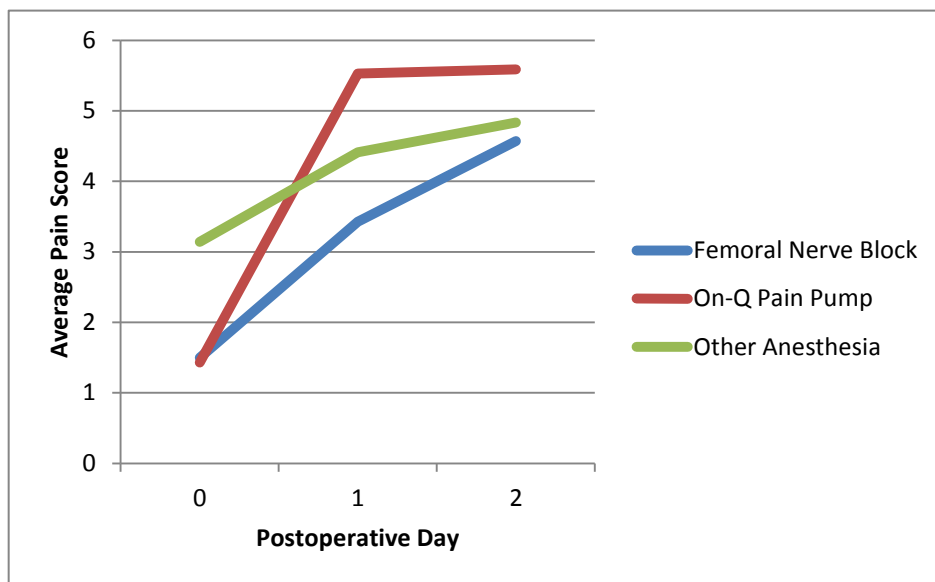
Average Pain Scores for TKA Patients According to Mode of Anesthesia

	Femoral Nerve Block		On-Q Pain Pump		Other Anesthesia	
	Weight Bearing	Non-Weight Bearing	Weight Bearing	Non-Weight Bearing	Weight Bearing	Non-Weight Bearing
Postoperative Day 0	1.250	1.500	2.929	1.429	2.786	3.143
Postoperative Day 1	6.000	3.429	7.263	5.529	5.588	4.412
Postoperative Day 2	6.714	4.571	6.833	3.667	6.083	4.833

Average Weight Bearing Pain Scores for TKA Patients According to Mode of Anesthesia



Average Non-Weight Bearing Pain Scores for TKA Patients According to Mode of Anesthesia



Percentage of TKA Patients Reporting Side Effects According to Mode of Anesthesia

	Femoral Nerve Block	On-Q Pain Pump	Other Anesthesia
Postoperative Day 0	10%	35%	29%
Postoperative Day 1	29%	47%	25%
Postoperative Day 2	43%	0%	8%

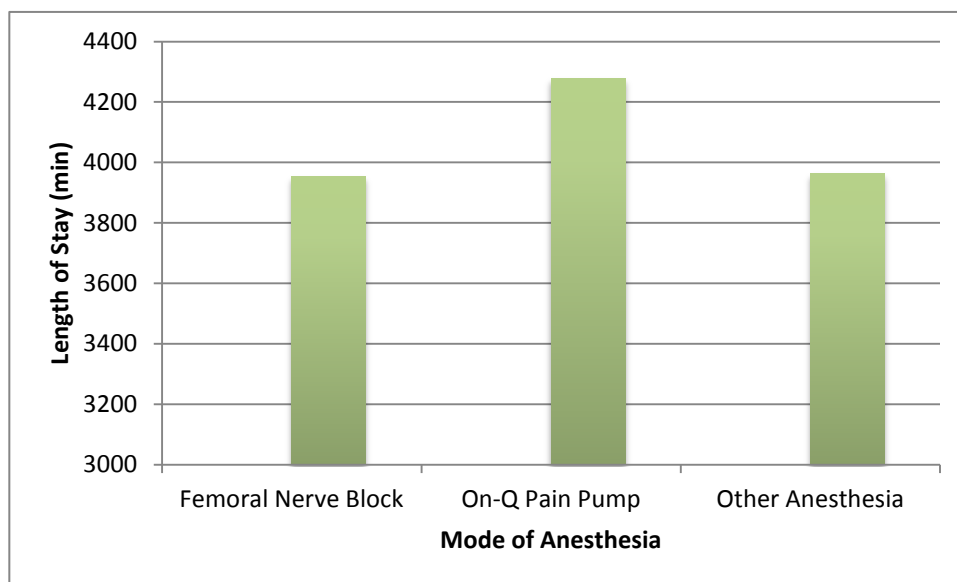
Comfort Levels for TKA Patients According to Mode of Anesthesia

	Femoral Nerve Block	On-Q Pain Pump	Other Anesthesia
Postoperative Day 0	9.222	8.688	8.188
Postoperative Day 1	8.571	8.632	7.941
Postoperative Day 2	7.429	8.333	6.500

Average Satisfaction Scores for TKA Patients According to Mode of Anesthesia

	Femoral Nerve Block	On-Q Pain Pump	Other Anesthesia
Postoperative Day 0	9.889	9.500	9.600
Postoperative Day 1	9.571	8.632	9.529
Postoperative Day 2	9.143	8.833	9.167

Average Length of Stay for TKA Patients According to Mode of Anesthesia



Conclusion/Discussion

In general, the femoral block appeared to be the most effective mode of anesthesia for managing postoperative pain. Overall, patients who received a femoral block reported the lowest levels of pain and the highest levels of comfort and satisfaction. Patients given a femoral block reported the lowest pain levels when non-weight bearing, even after the effects of the block had worn off. Patients not given a regional anesthetic reported more consistent pain throughout the three-day period, while both the nerve block and the pain pump pain scores showed a sharp increase in pain from postoperative day zero and day one. Patients on the pain pump appeared to experience the most intense pain on postoperative days one and two, but their pain on postoperative day zero appeared to be well-controlled. Those on the On-Q Pain Pump also experienced a consistently high level of comfort, whereas, those with other modes of anesthesia appeared to become less comfortable over time.

On the day that patients underwent surgery, pain seemed to be best managed on the pain pump and with the femoral nerve block; with patients reporting an average pain score of approximately 1.5. Because patients rarely have the opportunity to bear weight on postoperative day zero, non-weight bearing pain scores become most relevant. Patients reported more average pain (3.143) if they did not receive a regional anesthetic. Patients experienced the greatest comfort on postoperative day zero for all modes of anesthesia; with those receiving a femoral block reporting the greatest comfort. Femoral nerve block recipients also reported the lowest levels of side effects, which could affect comfort scores.

On postoperative day one, in general, patients reported more pain and less comfort as the anesthetic effects from their surgery wore off. On average, patients on the pain pump rated their weight-bearing pain as the highest, followed by patients with the femoral nerve block, and then

patients who received neither anesthetic. Patients on the pump also reported lower comfort levels than those with the nerve block, and those with neither the pump nor the nerve block. Patients with the On-Q Pain Pump also reported the highest number of side effects.

By postoperative day two, the pain metrics for each type of anesthesia appeared to be similar. Regardless of the type of anesthesia administered, patients reported subjective pain around the four to six range. While patients on the On-Q Pain Pump averaged the highest amount of pain on postoperative day one, pain pump recipients averaged the lowest non-weight bearing pain on postoperative day two, suggesting that patients may have more pain initially and less pain during long-term recovery. Of the recipients of the femoral nerve block, 43% reported side effects, such as headache, nausea, vomiting, and dizziness; while the rates for other modes of anesthesia were much lower, at 0% and 8%.

The data suggests that a regional anesthetic is more effective in managing postoperative pain than general anesthetic or a spinal nerve block; as patients experienced less pain, greater comfort, and greater satisfaction. Those given a nerve block and those on the pain pump experienced the lowest levels of pain on the day they had surgery, and by postoperative day two the average pain scores for each method of anesthesia were about the same. While the average pain scores seem to fall around the same value by postoperative day two, the femoral nerve block appears to control pain most effectively from postoperative days zero and one. Altogether, one can conclude that the femoral nerve block is most effective in reducing pain over a short recovery period, but are inconclusive regarding any long-term effects of the anesthesia.

Regardless of the type of anesthesia that patients received, the overwhelming majority of patients were extremely satisfied with their care, and almost all patients stated that they would highly recommend LVHN to a friend or loved-one. This suggests that, even though some

patients may experience more painful recovery, ultimately the majority of patients are pleased with the outcome of their surgery.

Patients on the On-Q Pain Pump averaged approximately a five hour longer stay in the hospital than the other two modes of anesthesia. However, further examination into this finding could screen out such discrepancies as pre-existing health conditions, fitness level before surgery, physiological issues, and overall pain tolerance as variables for increased time in the hospital.

As with any study, there were inherent weaknesses that affected the results. The largest obstacle to more scientific results was that although all patient data was collected postoperatively, data for some patients was inconsistently collected on postoperative days 1-3, yielding incomplete data availability for patients who underwent surgery on later days of the week. In response, data was analyzed for all patients according to postoperative day, rather than being able to analyze data on the whole group of patients over the entire duration of their hospital stay. A secondary, yet significant, error was non-response. Some patients refused to participate in the survey or in the interview; or did not understand the survey items. In addition, the survey administration times were sometimes inconsistent; as patients were seen in the evening of postoperative day zero, and again in the morning of each subsequent day, preventing a full 24-period between data collection times. Also, antithetical to expectations, on postoperative day zero, two-out-of-three weight bearing pain scores were actually lower than non-weight bearing pain scores, without reasonable explanation.

If the study were to be repeated, it would be useful to obtain a larger and more complete sample size to lessen the effects of outliers; as some subjects experienced complications unrelated to their joint replacement or to the anesthesia that they received. And although it was

not formally recorded as a metric in the study, it was suspected that those with a higher body mass index (BMI) experienced more pain and difficulty in recovery. It may be interesting to explore the correlation between patient BMI and pain, comfort, and satisfaction in future studies.

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