Published in final edited form as:

Am J Surg. 2009 November ; 198(5): 720–725. doi:10.1016/j.amjsurg.2008.11.043.

Prospective randomized trial of paravertebral block for patients undergoing breast cancer surgery

Judy C. Boughey, MD¹, Farzin Goravanchi, DO², Ronald N. Parris, MD², Spencer S. Kee, MD², Alicia M. Kowalski, MD², John C. Frenzel, MD², Isabelle Bedrosian, MD¹, Funda Meric-Bernstam, MD¹, Kelly K. Hunt, MD¹, Frederick C. Ames, MD¹, Henry M. Kuerer, MD PhD¹, and Anthony Lucci, MD¹

¹Department of Surgery, The University of Texas M. D. Anderson Cancer Center, 1515 Holcombe Blvd, Houston, Texas 77030

²Department of Anesthesia, The University of Texas M. D. Anderson Cancer Center, 1515 Holcombe Blvd, Houston, Texas 77030

Abstract

Background—The goal of this study was to evaluate the effect of regional anesthesia using paravertebral block (PVB) on postoperative pain after breast surgery.

Methods—Patients undergoing unilateral breast surgery without reconstruction were randomized to general anesthesia (GA) only or PVB with GA and pain scores assessed.

Results—Eighty patients were randomized (41 to GA and 39 to PVB with GA). Operative times were not significantly different between groups. Pain scores were lower after PVB compared to GA at 1 hour (1 versus 3, $p=0.006$) and 3 hours (0 versus 2, $p=0.001$), but not at later time points. The overall worst pain experienced was lower with PVB (3 versus 5, $p=0.02$). More patients were pain free in the PVB group at 1 hour (44% versus 17%, $p=0.014$) and 3 hours (54% versus 17%, $p=0.005$) postoperatively.

Conclusions—Paravertebral block significantly decreases postoperative pain up to 3 hours after breast cancer surgery.

Summary—This paper reports on the findings from a prospective randomized trial of paravertebral block (PVB) for breast surgery. Paravertebral block significantly decreased postoperative pain up to 3 hours after breast cancer surgery.

Keywords

Breast surgery; Paravertebral block; Regional anesthesia; Post-operative pain; Pain control; Length of stay

Corresponding Author Anthony Lucci MD, Department of Surgery, The University of Texas M. D. Anderson Cancer Center, 1515 Holcombe Blvd, Unit 444, Houston, Texas 77030, Phone: 713-563-1870, Fax: 713-745-1462, alucci@mdanderson.org.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Background

It is estimated by the American Cancer Society that 182,460 women will be diagnosed with breast cancer in the United States in 2008.¹ The majority of these patients will require both primary breast surgery and axillary staging or dissection. Traditionally, this surgery is performed under general anesthesia due to the extent of dissection and the length of the procedure. Postoperative nausea and vomiting are well described in association with breast surgery and are thought to be primarily due to the general anesthetic more than inherent to the surgical procedure.^{2,3} Risk factors for nausea and vomiting after general anesthesia include female sex, non-smoker and history of motion sickness or postoperative nausea and vomiting, as well as elective surgery and longer duration of anesthetic.⁴ Alternatives to general anesthesia in breast surgery have been sought to reduce the untoward effects of this anesthetic approach. Regional anesthesia in the form of paravertebral block (PVB) has been utilized by some investigators as an alternative to general anesthesia.

In an era where a need to reduce medical costs and patient preference have led to increasing numbers of outpatient surgical procedures, regional anesthesia is being increasingly utilized. The proposed advantages of regional anesthesia include decreased neuroendocrine “stress” response, improved postoperative pain control, improved postoperative pulmonary function and decreased thrombotic complications.⁵ It also reduces medical costs by decreasing the need for postoperative narcotics, antiemetics and hospitalizations.⁶

We have previously reported our institutional experience with the use of PVB in breast surgery.⁷ However, because the initial experience with PVB was assessed through a retrospective review, our clinicians felt that it was important to subject this anesthetic technique to a prospective randomized trial design. The objectives of this study were to evaluate the effectiveness of PVB compared with GA alone with respect to immediate postoperative pain, length of hospital stay, and nausea and vomiting in patients undergoing breast cancer surgery.

Methods

Study population

Institutional Review Board approval was obtained for this prospective randomized trial. Women over the age of 18 undergoing breast surgery at the Ambulatory Care Building (ACB) of The University of Texas M. D. Anderson Cancer Center were eligible for participation. Patients were excluded from participation if they were undergoing bilateral breast surgery or immediate breast reconstruction, were on anticoagulant therapy, chronic antiemetics, or chronic pain medication, had a BMI <20 or >40, were pregnant, had chronic pain syndromes and musculoskeletal disorders or had hypersensitivity to local anesthetic agents.

After obtaining informed consent, patients were randomized to one of two groups. In group I (study group), patients received a PVB prior to surgery and received general anesthesia at the time of surgery. In group II (control group), patients received general anesthesia alone at

the time of surgery without a PVB. The patient, surgeon and anesthesiologist were not blinded to the results of the randomization.

PVB technique

All patients received a PVB by one of four anesthesiologists (F.G, R.P., S.K., A.K). PVBs were performed in a dedicated preoperative area with continuous monitoring. Patients were sedated with intravenous midazolam, fentanyl, promethazine and propofol as needed for PVB placement. The patient was supported in a sitting position by an assistant. The PVB technique used was a unilateral multilevel injection technique of 1% and 0.5% ropivacaine with 1:400,000 epinephrine into the ipsilateral paravertebral space at six levels from T1 through T6. The spines of the target vertebral bodies (T1–T6) were identified and marked and topical antiseptic applied. Under sterile conditions, a 22 gauge Tuohy needle was inserted 2.5cm from the midline. The needle was advanced in the parasagittal plane until the transverse process of the vertebral body was contacted. The needle was redirected off the inferior border of the transverse process and advanced into the paravertebral space. The paravertebral space was confirmed by loss of resistance to local anesthetic solution. Each corresponding spinal nerve received 3-6mls of 0.5–1.0% ropivacaine with 1:400 000 epinephrine. The 1% ropivacaine solution was used for T1–T4 spinal nerves and the 0.5% solution was used for the remainder of the block. The maximum dose of ropivacaine was 5 mg/kg, not to exceed 350 mg per patient. After completion of the block, the patient was repositioned supine with the back of the bed elevated at 20 degrees. The effect of the block was tested by sensitivity to ice water in appropriate dermatomes. Patients with unsuccessful blocks were not excluded from this study; patients were analyzed on an intention to treat basis.

Anesthetic technique

General anesthesia for all patients was standardized and opioid supplement was titrated to normal cardiovascular parameters. Intraoperatively heart rate, blood pressure and oxygen saturations were monitored. All patients received medications for prophylaxis against postoperative nausea and vomiting that consisted of promethazine, dexamethasone and ondansetron. Patients were not allowed to receive scopolamine, ketamine, toradol, celecoxib or local anesthesia field blocks.

Post-operative monitoring

Pain and nausea scores were evaluated on an analog scale and episodes of emesis were recorded at 0, 1, 3 and 6 hours postoperatively and again on the morning following surgery (18 – 24 hours after surgery) and 1 week after surgery. Pain and nausea were assessed using the numeric rating scale (NRS). Pain was treated with increments of intravenous fentanyl and Dilaudid dependent on the level of pain. Time to discharge from the hospital and the amounts of pain medication received were recorded. All patients received the same discharge prescriptions (Lortab 5/500 30 tablets, take 1–2 tablets every 6 hours as needed for pain, with Darvocet allowed for patients allergic to Lortab).

Statistics

The study was designed to provide 80% power to detect an increase in the proportion of patients that were pain free immediately following surgery from an estimated 30% in patients who receive general anesthesia (GA) alone to 60% in patients who receive PVB and GA. A planned interim analysis was performed after accrual of 20 patients with no significant difference in immediate post-operative pain scores seen between the two groups at that time.

Associations between demographic factors with treatment assignment were assessed using the Fisher's exact test. Comparisons of continuous variables across treatment groups were carried out using the Wilcoxon rank sum test. All tests were two-sided with p-values of 0.05 or less considered statistically significant. Statistical analysis was carried out using SAS version 9 (SAS Institute, Cary, NC).

Results

Eighty patients were enrolled in the study with 41 patients randomized to Group 1 (control group) and 39 patients randomized to Group 2 (study group). Patients had a mean age of 55.5 (range 33–82). All patients were female and mean BMI was 28.7 (range 21.3–38.3). Demographic data for the patient groups is shown in Table 1. The groups were not different with respect to patient age, height, weight or BMI ($p>0.05$). Surgical procedures included in the study included segmental mastectomy with nodal surgery {sentinel lymph node surgery or axillary lymph node dissection (ALND)}, mastectomy with or without any nodal surgery and ALND alone. The mean length of time taken for PVB was 9.8 minutes (range 3–59 minutes). The PVB took longer than 15 minutes in only 6 cases.

Table 2 shows the mean pain scores at the various time points after surgery in the two study groups. The pain score immediately after surgery was not significantly different between the groups. Pain scores at 1 hour and at 3 hours after surgery were statistically significantly lower in the patients receiving PVB (mean pain score of 1.7 compared to 3.0, $p=0.006$ at 1 hour and 1.0 compared to 2.0, $p=0.001$ at 3 hours). Pain scores at 6 hours after surgery were not significantly different between the groups, however the worst pain experienced over the first 6 hours postoperatively was significantly lower in the PVB group (3.0) compared to the control group (4.5, $p=0.02$). Pain scores at 24 hours after surgery were significantly lower (1.0) in the general anesthesia alone group compared to the PVB group (1.9, $p=0.007$).

The percentage of patients who reported they were pain free (pain score of 0) at 1hr or 3 hrs postoperatively and during the PACU stay was statistically significantly higher in the PVB arm (Table 3). Seventeen (44%) of the PVB group were pain free at 1 hour and twenty one (54%) were pain free at 3 hours, compared to only seven (17%) of the GA patients reporting to be pain free at the same time intervals ($p=0.01$ at 1 hour; $p=0.0005$ at 3 hours). The proportion of patients who were pain free for their stay in the hospital prior to discharge home was also significantly higher in the PVB patients (13 patients (33%) compared to 5 patients (12%) for the GA alone group, $p=0.03$).

At the assessment 6 hours after surgery, the difference between the 2 groups was no longer evident with the proportion of patients reporting no pain being similar between the two groups (19 patients in each group, $p=1$). The percentage of patients reporting that they were pain free at ~24 hrs postoperatively was significantly higher in the GA alone arm (23% (9 patients) in the PVB group compared to 54% (22 patients) in the GA alone group, $p=0.01$). By one week after surgery there was no significant difference in the pain scores between the two groups. Overall nausea scores in both groups were low and there were no differences with respect to nausea scores or number of episodes of vomiting reported between the two groups at any time point postoperatively (data not shown).

Table 4 lists the operative times and length of hospital stay for both groups. The length of surgery was not different between the two groups. The length of hospital stay was also similar between the two groups with a mean stay of 9 hours in each group ($p=0.80$). The proportion of patients who were admitted to the hospital overnight was similar between both groups with 41% of both groups requiring overnight admission and 59% being discharged on the day of surgery ($p=NS$).

Analysis of the postoperative pain medication received both intravenously and orally in the PACU as well as the amount of oral pain medication taken after discharge from the hospital was compared between the groups. There was no significant difference in the amount of either intravenous or oral pain medication required between the two groups of patients (data not shown).

Seventeen patients reported side effects from the anesthetic regimens (9 in the PVB group and 8 in the GA group). These adverse events were all grade 1 and the majority were expected events in the routine postoperative setting likely due to prescription pain medications and use of general anesthesia (constipation, itching, nausea, somnolence, sleeplessness, and tape reactions at the surgical site). All events resolved within one week of surgery. Two patients in the PVB group complained of mild discomfort at the PVB injection sites. No patients suffered a pneumothorax. One patient in the GA group did report shortness of breath in the postoperative follow-up period. There were no serious complications, including pneumothorax, hematoma, or emergent reoperation, reported in either group.

Discussion

The results of this prospective randomized trial show that the use of paravertebral block (PVB) in patients undergoing surgery for breast cancer improves pain scores over the first 1 to 3 hours after surgery. At time points 6 hours and beyond, there was no statistically significant improvement in pain scores with PVB versus GA alone. The findings from this trial are similar to those of previously published studies. The length of improved analgesia with PVB appears to be limited to the immediate postoperative period, similar to the findings reported by Moller et al ⁸ who showed that the length of analgesia with PVB was limited to the PACU setting.

The current study did not show a difference in the nausea scores or the rate of postoperative vomiting between the two groups. This may be due to a low rate of nausea and vomiting in

our patients undergoing surgery at the ambulatory care unit due to the routine use of a prophylactic regimen including ondansetron, pepcid and metoclopramide (unpublished data). The length of hospital stay was similar between the two groups in this study. This is in contrast to other studies which have indicated that use of PVB may be able to decrease length of hospital stay. This may be related to the small sample size in our patient population and the fact that most patients undergoing mastectomy or axillary dissection at our institution are usually kept for a 23 hr observation period prior to discharge. We previously reported on a retrospective analysis of patients undergoing PVB for breast cancer surgery and showed a decrease in the proportion of patients requiring overnight admission after these same breast procedures.⁷ Since the current trial was conducted at our ambulatory care unit where outpatient surgery includes 23 hr observation, patient expectations and therefore patient length of stay may be different in an inpatient practice setting. The clinical setting at our ambulatory care unit is designed to facilitate early discharge and patients anticipated to require prolonged hospital admission undergo surgery in the inpatient hospital unit and therefore were not eligible for this study. The economics vary by institution and payor mix, however the cost of the PVB supplies (medication, syringes, tubing, needle, gloves, 4x4) is only \$49 and the total Medicare charge for a PVB is around \$109.63.

In the current trial we noted that pain scores at 24 hours postoperatively were higher in the PVB group compared to the GA alone group. This most likely reflects the PVB analgesia dissipating and patients may not have been using oral or intravenous pain medications in the early timeframe postoperatively. Different local anesthetic agents have been used for regional anesthesia including bupivacaine, ropivacaine and levobupivacaine with or without epinephrine. Ropivacaine was utilized in the current trial due to a more rapid onset, longer duration of analgesia and larger initial spread.⁹ Some clinical studies have also shown that adding clonidine to local anesthetic agents in regional blocks can prolong the duration and quality of anesthesia and analgesia.¹⁰ Additional studies evaluating the combination of ropivacaine with clonidine are warranted to determine whether this can increase the length of the analgesia associated with the PVB.

The degree of analgesic benefit from PVB may be related to the extent of surgery and the overall length of the procedure. Therefore one of the limitations of this study was the inclusion of patients undergoing segmental mastectomy with SLN surgery. If the study had been limited to patients with more extensive surgery, such as modified radical mastectomy or breast conservation with axillary dissection, the difference between the two groups and length of analgesia may have been greater. Defining the patients that are likely to receive the most benefit from PVB is important prior to incorporating the use of PVB into the routine operative management of patients undergoing breast cancer surgery. The benefit of PVB in patients undergoing breast conserving surgery and SLN surgery alone may not be as significant as could be expected for patients undergoing more extensive surgical procedures. The benefits of PVB may be even greater for patients undergoing mastectomy with immediate breast reconstruction.

Further subgroup analysis was performed comparing the benefit of PVB in the patients undergoing segmental mastectomy and SLN and the benefit of PVB in the patients undergoing more extensive surgery (ALND, MRM, mastectomy and SLN, mastectomy,

segmental mastectomy and ALND). PVB showed significant decrease in pain scores at 1 and 3 hours post operatively in the patients undergoing segmental mastectomy and SLN surgery, however there was no significant difference in pain scores at any time period in the patients undergoing more extensive surgery (data not shown). This study was not powered to detect a difference in a small subgroup of only 34 patients.

There are a total of 5 prospective trials reporting on the use of PVB in breast surgery.^{8,11–14} These studies have reported decreased rates postoperative emesis, lower pain scores and lower requirements for postoperative analgesics,¹¹ with the effect on reduced pain being noted for up to 24 hrs.¹² However, a more recent report suggested that the analgesic effect of the PVB only lasts for the PACU stay and not as long as the prior studies had reported.⁸ Our trial demonstrates that the predominant effect of the PVB is in the immediate postoperative setting, mainly the first 3 hours postoperatively, and does not appear to extend to the morning after surgery.

The side effects and complications associated with PVB on this trial as well as in many previous reports are few and overall this appears to be an acceptable alternative to general anesthesia.¹⁵ In the current study, a multilevel technique was used, which provides a more reliable sensory block.¹⁶ There are several approaches to PVB, with both single level and multiple level injections reporting good analgesia.

The use of regional anesthesia in the form of a multilevel PVB with ropivacaine can improve pain control for the first 3 hours after breast cancer surgery and this may improve the postoperative experience for patient's undergoing these procedures. Overall findings from this prospective randomized trial, however, do not support the routine use of PVB for breast cancer surgery, and further work is required to delineate which surgical breast procedures should incorporate the use of PVB in order to achieve the greatest benefit.

Acknowledgments

The authors wish to thank Austin Wei for assistance with statistical analysis and Mary Alice Hassett for patient accrual.

References

1. Jemal A, Siegel R, Ward E, et al. Cancer statistics 2008. *CA Cancer J Clin.* 2008; 58:71–96. [PubMed: 18287387]
2. Jaffe SM, Campbell P, Bellman M, et al. Postoperative nausea and vomiting in women following breast surgery: an audit. *Eur J Anaesthesiol.* 2000; 17:261–4. [PubMed: 10866010]
3. Sinclair DR, Chung F, Mezei G. Can postoperative nausea and vomiting be predicted? *Anesthesiology.* 1999; 91:109–18. [PubMed: 10422935]
4. Cohen MM, Duncan PG, DeBoer DP, et al. The postoperative interview: assessing risk factors for nausea and vomiting. *Anesth Analg.* 1994; 78:7–16. [PubMed: 8267183]
5. Karanikolas M, Swarn RA. Current trends in perioperative pain management. *Anesthesiol Clin North America.* 2000; 18:575–99. [PubMed: 10989710]
6. Weltz CR, Greengrass RA, Lyerly HK. Ambulatory surgical management of breast carcinoma using paravertebral block. *Ann Surg.* 1995; 222:19–26. [PubMed: 7618963]
7. Boughey JC, Goravanchi F, Papiris RN, et al. Improved post-operative pain control using thoracic paravertebral block for breast operations. *Breast J.* (in press).

8. Moller JF, Nikolajsen L, Rodt SA, et al. Thoracic paravertebral block for breast cancer surgery: a randomized double-blind study. *Anesth Analg*. 2007; 105:1848–51. [PubMed: 18042892]
9. Hura G, Knapik P, Misiolek H, et al. Sensory blockade after thoracic paravertebral injection of ropivacaine or bupivacaine. *Eur J Anaesthesiol*. 2006; 23:658–64. [PubMed: 16805930]
10. Singelyn FJ, Dangoisse M, Bartholomee S, et al. Adding clonidine to mepivacaine prolongs the duration of anesthesia and analgesia after axillary brachial plexus block. *Reg Anesth*. 1992; 17:148–50. [PubMed: 1606097]
11. Pusch F, Freitag H, Weinstabl C, et al. Single-injection paravertebral block compared to general anaesthesia in breast surgery. *Acta Anaesthesiol Scand*. 1999; 43:770–4. [PubMed: 10456819]
12. Klein SM, Bergh A, Steele SM, et al. Thoracic paravertebral block for breast surgery. *Anesth Analg*. 2000; 90:1402–5. [PubMed: 10825328]
13. Terheggen MA, Wille F, Borel Rinkes IH, et al. Paravertebral blockade for minor breast surgery. *Anesth Analg*. 2002; 94:355–9. [PubMed: 11812698]
14. Kairaluoma PM, Bachmann MS, Korpinen AK, et al. Single-injection paravertebral block before general anesthesia enhances analgesia after breast cancer surgery with and without associated lymph node biopsy. *Anesth Analg*. 2004; 99:1837–43. [PubMed: 15562083]
15. Lonnqvist PA, MacKenzie J, Soni AK, et al. Paravertebral blockade. Failure rate and complications. *Anaesthesia*. 1995; 50:813–5. [PubMed: 7573876]
16. Naja ZM, El-Rajab M, Al-Tannir MA, et al. Thoracic paravertebral block: influence of the number of injections. *Reg Anesth Pain Med*. 2006; 31:196–201. [PubMed: 16701182]

Table 1

Demographics of the study population and the two study groups

Variable	All Patients (n=80)	GA alone (n=41)	PVB plus GA Group (n=39)	P Value
	n (%)	n (%)	n (%)	
Age (years)	55.5	57.9	53.0	0.09
Weight (lb)	77.9	74.9	81.0	0.14
Height (cm)	164.1	162.5	165.7	0.09
BMI	28.7	28.1	29.3	0.38
<u>Race</u>				0.78
African American	11 (13.8)	5 (12.2)	6 (15.4)	
Asian	1 (1.3)	1 (2.4)	0 (0)	
Caucasian	55 (68.8)	27 (68.9)	28 (71.8)	
Hispanic	13 (16.3)	8 (19.5)	5 (12.8)	
<u>Diagnosis</u>				0.76
DCIS	2 (2.5)	1 (2.4)	1 (2.6)	
IDC	59 (73.8)	29 (70.7)	30 (76.9)	
ILC	6 (7.5)	3 (7.3)	3 (7.7)	
IMC	12 (15.0)	8 (19.5)	4 (10.3)	
Angiosarcoma	1 (1.3)	0 (0)	1 (2.6)	
<u>Side of Surgery</u>				0.66
Left	39 (48.8)	21 (51.2)	18 (46.2)	
Right	41 (51.3)	20 (48.8)	21 (53.9)	
<u>Breast Procedure</u>				0.73
None	2 (2.5)	1 (2.4)	1 (2.6)	
Segmental Mastectomy	55 (68.8)	30 (73.2)	25 (64.1)	
Mastectomy	23 (28.8)	10 (24.4)	13 (33.3)	
<u>Axillary Procedure</u>				0.35
ALND	26 (32.5)	15 (36.6)	11 (28.2)	
SLNBx	52 (65.0)	26 (63.4)	26 (66.7)	
None	2 (2.5)	0 (0)	2 (5.1)	
<u>Overall Procedure</u>				0.66
ALND only	2 (2.5)	1 (2.4)	1 (2.6)	
MRM	15 (18.8)	8 (19.5)	7 (18.0)	
Mastectomy & SLNBx	6 (7.5)	2 (4.9)	4 (10.3)	
Mastectomy only	2 (2.5)	0 (0)	2 (5.1)	
Segmental mastectomy & ALND	9 (11.3)	6 (14.6)	3 (7.7)	
Segmental mastectomy & SLNBx	46 (57.5)	24 (58.5)	22 (56.4)	

Table 2

Pain scores in the postoperative period for patients in both study groups

Time after surgery	GA alone (n=41)	PVB plus GA (n=39)	P value
Immediately after surgery	1.90	0.92	0.13
1 hour	3.00	1.69	0.006
3 hours	1.95	0.97	0.001
6 hours	1.33	1.15	0.90
24 hours	1.02	1.89	0.007
1 week	1.14	1.28	0.42
Worst pain score over first 6 hours	4.49	3.05	0.02
Worst pain over 24 hours	4.24	3.76	0.23
Worst pain score over first week	1.65	2.46	0.10

Table 3

Proportion of patients reporting they were pain free (pain score of 0) at time points after surgery by treatment group

	Treatment Group			P-Value
	All Patients	GA alone	PVB plus GA	
	n (%)	n (%)	n (%)	
Pain Free on arrival to PACU				0.21
Yes	58 (72.5)	27 (65.9)	31 (79.5)	
No	22 (27.5)	14 (34.2)	8 (20.5)	
Pain Free at 1 hr				0.014
Yes	24 (30.0)	7 (17.1)	17 (43.6)	
No	56 (70.0)	34 (82.9)	22 (56.4)	
Pain Free at 3 hrs				0.0005
Yes	28 (35.0)	7 (17.1)	21 (53.9)	
No	51 (63.8)	34 (82.9)	17 (43.6)	
Unknown	1 (1.3)	0 (0)	1 (2.6)	
Pain Free at 6 hrs				1.0
Yes	38 (47.5)	19 (46.3)	19 (48.7)	
No	41 (51.3)	21 (51.2)	20 (51.3)	
Unknown	1 (1.3)	1 (2.4)	0 (0)	
Pain Free during Hospital Stay				0.032
Yes	18 (22.5)	5 (12.2)	13 (33.3)	
No	62 (77.5)	36 (87.8)	26 (66.7)	
Pain Free at 24 hrs				0.011
Yes	31 (38.8)	22 (53.7)	9 (23.1)	
No	47 (58.8)	19 (46.3)	28 (71.8)	
Unknown	2 (2.5)	0 (0)	2 (5.1)	0.12
Pain Free at 1 week				
Yes	38 (47.5)	23 (56.1)	15 (38.5)	
No	42 (52.5)	18 (43.9)	24 (61.5)	

Table 4

Length of surgery and length of hospital stay for patients by treatment group

		Treatment Group		
	All Patients	GA alone	PVB plus GA	P-Value
Mean length of surgery (hours and min)	1:59	1:49	2:10	0.08
Mean Length of hospital stay (hours)	9 (1–23)	9 (1–23)	9 (2–23)	0.80
Overnight Stay				1.0
No	47 (58.75)	24 (58.54)	23 (58.97)	
Yes	33 (41.25)	17 (41.46)	16 (41.03)	