

Survey of Surgeons Attitude to Local Anesthetics for Postoperative Pain Relief

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Abstract

Background:

There is no ideal postoperative pain management. Simple surgeon-delivered local anesthetic (LA) techniques such as wound infiltration and regional nerve blocks can play a significant role in the improvement of postoperative pain relief.

Settings and Design:

Administered paper questionnaires to delegates attending surgical society conferences.

Methods:

A 15-point questionnaire was administered to surgical delegates attending general surgery, orthopedic and gynecological conferences at different locations.

Results:

Response rate was 65.26%. 33% of surgeons used LA regularly, 31% occasionally, and 36% never used LA for postoperative analgesia. 50% of all surgeons used lignocaine for local anesthesia ($P < 0.0001$) and infiltration (65% of all surgeons) was the most common method ($P < 0.0001$). Only 30% surgeons knew the correct duration of action of bupivacaine infiltration ($P < 0.0001$) and only 4% surgeons knew that LAs are antimicrobial ($P < 0.0001$). 53% of orthopedic surgeons used combination of lignocaine and bupivacaine, while 46% of general and 73% gynecologists surgeons used lignocaine more commonly. Only <5% of all surgeons had used long-acting liposomal bupivacaine and almost 40% more were willing to use the liposomal LA drug only if more evidence is available.

Conclusions:

Although majority of surgeons were aware of the benefits of LA use for postoperative pain relief, reluctance, lack of knowledge of LA drugs and methods of LA use and fear of infection and wound healing are barriers for effective use of LA drugs for postoperative pain relief. Attending anesthesiologists must develop methods in the operating room to create awareness about the effectiveness of LA use for postoperative pain relief. Single-use vials or ampules of LA must be encouraged to LA use for postoperative analgesia, especially in the third-world countries.

Keywords: Local anesthesia, pain relief, postoperative

INTRODUCTION

There is no ideal protocol for postoperative pain management. Simple surgeon-delivered local anesthetic (LA) techniques such as wound infiltration and regional nerve blocks can play a significant role in the improvement of postoperative pain relief. Epidural analgesia is no longer considered the “gold standard.” Infiltrative techniques with or without catheters are useful for almost all types of surgery.[1] Although LAs are excellent methods of immediate postoperative pain relief due to concerns of surgical site infection (SSI), wound healing, reluctance of surgeons, lack of knowledge about its effectiveness limits the use of local anesthesia for postoperative pain relief.

We conducted a questionnaire-based observational study of surgeons attitude toward LA use for post operative pain relief. The paper questionnaire was administered to surgical delegates attending two general surgery conferences, one obstetric and one orthopedic conference at different locations. Questions were asked on drugs used for local infiltration, methods of infiltration, surgeons knowledge of

duration of action of LAs, whether LAs cause infection use of long-acting LAs and surgeons attitude toward whether LA infiltration reduces postoperative analgesic requirements.

METHODS

The Institutional Ethical Committee approval was obtained for the survey. A 15-point questionnaire [Appendix 1] was designed covering the usual areas of general surgical, obstetric, and orthopedic practice. These paper questionnaires were administered to surgical delegates attending two general surgery conferences, one obstetric and one orthopedic conference (either state or interstate level) at different cities in South India. The questionnaire used is shown in Appendix 1. Respondents were instructed to indicate the most common scenario in their practice for each question. Multiple responses for the same question were considered invalid and unfilled as nonresponses. Statistical analysis was done using STATA version 12.0 (Stata Corp LP, Texas, USA). Individual question analysis was performed with Chi-square goodness of fit with CSGOF download in STATA. Question and grade comparisons were performed with the Chi-square test and Fisher's exact test where appropriate. Results were reported as percentages and confidence interval for proportions with $P < 0.05$ as statistically significant.

RESULTS

A total of 571 questionnaires were returned out of distributed 875 giving a response rate of 65.26%. Multiple responses for the same question were considered invalid and unattempted as nonresponses.

Distribution of categories of respondents

Figure 1 shows the distribution of three categories of surgeons. Hospital consultants comprised 38% surgical residents 36% and independent surgeons not employed by other comprised 24%.



All surgeons opinion on the use of LA for post operative pain relief

Table 1 lists the characteristics of combined responses of all categories of surgeons. Thirty-one percent of surgeons used LA regularly, 31% occasionally, and 35% never used LA for postoperative analgesia. 50% of all surgeons used lignocaine for LA ($P < 0.0001$), 19% used bupivacaine and 28% combination of lignocaine and bupivacaine, and only 2% other drugs. 65% used infiltration method only ($P < 0.0001$ vs. other methods), <2% used LA catheters, and < 3.6% used preincisional LA. For laparoscopic surgeries, 24% used peritrocal LA, 4.5% used intraperitoneal, and 9.8% used combination ($P < 0.0001$). 50% responders opined that there is no need to use LA for pain relief when regional anesthesia is used as technique of anesthesia. There was statistically significant difference in responders opinion for duration of action of bupivacaine infiltration (48% 2–4 h, 16% 2–4 h, and 30% 4–8 h, $P = 0.0001$). 68% surgeons opined that time to first analgesic dose and 64% responders said total analgesic dose in the 1st postoperative day is significantly prolonged ($P < 0.0001$). 23% of all surgeons opined that LA use increases SSI. 60% surgeons were of the view that LA infiltration will not any effect on the incidence of SSI ($P < 0.0001$). 53% surgeons opined that LA drugs have no effect on microbes, 7% responders said LA drugs support microbial growth. 4% surgeons said that local anesthesia drugs *per se* are antimicrobial ($P < 0.0001$). 43% opined multiuse vials are the cause of SSI ($P < 0.0001$). Less than 5% responders used long-acting liposomal bupivacaine, 53% were willing to use liposomal bupivacaine if available, and 41% would use liposomal bupivacaine only after further research evidence on risks and benefits. Overall, 70% surgeons opined that LA infiltration is useful without risk of infection ($P < 0.0001$), but 23% opined that LA infiltration carries risks of SSI.

| Table 1 All surgeons opinion on the use of local anesthetics - total 571 | | |
|---|-------------|---------|
| Characteristic | n (%) | 95% CI |
| Frequency of using LA | | |
| Regularly | 186 (32.57) | 28.80-3 |
| Occasionally | 189 (33.12) | 27.84-3 |
| Never | 205 (35.98) | 31.87-3 |
| Please read for infiltration | | |

Table 1

All surgeons opinion on the use of local anesthetics - total 571

Group opinion -General surgeons, orthopedic surgeons and gynecologists

Table 2–4 list the characteristics of responses from general surgeons, orthopedic surgeons, and gynecologists. Forty-one percent of general surgeons, 17% orthopedic surgeons, and 37% gynecologists used LA regularly. 24% of general surgeons, 53% orthopedic surgeons, and 32% gynecologists never used LA. These differences were statistically significant for general surgeons ($P = 0.003$) and orthopedic surgeons ($P = 0.0001$) but not for gynecologists. Infiltration was the most common method among all types of surgeons (69%, 57%, and 71%, respectively). Lignocaine was the most common drug among general surgeons (46%) and gynecologists (73%), while orthopedic surgeons (53%) opted for combination of lignocaine and bupivacaine. These differences were statistically significant within the respective group of surgeons ($P < 0.0001$, respectively). More than 33-36% of general surgeons and gynecologists used peritrocal, while only 7% used intraperitoneal instillation during laparoscopy ($P < 0.0001$). While majority of general surgeons (61%) and gynecologists (64%) opined that there is no need to use LA s for postoperative pain, 75% orthopedic surgeons opined LA can be used for postoperative pain even with regional anesthesia intraoperatively. Statistically, these were more significant (orthopedic surgeons $P < 0.0001$ and other two groups, $P = 0.001$). For duration of action of bupivacaine, 47% general surgeons, 55% orthopedic surgeons, and 45% gynecologists opined as 2–4 h. Only 26% of general surgeons and gynecologists and 38% orthopedic surgeons said that the duration of bupivacaine infiltration is 4–8 h ($P < 0.0001$). 61% general surgeons, 58% gynecologists, and 83 orthopedic surgeons agreed that time to rescue analgesia is significantly prolonged by LA use. 50% general surgeons, 55% gynecologists, and 80% orthopedic surgeons opined that the total analgesic dose on the 1st postoperative day is significantly reduced with LA use ($P < 0.0001$).

| Table 2 General surgeons opinion on the use of local anesthetics-total 241 | | |
|---|-------------|--------|
| Characteristic | n (%) | 95% CI |
| Frequency of using LA | | |
| Regularly | 101 (41.91) | 35.86- |
| Occasionally | 82 (34.03) | 28.35- |
| Never | 58 (24.07) | 19.11- |
| Please read for infiltration | | |

Table 2

General surgeons opinion on the use of local anesthetics-total 241

| Table 4 Gynecologists opinion on the use of local anesthetics-total 139 | | |
|--|------------|---------|
| Characteristic | n (%) | 95% CI |
| Frequency of using LA | | |
| Regularly | 52 (37.44) | 28.91-4 |
| Occasionally | 42 (30.29) | 22.84-3 |
| Never | 45 (32.27) | 25.18-4 |
| Please read for infiltration | | |

Table 4

Gynecologists opinion on the use of local anesthetics-total 139

| Table 3 Orthopedic surgeons opinion on the use of local anesthetics-total 191 | | |
|--|-------------|---------|
| Characteristic | n (%) | 95% CI |
| Frequency of using LA | | |
| Regularly | 33 (17.28) | 12.38-2 |
| Occasionally | 56 (29.32) | 23.50-3 |
| Never | 102 (53.40) | 46.54-3 |
| Please read for infiltration | | |

Table 3

Orthopedic surgeons opinion on the use of local anesthetics-total 191

About 3.8% general surgeons, 4.3% gynecologists, and 2% of orthopedic surgeons said that LA drugs are antimicrobial. 18% general surgeons, 37% orthopedic surgeons, and 11% gynecology surgeons opined LA use for incisional closure increases SSIs. Among vials, drug itself and surgical site, 42%–43% of all categories of surgeons opined multiuse vials are the cause of SSI ($P < 0.0001$). Depo LA preparations were used more commonly by general surgeons (7%) than the other two (3%). Sixty-eight percent general surgeons and 61% gynecologists said will consider long-acting liposomal bupivacaine

if available, while 66% orthopedic surgeons said will consider liposomal bupivacaine in their practice only after further research evidence become available. Overall 76% general surgeons and 65% gynecologists and orthopedic surgeons opined that LA infiltration is useful without risks of SSI. About 5% of all surgeons opined LA use is not useful. Overall 18% general surgeons, 30% orthopedic surgeons, and 28% gynecologists opined that LA use for postoperative analgesia is helpful but carries risks of SSI. These differences were statistically significant ($P < 0.0001$).

Comparison of responses among consultants, residents and practitioners

Table 5 lists the characteristics of responses among consultants, residents, and independent practitioners. 37% hospital consultant surgeons used LA regularly and 28% residents and 30% independent practitioners used LA regularly (consultant to practitioner odds ratio [OR] 1.3641). Lignocaine was the most common drug among all grades (45%, 50%, and 56%, respectively, differences not significant across grades, $P = 0.111$). However, bupivacaine was more commonly used by hospital consultants than practitioners (23% vs. 14%, OR 1.8249). Less than 2% of all grades used LA catheters. For laparoscopic surgeries, peritrocal was more common than intraperitoneal among all grades (45%, 30%, and 26% vs. 6%, 7%, and 5%, $P = 0.008$). Consultants more commonly used peritrocal LA than practitioners (OR 2.0938). 62% practitioner surgeons opined LA can be supplemented with regional anesthesia techniques. 51% consultants, 50% residents, and 42% practitioner surgeons said that the duration of action of bupivacaine infiltration is 2–4 h (consultants, residents and practitioners 30%, 27%, and 36% respectively said 4–8 h). 72% consultants, 71% residents, and 56% practitioners opined that time to the first analgesic is significantly prolonged ($P = 0.01$), but differences for total dose of analgesics was not statistically significant. 8% practitioners said LA drugs are antimicrobial (<2% consultants and residents). 20% of consultants, 26% residents, and 25% practitioners surgeons said LA use for incision closure use increases risk of SSI. 63% consultants, 55% residents, and 52% independent practitioner surgeons said LA drugs have no effect on microbes. Multiuse vials were cited as the most common cause of SSI (42%, 45%, and 30%, respectively, $P < 0.0001$). 17% consultants and 18% of practitioner surgeons opined surgical site also contributed to SSI. Only 5% of all grades used long-acting liposomal bupivacaine ($P = 0.02$), and more consultants were willing to use liposomal bupivacaine than practitioners (63% vs. 47%, OR 1.9151). There were no statistical differences across grades for the overall impression of LA use.

| Characteristic | Consultant | Resident | Practitioner |
|-----------------------|------------|-------------|--------------|
| Frequency of using LA | | | |
| Regularly | 63 (67.48) | 61 (28.81) | 41 (30.44) |
| | 93 (30.44) | 203 (30.38) | 101 (30.38) |

Table 5
Comparison of responses among consultants, residents, and practitioners

DISCUSSION

Simple surgeon-delivered LA techniques such as wound infiltration, preperitoneal or intraperitoneal administration, and local infiltration analgesia can play a significant role in the improvement of postoperative care. Table 1 lists the characteristics of all surgeons opinion on use of LA drugs. Only 33% of all surgeons used LAs for postoperative pain. Only 2% of all surgeons indicated for other drugs, but no surgeon enumerated about ropivacaine. This reflects lack of knowledge of recent LA drugs. In a French survey, LA infiltration was included in more than 85% of protocols for postoperative pain relief.[2] Similarly, only 2% responders used LA catheters in our survey, while 18% used continuous wound infiltration (CWI) in the French Survey. Another reason why LA infusion is not popular may be due to perceived risks of infection and reduced wound healing. Meta-analysis has shown that ropivacaine CWI is effective for postoperative pain management in a wide range of surgical procedures.[3] However, some studies have demonstrated reduction in interleukin 10 and increase in substance P following continuous instillation of bupivacaine for 24 h. Other markers of inflammation did not differ significantly between the groups.[4] However, it is not known for infusions <24 h. Brower and Johnson have demonstrated that adverse effects of LA infiltration suggest that the risk is more with continuous infusions.[5] However, these risks can be attenuated with lower concentrations of LAs.[6] Also in another study, LA-induced increases in histological markers did not extend beyond the 3rd day, suggesting that wound infiltration with long-acting LA does not impair the wound healing process in rats.[7] Thus, the perceived risks of infections and wound healing are not supported by sufficient evidence.

About 48% of all surgeons opined that duration of action of bupivacaine infiltration is 2–4 h only, while in reality, it is 4–8 h.[8] Only 50% of all surgeons used only lignocaine even though bupivacaine offers longer analgesia period. This shows surgeons lack of knowledge about duration of action of common LA drugs. Only <4% of all surgeons used preincision LA infiltration. Preincisional LA infiltration has been shown to be more efficacious than postincisional infiltration.[9] It is postulated that inhibition of peripheral sensitization may have a major role in impeding the development of acute pain and attenuating postoperative pain. It is possible that fear of SSIs or bruising discourages surgeons from the use of preincisional LA. However, preincisional LA has been shown to have no effects on bruising or wound cosmesis.[10]

For laparoscopic surgeries, only 5% used intraperitoneal and 24% used peritrocal infiltration. Peritoneal instillation was also rarely used by the surgeons in the French survey.[2] A systematic review has shown statistically significant pain relief with intraperitoneal infiltration and mesosalpinx LA block and lack of evidence for port-site infiltration.[11] These observations demonstrate that surgeons have high threshold for non-infiltrative routes of LA use for postoperative pain relief and attending anesthesiologists have to convince their surgeons with evidence regarding LA drugs, routes and doses of LA for postoperative pain relief, wall posters in operating rooms depicting available LA drugs routes efficacy, and duration of action of LA drugs will indirectly educate surgeons about use of LA for postoperative pain relief.

While 49% of surgeons all surgeons opined that there is no need to use LA for postoperative pain, an equal proportion of 50% opined LA can be used for postoperative pain even with regional anesthesia intraoperatively. LA infiltration has been used with regional anesthesia, both preincisional and postincisional.[12,13] There is evidence that LA infiltration in the surgical site that included peritoneal, musculofascial, and subdermal planes provides superior pain relief and reduced opioid consumption for 48 h compared to bilateral transversus abdominis plane blocks after open hysterectomy.[14] Even though 68% surgeons opined that time to first analgesic dose is significantly prolonged and 63% responders opined total analgesic dose in the 1st postoperative day is significantly reduced, only 33% of surgeons used LA regularly, 31% occasionally, and 36% never used LA for postoperative analgesia. These facts show surgeons do know LA is useful for postoperative analgesia but reluctant to use LA drugs for postoperative pain.

The fact that LA drugs are antimicrobial,[15,16] are known to only 4% of surgeons. This fact could be the reason for underuse of LA for postoperative analgesia. In fact, LA drugs have been used as a strategy of preventing SSI.[17] In a study using the American College of Surgeons National Surgical Quality Improvement Program database, the incidence of SSIs in patients given local anesthesia was significantly lower than for that of patients given nonlocal anesthesia (0.8 vs. 1.4%).[17] LAs at concentrations used in the clinical setting (e.g., bupivacaine 0.125%–0.75%; lidocaine 1%–3%) inhibit the growth of numerous bacteria and fungi under various conditions.[18] Furthermore, bupivacaine and lidocaine have been shown to inhibit growth to a significantly greater extent than does ropivacaine.[18] Thus, whether bupivacaine should be preferred for infiltration and infusion over ropivacaine to reduce SSIs should be assessed by further studies. Correspondingly, over 53% surgeons said LA drugs have no effect on microbes and 23% said LA drugs increased chances of SSI. Significant number of surgeons (42% $P = 0.001$) thought that multiuse vials are source of infection. Single-use vials must be encouraged to LA use for postoperative analgesia, especially in the third-world countries.

Bupivacaine extended-release has been shown to provide a statistically significant reduction in pain through 72-h postoperatively and adequate safety and tolerability.[19,20] Compared to thoracic epidural, liposomal bupivacaine has been shown to significantly lower pain scores, decreased postoperative opioid medication, and lower total and direct hospital costs in video-assisted thoracoscopic pulmonary resection.[21] Only <5% of all surgeons had used long-acting liposomal bupivacaine and almost 40% more were willing to use the liposomal LA drug only if more research evidence is available to them. Liposomal bupivacaine is not widely available in India, but sizeable proportions of surgeons in our survey seem to be cautious for any new LA for postoperative pain relief.

Among all three categories of surgeons, fewer orthopedic surgeons used LA compared to general surgeons and gynecologists (17% vs. 42 and 37%). However, when used, more than 53% of orthopedic surgeons used lignocaine and bupivacaine combination, while gynecologists and general surgeons preferred lignocaine only. Furthermore, 75% of orthopedic surgeons opined that LA infiltration can be used even with regional anesthesia, more orthopedic surgeons correctly enumerated the duration of action of bupivacaine infiltration (38% vs. 26% for other surgeons). More number of orthopedic surgeons opined that time to first analgesic dose and total analgesic dose in the 1st postoperative day is significantly prolonged (>80% vs. <60% for other surgeons). Fewer orthopedic surgeons knew LA drugs are antimicrobial (2% vs. 4% for other surgeons). These indicate probably clustering of cases under regional anesthesia and better knowledge of orthopedic surgeons regarding efficacy of LA drugs but not on the impact of LA drugs on SSIs.

Low use (6%–7%) of intraperitoneal instillation by general and gynecologists reflect reluctance and fear of infection among responders. While majority of general surgeons (61%) and gynecologists (64%) opined that there is no need to use LA for postoperative pain, 75% orthopedic surgeons opined LA can be used for postoperative pain even with regional anesthesia intraoperatively. This again may be attributed to cases under regional anesthesia and better understanding of efficacy of LA drugs by orthopedic surgeons. There is equal concern (42%–43%) among all categories of surgeons that multiuse vials are a source of SSI. Thus, the role of single-use LA vials or ampules cannot be overemphasized. Orthopedic surgeons are less likely to use liposomal depot LA drugs (30% vs 61% for other surgeons vs. 66% for other surgeons). This may probably due to concerns of long-standing SSI and implant infections. Also probably for similar reasons, more orthopedic surgeons expressed concerns of infections (37% vs. <18% for other surgeons) SSI with LA use for incision closure Overall impression among three categories of surgeons was LA is definitely useful without SSI risks (65%–76%).

Local anesthetic use among the three categories of surgeons

Hospital consultants used LA drugs regularly more often than residents and independent practitioners (37% vs. 30%, OR 1.3641) and bupivacaine was the most common drug (23% vs. 14%, OR 1.8249). Reasons probably are good knowledge regarding LA drugs and availability of options. Independent practitioner surgeons more often (56% vs. 45%) used lignocaine than bupivacaine for postoperative analgesia and were less likely to use preincisional LA drugs (1.4% vs. 4.0%) probably due to concerns of immediate postoperative pain control, inadequacy of staff, and SSI in smaller hospitals. Independent practicing surgeons were more likely (62% vs. 42% and 49%) than hospital consultants and residents to use LA drugs even with regional anesthesia. This probably reflects the lack of other multimodal methods and cost-effectiveness of postoperative analgesia in smaller hospitals. More independent practicing surgeons (36% vs. 30% for consultants and 27% residents) correctly cited the duration of bupivacaine action and antimicrobial nature of LA drugs (7.6% vs. <2% for consultants and residents). These reflect better knowledge of LA drugs among practitioners. However, hospital consultants opined LA drugs significantly prolonged time to first analgesic dose (72% vs. 56%, $P = 0.01$) emphasizing knowledge of efficacy of LA among consultants. More consultants and residents opined multiuse vials are source of SSI (45% and 42% vs 30% for practitioners, $P < 0.0001$). Surgical consultants and residents thus know how a multiuse vial is treated in the operation theater. Consultants are more likely to use liposomal LA drugs if available (63% vs. 47%, OR 1.9151) highlighting the need for long-acting and cost-effective analgesic method.

Limitations

This is a cross-sectional survey, and we asked for the most common scenario rather than percentages in the questions to make the questions as simple and straightforward as possible and to obtain a reasonable number of responses. For example, we asked for the most common drug or method of LA use rather than asking percentage. However, the most common scenario may more correctly estimate the actual scenario for each characteristic. There is also the possibility of overlapping of respondents across the same and different grades from the same hospital. Nevertheless, this survey provides an insight into the surgeons attitudes to LA drug use for postoperative pain relief and develop the methods to promote and encourage LA use for postoperative pain relief.

CONCLUSIONS

Although the majority of surgeons were aware of the benefits of LA use for postoperative pain relief, reluctance, lack of knowledge of LA drugs and methods of LA use and fear of infection and wound healing are barriers for effective use of LA drugs for postoperative pain relief. The perceived risks of infections and wound healing are not supported by sufficient evidence. Attending anesthesiologists must develop methods in the operating room to create awareness and convince surgeons with evidence about the effectiveness of LA use for postoperative pain relief. Single-use vials must be encouraged to LA use for postoperative analgesia, especially in the third-world countries. Anesthetic departments must make conscious efforts to educate surgeons both in the operation theater and other settings in the hospital and create awareness among surgeons about the local anesthesia drugs as a central role to postoperative pain relief modalities. Regular audits and interdepartmental presentations must be encouraged as part of education.

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Nil.

Conflicts of interest

There are no conflicts of interest.

Appendix 1:

Survey of surgeons attitudes to local anesthetics use for postoperative pain relief

Dear Colleague, This is a questionnaire regarding your practice for use of local anesthetics for postoperative pain relief.

Please TICK ONLY ONE BOX to indicate the most common scenario

1. What grade are you Sir/Madam?

- Teaching faculty/Consultant Own Hospital/Practice without attachment
- Postgraduate student
2. How often you use local anesthetics infiltration for pain relief
- Regularly (1 in 1–3 cases) Occasionally (>1 in 4) Never
3. What do you use for local infiltration?
- Lignocaine Sensorcaine (Bupivacaine) Combination of Lig + Sen
- Other _____ (specify)
4. What methods of local anesthesia you use? (tick more than one for this question only)
- Infiltration only LA catheter Preincision
- Tumescent for liposuction All
5. For laparoscopic surgeries, what methods do you use ?
- Peritrocal Intraperitoneal Combined None
6. If patient has received regional anesthesia, do you think there is no need to infiltrate the incision?
- Yes No
7. How long does pain relief with bupivacaine (sensorcaine) infiltration last?
- 0–2 h 2–4 h 4–8 h 8–12 h
8. Do you think Local anesthetic prolongs the *time to first analgesic dose* in the immediate postoperative?
- Significantly Not Significantly Not at all
9. Do you think Local anesthetic reduces the *total analgesic dose* in the first postoperative day?
- Significantly Not Significantly Not at all
10. Commonly used Local anesthetics
- Support microbial growth Are antimicrobial Have no effect on microbes Don't know
11. Does LA infiltration for incision closure increase surgical site infection?
- Increase Decrease No effect Don't Know
12. What is the cause of infection concerns with local anesthetic infiltration?
- LA Drug Multi use vials Surgical site Don't know
13. Have you used long acting (72–96 h) liposomal bupivacaine (DepoFoam[®]/Exparel[®]) local infiltration for pain relief?

- Yes, No of Times _____ Side effect _____
- No but will consider if available
- Will consider subject to more reports/trial outcomes on infections/complications

14. Your overall impression with local anesthetic use for pain relief

π Definitely helpful no risk π Definitely not helpful π Helpful but infection risk

15. Any comments

Thank you for your participation

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