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REVIEW ARTICLE

Breast

The Utility of Erector Spinae Plane Blocks in Breast Surgery: A Practical Review

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Background: In plastic surgery, breast surgery patients are among the most susceptible to postoperative pain. Amidst the opioid epidemic, healthcare goals seek to optimize nonopioid multimodal pain control by including regional analgesia. The erector spinae plane block (ESPB) is among several regional blocks used in breast surgery. Although the paravertebral block has previously served as the gold standard, new research focused on ESPB may shift standards.

Methods: A comprehensive PubMed review was performed in September 2023 to identify articles related to ESPB use in breast surgery. Non-English and unavailable articles were excluded. Data extracted included publication year, techniques, and outcomes.

Results: Sixty-eight publications were included, of which 31 were randomized control trials (45.6%). Most were published between 2021 and 2023 (n = 40, 58.8%). Most articles that evaluated pain and opioid use suggested that ESPB performed better than nonblocked groups (n = 26, 38.2% of total articles and n = 4, 5.88% of total articles) and performed similarly to other blocks. However, articles that evaluated the pectoral nerve block suggested it outperformed ESPB in these aspects (n = 6 articles, 8.82%). ESPB was shown to be a safe and procedurally short block to perform, effective in the hands of novice providers.

Conclusions: ESPB offers reliable outcomes, improving pain control and decreasing opioid consumption. In turn, this can decrease healthcare costs and patient morbidity. *(Plast Reconstr Surg Glob Open 2025;13:e6667; doi: 10.1097/GOX.0000000000006667; Published online 2 April 2025.)*

INTRODUCTION

The concept of pain management within the US healthcare system has changed drastically within the past several decades, and with this, the preferred treatments for pain have shifted. In 1995, the American Pain Society initiated a campaign, labeling pain as the "fifth vital sign," which subsequently led to strict standards for pain management, relying heavily on the use of opioids.[1] By 2016, the development of an "opioid epidemic" had gained national recognition, followed by a pendulum swing resulting in changes to public policy, physician prescribing habits, healthcare politics, and nonopioid pain–related research.[1] Enhanced recovery after surgery pathways were developed to decrease hospital stay, while simultaneously improving pain control and decreasing opioid requirements relying on nonopioids such as acetaminophen, nonsteroidal anti-inflammatory drugs (NSAIDs), cyclooxygenase (COX)-2–specific inhibitors, and local/regional analgesia.[1–7]

Breast surgery, including nononcological and oncological procedures, encompasses a large proportion of the fields of plastic and reconstructive surgery and surgical oncology. The Aesthetic Society reported that 742,896 total plastic surgery breast procedures were performed in 2022.[8] The American Society of Plastic Surgeons reported a slightly larger number, including 575,492 cosmetic breast procedures, 151,641 breast reconstructive procedures, and 24,316 breast implant removals in reconstructive patients

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(total 751,449).[9] Among patients who undergo plastic and reconstructive surgery procedures, breast surgery patients are the most susceptible to both acute and prolonged postoperative pain.[10,11] In light of the opioid epidemic, efforts have been made to improve opioid prescribing habits of providers, including plastic surgeons, as opioids carry significant risks—the most concerning of which includes the risk of abuse and overdose.[12–15] Multimodal regimens have been shown to decrease overall pain scores compared with opioids alone, lowering the total dose of opioids required to achieve adequate pain control.[12–15] Guidelines by the American Society of Breast Surgeons and the procedure-specific postoperative pain management group recommend the use of regional analgesia as part of a multimodal analgesic regimen.[16,17] Published in 2020, these guidelines, however, recommended the use of thoracic paravertebral block (PVB) as the standard for breast surgery given the available evidence.[16] At that time, the erector spinae plane block (ESPB) was too novel to determine its utility.[16] Since then, the scope of research surrounding ESPB and its use in breast surgery has widened.

Our authorship has previously published a review on the use of ESPB in breast surgery in 2019; however, since its release, the available literature has more than doubled.[11] ESPB has since been suggested as the best option for thoracoabdominal surgery.[18] We sought to provide an updated review on the use of the ESPB in breast surgery to discuss current evidence surrounding its utility in comparison to other alternatives for pain control.

METHODS

A review of the literature was performed in September 2023 according to recommended guidelines.[19,20] The research question and hypothesis were defined before the study as well as the search strategy and selection process. Peer-reviewed articles were identified by a single author (Layne Raborn Macdonald, MD) using PubMed. The search terms for ESPB in breast surgery were utilized to identify relevant articles (Table 1). The literature was broadly surveyed, and all articles that discussed the use of ESPB in breast surgery were included. Articles were screened by reviewing the title, abstract, and full text using the inclusion and exclusion criteria listed in Table 2.

Table 1. Search Terms Used in PubMed to Identify Articles Relevant to ESPB in Breast Surgery and the Number of Results

Term	Search Phrase	No. Publications
Erector spinae plane block and breast	Search: (“erector spinae plane block” OR “ESPB”) AND Breast (“erector spinae plane block”[All Fields] OR “ESPB”[All Fields]) AND (“breast”[MeSH Terms] OR “breast”[All Fields] OR “breasts”[All Fields] OR “breast s”[All Fields])	126

Takeaways

Question: What is the role of the erector spinae plane block (ESPB) in breast surgery and supporting evidence?

Findings: Sixty-eight publications were identified. ESPB showed safe and reliable outcomes, significantly decreasing pain and opioid requirements compared with non-blocked individuals. It performed similarly to other blocks including paravertebral blocks, but some evidence suggests pectoralis (PECS) nerve blocks outperform ESPB.

Meaning: ESPB demonstrates favorable outcomes in breast surgery; however, more research is needed to fully delineate if pectoral nerve block is a better choice.

Reviews were excluded to limit repeated data, but meta-analyses were included as these reported new findings on ESPB performance. Data were manually extracted, as available, and stored using a standardized spreadsheet. The categories of extracted data are reported in Table 3.

Table 2. Inclusion and Exclusion Criteria for Articles Selected to Examine ESPB in Breast Surgery

Inclusion criteria
Addresses, proposes, discusses, or exemplifies the use of ESPB in breast surgery
Exclusion criteria
Not about ESPB in breast surgery
Use of ESPB treatment of chronic pain after breast surgery
Language not in English
Review article (not meta-analysis)
Commentary
Reply
Letter to editor
Retraction/erratum
Abstract unavailable
Article unavailable

Table 3. Data Extracted from Included Publications

Year
Title
Journal
Author
Language
Type of study
Goal of study
Study groups
Findings of study
Type of breast surgery performed
Personnel required to perform block
Local anesthetic used
Time required to perform block
Effect of block on opioid use
Effect of block on use of nonopioid analgesics
Effect of block on pain levels
Time of block effect
Safety of block
Effect of block on PONV
Hospital duration length

RESULTS

Selection of Studies

A PubMed search yielded 126 publications that were screened by title and abstract (Fig. 1). After initial screening, 84 articles were further screened with a full-text review. Of these, 68 met inclusion and exclusion criteria and were included in the study.[21–88]

Study Characteristics

An average of 11 articles were published a year between 2018 and 2023, with the highest number published in 2021 (n = 17, 25%)[24,25,33,35,38,41,42,45,47,50,51,60,62,63,71,76,82] (Fig. 2). Included articles were primarily randomized control trials (RCTs) (n = 31, 45.6%)[21,22,26,27,30,32,34–36,38,41,42,46,48,50,51,53,61–63,66,69,72–75,78,80,83,84,86] and meta-analyses (n = 13, 19.1%)[23–25,33,43,45,49,58,60,71,76,77,82] (Fig. 3). ESPB was utilized primarily for mastectomies (n = 57, 83.8%)[21,23–26,29–46,48–52,54–61,64,65,67–70,74–81,83,85–88] and for breast conserving surgery (n = 18, 26.5%),[25,28,31,43,45,47,49,51,52,60,63,64,66,68,76–78,83] whereas nononcological breast surgery, including cosmetic surgery, was mentioned in only 6 publications (8.82%)[23,27,45,58,60,66] (Fig. 4). ESPB was compared with various other blocks including the PVB (n = 21, 30.9%)[23,30,32,38,42,44,45,49,52,53,58,60,64,66,67,71,72,76,77,80,81] and pectoral nerve block (PECS) (n = 10, 14.7%),[30,33,36,45,49,61,69,71,77,85] as well as with nonblocked groups (n = 33, 48.5%)[21,22,24–27,30–33,40,43,45–47,49–51,53,55,58,60,70,71,73–75,77,78,82–84,86] (Fig. 5).

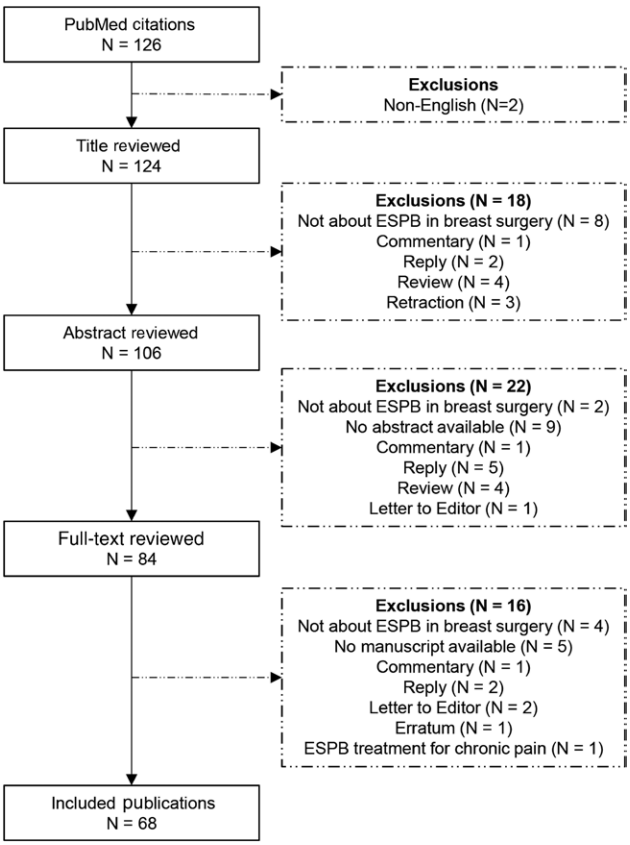

Fig. 1. PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flowchart.

ESPB Techniques

The placement techniques used for ESPB and other common nerve blocks are standardized and have been summarized in Table 4 and the video; however, we found that the components used for ESPB and mode of delivery varied among included publications. (**See Video [online]**, which displays the placement techniques used for ESPB and other common nerve blocks.) Local anesthetics used for ESPB included bupivacaine (n = 38, 55.9%)[21–25,27,29–33,36,37,39,43,45,49,51,53,55,56,58,60,61,65,67,69,72–74,76,81–84,86–88] (including liposomal bupivacaine [n = 1, 1.47%]),[87] ropivacaine (n = 35, 51.5%),[23–26,28,33,35,38,40–47,49,50,52,54,57–60,63,64,66,68,70,75–79,82] and levobupivacaine (n = 9, 13.2%)[33,34,45,48,49,62,77,80,85] but no studies compared efficacy among the 3. The concentration of anesthetic used varied from 0.125% to 0.5%. An RCT by Altiparmak et al[37] compared 0.375% and 0.25% bupivacaine, reporting that pain scores and tramadol consumption were significantly lower for the higher concentration group. Reported block volumes ranged from 10 to 40 mL in the included publications. An RCT by Abdella et al[21] compared 20 mL 0.25% to 40 mL of 0.125% bupivacaine, demonstrating analgesic equivalency, but finding that larger volumes could anesthetize more dermatomes. ESPB was compared with the use of local anesthesia (LA) in only 1 article (1.5%), which showed improved pain scores and recovery for the ESPB + LA group compared with LA only.[75] Catheters were used for continuous infusions in 8 publications (11.8%).[49,57,65,70,75,77,79,84] Additives used with ESPBs are listed in Table 5 (n = 9, 13.2%).[29,34,41,45,48,49,59,63,77] These articles suggest that ESPB can be effective when using various anesthetics and that higher concentrations have a positive effect.

ESPB was reported to have a short procedural time and was performed by trainees without significantly increasing duration or risk. ESPB was performed by anesthesiologists (n = 10, 14.7%),[34,36,37,41,50,52,69,70,80,86] residents, and fellows (n = 3, 4.41%).[23,66,67] ESPB had a higher success rate than PVB when performed by residents and also required fewer directing interventions.[23,67] ESPB took less time than PVB and the serratus plane block + pectoralis nerve block (SPB+PECS I) to perform in included studies (Table 6), including in RCT findings, although the difference may be clinically insignificant.[23,38,63,65,67,74,76]

ESPB on Opioid Use

Opioid use was compared for ESPB and control, PVB, PECS block, SPB, pectoserratus plane block (PSPB), retrolaminar block (RLB), intercostal nerve block (ICNB), and interscalene brachial plexus block. Intraoperative opioid requirements were assessed, along with postoperative opioid consumption and overall opioid requirements. (**See figure, Supplemental Digital Content 1**, which displays the summary of included publications that compared opioid requirements between ESPBs and controls or other blocks, **http://links.lww.com/PRSGO/D947**.) ESPB lowered intraoperative opioid requirements compared with nonblocked groups in most articles (n = 4,

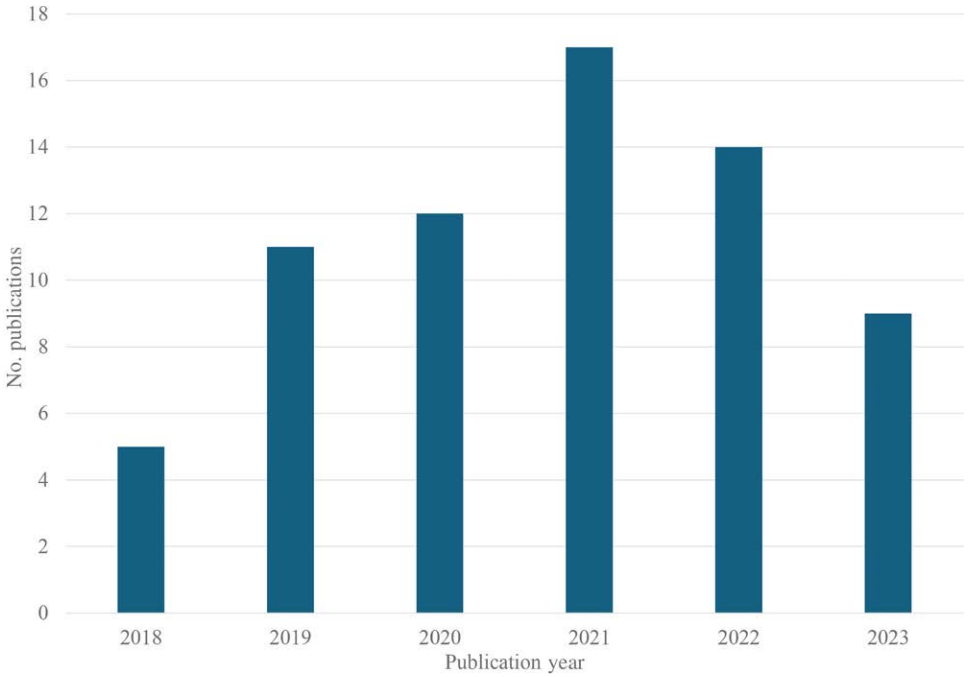

Fig. 2. Number of publications using the ESPB for breast surgery per year. Most articles were published in 2021 (n = 17, 25.0%), followed by 2022 (n = 14, 20.6%), and 2020 (n = 12, 17.6%).

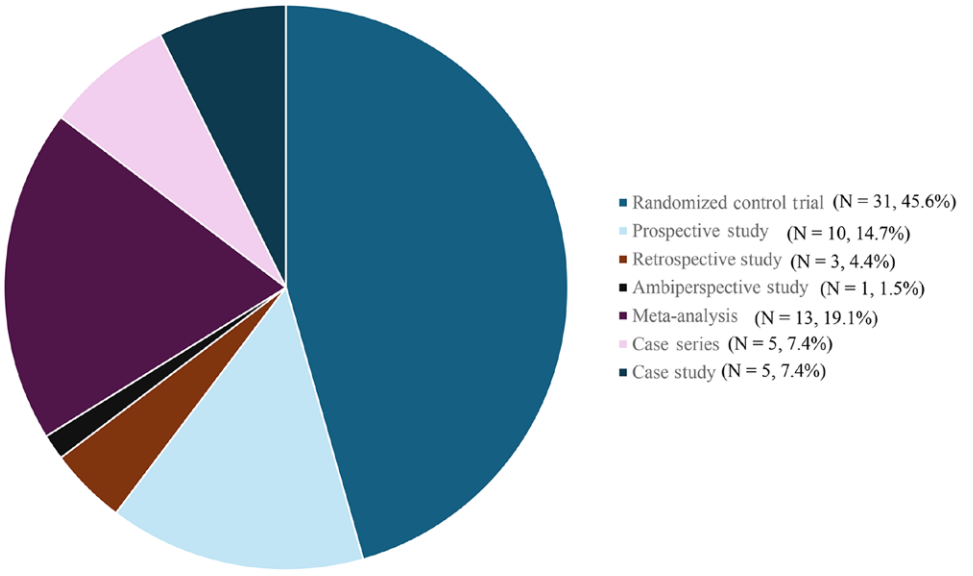

Fig. 3. Number of publications that used the ESPB for breast surgery per study type.

5.88% versus n = 1, 1.47%),[25,32,50,73,74,84] including in RCT findings, but performed similarly to PVB,[23,32,38,44,66,81] PECS,[36,61,85] SPB,[74] PSPB,[73] and RLB.[62] Postoperative opioid consumption was reported to be lower for PECS than for ESPB in most articles (n = 6, 8.82% versus n = 1, 1.47%), including most RCTs.[30,36,45,61,69,77,85] Other studies that assessed postoperative opioid consumption showed that ESPB performed better than nonblocked groups.[22,25,27,30,40,43,45,46,50,53,56,60,70,73–75,77,78,82–84,86] ESPB also performed similarly to PVB in most articles (n = 11, 16.2%); 4 articles reported lower opioid use when PVB was used (5.88%).[23,30,38,41,44,45,52,53,60,64,66,67,76,80,81] ESPB performed similarly to PSPB (n = 1, 1.47%),[73] SPB (n = 3, 4.41% versus n = 1, 1.47% favoring ESPB),[35,63,74,77] ICNB (n = 1, 1.47% versus n = 1, 1.47% favoring ESPB),[35,77] RLB (n = 1, 1.47%),[62] and interscalene brachial plexus block groups (n = 1, 1.47%)[77] in most studies. There were several studies that did not specify the timeframe of assessment and only compared total opioid requirements. In these articles, ESPB consistently lowered total opioid requirements compared with nonblocked groups,[24,33,49,58,71] but when compared with other blocks, there was more variability in

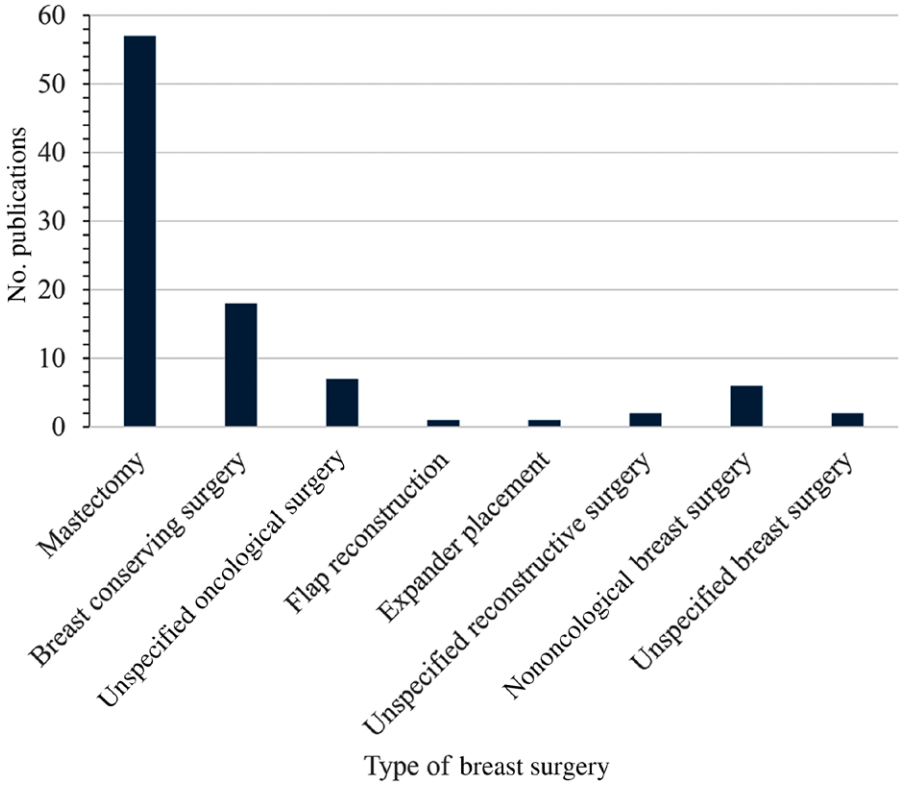

Fig. 4. Number of publications that used ESPB for each type of breast surgery. In most articles, mastectomies were performed (n = 57), followed by breast-conserving surgery (n = 18), and unspecified oncological breast surgery (n = 7).

its performance.[33,49,58,71,72] Overall, ESPB lowered opioid requirements more than nonblocked groups and similarly to other blocks, except for PECS, which seemed to outperform ESPB.

Postoperative nausea and vomiting (PONV) was assessed in several studies to determine if the use of ESPB could decrease this opioid-related postoperative complication. (**See figure, Supplemental Digital Content 2**, which displays comparison of PONV among ESPB, control, and other blocks, **http://links.lww.com/PRSGO/D948**.)

Most articles reported that ESPB did not improve or worsen PONV compared with control groups (n = 12 articles, 17.6% versus n = 9 articles, 13.2%).[22,24,26,27,30,32,40,43,45,46,49,50,55,60,70,71,74,77,82–84] but that it performed similarly to other blocks, including PVB,[23,24,30,32,44,45,49,52,60,66,71,76,77,81] PECS,[30,49,69,71,77] ICNB,[35,49,77] SPB,[35,49,74,77] and RLB.[62]

Effect of Nonopioid Analgesics on the Efficacy of ESPB

As previously discussed, postoperative pain control recommendations support the use of a multimodal analgesic regimen, which includes acetaminophen, NSAIDs, and COX-2-specific inhibitors. Interestingly, we found that these nonopioid analgesics were used in conjunction with ESPB in only 23 articles (33.8%).[26–29,31,36–39,41,43,44,47,54,59,65,66,68,69,74,75,87,88] Of these, only 11 articles (16.2%) used scheduled dosing of these medications postoperatively.[29,38,39,44,54,59,65,68,74,75,88] Elsabeeny et al[74] showed that when scheduled nonopioid analgesics were used with ESPB, less rescue analgesia was required compared with the control group that used nonopioid analgesics alone. In the remaining articles, either a one-time dose of nonopioid analgesics was administered with ESPB (n = 3, 2.9%)[36,37,66] one-time, followed by an as-needed regimen (n = 3, 2.9%),[28,47,69] or only as needed (n = 6, 8.8%).[26,27,31,41,43,87]

Effect of ESPB on Pain Scores

Pain scores were assessed and compared between ESPB and nonblocked groups as well as other blocks, including PVB, PECS, PSPB, ICNB, SPB, and RLB. A full list of comparisons is listed in Supplemental Digital Content 3. (**See figure, Supplemental Digital Content 3**, which displays a comparison of pain scores among ESPB, control, and other block groups, **http://links.lww.com/PRSGO/D949**.) A total of 26 articles (38.2%) reported lower pain scores in ESPB groups when compared with nonblocked controls,[21,22,24–27,30–33,40,43,45–47,49–51,53,58,60,70,73,75,77,78,82–84,86] with substantial RCT evidence, whereas 4 articles (5.88%) did not show a difference.[22,33,50,83] There were 3 publications that suggested that PVB showed a greater reduction in pain,[30,66,80] compared with 2 that suggested no difference,[38,53] and 2 that suggested ESPB reduced pain more than PVB.[32,42] Most publications, including RCTs, reported that PECS reduced pain more than ESPB (n = 6, 8.82% versus n = 1, 1.47%).[30,33,36,45,61,69,77] PSPB also reduced pain

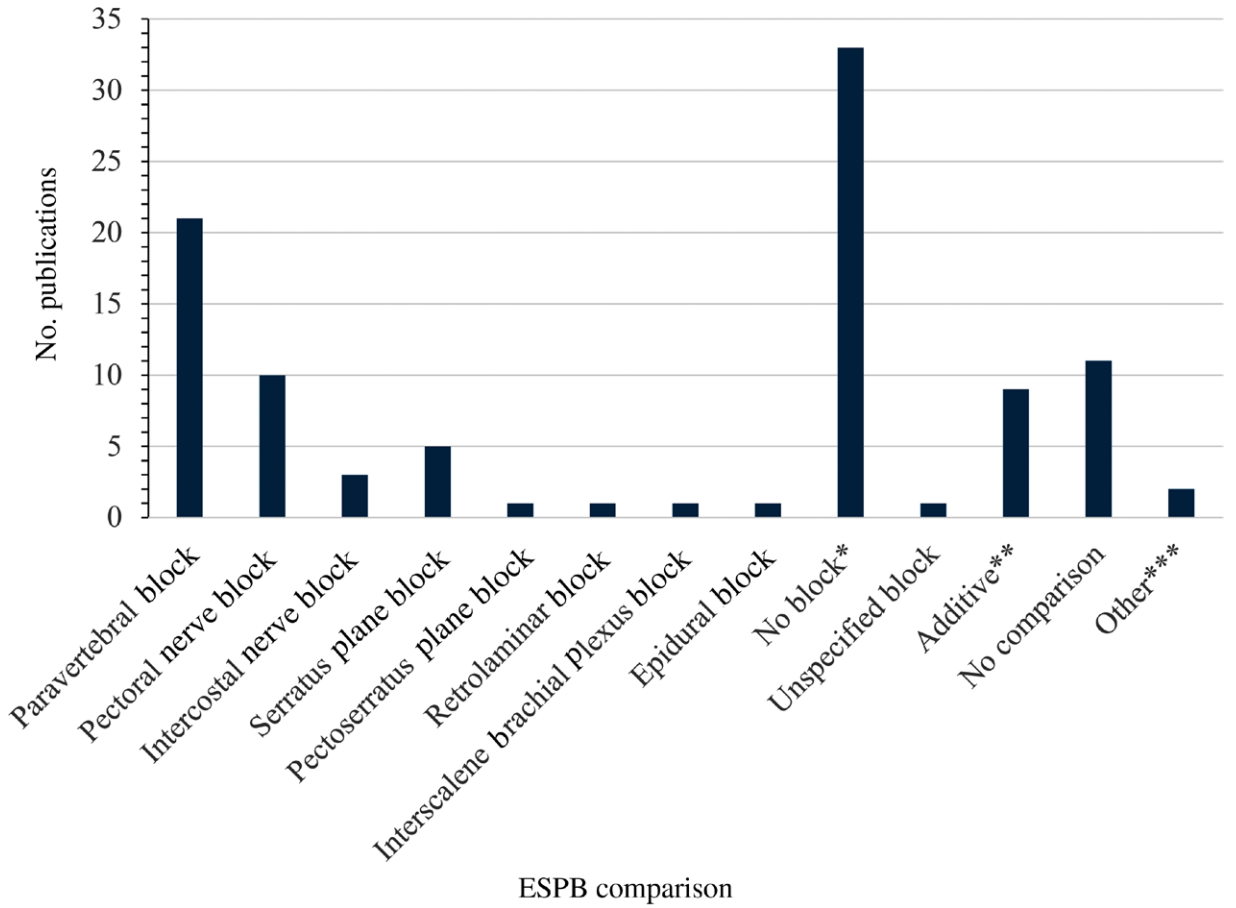

Fig. 5. Number of publications comparing either no-block, another block, an additive, or unspecified block outcomes to ESPB for breast surgery. Most articles compared ESPB to a nonblocked control (n = 33), the PVB (n = 21), or the PECS (n = 10). *The use of general anesthesia only, the use of placebo, and patient-controlled analgesia. **The use of epinephrine, dexmedetomidine, ketamine, and magnesium sulfate with ESPBs. ***Different ESPB concentrations and volumes.

Table 4. Summary of Nerve Blocks Utilized in Breast Surgery and Techniques

Block Name	Patient Position	Anatomic Area	Teaching Reference	Includes Video?
Interscalene brachial plexus block	Supine	Supraclavicular fossa, interscalene space	Nerve Block Tip of the Week: Interscalene Brachial Plexus Block (nysora.com)	Yes
PECS and SPB	Supine	Pectoralis major and minor and latissimus dorsi muscles	Pectoralis and Serratus Plane Nerve Blocks—NYSORA	Yes
ICNB	Upright/prone	Intercostal space between costal angle and posterior axillary line	Tips for an Intercostal Nerve Block—NYSORA	Yes
ESPB	Upright/prone	Lateral to transverse process	Tips for an Erector Spinae Plane Block—NYSORA	Yes (also **see Video [online]**)
PVB	Upright/prone	Lateral to spinous process	Tips for a Paravertebral Block: Transverse Oblique Technique—NYSORA	Yes
RLB	Upright/prone	Lamina of the vertebra	Tips for a Paravertebral Block: Transverse Oblique Technique—NYSORA	No

more than ESPB (n = 1, 1.47%).[73] ESPB reduced pain slightly more than ICNB in 1 publication[77] and no difference was found in another.[35] ESPB reduced pain more than SPB in 2 publications,[35,77] less than SPB in 1 publication,[49] and performed similarly in another.[63] One publication suggested RLB and ESPB reduced pain similarly.[62] The literature showed heterogenous results on pain scores without a clear indication of ESPB performance compared with other blocks, which can perhaps be owed to the challenge of measuring a patient's self-reported subjective outcome.

Duration of ESPB Effects

ESPB effect duration was compared with PVB, PECS, SPB, and epidural blocks (Table 7). ESPB and PVB showed similar durations in most studies (n = 3, 4.41%) with reported duration ranging from 11 to 18 hours on

Table 5. Additives Used in ESPBs Within Included Publications

Additives	References	Study Type	Comparison Results
Dexmedetomidine	Thota et al[29]	Case series	N/A*
	Wang et al[41]	RCT	The addition of dexmedetomidine to ropivacaine significantly reduced opioid requirements and pain scores
	Leong et al[45]	Meta-analysis	N/A*
	Kimachi et al[59]	Case study	N/A*
	Vanni et al[63]	RCT	N/A*
	An et al[77]	Meta-analysis	N/A*
Ketamine	El Sherif et al[48]	RCT	When added to levobupivacaine, both magnesium sulfate and ketamine decreased opioid requirements and lengthened the time to request analgesia
Magnesium sulfate	El Sherif et al[48]	RCT	When added to levobupivacaine, both magnesium sulfate and ketamine decreased opioid requirements and lengthened the time to request analgesia
	Singh et al[49]	Meta-analysis	N/A*
Epinephrine	Shigeta et al[34]	RCT	Adding epinephrine to levobupivacaine decreased the maximum concentration and delayed the time to maximum concentration, but had no effect on postoperative analgesia

*The additive was used in the study, but no direct comparison was performed to evaluate effectiveness.
RCT, randomized controlled trial.

Table 6. Publications Comparing ESPB Procedure Time to Other Blocks

References	Block Comparison	Study Type	Findings
Chen et al[23]	ESPB versus PVB	Meta-analysis	Procedure time was significantly reduced when ESPB was used
Agarwal et al[38]	ESPB versus PVB	RCT	Time required to perform ESPB (8.92 ± 3.40) was significantly shorter when compared with PVB (10.92 ± 3.61) ($P < 0.05$)
Malawat et al[56]	ESPB only	Prospective study	Average duration of ESPB procedure was 8.93 min
Jain et al[65]	ESPB versus PVB	Case series	ESPB was shorter than PVB (1.9 min/side for ESPBs versus 4.1 min/side for PVBs; difference = 2.5; $P < 0.001$)
Moustafa et al[67]	ESPB versus PVB	Prospective study	Procedure time was significantly less for the ESPB group (4.39 ± 1.2 min) than the PVB group (8.18 ± 2.42 min) with a P value of less than 0.0001
Xiong et al[76]	ESPB versus PVB	Meta-analysis	PVB required more time than ESPB; MD = 3.29 min; 95% CI: 2.31 to 4.26; $P < 0.00001$; $I^2 = 71\%$
Elsabeeny et al[74]	ESPB versus SPB	RCT	Duration of surgery was longer for the SPB and ESPB groups compared with the morphine group ($P = 0.005$)
Vanni et al[63]	ESPB versus SPB + PECS I	RCT	ESPB was faster than SPB+PECS I ($P = 0.007$)

CI, confidence interval; MD, mean difference.

Table 7. Publications Comparing ESPB Analgesic Duration to Other Blocks

References	Block Comparison	Study Type	Outcome	Specific Findings
Chen et al[23]	ESPB versus PVB	Meta-analysis	The duration of ESPB and PVB effects were similar	Average duration (mean, SD) ESPB: 15.8 ± 5.13 h versus PVB: 15.9 ± 4.47 h; MD = −0.10, 95% CI = −1.99 to 1.79, $P = 0.92$
Elewa et al[32]	ESPB versus PVB	RCT	The duration of ESPB was longer than PVB based on VAS pain scores	Pain scores at postoperative time points (median, IQR): 8 h—ESPB: 4 (3–5) versus PVB: 5 (4.5–6), $P = 0.001$; 12 h—ESPB: 5 (4.75–6) versus PVB: 6 (5–6.5), $P = 0.002$
Swisher et al[66]	ESPB versus PVB	RCT	The duration of ESPB and PVB effects were similar	Average duration (median, IQR) ESPB: 17.7 h (IQR: 9.7–20.1) versus PVB: 16.0 h (IQR: 11.9–19.9), $P = 0.833$
Moustafa et al[67]	ESPB versus PVB	Prospective study	The duration of ESPB and PVB were similar based on time until first required analgesic	Average duration (mean, SD) ESPB: 11.04 ± 1.9 h versus PVB: 11.22 ± 1.96 h, $P = 0.66$
Bakeer and Abdallah[61]	ESPB versus PECS	RCT	The duration of ESPB was shorter than PECS based on time to request analgesia	Average duration (mean, SD) ESPB: 4.1 ± 0.9 h versus PECS: 6.2 ± 0.8 h, $P < 0.001$
Elsabeeny et al[74]	ESPB versus SPB	RCT	The duration of ESPB was similar to SPB and both were longer than the control based on time to request analgesia	Average duration (mean, SD) ESPB: 20.40 ± 4.98 h versus SPB: 19.00 ± 5.9 h versus morphine only control: 5.00 ± 4.62 h, $P < 0.001$
Karoo et al[79]	ESPB versus epidural block	Prospective study	The duration of ESPB was similar to that of the epidural block	Average duration (mean, SD) ESPB: 20.60 ± 5.77 h versus epidural: 21.72 ± 4.73 h, $P = 0.39$
Jain et al[65]	ESPB	Case series	Duration of ESPB was at least 72 h when used with a multimodal analgesia regimen	No additional analgesia requested during 72 h of monitoring

CI, confidence interval; IQR, interquartile range; MD, mean difference; VAS, visual analog scale.

average[23,66,67]; however, 1 RCT (1.47%) reported that ESPB had longer effects based on lower pain scores at 8 and 12 hours postoperatively.[32] The duration of ESPB was presumed shorter than PECS based on the timing of the first requested analgesia (4 versus 6 h, respectively, $P < 0.001$).[61] However, ESPB had a similar duration to SPB (20 versus 19 h)[74] and to epidural blocks (21 versus 22 h).[79] Pain was controlled for 72 hours of observation when ESPB was combined with multimodal analgesia.[65] Of note, interstudy block duration was inconsistent, as studies used different measurements, such as pain scoring or time until the first analgesia request, and performed differing breast procedures. Overall, the results suggested that PECS has a longer effect than ESPB, but ESPB performs similarly to PVB, SPB, and epidural analgesia, and that block effects can be enhanced with multimodal analgesia.

ESPB Safety

No major complications were mentioned in any publications using ESPB. In contrast, PVB carries the risk of pneumothorax,[45] and hypotension can be a risk of epidural blocks.[79] Several studies reported improved heart rate and blood pressure measurements when ESPB was used.[31,32,55]

Effects of ESPB on Hospital Duration

Several studies evaluated hospital duration of stay with ESPB compared with other blocks and control groups. When ESPB was compared with nonblocked groups, no significant difference in duration was found.[27,40,75] When ESPB was compared with PVB, although 1 RCT suggested ESPB shortened duration by approximately a day,[42] another RCT reported shorter postanesthesia care unit stays in the PVB group by around 20 minutes,[66] and a prospective study found no difference in hospital duration.[44] Hospital duration may be affected by other factors and less significantly impacted by block effects given the conflicting data.

DISCUSSION

Although the PVB has previously been the regional anesthetic of choice for breast surgery, more than half of the current literature surrounding the effectiveness of ESPB in breast surgery has been published recently between 2021 and 2023 (n = 40, 58.8%).[16] We identified 31 (45.6%) RCTs and 13 meta-analyses (19.1%), suggesting that current evidence surrounding the use of this block for breast surgery has rapidly increased. In this review, we sought to provide an updated summary regarding the techniques and outcomes of ESPB when used in breast surgery.

ESPB is an effective option for pain management in breast surgery pain regimens, although some evidence suggests PECS may outperform its results. An advantage of ESPB is that it is an effective block even when utilized by novice providers and has fewer risks compared with other blocks such as the PVB, which carries the risk of pneumothorax and inadvertent epidural block with associated adverse effects. ESPB, however, may not be as widely applicable as PECS, which seems to show improved pain scores, reduced opioid use, and longer effects. For instance, PECS blocks can be performed by surgeons who have direct visualization of the target muscles in breast surgery. Ultimately, the provider's preference, comfort with the procedure, and convenience may be the most important consideration.

The importance of adequate pain control for postoperative breast patients cannot be understated, as they carry the highest risk for pain among plastic surgery patients.[10,11] Blocks such as the ESPB can be used to decrease opioid requirements, which are often responsible for significantly higher total healthcare utilization and costs.[89] The gold standard combines regional analgesic techniques with acetaminophen, NSAIDs, and COX-2-specific inhibitors to provide lasting pain control and reduce opioid requirements.[90] Additionally, dexamethasone can be used to prolong the block.[41,90] Although further research is needed on a larger scale to assess ESPB and PECS performance, ESPB has enough supporting evidence to justify its use in breast surgery.

Previous literature has suggested that some peripheral nerve blocks can be prohibitive due to cost, and thus, transparency via cost comparisons is crucial.[91] PVB has been shown to have a cost-effective profile by Offodile et al,[92] who reported that the incremental cost-effectiveness ratio for PVB when used for mastectomies was $154.49 per point reduction in pain. No cost-related literature currently exists on the use of ESPB for breast surgery. Research identifying equipment cost, the cost of hospital durations, personnel, and time is needed. A cost comparison study between blocks used for breast surgery could provide critical information that would justify its use over similarly performing blocks.

Chronic pain after breast surgery affects 60%–80% of breast cancer survivors.[93] The effect of ESPB on chronic breast pain is another important consideration when determining its cost-benefit, as chronic pain can have downstream effects on healthcare utilization. There are several cost-utility scoring systems that have been implemented to evaluate the benefits of breast surgery techniques in terms of chronic pain. For example, quality-adjusted life years incorporate pain scores in addition to other expected financial, psychological, and physical well-being measurements.[94–97] Karmakar et al[93] used health-related quality of life scores to demonstrate that PVB had a beneficial effect on the physical and mental health of breast surgery patients. The effect of ESPB on chronic breast pain has not been well researched, but a few reports suggest it may also have favorable effects.[43,73] Further research using these scoring systems would be beneficial to determine their cost-utility in relation to other blocks and controls.

Our study had several limitations inherent to a scoping review. Information was limited to available, reported, and published data in the current literature. Some publications were not available and thus excluded, which may have led to selection bias. We included a large number of publications to effectively represent the literature, but details were subsequently limited, which may also be subject to selection bias. Our data collection methodology was consistent

to mitigate this. Direct comparison between studies was not possible due to inconsistencies between block methodology and reporting. Meta-analyses were included in this study to adequately portray all ESPB-related findings, but this may have also contributed to bias.

Although some studies have previously looked at the effects of ESPB on a broad scale, our study focuses on its use in breast surgery, and through our wide inclusion criteria, we are able to draw attention to relevant areas in which little or no information currently exists in the published literature. There was wide variability in terms of the anesthetic and quantity used to perform ESPB in the literature. Further studies should evaluate the effects that different anesthetics have on ESPB effectiveness and ensure consistent methodologies are used when comparing ESPB to other blocks. Further studies are needed to fully denote the cost-benefit of ESPB versus LA, which is both easy to perform and safe compared with other block alternatives. Finally, most publications lack representation of the gold standard, multimodal analgesia, with the administration of ESPB. Because this regimen is known to improve pain control, the results of these studies should be interpreted with caution, and future studies should ensure it is used.[98]

CONCLUSIONS

ESPB is a low-risk, reliable, easy-to-perform block when used for breast surgery as part of a multimodal analgesia regimen. Although its outcomes rival the previous gold standard, PVB, some evidence suggests that PECS shows improved pain scores, reduced opioid use, and a longer duration of effect. Ultimately, additional large-scale studies are needed to fully delineate the better choice and identify the clinical relevance of outcome differences.

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